Chapter 2

Research Methodology

2.1 Introduction

This chapter describes the research methodology followed to achieve the objectives of the study and explains the choice for selecting the research tools and the methods for data collection. It also describes the selection of the study area, the identification of survey targets within and associated with the small scale aquaculture sector, the consequent sampling structure and strategy. Finally, it describes the process of negotiating to obtain information and gather the necessary data, the major tools used to analyze the data, the constraints encountered in these, and the means employed to overcome them. However, sample size and number of participants in different activities have been presented in individual chapters (Chapters 3, 4 and 5).

2.2 Study Area

The study was conducted in Gazole, Englishbazar and Kaliachak II Blocks of Malda district of West Bengal, India. The areas have been identified as Small Scale Aquaculture areas and hence selected for the study.

2.2.1 Geography - Location, administrative regions, district structure, map

Spreading over an area of about 3733 sq km (Census 2001), Malda is small district situated at the northern portion of the state of West Bengal (Map 1, Map 2 and Map 3). It extends from 24°40'20"N and 25°32'08"N latitude, and from 87°45'50"E to 88°28'10"E longitudes spreading over an area of 3733 sq km and covering 4.2 percent of the total landmass of the state of West Bengal. The district is bounded to the east by Bangladesh, to the west by the state of Bihar, to its south by the district of Murshidabad across the river Ganga, and by Uttar Dinajpur district to its north. It also shares its boundary with Jharkhand to the southwest and Dakshin Dinajpur district to its northeast (http://malda.gov.in).
In respect of administrative region, it has 2 Subdivisions i.e. Malda Sadar and Chanchal. Under Malda Sadar Subdivision, there are 9 administrative block i.e. English Bazar, Old Malda, Gazole, Manikchak, Bamangola, Habibpur, Kaliachak-I, Kaliachak-II, Kaliachak-III and under Chanchal Sub-division there are 6 administrative blocks i.e. Chanchal-I, Chanchal-II, Ratua-I, Ratua-II, Harishchandrapur-I and Harishchandrapur-II. Altogether the district is consisting 15 administrative blocks. It has 146 Gram Panchayats (Local Self Government) with 3701 villages (http://malda.gov.in).

Ecological Subregions in the District

The district of Malda can be subdivided into three physiographic regions, the Barind, the Diara and the Tal. Barind comprises of old alluvial tract formed by riverine flood plains lying towards the eastern part of the district and consisting of Bamangola, Habibpur, Gajol and Old Malda Blocks. The region extends into Uttar and Dakshin Dinajpur and adjoining areas of Bangladesh, forming an upland of nearly 37 m above sea level in its highest portion, and an area of about 1621 sq km. Barind comprises of two elevated and isolated topographic units one of which comprise of Old Malda and Gajol blocks in the Mahananda-Tangan interfluve area, and the other of Habibpur and Bamangola blocks in the Tangan-Punarbhava interluve with hard silty clay soil. The soil possesses a pH as low as 6.8 with decomposed organic residues and a reddish hue due to accumulation of sesquioxides. Organic carbon content is low at 0.54% soil fertility is modest under unirrigated conditions. Since the clayey soils permit little percolation, during monsoon, rain water accumulates in the large natural bils or pools in the ravines formed by the Tangan and Punarbhava rivers in the lowlands.

The remainder of the district covers an adjacent tract of flat lowland between the 27m and 21m contours, forming the local catchments of the Mahananda and Ganga. This lowland tract which slopes gradually from the north to south is classified into two additional physiographic regions, known locally as the Tal and the Diara.

