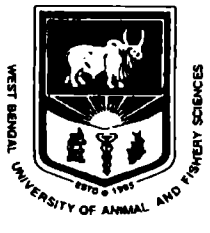
Indigenous Technical Knowledge in Fisheries in the district of North 24 Parganas of West Bengal

A Thesis
Submitted to the
West Bengal University of Animal and Fishery Sciences
in partial fulfilment of the requirements for the Degree of
Master of Fishery Science
In
FISHERY EXTENSION

By

Apurba Bhuyan
B.F.Sc.



Department of Fishery Extension
Faculty of Fishery Sciences
West Bengal University of Animal And Fishery Sciences
Mohanpur Campus, Nadia, West Bengal, India
2004

Dedicated to my beloved Parents

West Bengal University of Animal and Fishery Sciences

Faculty of Fishery Sciences
Department of Fishery Extension

Mohanpur Campus
P.O. Krishi Viswavidyalaya,
Nadia, Pin - 741 252
953473-222999
STD. 03473 33-557-1986
E. mail – wbuafs@wb.nic.in

Main Campus :
68, Kshudiram Bose Sarani,
Belgachia, Kolkata – 700 037

Dr. A.K.Panigrahi
Ph. D.; L.L.B.
Head, Department of Fishery extension.

Ref. No: .....
Date : .....

Certificate

It is certified that the research work embodied in this thesis entitled **"Indigenous Technical Knowledge in Fisheries in the district of 24-Parganas of West Bengal"** *submitted by* **Mr. Apurba Bhuyan** *for the award of* **Master of Fishery Science (Fishery Extension)** of **West Bengal University of Animal and Fishery Sciences** *is the faithful and bonafide research work carried out by the candidate himself under my direct supervision and guidance.*

The results of the investigation reported in this thesis have not so far been submitted for any other degree or Diploma. The assistance and help received during the course of investigation have been duly acknowledged.

Date:
Place: Mohanpur, Nadia.

(Dr. A.K. Panigrahi) 16.2.04
Chairman
Advisory Committee.

APPROVAL SHEET

APPROVAL OF EXAMINERS FOR THE AWARD OF THE DEGREE OF MASTER OF Fishery SCIENCE

(FISHERY EXTENSION)

We, the undersigned, having been satisfied with the performance of

Mr. Apurba Bhuyan, in the Viva-Voce Examination, conducted today, the ....., 2004, recommended that the thesis be accepted for the award of the Degree.

Name	Signature
1. **Dr. A. K. Panigrahi.** **Chairman, Advisory Committee**	A.K. Panigrahi 4.10.04
2. Dr. A. Sarkar **External Examiner**	A. Sarkar 4.10.04
3. **Dr. S. S. Dana** **Member, Advisory Committee**	
4. **Prof. N. R. Chattopadhayay** **Member, Advisory Committee**	

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CHAPTER-I

INTRODUCTION

INTRODUCTION

"Indigenous knowledge is an integral part of the culture and history of a local community. We need to learn from local communities to enrich the development process"

– Jomes D. Wolfensohn, President :World Bank.

Human societies all across the globe have developed rich sets of experiences and explanations relating to the environments they live in. These "other knowledge systems" are today often referred to as traditional ecological knowledge or indigenous or local knowledge. They encompass the sophisticated arrays of information, understandings and interpretations that guide human societies around the globe in their innumerable interactions with the natural milieu : in agriculture and animal husbandry; hunting, fishing and gathering; struggles against disease and injury; naming and explanation of natural phenomena; and strategies to cope with fluctuating environments (Nakashima *et al.,* 2000).

The term indigenous knowledge (IK) refers to the unique, traditional, local knowledge existing within and developed around the specific conditions of women and men indigenous to a particular geographic area (Grenier, 1998). The development of IK systems, covering all aspects of life, including management of the natural resources, has been a mater of survival to the people who generated these systems. Such knowledge systems are cumulative, representing experiences of generations and trial and error experiments (Charyulu, 1998). However (Das *et al.,* 2002) defined indigenous knowledge as the participants' knowledge of their temporal and social space. Indigenous knowledge as such refers not only to knowledge of indigenous peoples, but to that of any other defined community, while Indigenous Technical

Knowledge (ITK) is specifically concerned with actual application of the thinking of the local people in various operations of agriculture and allied areas.

Further, according to Warren (1991), the Indigenous Knowledge in a given community have developed overtime and continue to develop. IK is stored in peoples memories and activities and it is expressed in the form of stories, songs, folklores, proverbs, dance, myths, cultural values, beliefs, rituals, community laws, local language, taxonomy, agricultural equipments, materials etc. Indigenous knowledge is often contrasted with "Scientific", "Western", "international" or "modern knowledge" – the knowledge developed by Universities, research institutions and private firms using a formal scientific approach. Because indigenous knowledge changes over time, it is sometimes difficult to decide whether a technology or practice indeed is indigenous or adopted from outside or a blend of local and introduced components. For a development project, however, it doesn't matter whether a practice is really indigenous or already mixed up with introduced knowledge. What is important is that instead of looking only for technologies and solutions from outside the community, we first look at what is in the community. We then use whichever technology knowledge is found to be effective (Charyulu, 1998).

Indigenous knowledge is the basis for local-level decision in agriculture and its allied means of livelihood, health care, food preparation, education, natural resource management, and a host of their activities in rural communities (Warren, 1991). It is the information base for a society, which facilitates communication and decision making. Indigenous information system are dynamic and are continually influenced by internal creativity and experimentation as well as by contact with external systems (Flavier 1995). The term Indigenous Technical Knowledge is often camouflaged with the belief that is associated with forthcoming happenings and the innovations made by the farmers to solve specific problems.

❖ According to a world bank report 1998, the special features of IK are:

- Local in that it is rooted in a particular community and situated within broader cultural traditions; it is a set of experiences generated by people living in those communities.

- Tacit knowledge and, therefore, not easily codifiable.
- Transmitted orally, or through imitation and demonstration. Codifying it may leads to the loss of some of properties.
- Experimental rather than theoretical knowledge. Experience and trial and error, tested in the rigorous laboratory of survival of local communities constantly reinforce indigenous knowledge.
- Learned through repetition, which is a defining characteristic of tradition even when new knowledge is added.
- Constantly changing being produced or reproduced, discovered as well as lost; thought it is often perceived by external observers as being somewhat static.

❖ Advantages of Indigenous knowledge of farmers :

- Indigenous knowledge of farmers has two powerful advantages over outside knowledge are – it has little cost and is readily available. Indigenous knowledge systems and technologies are found to be socially desirable, economically affordable, sustainable and involve minimum risk to rural farmers and producers, and above all, they are widely believed to conserve resources (Grenier, 1998).
- Indigenous knowledge is the basis for self-sufficiency and self-determination for at least 2 reasons : i) People are familiar with indigenous practices and technologies. They can understand, handle and maintain them better than introduced western practices and technologies. ii) Indigenous knowledge draws on local resources (Warren, 1993).
- The indigenous techniques are eco-friendly and environmental pollution is less as they use locally available materials.
- Farmers have the reference of use of those indigenous practices and techniques from their ancestors and therefore considered to be tested over centuries of use.

❖ Gender and indigenous knowledge :

According to Warren (1988) "All knowledge is gendered". Thus knowledge system consist of total acquired and practiced knowledge by both men and women. Knowledge is the part of social fabric in which people live, and gender is one of the dimensions of social fabric, the study indigenous knowledge must include gender as a factor. IK and gender are inextricably bound up with each other. Bodies of local knowledge are formed by systems of classifications, observation of environment and systems of management that govern resource. They are accessible to those number in the social group who is charged with responsibility of management productions. Thus, IK held by women differ with that of men according to their responsibilities they have assigned (Norem, Yoder and Martin, 1989).

The perspective of Indian fisheries sector has been changing over decades towards more contribution to the food basket, national economy and livelihood to a large section of population of the nation. Along with the advent of technological up gradation, more fishery resources and manpower have come under this sector leading India's position among top fish producing countries of the world. Yadava,(2003) mentioned that, more than 6.0 million fishermen and fish farmers in the country depend on fisheries and aquaculture for their livelihood. The fisheries sector has been a major source of foreign exchange earnings through export, contributing Rs. 68810 million (US $ 1425 billion) during 2002-2003. The current annual fish production has been estimated at 6.18 mt (2.98 mt from the marine sector against a potential of 3.934 mt and 3.20 mt from the inland sector against a potential of 4.5 mt. Based on harvestable potential and the production trend, a growth rate of 2% has been envisaged for the marine sector during the tenth 5-year plan. In view of the potential and prospects of inland fisheries and aquaculture development in the country, a growth rate of 8% has been envisaged for this sector during the 10^{th} plan. With the above proposed growth rates, it is estimated that a total fish production of 8.09 mt (3.26 mt from marine sector and 4.83 mt from the inland sector) would be achieved at the end of the plan period. Presently the contribution fisheries sector to the GDP has been estimated to be 1.2% (Ayyappan, 2004).

Reviewing the fish production trend since past fifties has clearly been indicating the tremendous growth in term of fish production. The success is mainly attributed to the revolutionary technological advancements like mechanization of boats, improved and advanced fishing gears and methods, use of aqua-drugs, chemical fertilizers, hatchery technology etc. But due to negligence of their drawbacks, questions and threats are rising on the sustainability of fish production, resources because of pollution, over-exploitation of fishery resources, disease outbreak and other related issues.

Most of our aquaculture and fishing technologies are cost intensive and often not fitted to the economic conditions of majority of the farmers and fishers. Against this background, some research studies are going on in different parts of the country for effective utilization of traditional knowledge based technologies, which are cost effective, environment friendly, socially acceptable for enhancing fisheries and aquaculture production. Besides, there is a growing alarm on the issues of conservation of bio-diversity for sustainability of the natural resources worldwide. In this line Indigenous Technical Knowledge of farmers in agriculture and allied farming patterns are also gaining much more attention among the international development circles.

Fish has been occupying in the food dishes of West Bengal since time immemorial. The state West Bengal has already occupied supreme position in terms of fish production both from marine and inland sector and owned the 'National Productivity Award' for consecutive ten years. The state has the pride of possessing classical and diverse aquatic resources and favourable agro-climatic conditions to suit fish habitat and growth from the Bay of Bengal right up to the foothills of the Himalayas. It has got a short coast line of 158 km, which is spread over 2 districts of South 24 Parganas and Purba-Medinipur. The inland fishery resources are laying as Tanks/Ponds (2,76,201.90 ha), Beel (41,781.65 ha), River (1,72,586.36 ha), Reservoir (16,738.80 ha) and Canal/creek (80,085.71 ha) with an estimated fisher population of 14.87 lakhs (2001-02), comprising both marine (1.99 lakhs) and inland (12.88 lakhs). The state has the highest domestic demand for fish and fishery products in the country. West Bengal is the pioneer in the production of fish seed and contributes to

about 75% of the total seed production in the country. Besides, sewage fed fisheries provide a unique system of recycling urban waste for productive use. With an extent of 4000 ha of sewage-fed fisheries, 7262.11 acres are under culture of fish. The state has the largest impounded brackish water (2,10,000 ha) in the country. It is one of the pioneering states contributing to export of shrimps and certain varieties of fishes to different countries. About 18,420 metric tones of fishery products, worth Rs. 585.57 crores were exported (2000-01) of which 90% comprised shrimps (Sawant, 2003).

This heritage of fishery resources have been playing a substantial role to the state's food security, economy and providing livelihood to mass of people.

Application of innovative ideas in different situations of fishing and fish farming is evident across the globe. Many a times, they fit to the local conditions and solve specific problems. The so called "uneducated" or "poor farmers" often found to possess wide variety of knowledge and skills in the field of fishery and they can substantially contribute to productive efforts. Most often these Indigenous Technical Knowledge and skills remain unfocussed and underutilized in laboratory. The ITK in fisheries is highly informal and have been passing over generations without being recorded properly or documented. As with the socio-economic, environmental and technological changes over time, the ITK system is being threatened for its existence. It is the history and knowledge of local community and perceived as their legacy.

