CHAPTER-3

MATERIALS AND METHODS
3.1. Study area:

The present Goalpara district is one of the five parts of the undivided Goalpara district. Situated in the south western part of the state of Assam, Goalpara district lies between 25°53' N and 26°30' N latitudes and 90°07' E and 91°05' E longitudes with an area of 1824 sq.km. The total population of the district, as per 2011 census, is 1008959. The mighty Brahmaputra river flows to the northern boundary of Goalpara district in east-west direction. Besides Brahmaputra the other four main perennial rivers that originate from Meghalaya and flow through the district are Dudhnoi, Krishnai, Jinjiram and Jinari. The district is bounded by river Brahmaputra on the north, Garo hills of Meghalaya on the south, Kamrup district on the east and Dhubri district on the west. Monsoon enters into the district in late May with moderate to heavy rainfall inundating the district, often causing flood and erosion of rivers. The average annual rainfall in the district is 1614 mm (National Wetland Atlas: Assam, 2012).

Dhubri, another part of erstwhile Goalpara district is situated on the extreme south western part of Assam bordering West Bengal and Bangladesh. The geographical location of Dhubri district is between 25°30'N and 26°30'N and 89°40'E and 90°30'E longitude. The district covers an area of 1664.10 sq.km. The total population of the district, as per 2011 census is 1948632. Characterised by almost flat topography, the mighty Brahmaputra enters the district in east-west direction but turns southwards before flowing towards Bangladesh.
Figure 3.1 Location map of Chekchekia and Sidli beel, Goalpara district, Assam
Figure 3.2 Location map of Urpod beel, Goalpara district, Assam
Figure 3.3 Location map of Chandakhol beel, Dhubri district, Assam
Figure 3.4 Location map of Dhir beel, Dhubri district, Assam
The important tributaries of the Brahmaputra that flows through the district are Gaurang, Sonkosh, Godadhar, Gangadhar and Jinjiram. The district receives the first wave of monsoon shower in late May or early June and experiences intermittent rain lasting sometimes up to early August, frequently causing flood and erosion of rivers, often disrupting communication.

3.2. Collection and Preservation of Fish:

Sample fishes were collected from different sites of selected beels as well as from landing sites from December 2010 to December 2014 seasonally in the early morning and at dusk. Since all the beels could not be covered for obvious reasons only a few of them were selected on the basis of relative size, known fishery status, surface connectivity and such other considerations. Based on diversity and status, sample fishes were directly bought from fishermen or from landing sites sometimes before and sometimes after their segregation.

Records of the collected fishes were kept. Care was taken to ascertain that the fishes get least injury in the collection process and to keep their external morphology intact. Enumerations of fishes were done as far as practicable. At the same time amount of fish caught by tentative weights based on experience were recorded. Photograph of sample fish and/or the collection or segregated fishes were taken as deemed necessary preferably on the spot or photographs were taken subsequently in the laboratory. Jar for preservation of important fish samples as well as preservatives were carried while visiting the fields so that preservation becomes perfect. The sample specimens were preserved in 10% formaldehyde solution for future reference.
Panoramic view of the beels selected for study, ecological features of the beels, fishing gears used in different beels from time to time, *katals*, macrophyte infestation, process of fishing preparation, etc. were also photographed as far as possible. Identification of ichthyofauna was followed after Talwar and Jhingran (1991) and Vishwanath (2002). The validity of the nomenclature of all the sampled fishes was checked from the online facilities available at http://www.calacademy.org.

3.3. Collection of data:

Detail information regarding occurrence and availability of different fish species were collected from *Mahaldars*, lessee, practising fishers, people in the vicinity of the beels and others. This was preceded or succeeded by observation, discussion or interview with the fishermen in the field or in the landing sites, in accordance with the situation. Data were also collected from District Fishery Office, AFDC sources, publications and various research bulletins.

3.4. Collection of water sample:

Water samples from the selected beels were collected seasonally. Care was taken to collect water samples from the sub-surface, about 15-20 cm below the surface level of beel water. Further, a number of samples from different spots of the beel were collected and mixed together to have the final sample so as to make the sample really representative. Clean and glass-stoppered bottle of one litre capacity carried for the purpose was used to store the collected final sample.
3.5. Analysis of water sample:

To get most accurate result and to avoid deterioration of water quality due to time lapse, some of the quality parameters like water temperature, pH, etc. were recorded on the spot with the help of scientific kit. Air and water temperature were measured in the field itself with the help of a mercury bulb thermometer. Parameters of water quality like pH, dissolved oxygen (DO), total dissolved solid (TDS), total hardness, specific conductivity, free carbon dioxide (FCO₂), total alkalinity (TA), turbidity, etc. were measured in the laboratory. pH of the water samples were recorded using pH meter (make: Systromic; model: 103621). Specific conductivity, TDS, turbidity of the water samples were recorded using digital portable water analysis kit (make: MAC; model: MSW-551) while the other parameters like free CO₂, TA, DO, hardness of the water samples were measured adopting the method of Trivedi & Goel (1986), APHA (1989) and Dutta Munshi & Dutta Munshi (1995).

3.6. Collection of socio-economic data:

The present study included inter alia socio-economic condition of a small area of Dhubri district on the bank of the mighty Brahmaputra viz. Pachpeer char, predominantly inhabited by traditional fishermen families. Pre-tested interview schedule (vide Annexure 1) was used for the collection of information and responses following conduct of a preliminary survey to suit the requirement. To gather details of some items as well as to supplement some information, data were collected from the fishermen families through personal discussions and interviews.
To get information about those families who could not be met or were unable to provide data because of illiteracy, secondary data were collected from the ward commissioner and their children interviewed by visiting the school they were studying at.

3.7. Determination of water area and land use:

Although beel in Assam have potential to yield as much as 1000-1500 kg/ha/yr, the present production level remains low (Ayyapan, 2004). Wetlands have been deteriorating as they are being continuously encroached upon, altered by using them for purposes not conducive to fish production, siltation, weed infestation, etc. (Deka et al., 2005). In short, degradation and conversion of wetlands are continuing despite efforts to raise ecological consciousness.

For a clear understanding of conservation and management of beels, it is important to have maps of the beels and their catchments depicting change over time scale. Unless and until maps support, we cannot establish the decrease of wetland status vis-a-vis decline in fish catch. Topographical maps prepared by Survey of India do show various land use/land cover including wetlands. Maps using remote sensing technique and geographic information system are of more precision and are thus more scientific in nature. Keeping those facts in mind, location maps, wetland area map, land use/land cover of 5 km buffer area of the studied beels were determined basing on Google Earth, IRS LISS III Satellite Imagery, Landsat MSS Satellite Imagery, Landsat TM Satellite Imagery, Landsat+ETM Satelite Imagery of years 1978, 1991, 2002, 2010 and 2014. The interpretations of the images were had from skilled resource persons.