DISSERTATION

ON

"SPATIO-TEMPORAL CHANGES OF INLAND FISHERIES AND ITS IMPACTS ON SOCIETY & ENVIRONMENT OF BHUNIYA KHALI VILLAGE AT NANDAKUMAR BLOCK OF PURBA MEDINIPUR DISTRICT-A CASE STUDY"

M.Sc. SEMESTER-IV EXAMINATION 2023

SUBJECT- GEOGRAPHY

PAPER: GEO496 **UNIT: GEO496.2**

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This is to certify that **MR. KARTIK BIJLI,** Roll- **PG/VUEGG19/GEO-IVS No. - 011** has prepared a dissertation work on " **SPATIO-TEMPORAL CHANGES OF INLAND FISHERIES AND ITS IMPACTS ON SOCIETY & ENVIRONMENT OF BHUNIYA KHALI VILLAGE AT NANDAKUMAR BLOCK OF PURBA MEDINIPUR DISTRICT-A CASE STUDY**" From Bargoda Godar, Bargoda, Bhuniya khali Village, Purba Medinipur, West Bengal" under my guidance and supervision for M.Sc. Semester-IV, Examination in Geography, 2023 as a partial fulfilment of the curriculum of Vidyasagar university in geography paper 496.2.It is further certified that this is her original work and no part of this work has been submitted elsewhere before for the awardment of any degree.

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ACKNOWLEDGEMENT

Presentation, inspiration and motivation have always a key role in the success of any venture. First and foremost, practice and thanks to the God the Almighty, for his/her showers of blessing throughout my Field work to complete successfully.

I express my sincere thanks to Dr. Pijush Kanti Tripathi, Associate Professor, Department of Geography and Officer-in-Charge, Haldia Government College, who gave me the golden opportunity to do this wonderful field work on **Socio-Economic Impact of Fisheries** at Bargoda Godar, Bargoda, Bhuniya khali villages of Nandakumar Block under Purba Medinipur district.

Also, I express my sincere thanks to Mr. Sarbeswar Halder, Assistant Professor & HOD Department of Geography for his tremendous support and assistance in the completion of my Field report.

I would like to express my deep and sincere gratitude to my field Supervisor, Mr. Gopal Chandra Hembram, Assistant Professor, Department of Geography, Haldia Government College for giving me the invaluable guidance throughout this field report. His dynamic vision, sincerity and motivation have deeply inspired me. He has taught me the methodology to carry out the field work and to present the field report as clearly as possible. It was a great privilege and honor to work and to study under his guidance. I would like to thank all the respective Professors of the Geography Department Haldia Government College for their constant encouragement and support throughout the field work. I would also like to thank him for his friendship, empathy and great sense of humor.

Also I am giving the true hearted thanks to my all friends of M.Sc. 4thSemester for their extraordinary help, support and belief each and every purpose of my research work Last, but not the least, I am extremely grateful to my parents for their love, prayers, caring and sacrifices for educating and preparing me for my future.

Date: 22/08/23

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PREFACE

Fisheries have an important role in socio-economic development. Nowadays due to the rapidly increasing fisheries, agricultural land becomes decreased everywhere in the world as well as in India in West Bengal. The Present study is an attempt to understand the features of socio-economic development due to increasing fisheries and its impact on the agricultural land with special in Nandakumar block of PurbaMedinipur district of West Bengal, India the project report has been prepared on the basis of secondary data collected from different journal and articles as well as a literature survey.

The entire study is presented in eight chapters. The first is the description of the study and research objectives and limitations of the study. The second chapter presents the literature review. The third chapter will discuss the about the study area and the fourth chapter will discuss study methodology and the fifth chapter will discuss the demographic structure, the sixth chapter will discuss the socio-economic data and the seventh chapter will discuss the pisciculture information. The final chapter will discuss the main findings and suggestions and conclusions, references.

Abstract

Pisciculture is playing a great role in Indian economy. It has big contribution to the economy of a developing country like India but is always subjected some adverse environmental consequence. Freshwater fish farming is an important sector contributing to food production, nutrition, livelihood support, employment generation and national income. Fish farming in lowland paddy fields in Nandakumar block of East Midnapore district of West Bengal, India is now of national importance for changing the socio-economic status of rural communities. Following the same route, this study has been made on physical background, to clarify the demographic characteristics, to determine the socio-economic status as well as to examine the pisciculture information of the study area by applying LULC mapping, primary and secondary data collection and cartographic and statistical methods. The results of this study show that fisheries have overtaken agricultural land at an unprecedented growth rate. Fishing offered a more profitable option than rice farming. But the region has many environmental problems due to the expansion of unplanned and unregulated fisheries as well as the use of chemical fertilizers and pesticides. So both the government and the local people need to take quick steps to improve the current situation.

Key Words:

Pisciculture, low-land paddy fields unpreedented growth, environmental consequence.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF PHOTO PLATES

CHAPTER – I

Background of study

1.0 Introduction

Fish and fisheries play an imperative part in the socio-economic expansion, accomplishing the demand for animal protein, protein, prospect for employment, poverty mitigation of the huge population fishing and aquaculture are significant economic situation of the rural population, pisciculture in the lowland paddy field in Nandakumar block of PurbaMedinipur District is now of national significance. It appears to have a strong chance of quickly raising the fisherman's yearly revenue. That's why they convert their paddy field, mound land, wetland, vegetated area and small pond into fisheries. They also follow the intensive type of farming method where they tend to produced more products within a short period. They, therefore, used a lot of fish feed, medication, chemical fertilizer, lime and other chemical components.

That could lead to increased soil and water pollution in this area and biological hazards to the local flora and animals. The salinity of the land in the Nandakumar area increasing, quality of soil depends on the soil nutrients like organic C, N, K and P because all physical and chemical properties significantly depends on these parameters physic-chemical and biological properties significantly depends on these parameters physic-chemical properties of soil salinity crop production get severely hampered due to saline infiltration.

1.1 Objective of the study:

All people want to be economically more prosperous. There is a growing tendency towards shrimp farming for people and more profit. As a result, the cultivable land area is decreasing. Selection of this study area depends upon the following points.

1. To identify different types of natural resource of this of this coastal area.
2. To examine how people utilized these natural resources.
3. To show the nature of socio-economic development,
4. To show how coastal landform have changed,
5. To show decrease agricultural land for increase of inland fishery and saline water,
6. To identify the causes of environmental pollution, soil degradation and loss of bio-diversity,
7. To identify why poor farmers lease their land?
8. To identify why people, leave other jobs or business and have Been engaged in shrimp farming?

1.2 Limitation of the study:

Obviously, all studies .and researches have their own limitations. Some of the limitations of the study are indicate bellow .

1.sample are was only limited in the Nandakumar block of Purba medinipur district in west Bengal and thus the result may not represent the entire state of nation.