Spanning Manikchak, Kaliachak 1, 2 & 3 and Englishbazar blocks within the district, the Diara is a relatively well-drained flatland formed by the fluvial deposition of newer alluvium in the transitional zone between the Barind upland and the marshy Tal tract. The Tal is mostly composed of bog lands formed in many marshy pockets around vestigial inland drainages. The streams of this zone have switched over to new courses, leaving many dead or dying channels.
that only retain a waterflow during the monsoon. Consequently, the Tal is strewn with innumerable marshes, bills and oxbow lakes. Interbraided streams with multiple channels also occur quite commonly along the Kankhor, Kalindri, Punarbhava and other rivers that traverse this land unit – the Kalindri, particularly, displaying an amazing capacity to meander. Because of the lack of gradient and consequently of runoff, most of the Tal tract remains submerged under considerable depths of water during the monsoon rains. Large sections of it then turn into mudbanks during the dry season, while the many marshy pockets that still remain become relatively shallow.

**Rivers**

The mighty river Ganga flow along the southwest boundary of the district. The river Mahananda traverses the district from north to south meeting the Ganga and roughly dividing the landmass into two regions, the Barind on the eastern side, and a western region, which is again subdivided into two subregions by the Kalindri river - the northern, lowlying area known as the Tal, and the southern densely populated area called the Diara. Tangoan, Punarbhaba, Pagla and Bhagirathi.

**Anthropological characteristics**

The majority of the population is rural staying in small villages. The residents of Bamongola, Habibpur, Kaliachak and Old Malda comprise of immigrants from Bangladesh during 1949. A considerable population of Santals are also natives in the Barind region who are quite backward economically and educationally. The major occupation of the villagers in the alluvial tracts is cultivation. Apart from this, a part of the population is silk weavers and fishermen. Most of the people speak Bengali, while few speak Hindi or Maithili.
2.2.2 Demographics

This is one of the backward district in West Bengal in its northern part. As per the report of Census 2011 (Provisional), the total population of Malda district is 3,997,970 with 2,061,593 male and 1,936,377 female. SC population is 554165 and ST population is 227047 (2001 Census). Literacy rate is 53.45% (http://malda.gov.in).

2.2.3 Economics and industry

The economy of the district is basically an agrarian one and ranks as one of the most underdeveloped district in West Bengal. The backwardness is characterised by low per capita income, low yield per acre of land, backwardness in industrialisation, shortage of capital and entrepreneurship, and also the lack of infrastructure and large labour surplus.

The district has no known mineral resources and agriculture remains the main stay. The main agricultural products are paddy, Wheat, jute and Rabi-crops. Despite this backwardness, Malda occupies and important place in the map of the State for the production of raw-silk yarn. The annual estimated production of raw-silk yarn in this district is about 85 % of the total output of the State which, if taken in terms of money amounts to approximately rupees 4 crores. Production of mango is another important aspect of Malda's economy. About forty five thousand acres of land are covered by mango orchards which, in normal years., bear fruit to the extent of 3,60,000 tonnes the value of which in money terms comes to about Rs. 5.5 crores (http://malda.gov.in).

2.3 Data collection process

Questionnaire interviews and Participatory Rural Appraisal (PRA) methodologies were used in collecting data from fish farmers and fish market stakeholders for this study.
2.3.1 Questionnaire interviews

Questionnaire survey research is the most popular social research method which is commonly used by universities and research institutions as well as government and nongovernmental organizations (Haynes, 1982; Theis and Grady, 1991) across the globe. According to the authors, it is so popular just because of its formal and standardized techniques, which can nicely produce quantifiable, representative, verifiable and comparable data, which are suitable for statistically analysis.

Questionnaire interviews may be of two types - structured or unstructured. It depends on the degree of standardization imposed on the interview schedule. A highly structured interview is one where the questions asked and the responses permitted are pre-determined i.e. "closed", while in a highly unstructured interview, the questions to be asked are only loosely pre-determined, and respondents are free to respond in their own words. In practice, the choice is not between these two extremes, but between many degrees of formality. Some researchers have advocated the semi-structured or focus interview, where questions are mainly open-ended, but in which closed questions can also be included (Maccoby and Maccoby, 1976).

For this study personal interview using semi-structured interview schedules were carried out as the primary method of collecting data from survey target population.