Fishing and farming of fish is an ancient practice in the state of West Bengal. The state has diversified fishery resources, climates, tribes and accordingly therein existence of varied indigenous knowledge and practices. The fishers and farmers, through their direct interaction with the fishing and farming situations, have developed lots of working knowledge base and practices. These self gathered knowledge, through experiences and repeated practices, have their unexplored rationality. Albeit the emergence of growing concern of indigenous knowledge world-wide, relevant studies regarding fisheries in this line is less evident. Against this background, the present study has been aimed to document and conduct systematic studies on the indigenous knowledge in fisheries and aquaculture with the following objectives :

General Objective:

To recognize and document Indigenous Technical Knowledge related to different aspects of fisheries.

Specific Objectives:

1. To recognize and document ITK regarding fish farming.
2. To recognize and document ITK regarding Hatchery management practices.
3. To recognize and document ITK regarding fishing methods and equipment.
4. To short out gender concern in different practices.
5. To short out practices according to farmer type.

Limitations of the study :

Albeit utmost care and efforts were made in the study, keeping the study objectives in mind, some limitations of time and resources felt during the course of present investigation which are common to student investigators. However, all possible care has taken to represent their information and views.

The study was restricted to a limited numbers of villages under the block of Barrackpore-I of the district of 24 Parganas (N) of West Bengal. Besides the range of the study was further confined to fish farming, fishing and hatchery operations, where there are several equally important areas of rural life like agriculture, animal husbandry, dairy farming etc.

Bearing all these limitations, it is hoped that the study would make a drop of contribution towards the issues of rural and sustainable development and place an idea to think of integrating Indigenous Technical Knowledge of fish farmers and fishers in the development policies among the states planners, administrators, extensionists and fishery scientists.

CHAPTER-II

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Many scientists had done worthy experiments, works on different direction of Indigenous Knowledge applied in different aspects of rural life including agriculture, fishery sciences, animal husbandry and other allied of farming areas. This pool of collective works and their results will immensely help in defining and orienting the present study towards right direction. In this chapter, an effort has been made to establish a pool of compiled research works done by earlier scientists, which would serve as a theoretical base for the present study.

The review of literature on ITK is divided on the following sections

- **On definition and explanation of ITK**
- **On some evidences of ITK in Fishery Sciences.**
- **On some evidences of ITK other than field of fishery sciences (agriculture and animal husbandry practices).**

❖ On definition and explanation of ITK.

Harwood (1979) believed that the purposeful blending of traditional and modern technologies might well prove the key to starting the most disadvantaged farmers along a more development path.

Haskell *et al.* (1981) elaborately explained that the Indigenous Knowledge are not primitive leftover from the past but are on the contrary, systems finally turned and adopted both biologically and socially to counter they possess of what are often harsh and inimical environments and often represents hundreds and sometimes thousands of years of adaptive evaluation in which vagaries of climate, the availability of land and water, the

basic need of people and their animals for food, shelter and health had been amalgamated in a system which has allowed society to exist and development in the face of tremendous odds.

Nogard, R.B. (1984) has opined that indigenous knowledge relates with various cultural norms, social rules and their efficiency lies in the capacity to adopt the changing circumstances.

Warren and Cashman (1988) explained local knowledge as sum of experience and knowledge within a given group, which form the basis for decision making related to familiar and unfamiliar problems and challenges.

Carter (1988) explained the nature of Indigenous Knowledge that Indigenous Knowledge is highly localized and restricted in a particular region as because local environmental factors and cultural conditions have impact on the evolution of Indigenous knowledge.

Carter (1988) stated that Traditional knowledge is highly localized and restricted with the governance of local environmental factors and cultural conditions which varies from country to country, region to region and even farm to farm.

Wang (1988) defined Indigenous knowledge is the sum total of people's knowledge and practices which are based on people's accumulated experiences which help to solve various problems particular to cultural life.

Water-bayers (1989) described how the proper understanding of indigenous knowledge of farmers will lead to development of techniques which are ecologically sustainable economically feasible and sociologically acceptable.

Scoones (1989) reported that understanding farmers knowledge allows a framework of reference for posing technical and scientific questions in research. It also provides the basis for evolving technologies, options that are not imposed as alien "packages", which contract existing practices.

Warren (1989) stated that Indigenous Knowledge is the information base of the society confined in the local language and facilitates communication and decision-making.

Thrupp (1989) opined that Indigenous Knowledge encompasses non-technical insights, wisdom, ideas, perceptions and innovative capabilities with adaptive skill of local people usually derived from many years of experiences and have often been communicated through "oral Tradition".

Basant (1990) defined Indigenous Knowledge as a knowledge originating and characterizing a particular region or a country. The quantum and content of Indigenous Knowledge, however, vary across space and change over time.

Gnanadeepa (1991) stated that indigenous resource management is the art of manner by which the available local resources are directed in a better way to improve the income by applying the accumulated knowledge and experiences generated by observation and experimentation for their better life.

Gill (1991) in his study on Indigenous Knowledge concluded that a remarkable degree of institutional and organizational development lies behind the success of the indigenous system and he further added that the so called "uneducated" farmers are capable of creating and maintaining large and complex multimember system to achieve mutually beneficial results.

Fernando (1991) in his study reported that the adoption of improved practices was not so wide.

Alteri (1991) also defined Local knowledge as the accumulated knowledge, skills and technology of rural people, derived from the direct interaction of human beings and their environment.

Talwar and Singh (1992) stated that Indigenous knowledge provide a basis for identifying ecologically sustainable options of resource use and for others these are cheap sources for identifying ideas which have considerable scope for commercial exploitation after value addition. Further they added Indigenous knowledge has undergone evolutionary process and is built from the ideas based on thousands of years of experience.

Talwar *et al.*(1993) stated that indigenous practices may help in increasing the knowledge of formal science and also give clues to the scientists in designing newer and

newer experiments. Besides, many such practices may be recommended for adoption in the farming situations having similar agro-ecological conditions.

Joseph (1993) argued that Indigenous technology can sometimes play a key role in technology development and he also opined that what is now required is a methodology that will facilitate the use of Indigenous Knowledge as basis for appropriate technology transfer.

Reijntes *et al.* (1993) defined ITK as knowledge of people living in a certain area, generated by their own and their ancestral experiences including knowledge originating from elsewhere which the local people have internalized.

Patel (1993) stated that people have gained Indigenous Technical Knowledge through inheritance from their ancestors. He further added that it is people derived science and it always represents people's creativity, innovations and skills.

Choudhury and De (1993) stated that Indigenous Knowledge is unwritten, untapped and largely unutilized knowledge that is unique to a given culture and society and its documentation helps to accelerate research, planning and development.

Rajasekaran (1993) stated that Indigenous Knowledge is the systematic body of knowledge acquired by local people through the accumulation of experiences, informal experiments and intimate understanding of the environment in a given culture.

Havekort (1993) stated that Indigenous Knowledge is the actual knowledge of a given population that reflects the experience based on tradition and includes more recent experience with modern technology.

Brouwers (1993) also stated that Indigenous and Local Knowledge are same and refer to knowledge, which is generated and transmitted by communities over time with an effort to cope with their own agro-ecological and socio-economical environment.

Titiola (1994) reported that Local knowledge is an important aspect of societies culture based on accumulated experience and much fitted to the local situation and social system and it is also dynamic in nature.

Agarwal (1995) stated that Indigenous Knowledge is often seen to exist in a local context, anchored to a particular social group in a particular setting at a particular time.

McCall *et al.* (1996) stated that ITK embraces people's knowledge of tools and techniques for the assessment, acquisition, transformation and utilization of resources, which are specific to particular location.

Ban and Hawkins (1998) stressed that Indigenous technology or knowledge system can contribute towards sustainable farming and for evolving location specific recommendations.

Legeye *et al* (1999) discuss the nature of Indigenous Knowledge and explored the relationship between Indigenous Knowledge and extension in the line of farmer's agricultural practice with the consideration of environment.

Charyulu (2001) in his study explained that Indigenous Knowledge spans the entire range of human experience including history, linguistics, politics, arts, economics, administration and psychology and its technical aspects, which includes agriculture, medicine, natural resource management, engineering and fishing.

❖ On some evidences of ITK used in fishery sciences.

a) *Fishing gears/ methods/ equipments.*

Haling, L.J.J. (1974) described the light fishery, a traditional fishing method, for *Stolothrissa tanganicae* in Tanganyika lake, Barundi and reported low catch rate of this indigenous fishing method.

Ranchhodaji (1995) reported trapping of fish with dried and powdered "Supali" (*Mundulea suberosa*) leaves immersed in stagnant pools or slow streams. Fishes become daze after immersion of this powder and they are trapped with a net.

Joyakody, D.S.(1996) reported 13 traditional fishing methods in Negombo lagoon (Srilanka). These include Staked seine nets, Brush piles, cast nets, Kidippu nets, angling and scoop nets. Shrimp is the target species of most of these methods. According to him, most of the traditional fishing gear is simply designed, easy to operate, resource friendly and causes little damage to the lagoon environment where as modern fishing methods are efficient but are not always resource friendly.

Gadat (1998) reported indigenous method of catching of fish by feeding with fruits of 'ingori' (B' Nalanites roxburghii) tree. Fish slowly become unconscious and float after feeding these fruits and becoming easier to catch fishes.

Koya, C.N.H.(1998) in his study described the availability, abundance of traditional fishing gears and technology employed in the exploitation of Ray (*Manta birostris*) in the Lakshadweep islands, India. The need to introduce modern methods for capture of the large quantity of the Ray available in and around the islands has been dealt with in the report.

Fuwa, S. et al. (1999) described in detail of the Buriami fishery, one of the traditional fishing methods in Japan that considers the fish behaviour towards fishing gear. They found the method is very useful to catch Red sea bream, Pagrus major and Japanese sea bream.

Das, A.K. 2000. described two indigenous fishing methods namely *Bana* and *Katal* widely practiced in the Beels of Assam. The methods are efficient and found to be environment friendly.

Sharma, R. (2001) in his study on traditional fishing methods and gears of Assam reported various indigenous fishing gears operated according to type of water body. He suggested proper research of the gears to increase the efficiency of fishing for the up gradation of socio-economic conditions of the fisher community.

b) Fish Breeding

Sannigrahi *et al.*(1977) reported the practice of collection of eggs of IMC (Indian Major Carps) through an indigenous technique for breeding ,i.e. Bundh breeding, in West Bengal, India.

Rahman,A.(1999-2000) in a case study on how to collect and incorporate local knowledge (with scientific technology) for captive breeding of *Cirrhinus microlepis*, found that the concerned representatives of the local communities on the Mekong (Local village elderly, experienced fishermen and women live fish traders) possess a tremendous

amount of knowledge on the local aquatic resources and environment, including the breeding grounds and seasons and biology of Mekong fishes.

c) Herbal Treatments

Amonkar and Banerji,1971; Barone and Tansey, 1977; Moore and Atkins. 1977; Sato *et al.* 1993; Sato *et al.* 1990; Waqar *et al.* 1994. had widely studied the larvicidal, Anti-fungal, Anti-bacterial activity of Garlic respectively.

Salum and AI delaimy, (1982) studied on garlic and considered it as a useful drug in fishery as it contains anti-microbial compound called *Allicin.*

Ai Fang et al. (1998) stated that the administration of Garlic oil compound as feed additive could significantly increase the immune function in shrimp and efficiently protect the shrimp from infection with *Vibrio sp.*

Kumar and Berwal (1998) had reported the inhibitory activity of Garlic (*Allium sativum*) against *S. aureus, S. typhi, E. coli* and *Listeria monocytogenes.* They found that, all pathogenic strains were sensitive (80%) to Garlic, *E.coli* was the most sensitive and *L. monocytogenes* was the least sensitive.

Mukherjee (1996) suggested that the application of neem (*Azadirachta indica*) oil and phosphate fertilizer to pond soil to overcome the disease outbreak in shrimp farms.