2. Sample size of the study was very limited to acquire a more reliable and relevant data.

3. Lake of previous information on relevant topic. Only small amount of data available for reference.

4. As this research paper based on the secondary data, so the present data are not included in this paper.

5. No public opinion was taken regarding the existing situation of the socio-economic development in the study area due to COVID -19 pandemic.

6. Lack of financial assistance from any source in the car

Ying out the study, at times was a major hurdle faced by me.

CHAPTER – II

2.0 Literature review

Tarunkumarbera, Bidhn Chandra patra and Ganesh Chandra Rana(2015), socio economic aspects on paddy alternate fish culture at Nandakumar block, Purba Medinipur, West Bengal. The growth rate of culture are higher than paddy with fish culture. The study reveals that expenditure of winter paddy cultivation is less on culture sites because during fish culture the soil fertility is higher due to application of inorganic and organic manure. The result of this investigation exhibits the sustainability of this culture system as this system does not pollute the water and soil by use of fertilizers and pesticides also brings to light clearly that this system is a very good instrument for socio economic developed of the any other system of culture.

Dipanwita Dutta, Chandra Sekhar Das, Arnab Kundu (2016), A geo-spatial study spatiotemporal growth of brackish water aquaculture along the coastal area of West Bengal. In this study seeks to identify the land/use changes occurring due to haphazard growth of brackish water fisheries along the coastal areas of West Bengal through remote sensing and GIS techniques. High resolution multi temporal google earth images were used for detecting spatio temporal changes of block Nandakumar located in Purba Medinipur district of West Bengal. Also this area was surveyed with GPS and the digitized maps were verified using the information collected from the aquaculture farm owners.

Nirupam Acharyya, Manojit Bhattacharya, Panchanan Das (2015), Changing phenomenon of aquaculture land through space and time using geoinformatics techniques: a case study of Nandakumar Purba Medinipur, West Bengal, India aquaculture basically known as aqua farming that means the farming of aquatic organisms such as fish. In this study an attempt has been made to identification and quantification of aquaculture zone occurring in the inland area of Nandakumar, Purba Medinipur, West Bengal, India by using space born remote sensing (RS) technology which has a good potentiality for change detection and good data availability and is consequently, well suited for the monitoring of land use change over a gap time period. The benefits of geographic information system(GIS) application in aquaculture have promoted its quick expansion and as a most advantage to compare with the ground reality.

Subrata Giri (2018), Decreasing agricultural land for increasing inland fisheries and its impact on the socio-economic development of Nandakumar block in Purba Medinipur coastal area, west Bengal, India. In this study brackish water fish farming is increasing rapidly for more profits. The paper analysis the impact on socio economic development due to increasing increasing inland fisheries. The socio-economic development of this study area has been done through decreasing agriculture land for inland brackish water fisheries mainly

fish farming and how increasing the soil degradation for water of fish farming and its effect on natural environment.

AtanuOjha, AbhisekChakrabarty(2018), Brackish water aquaculture development and its impacts on agriculture land: A case study on Nandakumar block of PurbaMedinipur District, West Bengal, India using multi temporal satellite data and GIS techniques. This study has been made on the growth pattern of commercial aquaculture activity and effect on traditional Five village of Nandakumar block in PurbaMedinipur District, West Bengal, India. Multi satellite data provided the accurate quantification of the present status of land use and also help to understanding the land cover changes due to the fish farming the year of 2003,2014, and 2023 using GIS technique. Five regions from the year 2008 to 2016, 1945.32 agriculture land has been decreased, in which 1546.54 has decreased due to brackish water tanks/pond as a result farming.

Das. M. et. All (2019) studied on "Estuarine fish fauna affected due to industrialization near D.H". The objective of the study was to assess the fish health affected due to heavy metals in D.H. The methodology of the study was different type of marine and estuarine fishes were collected and preserved in crushed ice and bring to the laboratory for AAS to see accumulation of heavy metals in fishes. The major findings of the study was heavy metals analysis show Zn>CU>Pb. Lead, Copper and Zinc these heavy metals are persistent in river water. Fish health affected and bio- accumulation in adipose tissue and muscle layer in fish.

CHAPTER – III

ABOUT THE STUDY AREA

3.0Introduction:

The study area Bargoda godar, Bargoda, Bhuniya khali villages situated at the north and North west part in Nandakumar Block, at Purba Medinipur District of West Bengal. Nandakumar block is an administrative division of the Tamluk subdivision of Purba Medinipur district in the Indian state of West Bengal. It is located 12km.sq from Tamluk headquarters and Nandakumar CD block has an area of 165.70km sq. and the average elevation from Mean Sea Level is 6m (20ft). The block is surrounded by the Kangsabati River in the western part. the Western part is bordered by the Nandakumar block.

It has 1 Panchayet Samity, 12 Gram Panchayet, 186 Sansads (village Councils) 10Mouzas and 100 inhabited Village. The total population of which 262,998 people are living this block of which 135720 are male and 127278are female.

The site selected for this study is ecologically and economically important and is a representative aquatic region for the present investigation as it is one of the shrimp farming hot spots along the east coastal of India. This study area selected for aquaculture because most of fish farming activities developed by river water supply. The study area main river are Keleghai, Kangsabati. Climatic condition of this area is basically tropical monsoon type and rainfall has been occurred by influence of south west monsoon in month, June to October.

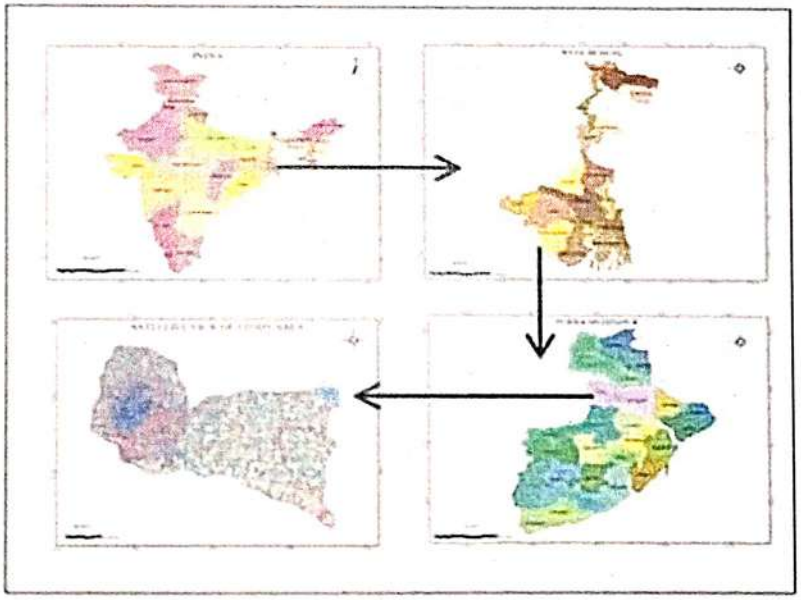

Fig No: 3.1 Location Map

3.1 Climate Condition:

The study area at Nandakumar block has a tropical monsoon climate with hot summer & well distributed normal rainfall. There are mainly four seasons found in this region. The winter season starts from about the middle of December and continues up to the end of February and summer extends up to May. The southwest monsoon season continues up to the end of September, and October and the first half of November is the post-monsoon. The study area is highly affected by floods in the monsoon season. And this summer and monsoon climate is very well for fishery. This season fish growth increase.