The advantage of this are as follows:

- It has higher response rates and permits the use of long and complex questionnaires as per the need of the study objective.
- It enables the interviewer to explain, persuade, prompt and even probe during the period of data collection
- It enables the interviewer to spot insincere or careless responses, reduce the problem of semi-literate or foreign speaking respondents and use ancillary items such as photographs, sketches and prompt cards (Haynes, 1982), as per the need of situation.
- The personal face-to-face interview is deemed appropriate for studying in developing countries, where the level of education attained by most of the population is basic and clarifications of questions are necessary to obtain a complete response.
Disadvantages of questionnaire interviews include:

- It bears a huge cost. The expenditure becomes much higher especially when respondents are widely dispersed geographically.
- Interview bias. Innate characteristics of interviews and differences in interview techniques may affect respondents’ answers.
- Lack of anonymity. The presence of the interviewer may make the respondent feel threatened or intimidated. It particularly happens when interview takes place with rural illiterate community.

### 2.3.2 Participatory Rural Appraisal

Participatory Rural Appraisal (PRA) is a specific form of Rapid Rural Appraisal (RRA), a research technique developed in the late 1970s and early 1980s by researchers in international development as a complementary alternative to conventional sample surveys (Theis and Grady, 1991). Rapid Rural Appraisal (RRA) consists of a set of guidelines which help people to work in a structured but flexible way in rural communities and a set of tools to aid communication and interaction with those communities (Townsley, 1996). RRA according to the author consists of the following:

- It usually involves collecting information by talking to people “on the ground”
- It uses a set of guidelines on how to approach the collection of information, learning from that information and the involvement of local people in its interpretation and presentation
- It uses a set of tools- these consist of exercises and techniques for collecting information and means of organizing that information so that it is easily understood by a wide range of people and provides methods for quickly analyzing and reporting findings and suggesting appropriate action.

Participatory Rural Appraisal is an intensive, systematic but semi-structured learning experience carried in a community, and has a range of potential applications in aquaculture (Muir et al, 1999). Chambers (1992) stated that PRA is a group of methods used to collect information from rural communities in a participatory fashion. The advantage of the method is that it allows wider participation of the local people and enables them to present their own priorities and needs.
Participatory Rural Appraisal technique was adopted because of the increasing recognition of the importance of local participation in development projects and the emphasis on learning from the people themselves. This is why this method is mostly used method for any developmental research work.

Guijit and Pretty (1992) stated that Participatory Rural Appraisal methods usually rely upon the commitment and analysis of local people, enable the expression and sharing of their diverse and complex realities, give insights into their values, needs and priorities, and can also lead to participatory action. Whereas Townsley (1996) noted that PRA allows local people to present their priorities for development and get them incorporated into development plans. Where aquaculture is identified as a priority during the course of PRA, planners can be more certain that this respond to real need among local people, whether that is for increased income, better fish supply or intensive water use and management.

Participatory Rural Appraisal tools which have been used in this study are described below –

2.3.2.1 Participatory Mapping

Participatory mapping is one of the most popular PRA tools used in a variety of ways and purposes in research and development. In many cases gathering of information starts with mapping, as it gives a broader view of society and systems. But most importantly participants enjoy mapping and thus good rapport is built between participants and researchers/professionals, which later provides them with greater access to in-depth information.

Mapping flows of products can be an effective tool for identifying marketing chains, markets and networks, which can be then used to capture other required information through group discussions (Kleith et al. 2003). Barman et al. (2002) used mobility mapping to identify the social impacts of small-scale aquaculture. Human mobility mapping of farmers was also found to used in aquaculture technology dissemination and adoption in the north-west Bangladesh. In this study, Natural Resource & Social Resource mapping had been excercised to know about all the livelihood assets in the area.
2.3.2.2 Focus Group Discussion (FGD)

FGD were used to get an overview of particular issues from the target groups. In FGD, small groups of people who are knowledgeable or who are interested in the topics are invited to participate in a discussion. This allows the community to discuss the issues that they feel are important rather than responding to a questionnaire (Theis and Grady, 1991). Theis and Grady (1991) noted that small groups of people of 6 to 12 are most suitable for focus group discussions.