Rao (1996) found the success in reduction of white spot viral disease among shrimps, using agricultural lime, turmeric powder and powder made out of the plants *Phyllanthus nervri* and *Clincanthus nutans.*

Chakraborty *et al.* (1998), in their study on "Turmeric and Neem (*Azadirachta indica*) leaf extract in the management of bacterial infection in African Catfish, *Clarias gariepinus*" found declination of fish mortality in dip treatment with Neem and turmeric extract.

Das *et al.*(1999) reported antibacterial activity of Neem (*Azadirachta indica*) against 4 pathogenic bacteria (*A. Hydrophila, P. fluorescens, Myxobacteria* and *E.coli*).

According to them the first three bacteria showed greater sensitivity of Neem than E.coli(70.14%, 74.15%,63.9% and 61.75% respectively).

d) Indigenous fish processing methods.

Pattnaik, B.C. (2000) stated that a good % of the harvested fish is also processed and preserved by adopting various traditional methods like smoking, curing, salting and sun-drying, specially in the rural areas. However some of the fish products continue to be produced with traditional technologies, which don't take into account hygienic standard and quality control.

Muzaddadi, A.U. and Basu S. (2003) described in detail the indigenous fermented fishery product (Seedal) of North-Eastern India. They opined that Seedal is a more or less scientifically untested indigenous fermented fishery product which has ample scope and need for research.

e) Others

Sawant, S.M. and Ashish S. Mohite (1999) has identified and studied the traditional method of lime production by " Shell Baking Process" from Oyster and Clams shells, with special reference to village Juve near Ratnagiri, Maharastra. The economics of this traditional method of lime production indicates that it has a great potential of emerging as a good subsidiary business, playing an important role in upgrading the socio-economic status of fisher community along the coastal areas of Ratnagiri.

Bonaventure et al. (2000) gives an overview of the use of indigenous technical knowledge (ITK) and water management interventions in the upper east region of Ghana. They discussed about various ITK.

Azim,E. (2001) described the indigenous method of putting Bamboo sticks in pond mud to improve yields in fish pond used by fishermen in open waters such as lagoons of Cote d'Ivoire and Benin and some Asian rivers. Researchers from the Universities of Manglore(India), Mymensingh (Bangladesh), Stirling(Scotland) and

Wigeningen (The Netherlands) in a joint study on this technique revealed that the Bamboo sticks serve as a breeding ground for Periphyton (Algae, Bacteria, plankton and other organisms) on which fish thrive well which cuts down cost of fish feed with yields increasing by 70-80% according to type of fish cultured.

Chand,B.K.(2003) collected various indigenous practices in fishery while conducting PRA (Participatory Rural Appraisal) survey in Barua village of Midnapore (West) district, West Bengal, under Institution Village linkage programme (IVLP). He has assessed the efficacy of these ITKs using matrix ranking as a tool and has found the ITKs to be very useful to the fish farmers.

❖ On some evidences of ITK other than field of fishery sciences. (Agriculture and Animal husbandry practices)

a) Agriculture

Chakravarthy (1982) in his study on, Indigenous Farm Practices: their influence in Cauvery delta zone identified 20 indigenous practices connected with paddy farming. He concluded that the percentage of adoption of green leaves manure was more with big farmers(80.83%) followed by medium(55%) and small farmers(22.50%). Three fourths (75%) of the big farmers, 31.25% of medium farmers and 5% of small farmers were adopting cattle penning. Cent percent of small farmers, 80% and 20.83% of medium and big farmers respectively were using the indigenous plough for cultivation.

Balasubramaniam (1992) in his study on "indigenous use in dry lands" concluded that farmers were aware of 25 indigenous practices connected with dry land farming. He also reported that 18 practices were adopted both by small and big farmers at varying degrees.

Dialla (1994) reported four indigenous soil conservation and stone lining process in a study on the adoption of soil conservation practices in two rural communities

at Burkina Faso. According to his report, the level of utilization of these two practices was between 96.70 and 100 percent in the two rural communities.

Prasad *et al.* 1996 in their study on " Rationale of indigenous post harvest practices" in Ranchi district concluded that scientists favoured the continuation nine of the eleven indigenous post harvest practices on threshing, de-husking and storage activities for rice, wheat and grain legumes by a sample of 200 farmers.

Praskash *et al.* (1999) discussed the indigenous technical knowledge followed by the tribal farmers of North-eastern hill region in agriculture. They discussed about covering bamboo drip irrigation, winnowing of paddy, storing of maize cobs, insect pest and disease management by use of pine leaves for insect pest control and management of biophysical resources.

b) Animal husbandry practices

Mukherjee and Namhata (1988) studied about the tribal inhabitants on the use of herbal medicines for the treatment of 9 common ailments (Placenta retention, Foot and Mouth disease, Cataract, Constipation, Worm infestation, Colic, Dysentery, Indigestion and Louse infestation) of Cows, Buffaloes and Goats.

Talapad *et al.*(1990) in his survey on traditional wisdom on animal feed and fodder practices reported the feeding of Mohua Cake with other ingredients improved milk production, feeding of Kuradia weed and forestb tree leaves of Sira, Bilva, Sisham etc. were the good source of feed and nutrients. They opined that these wisdoms should be applied in planning the applied nutritional programs suited to local situation.

Honey Bee, News Letter (1992) has identified and documented several indigenous practices from different parts of the country on urinary problems in Bullocks, Unsuccessful conception, Post calving care, control of intestinal parasites, Bone facture, ingrown horn wound etc.

Sharma *et al.*(1993) documented some indigenous methods to treat worm infection and other digestive disturbances of Cattle and Buffaloes in Himanchal Pradesh.

Srivastava and Ratan (1993) studied on Indigenous Cattle Husbandry practices such as Calf rearing practices, care and management of heifers and Cow, rearing of Bulls, Grasslands and fodder management and disease and their therapy.

Mishra *et al* (1994) reported about the plants being utilized for ethno veterinary purpose as house hold medicines and those used for increasing the strength, vigor and milking capacity of the animals.

Chander and Mukherjee (1994) stated 18 traditional animal husbandry practices regarding Anaemia, retention of placenta, parasitic infestation, fracture, FMB, fever, colic pain etc.

Toyang, J. *et al.* (1995) documented several indigenous practices on Diarrhoea, worm, Brucellosis, Mastitis, retained placenta, Ear problems, snake bites, black quarter, fertility enhancement, Babesiosis, Mange and Ticks, Shipping fever, Anaplasmosis etc.

CHAPTER-III

RESEARCH SETTING

RESEARCH SETTING

Research setting refers to the detail information of an area, where the study was conducted. The study area generally comprise with a particular geographical area viz. a state or district or a block selected according to the convenience of the investigator who must possess adequate knowledge regarding the location, communication facility etc. of the locality so that the investigator can easily approach each and every corner of the area for data collection. Besides, the investigator must have basic knowledge of the socio-demographic background of the people so as to have an easy understanding of their knowledge, attitude and behaviour.

❖ State At A Glance:

The study area is situated in the state of West Bengal located in the eastern part of India lies between $21^0 31'$ and 27^0 14' N latitude and 85^0 51' and 89^0 53' E longitude.

To the south is the Bay of Bengal, to the North is Sikkim and to its East are Assam and Bangladesh and to the west it has Bihar and Jharkhand respectively. It has common borders with the neighboring countries of Nepal and Bhutan in the North and Bangladesh in the East. The state is quite unique to have the tropic of Cancer running across the state.

Table 1: State Profile

Total geographic area	88,752 sq. km.
Total population	8,02,21,171
Rural population	2,96,06,028
Urban population	1,18,81,666
Number of districts	19

Source:(*Census of India, 2001)*

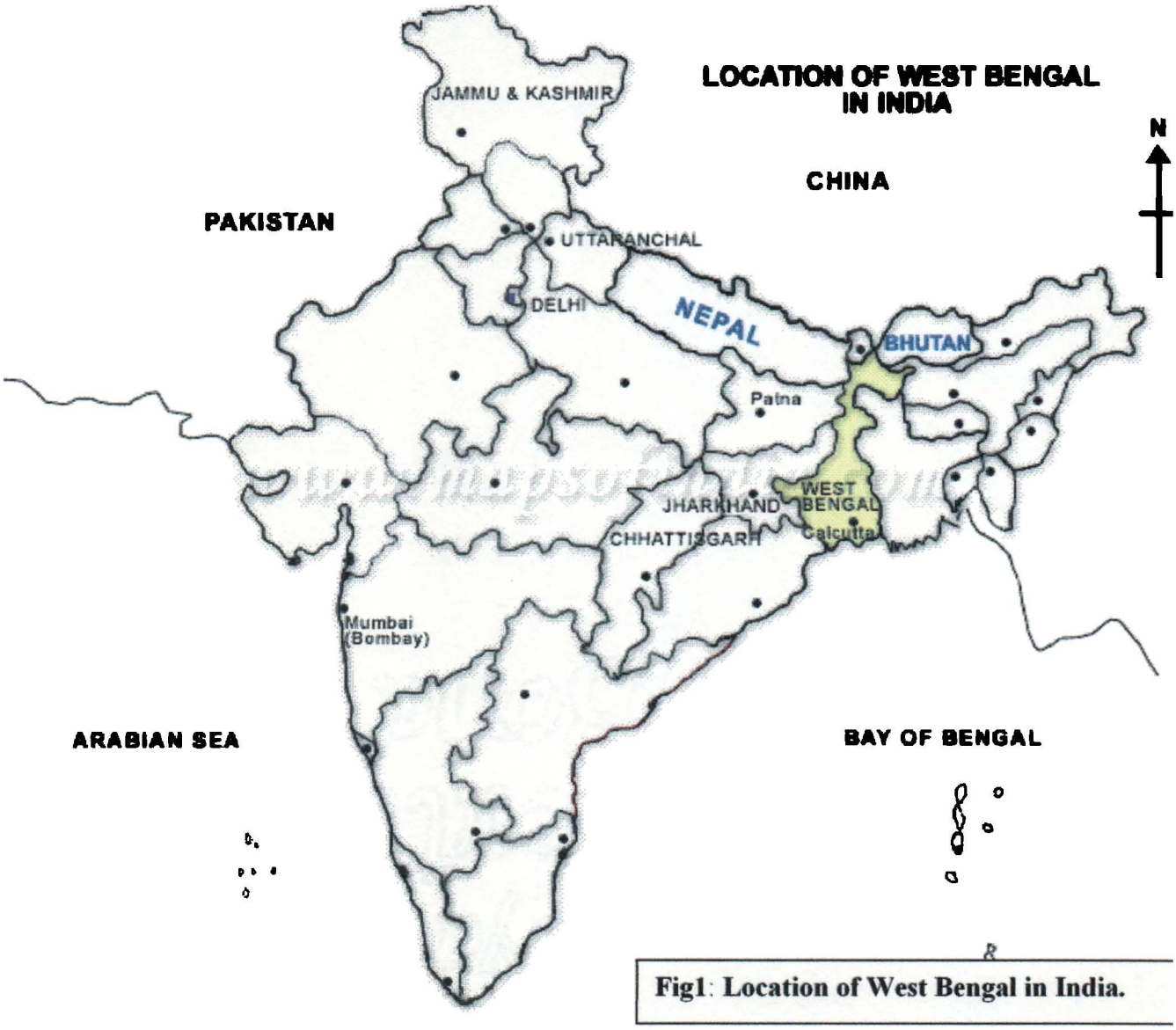


Fig1: **Location of West Bengal in India.**

Table 2: Fishery resources of West Bengal

Resources	Water area (ha)	Water area developed under Govt. Sponsored Schemes
Pond and Tanks	11,212.11	6589.40
Derelict water bodies	459.5	--------
Canals/creeks	8,712.00	--------
Rivers	14,229.00	--------
Brackish water	33,466.00	1386.966
Sewage fed.	147.92	617.90

Source: *(Census of India, 2001)*

Productivity/ha

IMC: 2000kg

Fresh water prawn: 550kg

Shrimp, Mullet etc.: 2680kg

Crab : 6000kg (per ha in four crops)

Demand for fish : 1.27 lakh M.T.