3.2 Temperature:

The Temperature rapidly rises from about early March. May is the hottest month. The Average annual temperature is 21oC to 36oC. The temperature rapidly decreases in the Winter season mainly in the month of January to February. This is mostly affected by the Aquaculture commercial people increasing the business.

3.3 Rainfall:

The average annual rainfall is 242 mm to 380mm (rainfall does up-down between 70mm to 636mm). Considerable amount of monsoon rainfall occurs in association with the movement of Cyclonic depression from the Bay of Bengal. By this effect it rains heavily from June to October. Month Wise rainfalls in the year from 2009 to 2013.

3.4 Geology:

The one type of litho logical structure seen in this study area which is Panskura formation of flood plain 'deposition that constructed by Holocene age. Panskura formation lithological structure is mainly sand with silt and clay associated with Fondles the nature and soft unconsolidated sediments characteristic with low slope, flood proneness and water logging hazard. So the study area of two blocks is low slope and highly flood prone area.

CHAPTER – IV

Data base and Methodology

4.1Sources of Data:

The data base is one of the most important tools for any study. For collection of any data base, primary and secondary data sources have been needed. The study based on different primary and secondary data.

4.1.1 Secondary Data Source:

❖To understand the chronological development of the study area literature review have been done from different books, articles, research papers and web pages.

❖ Physical background of the study area has been studied from different articles and web pages.

❖ To understand the demographic background of the study area secondary data have been collected from Primary Census Abstract, 2011 and District Census Handbook, 2011.

4.1.2 Primary Data Source:

❖Intensive door to door survey has been carried out covering total 45 household at Nandakumar Block Bargoda Godar, Bargoda, Bhuniya khali, in Purba Medinipur district of west Bengal

❖ This area have been surveyed through structure questionnaire.

4.2 Methodology:

Objective-wise methodology of field report are

1. **Assess the physical back ground of the study area.**

The methods of data collection are

a. Dereferencing
b. Digitization
c. Digital Elevation Model
d. Contour Mapping

2. The study aims to clarify the demographic characteristics of the study area.

The methods of data collection are

a. Primary data collection through questionnaire.

b. Secondary data collection from census handbook.

c. Cartographic and statistical methods.

3. Understand the different phases and chronological development of study area.

The methods of data collection are

a. Secondary data collection from different Website, Book, Journal and Articles.

4. The study seeks to examine the basic amenities available in the study area.

The methods of data collection are

a. Primary data collection through questionnaire.

b. Secondary data collection from different website, book, journal and articles.

c. Cartographic and statistical methods for data analysis.

5. Determine the relationship between economic conditions and socioeconomic status.

The methods of data collection are

a. Primary data collection through questionnaire.

b. Secondary data collection from different website, book, journal and articles.

c. Cartographic and statistical methods for data analysis.

d. Modified Kupuswamy scale of socio-economic status

❖ House-Hold Survey:

We collect primary data through intensive door to door household survey with the help of structured questionnaire. To fulfill the objectives of the study, data on socio-economic factors (level of education, Occupation, income, expenditure pattern of the family, building types and household assets etc.) were collected from Bargoda godar, Bargoda, Bhuniya khali village in Nandakumar block of Purba Medinipur district of west Bengal.

Plate No: 4.2 Household Survey

❖ Cartographic and Statistical analysis:

We have compiled all the primary and secondary data and tabulate the data to prepare master table. After that analyzed data for preparation of diagrams and subsequent analysis.

Statistical analysis has been done. We have drawn some cartograms by suitable cartographic techniques.

Map of Study area has been done by Arc- GIS 10.3 software.

Land use Land cover map has been done from Google Earth Image.

❖ Sex ratio:

His sex ratio is the ratio of females to males in a population. Sex ratio has been carried out by using this formula

$$\text{Sex Ratio} = \frac{\text{Number of Male population}}{\text{Number of Female population}} \times 100$$

❖ Literacy rate:

Literacy rate is defined by the percentage of the population of a given age group that can read and write. Literacy rate has been calculated by following formula

Literacy rate =

$$\frac{\text{Total Population}}{\text{Male Population}} \times 100$$

❖ Socio Economic Status:

Socio economic status of the study area has been calculated on the basis of modified Kupuswamy scale 2021

Modified Kupuswamy scale 2021					
Education of head		Occupation of head of Family		Monthly family Income	
Level of Education	score	Occupations	score	Income Ranges (RS)	Score
Profession	7	Legislators	10	>123,322	12
Graduate	6	professionals	9	61633- 123321	10
Intermediate or diploma	5	technicians	8	46129- 61622	6
HS certificate	4	Clears	7	30831- 46128	4
middle school certificate	3	Skilled workers	6	18497- 30830	3
primary school certificate	2	Agricultural worker	5	6175- 18469	2
Illiterate	1	Trade worker	4	<6174	1
		mechanics	3		
		Elementary occupation	2		
		Unemployed	1		

❖ Software used:

ArcGIS: It is a geographic information system (GIS) for working with maps and geographic information. It is used for creating and using maps, compiling geographic data, analyzing mapped information, sharing and discovering geographic information, using maps and geographic information in a range of applications, and managing geographic information in a database.

Ms-Excel: Have compiled all the primary and secondary data and tabulate the data to prepare master table with MS-Excel. For the interpretation of data and subsequent analysis we have prepared different diagrams with the help of MS-Excel software.

CHAPTER –V

Study on Demographic Profile

5.1 Demographic Profile:

Demography is the statistical study of populations, especially humans. Its examines and measures the aspects and dynamics of populations; it can cover entire societies or groups defined by criteria such as education, nationality, religion, and ethnicity. Educational institutions usually treat demography as a field of sociology, though there are a number of independent demography departments. These methods have primarily been developed to study human populations, but are extended to a variety of areas where researchers want to know how populations of social actors can change across time through processes of birth, death, and migration. In the context of human biological populations, demographic analysis uses administrative records to develop an independent estimate of the population. As a rule, in the same country and at the same period, the size of an urban community is much larger than that of a rural community. In other words, urbanity and size of a community are positively correlated. Density of population in urban areas is greater. Urbanity and density are positively correlated. So far as urban community is concerned, greater importance is attached to the individual than to the family. Nuclear families are more popular in urban areas.

5.2 Gender Composition:

Gender composition of the human population is one of the basic demographic characteristics, as changes in gender composition largely reflect the underlying socio economic and cultural patterns of society in different ways. The field survey revealed that the total number of all fisheries owners households is 184 in which the number of female is 79 and with a sex ratio 752 per thousand males.