In the present study, focus group interviews were used to get an overview of the aquaculture practices including social and economic conditions of the farmers. Where information was contradictory or required further assessment, interviews were crosschecked with key informants (fisheries experts). It was also done with different stakeholders who are associated with marketing of small scale produced fish.

2.3.3 Observation

Observation as a research method involves ‘systematically observing objects, events, processes, relationships or people and recording these observations’. Bowling (1997) also added that systematic observation is a classic method of enquiry in natural science (people's experimentation, knowledge and values). Robson (1993) have emphasized the advantages of the use of direct observation as a research method, particularly for case studies. Moreover, Simpson and Tuson (1995) noted that there is almost no research strategy to which data collection by observation cannot contribute. Observations in this study were used mainly to collect information of marketing activities, particularly during product handling. Kleith et al. (2003) suggested that in fish marketing research direct observation of operations and facilities helps to improve understanding and to cross-check the data already obtained. There are many instances of market study through observation, such as, Islam et al. (2004b) studied auction markets and activities in Dhaka through observation.

2.3.4 Case studies

The case study is a widely used research method in a variety of disciplines, including natural sciences. A case study is a context or situation commonly studied as a single unit and has clear boundaries. It may be an investigation of an organization, an event, a process or a
programme (Merriam, 1988; Bassey, 1999). Whereas Anderson (1998) stated that ‘case studies are a holistic research method that use multiple sources of evidence to analyze or evaluate a specific phenomenon or instance’. He further elaborated that ‘case studies are a useful way to systematically look at a specific case, collect data, analyse and interpret findings within their context and report results’. Bassey (1999) in his critical review on case study suggested that the case study can lead to an understanding of the complexity of a particular context. Case studies have been used in the current research to understand the present status of small waterbodies and aquaculture practices in the research area, and to explore the in-depth impact of aquaculture and marketing on stakeholders’ livelihoods.

2.4 Questionnaire design

Harmonized questionnaires were developed and implemented in all study sites. The questionnaires for fish farmers were structured to have information on the following broader aspects:

- The issues of personal information
- Types of aquaculture systems
- Socio-economical impacts of aquaculture systems and
- Socio-economic conditions of the fish farmers.

Some questions in the questionnaires were open-ended while others were close questions with a number of alternative choices.

2.5 Pre-testing of questionnaire

Questionnaires were pilot tested with before taking final survey. The aim of the pilot test was to ensure that questions and issues regarding the subject of the study were included in the questionnaire and clear from ambiguities and that the respondents could answer the questions without significant constraint.

Some of the respondents, in the first instance, did not show any interest in taking part in the interview. They were suspicious about the identity of the researcher and were reluctant to talk unless with the intervention of the village head and community leaders. This happened mainly
with those who had no formal education. Co-operation from the village head was therefore sought, whenever possible, for interviewing these respondents and thereafter response was good.

Although, the reactions and responses of the farmers were generally positive, this was not always so when they were asked questions on costs, returns or incomes, with data supplied mainly from guess-work. Most of the farmers did not have any proper record of accounts and therefore great care had to be taken in compiling financial information.

It was also observed during the pre-testing that a few questions were not clearly understood by the respondents. Hence, some questions were dropped and a number of additional questions added. The sequence, phrasing and language of some questions were also changed.

2.6 Data processing and analysis

Data from various sources were coded and entered into a computer for analysis. Some of data were collected in local units such as bigha due to familiarity for respondents. These were converted into international units before transfer. Data were processed using Microsoft Excel spreadsheet. Preliminary data sheets were compared with the original coding sheets to ensure the accuracy of the data entered. At each stage of the survey, data were checked up, editing, coding and transferred into computer at the field level. The sum, mean, averages, percentages are the simple statistical measures employed here to interpret the data. Graphical interpretation was done by using Microsoft Excel Spreadsheet. The nature of the data collected was both quantitative and qualitative.