Fish seed production : 510 crores

Fish eater percentage : 75

Production of fish : 1051 lakh M.T.

Source: *(Census of India, 2001)*

❖ DISTRICT AT A GLANCE:

The study was conducted in the 24-parganas district(N) of West Bengal. The district lies between the parallels of $26^0 23'$ and$27^0\ 30'$ North and Latitude and $82^0\ 17'$ and $83^0\ 20'$ East Longitude. The district covers an area of 4094 sq.km. Average annual rainfall in the district is 1166mm. Temperature from 9^0Celsius to 44^0Celsius. Fish of almost all the varieties that occur elsewhere in the state are found in the rivers, canals and ponds of the district, the common species being Rohu (*labeo rohita*), Bhakur (*Catla catla*), Nain (*Cirrhina mrigala*), Parhin (*Wallago attu*), Krunch (*Labeo calbasu*), Tengan (*Mystus seenghala*) and etc.

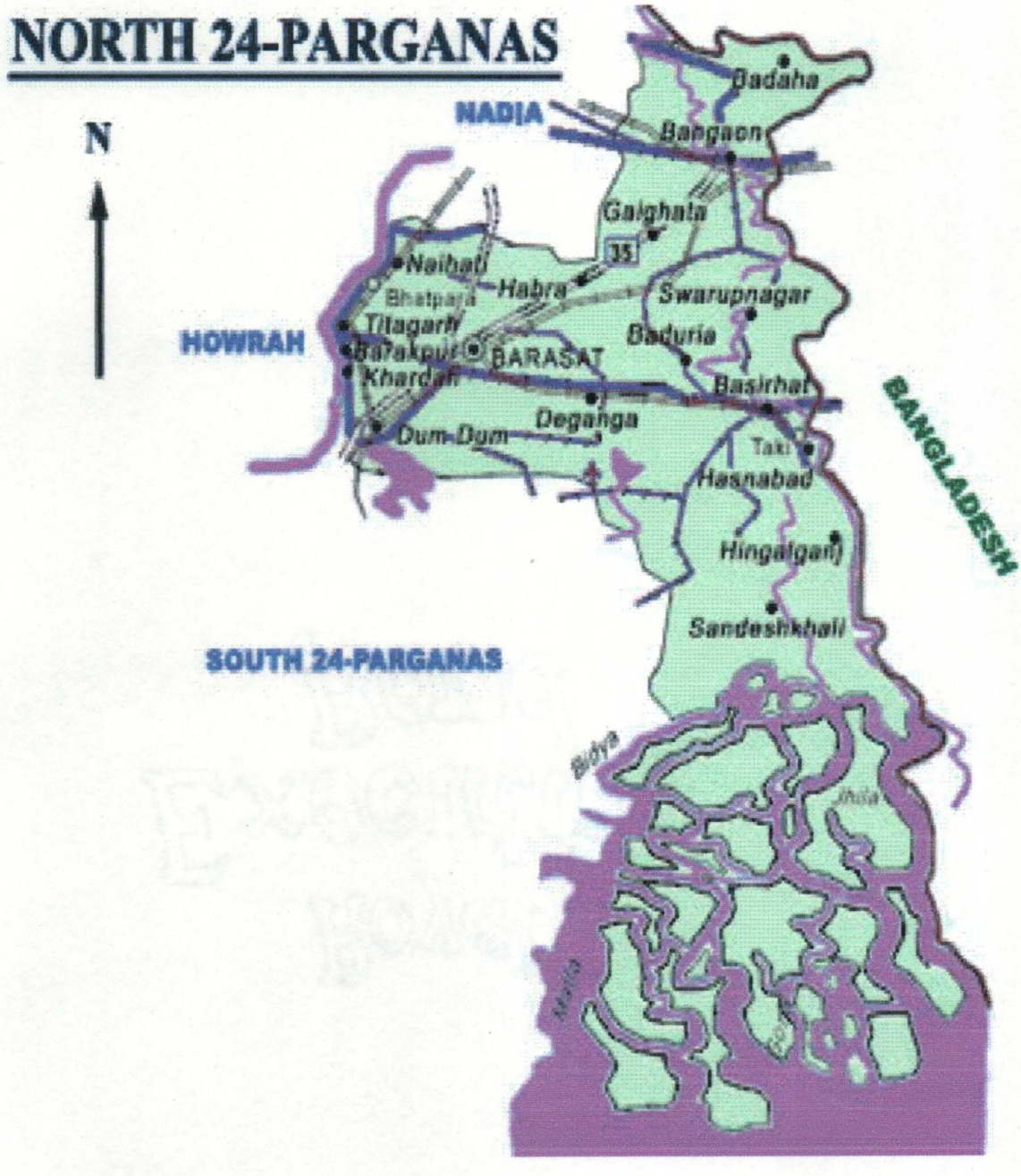


Fig 2: District map of North 24 Paraganas.

Table 3: District profile- North 24 Paraganas.

Total geographic area	4094sq.km.
Net sown area	2882.55sq.km.
Net irrigated area	1405.41sq.km.
Number of sub-divisions	5
Number of blocks	22
Number of Police station	22
Number of municipality	27
Number of gram panchayat	214
Total population	8930295
Rural population	4081077
Urban population	4849218
Male population	4635262
Female population	4295033
Schedule cast population	15,64,689
Schedule Tribe population	1,69,833
Fishermen population	2,31,270
Primary fishermen Co-operative society Ltd.	85
Total Population density (per sq.km.)	2181
Rural Population density (per sq.km.)	1132
Urban population density (per sq.km.)	9926
Literacy (Total)	6207540
Percentage of literacy	78.49

Source: *Census of India, 2001*

Block at a glance:

The study was conducted in Barrackpur-I development block. To the North is the Kanchapara municipality, to the South is Barrackpur-II development block and to its East and West are Amdanga and Bhattapara Naihati municipality respectively.

Table 4: Block profile-Barracpore-I

Number of Gram panchayats	8
Number of Municipality	1
Number of Mauza	46
Total population	327322
Male population	171577
Female population	155745
Total literacy	238191
Male literacy	133217
Female literacy	104914
Total area under fish culture	2367.50 ha.
Area under IMC culture	2347.5 ha.
Area under prawn culture	20 ha.
Production under IMC culture	4695 M.T.
Production under Prawn culture	11 M.T.
Number of Chinese eco-hatchery	200

Source: *Census of India, 2001*

Table 5: Overview of the Study Area:

Name of villages	Mauza	G.P.	C.D. block	District	State
Pantra	Rajendrapur	Mamudpur	Barrackpur-I	24-parganas(N)	West Bengal
Nathpara	Do	Do	Do	Do	Do
Ghosepara	Do	Do	Do	Do	Do
Beja	Buduria	Sibdaspur	Do	Do	Do
Aatisara	Do	Do	Do	Do	Do
Salidaha	Do	Do	Do	Do	Do

CHAPTER-IV

MATERIALS AND METHODS

MATERIAL AND METHODS

In this Chapter, the methodologies adopted for the present investigation are stated below.

- **Pilot study.**
- **Locale of the selection of study area.**
- **Sampling design.**
- **Methods of data collection.**
- **Interpretation of procedure**.

❖ Pilot Study:

Pilot study is a preliminary study conducted on a limited scale before the original studies are conducted and in order to gain some primary information on the basis of which the main project would be planned and formulated. For selection of study area, initially a demographic survey of different places of the district (North 24-Parganas) has been carried out to find out the prominent areas where the farmers practice Indigenous Technical Knowledge (ITK) for their crop production in the field of Aquaculture. On the basis of these information the present study was finalized. Basic situational and background information were collected during pilot study.

❖ Locale of the Study Area:

The district 24 Paraganas (N) is selected for investing existing Indigenous Technical Knowledge system. The rationale behind selecting the said district are:

- The main study center (Faculty of Fishery Sciences, W. B. U. A. F. S.) is situated nearby the district of district 24 Paraganas (N)
- Furthermore, the district is found to be rich in terms of fishery resources along with a good number of fisher folk community belonging to Schedule Caste and Schedule Tribe .
- Another reason for selecting the district is having good physical facilities like communication, transportation etc.

- Fishermen communities in the district are considered to be comparatively more developed by different experts.

❖ Sampling Design:

Purposive as well as Random sampling techniques with applying lottery method, were adopted for the present study. For selection of state, district and blocks purposive sampling technique was carried out. Two Gram Panchayats were selected randomly out of eight. Out of nineteen villages, only six villages were randomly selected. From each village, a twenty number of respondents selected randomly with a total sample respondents of 120.

❖ Methods of Data Collection:

Methods followed for data collection in any research work play a very important role as the methods are main structure of data collection and information exchange (Basu *et al.,* 1996). Basu and Biju (1996) have also identified 59 methods going through available literature for the identification of various indigenous knowledge in different perspectives.

The study was based on primary and secondary data and information collection. The secondary data were collected from the published sources and information gathered from the Meen Bhavan, Barasat and Barrackpore-I development block. These data include area, population statistics, their pattern including literacy, profile of fishery resources, fish production and other fisheries infrastructures.

The primary data and information collection includes practices of ITK in fisheries activities in the selected block from the respondent sample of 120 farmers and fishers distributed in six villages under two Gram Panchayats.

In the present investigation, following two methods were selected from the set of methods in accordance with the objectives of the study after considering the nature of the fishery resources, type of people and of course the nature of the study.

A. Through personal interview schedule.

B. Direct observation.

These methods were used consequently according to the level of complexity associated with each method. These methods are used singly or in combination to identify villager's knowledge about each domain.

A. The Interview schedule

Preparation of interview schedule :

An interview schedule has been prepared for collection of information about ITK in the study area. This was done for obtaining more accurate responses from the literate as well as illiterate respondents. Draft copy of interview schedule was prepared with the help of various type of ITK related books, journals etc. After preparation of the draft schedule, it was finalized after consultation with various experts.

B. Direct observation

Direct observation is systematically observing objects, events, processes, relationship or people and recording these observations. Direct observation is a good way to cross-check respondents' answers.

Advantages of the method :

- Subject bias may be eliminated if observation is done accurately.
- Information related to current state of affairs.
- It is possible to record the general behaviour as it occurs.
- This method is independent of respondent's willingness or unwillingness to report and active Co-operation of the respondent is not required in this case.

Steps followed in Direct Observation :

- Information were recorded in notebook about different ITK in fisheries.
- Schematic diagrams were made where necessary.
- Photographs related to different domains were taken.

- Different fish farms, hatcheries, households, fields etc. were visited to record the information in order to get a better access into the farming life of the study area.
- The differentiation among the activities of men, women were carefully observed and noted down in case of every domain.

Precaution followed

Observations and movements were done in accordance with the local norms showing regards to their values and practices.

Methodology

Methods/Tools	Purpose
i: Primary data collection • Direct Observation. • Interview schedule method.	To document ITK practiced in the field of fishery
ii: Secondary data	To get data of fishery resources and related information in the selected blocks and district.
iii: Photographs	More generalization and proof of the application of ITK practices.

Categorization of Farmer:

The respondents were categorized in to four groups viz. Marginal, Small, Medium and Rich farmers on the basis of their land holding size. This was done as per the convenience of the study and the schedule was developed accordingly. The categorization of farmers are made according to their land holding size which includes total land possessed by farmer for their livelihood i.e. Agricultural land, Land for fishery activity, home stead land and others.