Table NO: 5.2 Gender Composition	
Total Member	184
Male population	105
Male Ratio	57
Female Population	79
Female Ratio	42
Gender Ratio	752
Source: field Survey 2023	

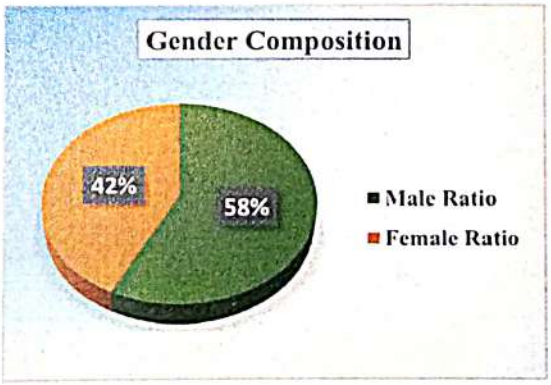

Fig No: 5.2 Gender Composition

5.3 Age Composition:

Age composition refers to the number of people in different age groups in a Country. In this field survey fisheries owners are divided into three age group such as (<35), (35-45), (>45). It appears that 35-45 this group has more number of owners belongs which is around 59.23% and 36.41%, 4.89% are found <35, <45 in this group.

Table No:5.3 Age Composition		
Age Group(yrs.)	Number	(%)
<35	109	59.23%
35-45	67	36.41%
>45	9	4.89%
Source: Field survey 2023		

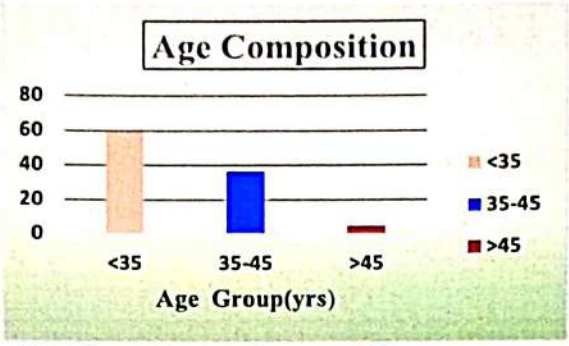

Fig No: 5.3 Age Composition

5.4 Family size:

According to field survey, at Bargoda godar, Bhuniya khali, Bargoda village in Purba Medinipur district at west Bengal. There are two types of family sized we saw in these villages; bellow 4 member and 5-to-8-member family are there. According to survey 66.66% family are less than 4-member family and 33.33% family are 5-to-8-member family belong there. So, this data indicate small sized families are here more than big size of family.

Table No: 5.4 Family size		
Family size	number	%
<4	30	66.66%
5 - 8	15	33.33%
source: Field survey 2023		

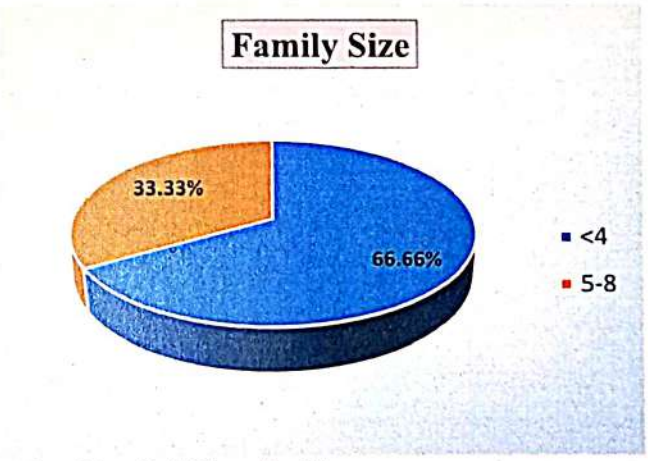

Fig. No: 5.4 Family Size

CHAPTER – VI

Socio Economic Status

6.1 Socio-economic profile:

Socioeconomic status (SES) is an economic and sociological combined total measure of a person's work experience and of an individual's or family's economic access to resources and social position in relation to others. When analyzing a family's SES, the household income, level of education, and pattern of occupation are examined, as well as combined income, whereas for an individual's SES only their own attributes are assessed. Socioeconomic status is classified into three levels (high, middle, and low) to describe the three places a family or an individual may fall into. When placing a family or individual into one of these categories, any or all of the three variables (income, education, and occupation) can be assessed. Education in higher socioeconomic families is typically stressed as much more important, both within the household as well as the local community. In poorer areas, where food, shelter and safety are major priority, education is typically considered as less important. Additionally, low income and education have been shown to be strong predictors of a range of physical and mental health problems, including respiratory viruses, arthritis, coronary disease, and schizophrenia. These problems may be due to environmental conditions in their workplace, or, in the case of disabilities or mental illnesses, may be the entire cause of that person's social predicament to begin with.

6.2 Literacy Status:

According to the 2011 Census, any person aged seven and above and has the ability to read and write is considered literate. According to the 2011 Census. The literacy rate in study area is 85.56%. the male literacy rate is 79.89%and female literacy rate is 70.5% in Nandakumar block. The total literate persons in nandakumar block were 198153 out of which males were 108428 and remaining 89725 were female. And my study area 69.07% are male literate and 30.92% are female literate. The study area has a literacy gender gap of 38.15% percentage points.

Table No: 6.2 literacy status			
Gender	Number	%	Literacy gap (gender gap)
male	105	69.07%	38.15%
female	47	30.92%	
source: field survey 2023			

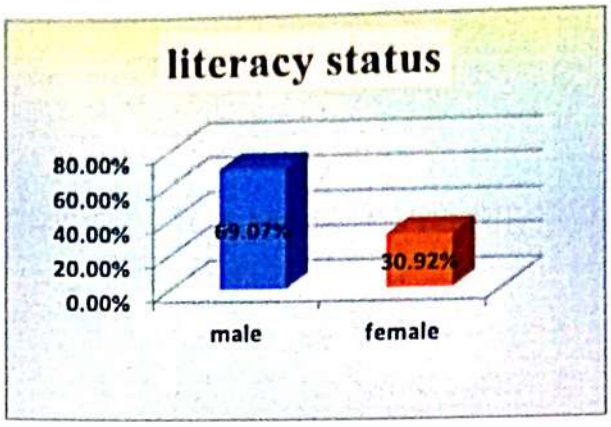

Fig No: 6.2 Literacy status

6.3 Level of Education

Level of education refers to the level of formal education that have completed. There are education level are divided three level i.e. Secondary (VII-X), higher secondary (XI-XII), graduate. Field survey showed that most of the fishery owners are in secondary education that is 58.06% , has 29.03% and graduate has 12.09%. So, it is understood that education level of fishery owners is low.

Table No: 6.3 Level of Education		
Education Level	Number	(%)
Secondary Education	70	58.06
Higher Secondary Education	33	29.03
Below Secondary Education	68	36.95%
Graduate	11	12.09
Source: Field Survey 2023		

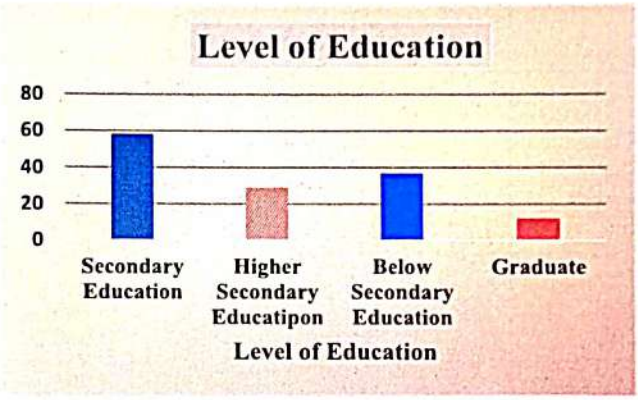

Fig No: 6.3 Level of Education

6.4 Cast Composition

Caste is a form of social stratification characterized by endogamy, hereditary transmission of a style of life. According to field survey all fishery owners in Nandakumar block in Purba Medinipur district are divided many different castes such as SC, ST, and OBC. It shows that majority of the fishery owners belongs to general category which is around 41.84% SC and OBC-A fishery owners is (34.23%) and (4.89%) respectively. The lowest fishery owners group is OBC-B with only 19.02%

Table No: 6.4 Caste Composition		
Category	Number	(%)
General	77	41.84%
SC	63	34.23%
OBC-A	9	4.89%
OBC-B	35	19.02%
Source: Field survey 2023		

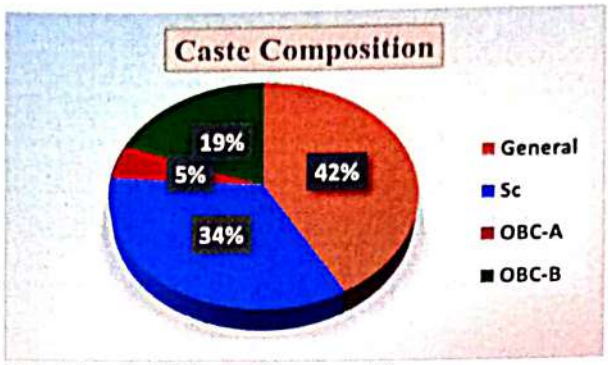

Fig No: 6.4 Caste Composition

6.5 Marital Status:

Marital status is the legally defined marital state. There are several types of marital status: single, married, widowed, divorced, separated and, in certain cases, registered partnership. According field survey most of the people is married (54%) followed by the unmarried people is 40%, widow people are 6%.

Table No: 6.5 Marital Status		
Marital status	Number	(%)
Married	100	54%
Unmarried	74	40%
Widow	10	6%
Source: Field survey 2023		

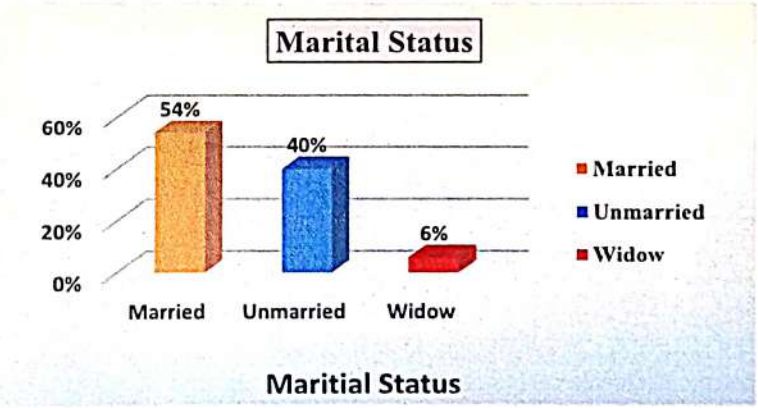

Fig No: 6.5 Marital Status

6.5.1 Age of marriage

Age of Marriage According to field survey marriage deterministic age limit has divided into 3 parts. The 3 parts is less than 17, 17-20, and 20-24, in this deterministic marriage age group also divided two parts one is male and another is female. According to the survey we can see that 5.45% people are married under 17 years. And and 82.72 % people are married 17 to 20 years age and 11.81% people are married 20 to 24 years age . So that is good for society.

Table No: 6.5.1 Age of marriage		
Age Group(yrs.)	**Number**	**(%)**
<17	**6**	**5.45%**
17 – 20	**91**	**82.72%**
20 - 24	**13**	**11.81%**
Source: Field survey 2023		

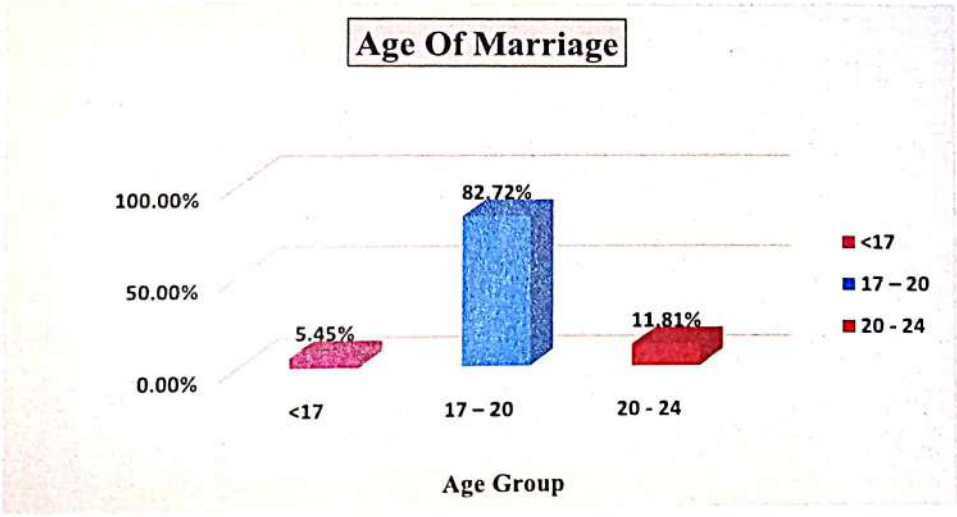

Fig No: 6.5.1 Age of Marriage

6.6 Occupation pattern:

The occupational pattern of a nation refers to the percentage of its workforce employed in various economic ventures. The field survey in Nandakumar block of Bargoda godar, Bargoda, Bhuniya khali village also gives us data about the occupation. The shows that most of the people are engaged with pisciculture (66.66%), some are engaged in salaried employment in government (15%) and any other people engaged in other trade, work, shop (18.33%) etc.