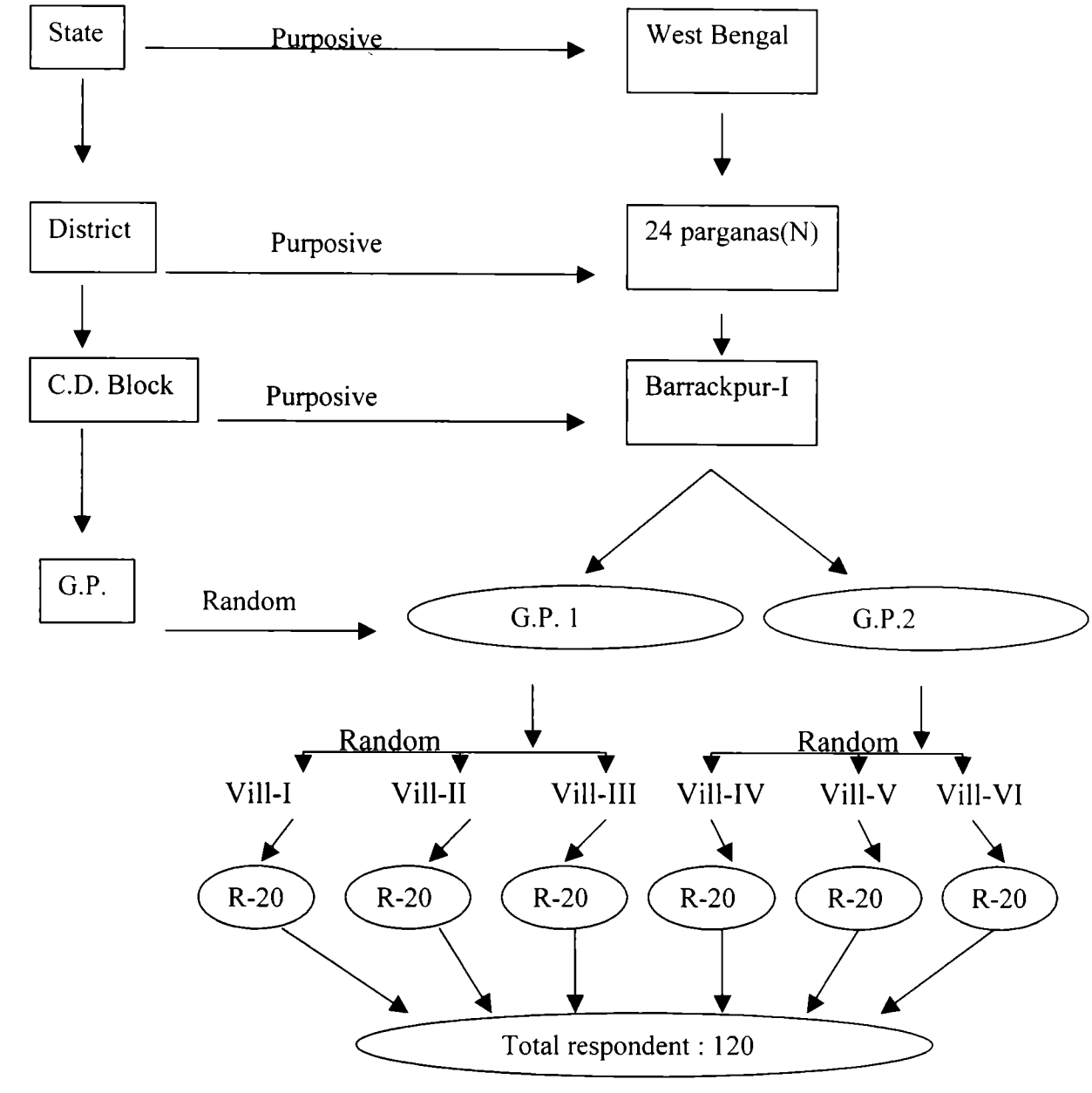
Table 6: Categorization of farmers

Land holding size (Acre)	Farmer type
<1 Acre	Marginal
1-2.5 Acre	Small
2.5-5 Acre	Medium
>5 Acre	Rich

Interpretation of procedure

The information collected were framed into tabular form with subjective descriptions where ever required.

The knowledge of each domain was described against the following criteria :- ITK found, Purpose of use, farmer type and Gender differentiation in activities in tabular form and later, brief interpretation of the ITK is presented.



Legends:	R = Respondents G.P.1 =Mamudpur , G.P.2 =Sibdaspur. Vill-I = Ghosepara Vill-IV = Beja Vill-II = Nathpara Vill-V =Atisara Vill-III =Pantra Vill-VI =Salidaha

Fig 3: Sampling design of the investigation.

CHAPTER-V

RESULTS AND DISCUSION

RESULTS AND DISCUSSION

This chapter deals with the results of the study that was conducted to document the Indigenous Technical Knowledge (ITK) practiced by the fish farmers, fishermen and hatchery owners in the study area of West Bengal. The information regarding Indigenous Technological Knowledge were collected and subsequent interpretation have been made accordingly for proper establishment of the findings. The interpretation of the collected ITK have been presented according to four major domains as stated below.

A. Treatment of Fish Diseases and health Management.

B. Hatchery Management Practices.

C. Traditional Fishing Methods and Equipments.

D. **General Fish Farm Management.**

The knowledge items of different domains are presented according to subjective manner with the help of framework developed specially for the present study. The results are presented in the tabular form and suitable discussions have been made accordingly with proper interpretations.

A.

Table 6: Treatment of Fish Disease and Health Management.

Sl No.	ITK found	Purpose of use	Farmer type	Gender involved.
A-1.	Application of Neem (*Azadiractha indica*) leaf paste and lime in fish pond	To reduce fish disease and mortality.	Small and Medium farmers.	Male and female.
A-2.	Application of Neem leaf paste and turmeric in fish pond.	As prophylactic measure and for treatment of fish diseases.	Small and medium farmers.	Male and female.
A-3.	Application of Garlic-paste to pond water.	To cure whirling motion of fry and fingerlings.	Medium farmers.	Male.
A-4.	Application of Garlic and Salt; Turmeric, Lime and Salt mixture to fish pond.	To cure EUS (Epizootic Ulcerative Syndrome) in fish.	Medium farmers.	Male.
A-5.	Broadcasting of ash in to fish pond.	As prophylactic measure against fish diseases.	Small and Medium farmers.	Male and Female.
A-6.	Bamboo logs fixed to fish pond	To control fish louse infection in fishes.	Small and medium fishes.	Male.
A-7.	Application of Banana stem pieces in to fish pond.	To purify pond water in occurrence of foul smell, gas bubbles from pond water and to combat illegal fish poisoning.	Small, medium and rich fish farmers.	Male.

Interpretation of the findings:

A-1: Application of Neem leaf paste and lime in fish pond

Neem leaves are ground to make a paste and lime is added (Neem: lime=1:2). The paste is divided equally in to 2-3 lots. Each lot is added with water in 25-30 liter capacity container, locally called "Handi". The fishes having external injuries, reddening areas, lesions in their body are dipped into the prepared solution for about half an hour and released back to pond. The remaining lots (if any) are mixed with water and sprayed into pond water. This might be due to anti-microbial activity of the paste which heals the above said disorders in fishes. Related reports have given by Mukherjee (1996) and Das *et al.*(1999).

A-2:Apllication of Neem leaf paste and turmeric in fish pond.

Neem leaves are ground to make a paste. Turmeric is added (250gm) in to the paste and mixed properly. The paste is then mixed with 25-30 liters of water and sprayed in the cultured fishpond evenly. This is practiced as *prophylactic* measure while there is disease outbreak in the locality. Some farmers use this practice for treatment of fishes showing lesions, reddening areas and other external disorders in their bodies. Used materials are readily available and cheap. Related reports has given by Chakraborty *et al.*(1998)

A- 3: Application of Garlic paste to pond water

About 1kg of Garlic is ground and mixed with 20-30 liters of Tube-well water in a container. It is stirred properly and sprayed into the effected pond or larval rearing unit evenly. This is practiced to cure whirling motion and balance lost of yearlings and fry-fingerlings of fishes. Locally available materials are used in less intricate manner and Garlic may have inhibitory effect of the causative agent of the Whirling disease. Related reports have given by Salum and Ai delaimy (1982), Ai Fang *et al.*(1998) and Kumar and Berwal (1998).

A- 4: Application of Garlic and Salt; Turmeric, Lime and Salt mixture to fish pond.

The following ingredients are mixed and soaked in water (30-50 liters) and sprayed over the effected-pond (measuring 1 bigha). According to farmers, the practice is reliable only when early detection of EUS is possible.

a. Garlic (2kg)+ Salt (5kg)

b. Turmeric (500gm) + Lime (1kg) + Salt (5kg)

The combination of the cited mixtures might have multi-dimensional effect on causative agents of EUS resulting checking of the disease. Besides the materials used are readily available and cheap.

A-5: Broadcasting of ash in to fish pond.

Paddy straw are burnt and the ash of it is broadcasted into fishpond or sometimes heaped in one corner of the cultured pond. The practice is used as prophylactic measure to check fish disease in cultured pond. The practice involves least cost and materials are readily available. Applying burnt ash of paddy straw may keep pond water quality congenial for fish growth.

A-6: *Bamboo logs fixed to fish pond.*

Bamboo logs are fixed to pond bottom. This is specially applied in the times when cultured fishes are infected with fish louse. During this infection, fishes use to rub their body against hard substances. Here Bamboo logs provide scope for rubbing their body. Farmers use to practice for removal of fish louse by rubbing their body against bamboo logs and thereby control of the infestation. This involves less intricacy in arrangement of the bamboo logs and the practice is farmer's friendly. Rubbing of fish body against Bamboo logs may cure louse infestation in fish.

A- 7: Application of Banana stem pieces in to fish pond.

Banana stems are cut into small pieces on the bank of the fishpond and sprayed into the fishpond. Farmers follow this practice widely when the there is occurrence of fish mortality without any external signs, occurrence of foul smell and gas bubbles from pond water. It is also practiced to purify pond water when farmer's pond has been poisoned for poaching by anonymous. Method is easy ,material is readily available, cheap and Banana pseudo-stem may act upon harmful gases and toxicants in pond water.

B.

Table 7: Hatchery Management Practices.

Sl. No.	ITK found	Purpose of use	Farmer type	Gender concern
B-1	Use of "Khoyer" in hatching pools.	To harden egg-shells against damage or breaking of eggs by collision among eggs and against hatching pool.	Medium and Rich farmer	Male.
B-2	Application of mud-water solution to egg-milt mixture of Common carp.	To de-adhere sticky eggs for proper fertilization	Medium and Rich farmer	Male.
B-3	Application of milk to egg-milt mixture of Common carp.	To de-adhere sticky eggs for proper fertilization.	Medium and Rich farmer	Male.
B-4	Manual de-adhering of Common Carp eggs.	To de-adhere sticky eggs for proper fertilization.	Medium and Rich farmer	Male.
B-5	Application of poultry egg contains to brood-stock pond.	To advance maturation of brooders.	Medium and Rich farmer	Male.
B-6	Mixing of Red-soil in the seed transportation containers.	To reduce fish seed mortality during transportation.	Medium and Rich farmer	Male.

Interpretation of the findings:

B- 1: Use of "Khoyer" in hatching pool.

The fruits of *Hortoki* tree (*Terminalia chebula Retz. combretaceae*) are washed thoroughly. About 4kg of washed fruit are boiled in a large silver bowl with 20-25 liters of water. Boiled item is allowed to cool as such and filtered through a double folded Cotton cloth or Nylon net. This boiled and filtered solution is called "*KHOYER*". About 2.5 liters of the filtered solution is added into the fertilized eggs of fish spp. (IMC, Exotic Carps and *Pangasius spp.*,) in the hatching pool with water circulation. The *Khoyer* solution is carefully mixed properly with the hatching pool water so as to give an even distribution of the solution to all eggs. The colour of the *Khoyer* solution is bright Brown. It is used to harden the eggshells against damage or breaking of eggs by collision among eggs and against hatching pool wall. The method is simple, less costly and "*KHOYER*" solution may harden the eggshells.

B-2: Application of mud-water solution to egg-milt mixture of Common carp.

Eggs of Common carp and some catfishes are sticky in nature. Due to stickiness, the eggs form a clump after release by the female sp. This makes the improper mixture of eggs with milt that leads to improper fertilization. In Stripping method, for the breeding of Common Carp, it was observed to add mud-water solution into the egg-milt mixture. The total mixture of mud-water and egg-milt on a tray is now agitated manually by hand. The eggs get separated and then transferred them to hatching pool with water circulation for further hatching. The practice involves least cost and mud-water mixture may have de-adhering agents, which separates the sticky fish eggs.