Table No: 6.6 occupation pattern

Occupation Pattern	Number	%
pisciculture	80	66.66%
salaried employment in government	18	15%
other trade	22	18.33%

source: Field survey 2023

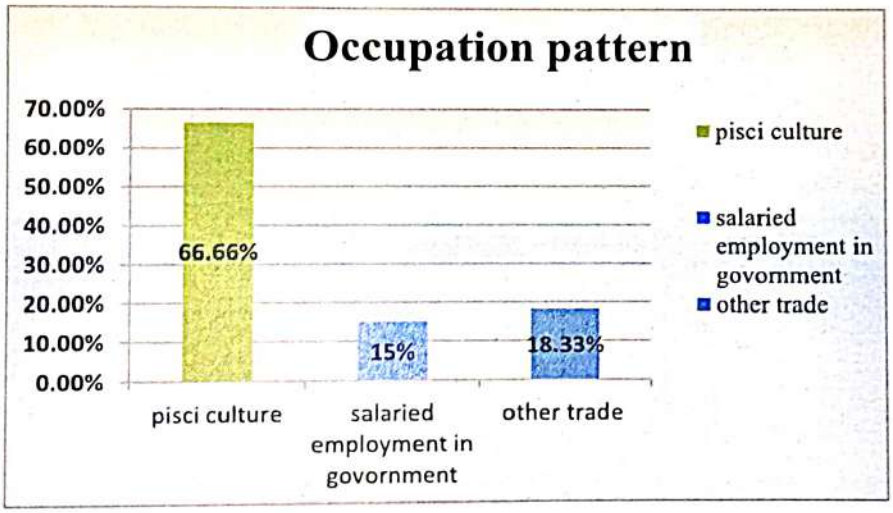

Fig No: 6.6 Occupation Pattern

6.7 Monthly Family Income:

According to field survey, over 17 per cent of households have a luxury standard of living and most of them belong to higher income cohorts (High- Middle and Rich). 66 per cent families have an income of less than Rs 20 thousand per month i.e., belong to the aspiring or lowest income cohort. Also, the survey found that 6 per cent of household's monthly income 20 thousand to 30 thousand per month and 9 percent of households monthly income 5 thousand to 10 thousand per month. As per as survey this area is economically medium do some financial savings in the form bank deposits, insurance etc.

Table No: 6.7 Monthly Family Income		
Monthly family income	Number	%
5000-10000	4	8.88%
10000-20000	30	66.66%
20000-30000	3	6.66%
>30000	8	17.77%
Source:Field survey 2023		

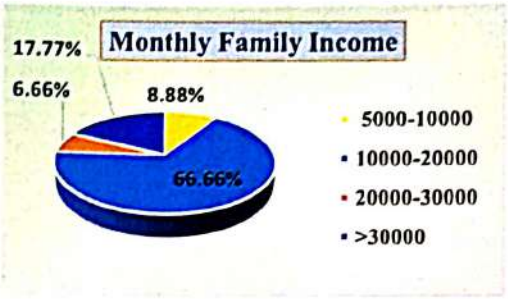

Fig No: 6.7 Monthly Family Income

6.8 Bank account status:

Bargoda godar, Bargoda, Bhuniya khali village at Nandakumar block in Purba Medinipur district, here people are educated and involved fishery or others trade work. So, in this area people have bank account so the percentage of bank account holders (81.52%) in Bargoda godar, Bargoda, Bhuniya khali village because those people are involved in fishery and any other trade but the bank account are dose not present (18.47%) people according to survey data.

Table No: 6.8 Bank Account status		
Bank Account	Number	%
yes	150	81.52%
no	34	18.47%
Source: Field survey 2023		

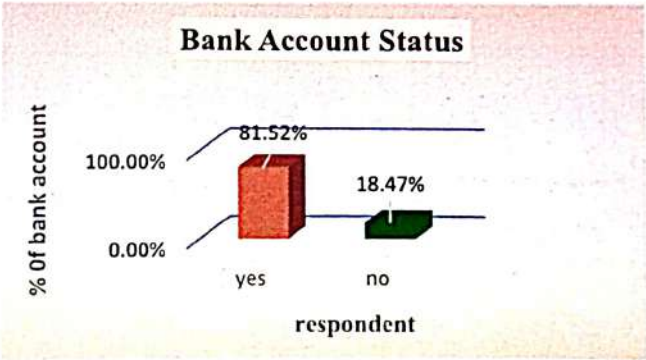

Fig No: 6.8 Bank Account Status

6.9 Source of Drinking Water:

Water a basic necessity of humans. The nandakumar block human broad made tremendous progress in providing safe drinking water to its people. Almost 45 household or 100% household of the study area has access to safe drinking water. So, the study area successfully archived universal (100%) drinking water supply water supply to the households than the acuter nandakumar water supply scheme. The main source of drinking Water, a basic necessity of humans. In this study area 77.77% people are used tap water and 22.22% people used tube well water which is about 45 household (100%).

Table No: 6.9 source of drinking water		
source of water	number	%
tap	35	77.77%
tube well	10	22.22%
source: Field survey 2023		

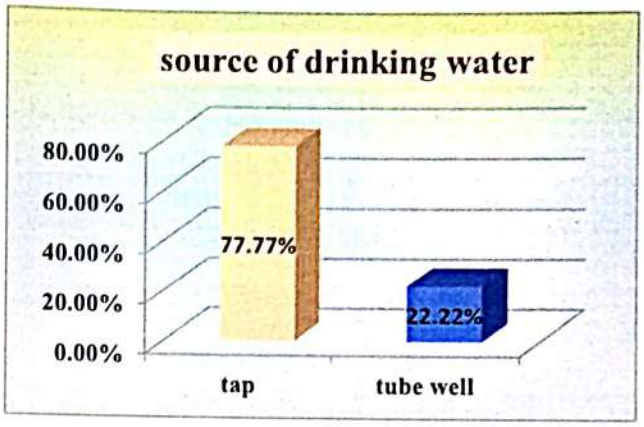

Fig No: 6.9 Source of Drinking Water

6.10 Household Assets:

Nandakumar block is situated in state of West Bengal part of India. Household wealth comprises of combinations of household asset. From this survey it can be shown that mobile and television and electric fan, bicycle are the main household assets in this region. Mobile is very common household asset in 100% household which is largest asset share and followed by television 100%. And any other assets are like bike, four wheeler, refrigerator, Wallcock also have. Significantly mobile, television, fan, bicycle become a popular communication asset.

Table No: 6.10 Household Assets		
verities of asset	number	%
mobile	45	100%
television	45	100%
electric fan	45	100%
bike	25	55.55%
four wheeler	4	8.88%
bi cycle	45	100%
refrigerator	3	6.66%
wall clock	40	88.88%
computer	4	8.88%
source: Field survey 2023		

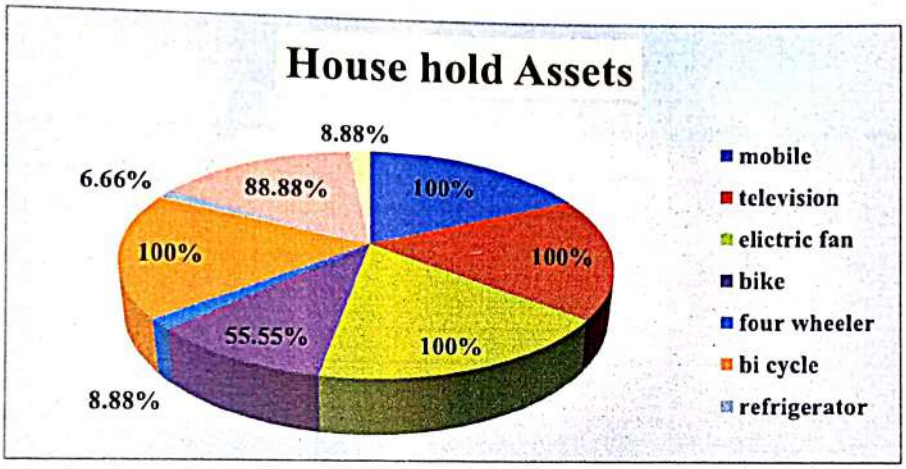

Fig No: 6.10 Household Assets

6.11 ELECTRIFICATION STATUS:

Nandakumar block to provide energy access to all by last mile connectivity and electricity connection to all remaining un-electrified households in study area at Bargoda godar, Bargoda, Bhuniya khali village to archived universal household electrification .in the study area all households (45) have electricity connection. So, the study area successfully achieved universal household electrification.

Table No: 6.11 electrification status		
use of electricity	number	%
yes	45	100%
no	0	0%
source: field survey 2023		

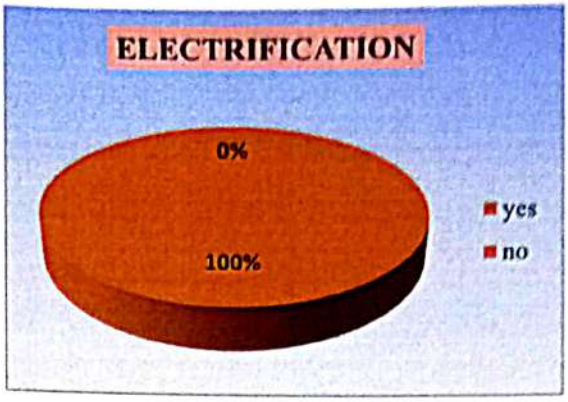

Fig No: 6.11 Electrification Status

6.12 Socio economic status:

Socio Economic Status In the present study 45 household was visited in Nandakumar block Bargoda godar, Bargoda, Bhuniya khali, village. According to the survey this village is 4 types of socio economic status that's upper, upper middle, middle, and lower. This data indicate 17.77% household belongs to upper class. And 11.11% household belongs to upper middle class, 55.55% household belongs to middle class and 15.45% household belongs to lower class. This data indicate here economic status is good.

Table No: 6.12 socio economic status		
Socio Economic Status	Number	%
upper	8	17.77%
upper middle	5	11.11%
middle	25	55.55%
lower	7	15.45%
source: Field survey 2023		

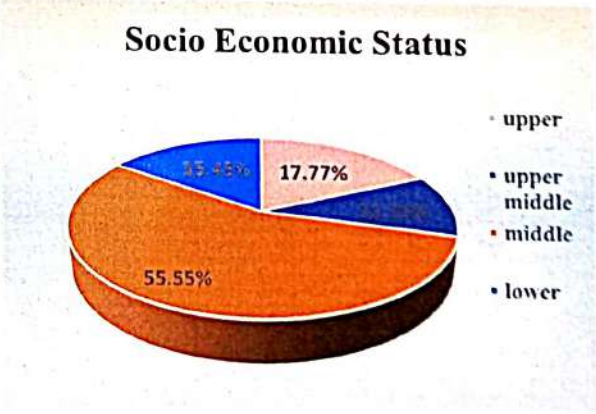

Fig No: 6.12 Socio- Economic Status

CHAPTER - VII

Pisciculture Information

7.1 Introduction:

Pisciculture is defined as the method for culture and rearing of fish and shell fish. The word pisciculture is divide from the Latin word 'picnics' which means "fish'. Pisciculture is now carried out in freshwater ponds. Paddy fields, lakes and even in artificial tanks and reservoirs. The species of fish which can be kept successfully in captivity throughout their lives from egg to adult is exceedingly limited in number. Pisciculture providing large scale employment opportunities, improving rural economy and protein rich food. India has a vast area of natural and artificial water bodies as paddy fields, lakes, Ponds River, swamps, irrigation channels and reservoirs. Most of these holdings water throughout the year or for greater part of the year are suitable for fish culture. The advisory board of the Indian council of agriculture research commenced sponsoring may culture schemes, for promoting fish culture methods. Today in many states of India especially West Bengal, Tamil Nadu, Orissa and Kerala pisciculture is carried out on commercial scales. Pisciculture is a method for culture and rearing of fish and shell fish. Consequently there are two main types of pisciculture to be distinguished: 1) The rearing in confinement of young fishes to an edible stage and 2) The stocking of natural waters with eggs from captured breeders. Fish farming is the principal form of agriculture, while other methods may fall under agriculture. Fish farming involves raising fish commercially in tanks or enclosures usually for food. A facility that releases juvenile fish into the wild for recreational fishing or to supplement a species natural members is generally referred to as fish hatchery.

7.2 Importance of Pisciculture:

The main importance in pisciculture is;

1. Pisciculture has a vital role in augmenting food production as the world demand for fish products is increasing steadily.

2. It helps to utilize the vast areas like paddy fields can be used for culturing of fishes.

3. Culture of selected varieties of fish will help in a good yield of commercial forms.

4. Artificial feed enhances the growth ratio of fishes and therefore helps in early harvest. Viniculture generate employment for many people especially in the rural areas of developing countries.

7.3 Characteristics of Pisciculture:

Certain natural amenities are required in selecting a site for pisciculture. They are:

1. Water is an essential medium for the culture of fish,

2. The depth of the pond has an important bearing on the quality of water. In shallow ponds, sunlight penetrates up bottom thus face-lifting increased productivity, hence depths greater than five meters are rare in fish ponds.

3. Temperature is another important physical factor of the water. As fishes are cold blooded, their activity depends on the temperature of the environment. All activities in fishes slow down with fall in temperature: so, growth of the fish thus depends much on the temperature.

4. The chemical conditions of water such as dissolved gases, PH, inorganic compounds etc. are also very important in the productivity of a pond.

Alkaline or natural water is more productive than acid water. (PH between 6.5 to 9)

5. Plants are essential for a fish farm, but is necessary to check their growth and speeding beyond a limit.

6. Care should be taken against carnivorous fishes and water beetles in fish farms.

7. Water pollution should be controlled.

Nandakumar block is the most cultivated area of Purba Medinipur district in the state of West Bengal, India. So pisciculture of Nandakumar block is discussed given bellow.