B-3: Application of milk to egg-milt mixture of Common carp.

In stripping method meant for breeding of Common Carp, dairy milk is added to the egg-milt mixture. Milk is added (2liters) to the mixture slowly and in

installments. The total egg-milt-milk mixture is then agitated manually which leads to separation of eggs. The separated eggs are then transferred to hatching pool with water circulation for further hatching. It is a simple method and milk may have de-adhering substances, which separates sticky eggs.

B-4: Manual de-adhering of Common Carp eggs.

In this practice, the female of Common Carp is directly stripped in to the hatching pool, initially with no water circulation. At the same time, male is also stripped for milts over eggs and the egg-milt mixture is allowed to stick in the pool as its own fashion. After 5-6hrs, the eggs are separated carefully by manipulating finger movements by farmers. It is a simple method and involves least cost but bears risk of damage of the eggs.

B-5: Application of poultry egg contains to brood-stock pond

Farmers use to apply poultry egg (10-15 numbers) contains in to brood stock pond earlier to breeding season. Farmers use this practice to advance maturation of brooders (IMC) in order to breed them earlier. Poultry egg contains may enhance early maturation of IMC.

B-6: Mixing of Red-soil in the seed transportation containers.

Red soil are mixed into to fish seed transporting silver container, locally called "Handi", while transporting of the seeds to reduce mortality of seed. It was observed to use mostly by vendors. It is a simple method and red soil may help in proper conditioning fish seed during transportation.

C.

Table 8: Traditional fishing methods and equipments.

Sl.No.	ITK found	Purpose of use	Farmer type	Gender concern
C-1	Indigenous Fishing trap-***Aatal.***	To trap fish	Small and medium farmers.	Male.
C-2	Indigenous Fishing trap-***Ghoonni.***	To trap fish	Small and medium farmers.	Male.
C-3	Indigenous fishing gear-***Polo.***	To catch fishes in shallow water bodies.	Small farmers	Male and female.
C-4	Tree branches as fish aggregating device.	To aggregate fishes in open water bodies meant for fishing.	Small and medium farmers.	Male.
C-5	Indigenous fishing harpoon-***Konch.***	To catch fishes in shallow and medium water bodies.	Small and medium farmers.	Male.
C-6	Earthworm, Roasted larvae of ***Vespa sp.*** and boiled rice as fishing baits.	Used as baits in angling.	Small and medium farmers.	Male.

Interpretation of the findings:

C-1: Indigenous Fishing trap- Aatal

This is an indigenous rectangular fishing trap made of small split Bamboo pieces. There is provision of door in one side to enter fishes into it. The trap is operated in small streams, connecting channels of *Beels*, paddy fields and low laying water bodies, preferably with water current. The trap is placed in such manner that the door of the trap doesn't faces the water current. The door of the trap is fitted in such an angle so that fish can easily enter the trap can't come out as water current prevents the door of the trap to open. It is generally placed in the late evening and replaced with another "*Aatal*" in the next morning. Sometimes, baits such as earthworms, insect larvae and small fishes (*Puntius spp.*) are placed by means of hooking with bamboo threads inside the trap to attract big fishes to enter

the trap. The fishing trap and the method is easy to operate and maintenance and repairing, less bulky and has least hazardous effect on environment.

C-2: Indigenous Fishing trap- Ghoonni

This is an indigenous fishing trap made of Bamboo strips. It has a hollow body with one tapering end. The other end is provided with an oval opening, serves as mouth of the trap to enter fishes and water. The mouth is fitted with small spiral Bamboo fencing leaving some gaps to enter fishes. 2-3 such spiral Bamboo fencing are also fitted inside the trap for efficient trapping of fish. These spiral structures prevent escaping of fishes. This trap is also operated in places of water current like irrigation canal, paddy field, connecting channels of *Beels* etc. where the mouth faces the current. It is cut out for small fishes like *Puntius spp., Anabas spp., Clarias spp.* etc. Sometimes it was found to operate with a structure locally called *Bana*. *Bana* is a bamboo fencing or earthen wall, erected across a water channel. In case of Bamboo fencing, few spaces are left in both side of the fencing in the two banks of the water channel. Several numbers of *Ghoonni* are placed in those blank spaces. In case of earthen wall erection across the canal, only one or two openings are made in the wall to pass water and the traps are placed in those openings. Some times other traps and gears *Aatal* , *Polo* and *Koch* are also operated in the site of *Bana* simultaneously. The fishing trap is easy to operate and maintenance and repairing, less bulky and has no hazardous effect on environment.

C-3: Indigenous fishing gear- Polo

It is a cone shaped, hollow indigenous fishing gear made of cut bamboo pieces and threads. The both end of the gear has circular opening. The lower opening is wider than the upper one. The gear is operated in shallow water bodies. It is operated over probable fish schools repeatedly, where fishes are caught by inserting hand through the top opening of the gear. Fishing is done inside the *Polo.* The fishing gear is easy to operate, maintenance and repairing, less bulky and

has least hazardous effect on environment .Besides both male and female can operate the gear.

C-4: Tree branches as fish aggregating device

In large water bodies like Beels and floodplain areas, fishers use to place tree branches for 2-3 days in different parts of the water body to aggregate fishes. Fishing is done by Cast net after carefully removing the branches either from boat or from shore as per convenience. Tree branches are also placed in culture ponds to prevent poaching. This is a simple method of aggregating fish in open water bodies, less cost are involved and user friendly.

C-5: Indigenous fishing harpoon-Konch.

This gear (*Konch*) is operated in shallow to medium depth water bodies. The gear comprises a Bamboo pole and a few sharp-ended small iron rods. The wider end of the pole is fitted with those iron rods firmly with jute ropes. *Konch* has two varieties viz. *'Konch'* with barbed rods and *'Konch'* without barbed rods. *'Konch'* with barb rods is used for catching larger fishes like large catfishes, carps etc. and the pole of the gear is longer. The other is a bit shorter and used for small fishes like *Channa spp., Anabas spp. etc.* Fishers use to puncture the fishes under water from above the water surface where fishes entangle in the rods, which pierces their body. Fishing depends on the expertise and skill, because, position of fish is a bit different under water as it seems to be from above. The Materials are locally available, easy to use and repair and less bulky.

C-6: Earthworm, Roasted larvae of Vespa sp. and boiled rice as fishing baits

Earthworm, roasted larvae of (*Vespa spp.*) and boiled rice are used in angling as bait. Sometimes small fishes (*Puntius spp.*) are also used in angling for catching large fishes. Baits are readily available, almost least cost involved. Roasted larvae of *Vespa spp.*, Earthworm, boiled rice may attract fishes as their feed.

D.

Table 9: General farm management practices.

Sl.No.	ITK found	Purpose of use	Farmer type	Gender concern
D-1	Provision of shade in culture pond.	To provide shelter to cultured fishes specially during hot-summer.	Medium farmers.	Male.
D-2	Application of raw cow-dung to fish pond.	To enhance natural feed production.	Small and medium farmers.	Male and female.
D-3	Application of Cattle urine in fish pond.	To control algal bloom.	Small and medium farmers.	Male and female.
D-4	Placing fish feeds in gunny bags immersed in pond water.	To feed fishes and to avoid wastage of feed.	Small and medium farmers.	Male and female.

Interpretation of findings:

D-1: Provision of shade in culture pond.

Long and broad leaves of Coconut tree *(Cocos nucifera)* or Khajur tree *(Phoenix sylvestris)* are tied with 2-3 bamboo poles. The poles are fixed to bottom of the pond. The leaves are tied in such a position that float or partially submersed into the pond water. The structure is made to provide shelter to cultured fishes specially to overcome hot summer. Locally available materials are used and easy for maintenance. Related report has given by Azim, E. (2001)

D-2: Application of raw cow-dung to fish pond.

Raw cow dung is broadcasted in the fish pond to produce natural fish feed and tempering of water for proper growth of fish. But according to scientific interpretation, Cow dung serves as an ideal source of organic manure which enhances plank tonic feed items for fishes in pond.

D-3: Application of Cattle urine in fish pond.

Farmers spray Cattle urine in occurrence of algal bloom in the culture fishpond. This is a Simple method and cattle urine may control algal bloom.

D-4: Placing fish feeds in gunny bags immersed in pond water.

Feed stuff such as Mustard oil cake, Mohua oil cakes are put in to gunny bag and the mouth of the bag is tied up with a jute rope tightly. One to three such bags with feeds are now kept submersed under water near pond bank in 2-3 corners of the pond. Sometimes the bags are tied up with Bamboo pole and fixed to bottom such that the bags remain under water. The feeds are released from the pores of the bags slowly. Thus it checks wastages of feeds.

Other feedstuff includes wheat flour mixed with water, boiled rice, leaves of Pumpkin and Banana. The later two items are specially applied as feed for Grass carp. These items are applied by broadcasting to pond water. Method is simple and may be efficient to feed the fishes.

General observation:

From the above study, it was observed that most of the ITK used by farmers and fishermen are all the rage in the study area. The results of the study bear potential scientific rational. Further studies in this line is needed to explore those hidden science through multi-disciplinary approach which will also protect the local knowledge from being lost.

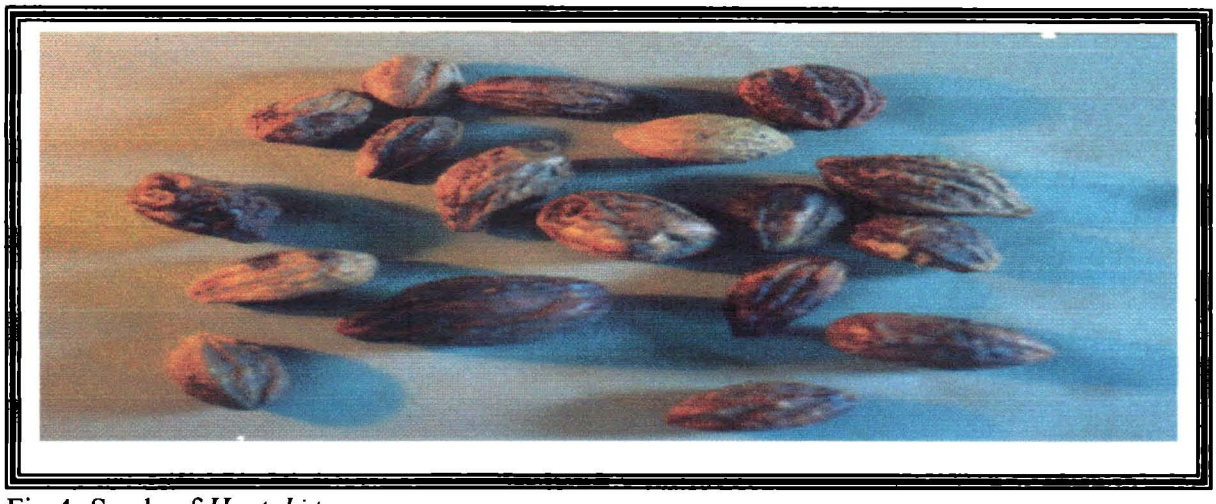


Fig 4: Seeds of *Hortoki* tree.

Fig 5: Boiled seeds of *hortoki* tree.

Fig 6: Investigator with Hatchery owners.

Fig 7: "*Khoyer*" being used in hatching pool.

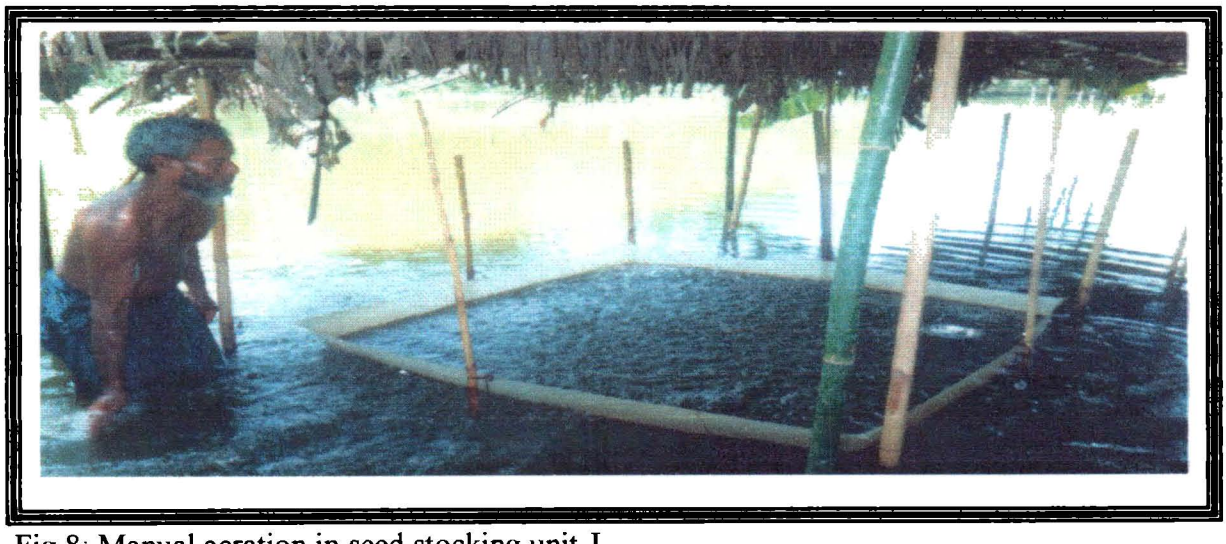


Fig 8: Manual aeration in seed stocking unit-I

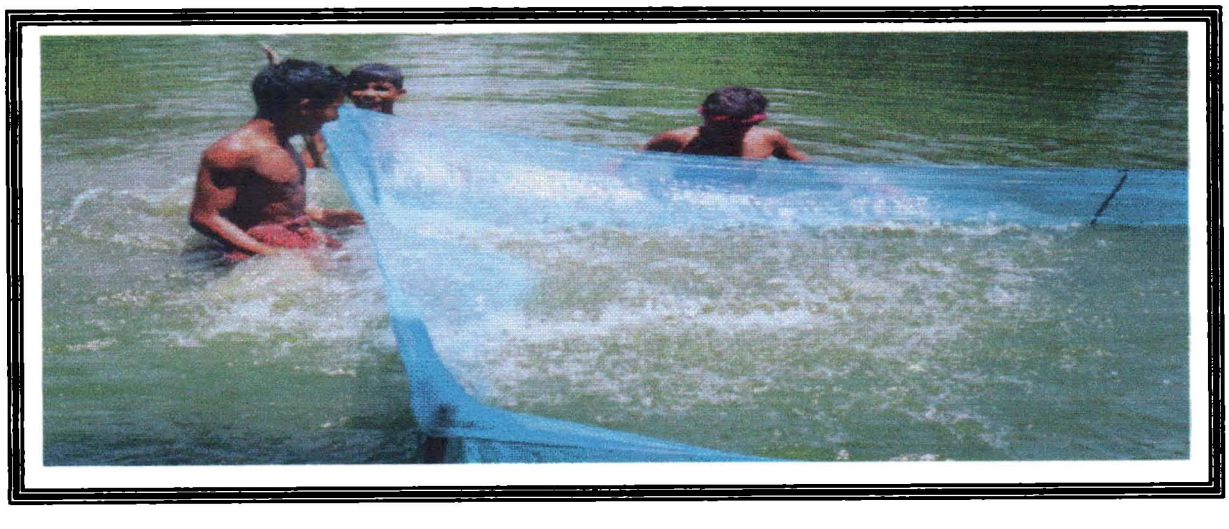


Fig 9: Manual aeration in seed stocking unit-II

Fig 10: indigenous Fishing trap- Aatal.

Fig 11: indigenous Fishing trap- Ghoonni.

Fig 12: Fishers placing *Ghoonni* in water canal.

Fig 13: Fishers with indigenous Fishing Harpoon- *Konch.*

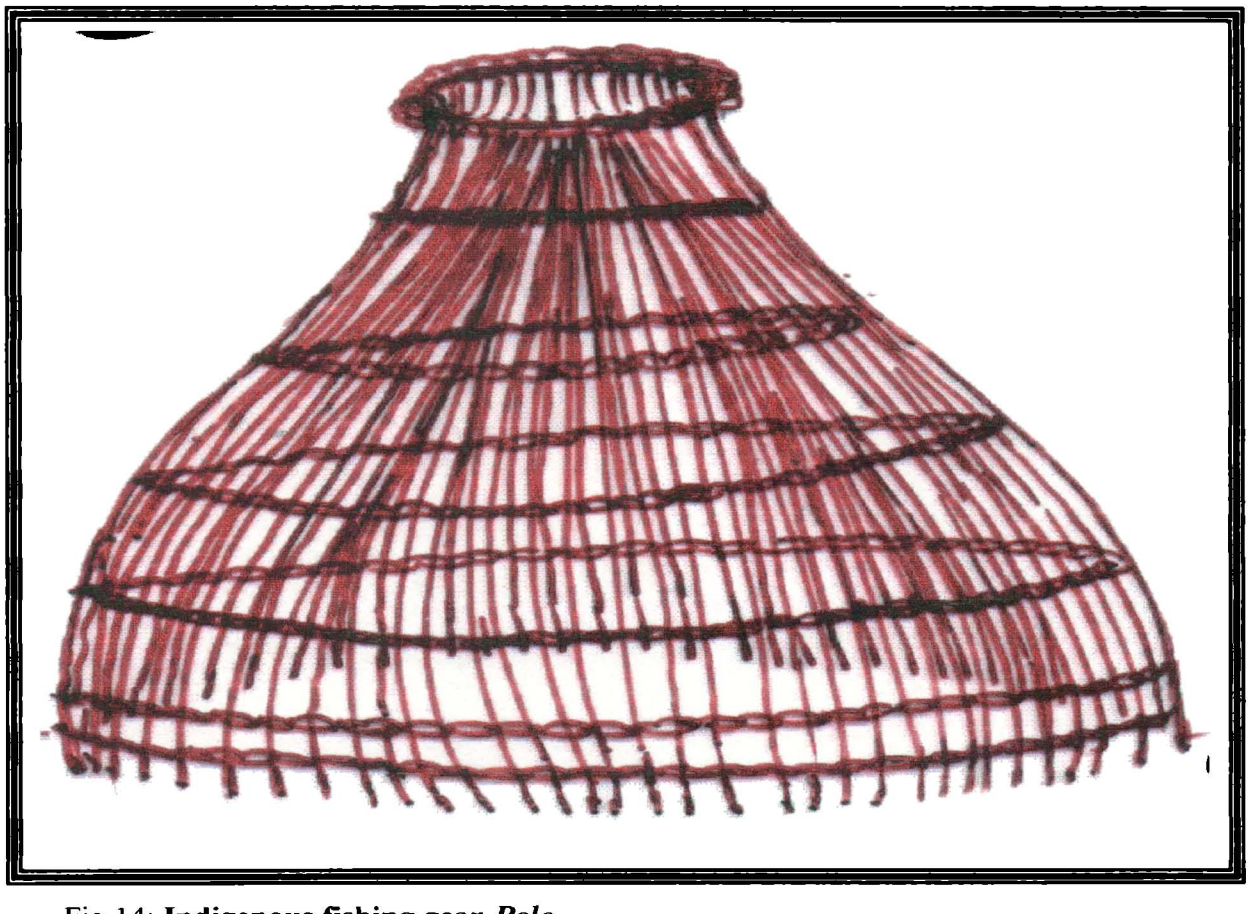


Fig 14: **Indigenous fishing gear-*Polo.***

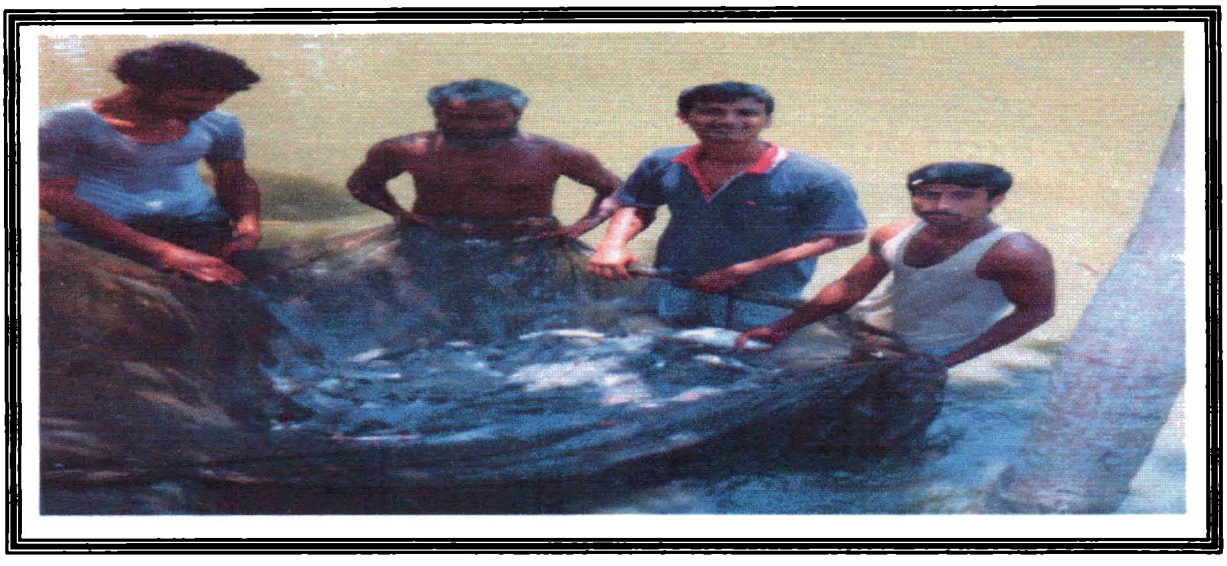


Fig 15: Investigator in farmers pond.

Fig 16: *Neem* leaves.

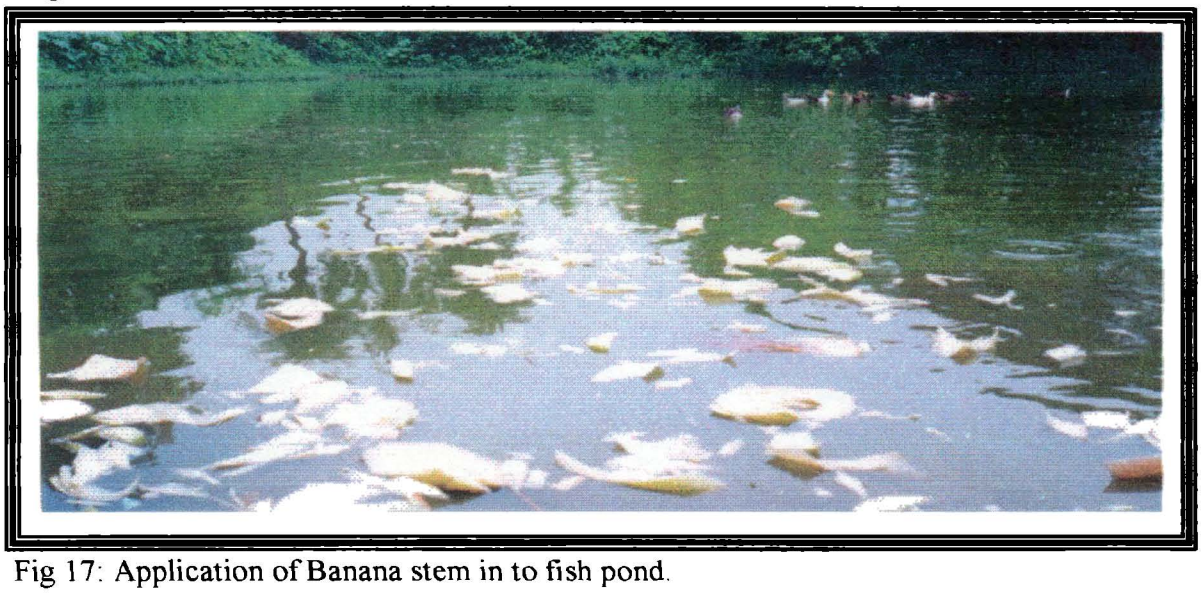


Fig 17: Application of Banana stem in to fish pond.

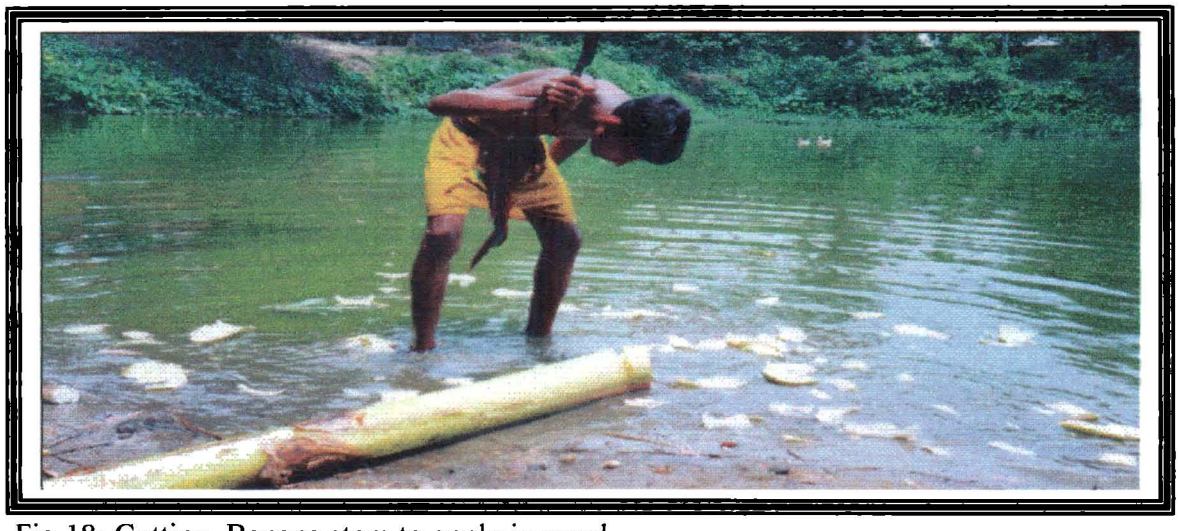


Fig 18: Cutting Banana stem to apply in pond.

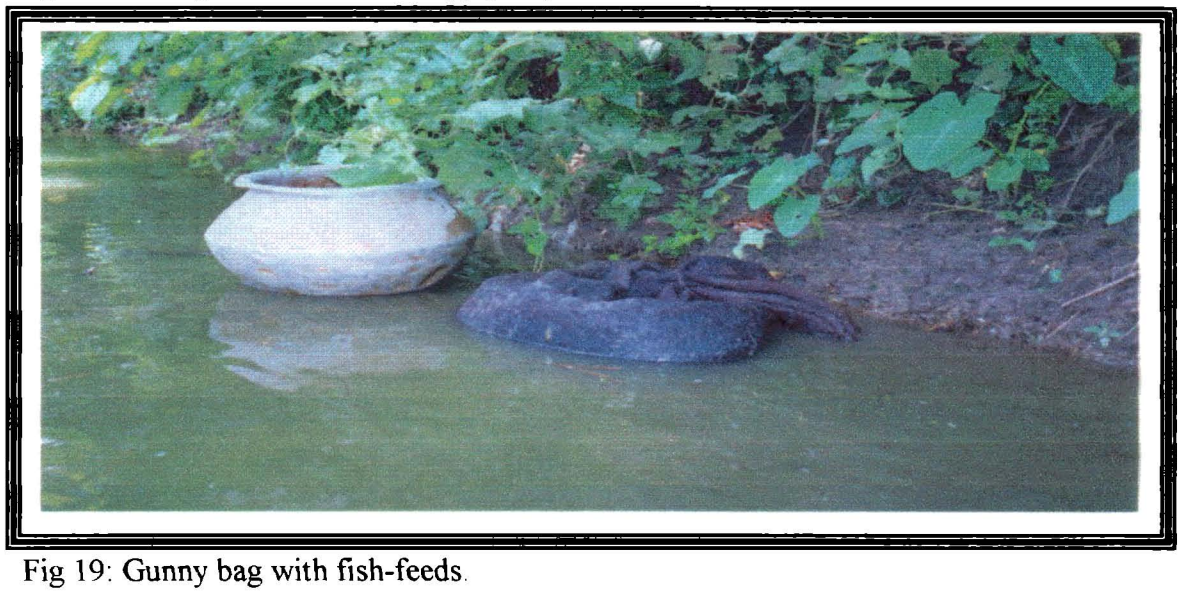


Fig 19: Gunny bag with fish-feeds.

CHAPTER-VI

SUMMARY AND CONCLUSION

Summary and Conclusion

Indigenous Technological knowledge (ITK) bears multi-dimensional advantages for both local and global community. In recent years investing ITK in the development of cost-effective and sustainable farming strategies is gaining more importance in the development plans and projects. Promoting the use of scientific farm technologies among the end users can be well executed if they are adapted to local conditions and indigenous practices. In the current context of Fisheries and allied farming sectors, effective adoption of a technology among target group is more essential rather than mere technology development. Hence it seems that ITK and practices will be an effective tool in generating location specific, low cost technologies for better adoption at the grass root level.

Keeping this in view the present investigation titled with ***" Documentation of ITK in fisheries in the district of 24-Parganas (N), West Bengal"*** was carried out with the following objectives.

- To recognize and document ITK regarding fish farming.
- To recognize and document ITK regarding Hatchery management practices.
- To recognize and document ITK regarding fishing methods and equipment.
- To short out gender concern in different practices.
- To short out practices according to farmer type.

The study was purposively conducted in the 24-Parganas (N) district of West Bengal. Within the district, one block namely Barrackpore-I was selected purposively for the study. Six villages from two Gram Panchayats under the block were selected randomly. The study was based on primary and secondary data and information collection. The secondary data were collected from the published sources and information gathered from the Meen Bhavan (Barasat) and Barrackpore-I development block. These data include agro-climatic parameters, area, population

statistics, their pattern including literacy, profile of fishery resources, fish production statistics and other fisheries infrastructures. The primary data and information collection includes practices of ITK in fisheries activities in the selected blocks from a respondent sample of 120 farmers and fishers distributed in 6 villages of the block. ITK in fisheries activities were collected and documented from the respondents of the study area in four major domains viz.

- **Treatment of fish disease and health management.**
- **Hatchery management practices**
- **Traditional fishing methods and equipments.**
- **General fish farm management.**

These findings are summarized below:

Based on response from the respondents from all the 6 villages, an inventory of 23 numbers of ITK in fisheries activities were prepared according to various domains.

a) Treatment of fish disease and health management.

Farmers were observed to use Neem leaf paste with Turmeric and lime; Garlic, Salt, Burnt ash of paddy straw, Bamboo logs, cut Banana pieces in different proportions to control different fish diseases and disorders.

b) Hatchery management practices.

Hatchery owners were noticed to use some indigenous practices like mixing "*Khoyer*" solution made of fruits of *Hortoki* tree (*Terminalia chebula Retz. Combretaceae*) in hatching pool for hardening of egg shells in hatchery. Other practices includes separation of sticky eggs of Common carp by adding mud-water mixture, milk and by manual operation; mixing of red soil in seed transporting waters and applying poultry egg contains in brood stock pond.

c) Traditional fishing methods and equipments.

Fishermen of the study area were observed to operate traditional fishing methods and equipments. These include *"Aatal"*, *"Ghoonni"*, *"Polo"*, *"Konch"*, Tree branches as fish aggregating device and some traditional baits for angling.

d) General fish farm management practices

In general fish farm management practices, farmers were noticed to provide shade in cultured fish pond, application of Cattle urine, raw cow dung and a traditional feeding system.

❖ CONCLUSION:

The present study has indicated the rich extent of Indigenous Technical Knowledge and practices in fisheries in the study area. Farmers and fishers have long been bearing up these knowledge and practices and most often use them in their farming situations. The study also reveals involvement of women in different fishing and farming activities. Their participation call for women specific approaches in fisheries technology development which would stand by the growing concern of women empowerment.

The experience from the present investigation support the tacit nature and oral communication pattern of the ITK among the fishing and farming community. The study also noticed the blending of modern fishery technology with farmers own experiences which made difficult to identify ITK in farm situation and hence, demands more accurate measures to identify and document ITK in fisheries.

Formation of Indigenous Knowledge Centers nationwide and its effective network to the grass root level is the need of hour. We have the opportunity to conserve and validate Indigenous Technical knowledge from the indigenous people to make them more productive. It needs back up from the scientific analysis and interpretations. However, the outcome of these interpretations needs to be generalized and disseminated to its end users. Mere documentation and validation of ITK wouldn't be a wise step if the same aren't returned to its owners.

CHAPTER-VII

IMPLICATION AND FUTURE SCOPE OF RESEARCH

IMPLICATION AND FUTURE SCOPE OF RESEARCH

Implication :

The promotion of Indigenous Technical Knowledge of fishers as well as fish farmers has important policy implication. Integration of fishers and fish farmers as well as scientists' complementary knowledge and expertise would be a wise step towards lighting upon location specific and cost effective technologies.

The present study, "Documentation of Indigenous Technical Knowledge in fisheries in the district of 24 Parganas (N) of West Bengal" has both theoretical and practical implications.

Theoretical implication of the study :

- The materials and methodologies carried out for identification and documentation of Indigenous Technical Knowledge in fisheries will orient further research in this line.
- The gender differentiation produced here in different practices will be a useful tool to set about gender specific development policy plan.

Practical implication of the study :

- The documented ITK can be extended to other regions having similar type of agro-climatic conditions after validation.
- The present study sets forth the usage of naturally available materials in fishing and fish farming practices and hence bears the potential to light upon the working knowledge of indigenous natural materials.
- The present study provides the platform for the debate and negotiation on the Intellectual Property Right of the possessors of the Indigenous Technical Knowledge (ITK) in respect of fishing and fish farming practices.

Future scope of research .

The respondents of the block were observed to widely practice different Indigenous Technical Knowledge in fishing and fish farming in continuation over generations in their own expertise. In the effort to document Indigenous Technical Knowledge in the present study, it was felt to conduct similar studies in fisheries and other major farming domains in different parts of the district as well as in different districts of the state West Bengal. Furthermore it calls for a nation wide awareness on conducting studies in this line.

Future scope of research against this background can be maneuvered in the following directions.

- It has scope for identifying and documenting numerous untapped Indigenous Technical Knowledge pertaining to fisheries and other major farming sectors.
- It has scope for laboratory testing and validating the usefulness of the documented ITK and further to contrast in terms of economic and technical feasibility against scientific packages.
- It has scope for integration of farmers type of knowledge with scientific know-how, the outcome of which is expected to evolve low cost technology that fits within specific situations.

CHAPTER-VIII

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APPENDIX

Format for Collection of ITK

1. Title of the ITK
2. General description of the ITK practice
3. Purpose for which the ITK used.
4. Location where the ITK is in practice
    - Village
    - Taluka/Block
    - District
5. Name of the farmer.
6. Area of pond/farm.
7. Type of indigenous fishing gears possessed (if any)
8. Method of operation of the gear.
9. Site specification
    - Prominent fish species in the locality
    - Feeding systems adopted for fish farming
    - Main source of water for fish rearing annual/perennial ponds, lake, reservoir etc.
    - Integrated fish farming, if available.

- Infrastructure availability for fisheries development.

10. ITK attributes/characteristics

- Purpose for which ITK used : disease problem/survivability/higher production/usual practice/breeding ,others.
- Type of ITK : material/method/technique/equipment
- Detailed report on methodology adopted in using ITK
- Species of fish in which ITK used.
- Documentary evidence of ITK : (Photograph, sample, specimen, illustration etc.)
- Gender concern of the practice (ITK)
- Type of farmer using ITK.
- Farmer's comment on used ITK.

Date:

Place: ----------

(Collected by)