7.4 Drainage System:

Inadequate drainage outlet causing water logging and associated drainage congestion are the most obvious results of floods which occur almost every year in the low-lying deltaic regions all over the world. The trough-shaped Nandakumar Basin (154.51 sq.km in area) is a similar region in the Purba Medinipur District of West Bengal, India. It is drained by the R. Kasai in the west and respectively, R. Halide in the south. The area is crisscrossed by a multitude of sinuous and sluggish channels and narrow linear embankments of varied physical dimensions and morphologies that together give rise to a situation which is geomorphologic ally termed as drainage congestion, resulting in annual seasonal water logging that often takes the shape of severe floods in times of heavy monsoonal downpours and tidal influxes. Floods are most frequent here, particularly in the lower vicinity which may also be attributed to various other factors such as sudden torrential rain, heavy siltation of river bed causing a general reversal

of channel bed slope, formation of bars which restrict usual discharge through the channel and tidal inundation from the R. Halide.

7.5 Size of Fisheries:

The Larger size of the fishery area, the greater number of different species of fish that can be farmed together and the higher the growth rate of the fish. This will result in greater trade and economic divided. It is seen that 32.26% of fishery owners have >25 Acre fishery area and 24.16% fishery owner have 15-25 Acre fishery area. 22.58% of people have <15 Acre fishery area. As a result, in this Nandakumar area fishery is very high and agriculture decreasing.

Table No: 7.5 Size Of Fisheries

Size Of Fisheries	Number	%
<1 acre	41	54.66%
1 acre- 3 acre	10	13.33%
>3 acre	24	32%
Source: Field Survey 2023		

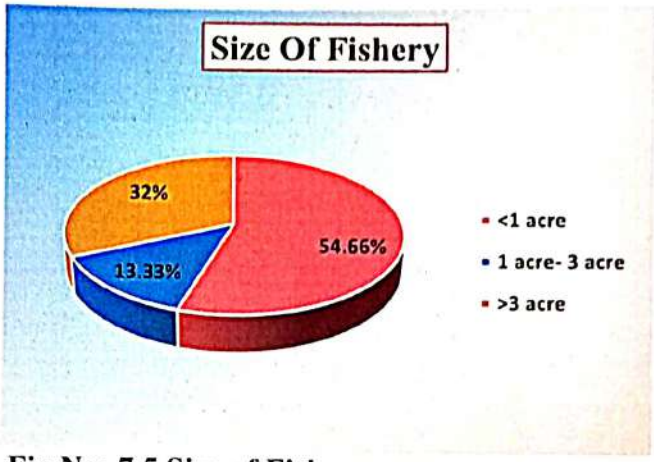

Fig No: 7.5 Size of Fishery

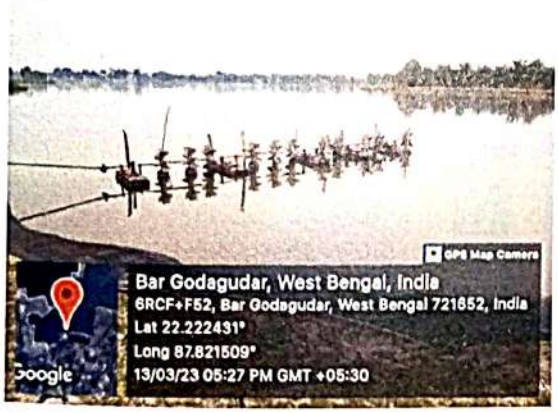

Plate No:7.5 Fishery Size

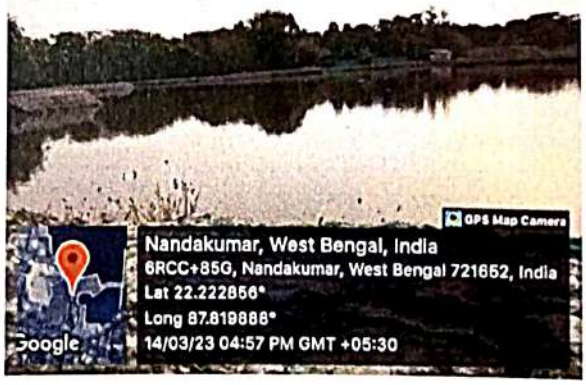

Plate No:7.5 Fishery Size

7.6 Source of Water:

Water source is also important for fisheries. So, all the fisheries are need to water for their fisheries. according to the survey 2023 most of the fisheries are get water from river and canal. According to survey 100% people are used river water and 100% people are used canal water for their fisheries. So, use of Water River and canal are same.

Table No: 7.6 Water Source		
Water Source	Number	(%)
River	45	100
Canal	45	100
Source: Field Survey 2023		

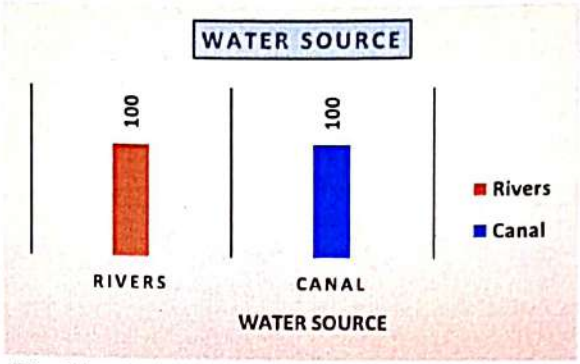

Fig No: 7.6 Water source

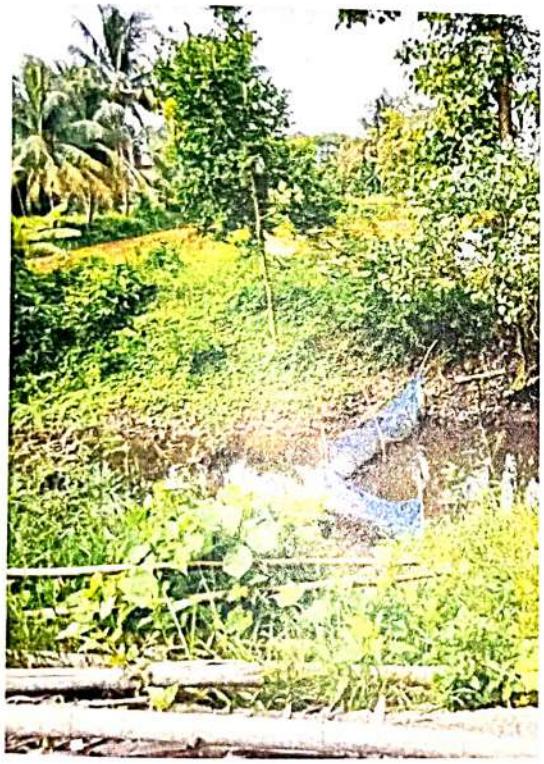

Plate No: 7.6 Source of Water

Plate No: 7.6 Source of Water

7.7 Use of Various Food:

Fish feed refers to materials including processed food, grains and seeds, plants, plant waste, meat and parts of dead fish or other dead animals, but not including live aquatic animals, primarily aimed to sustain growth and repair or provide every for vital process used for the purpose. Knowing the nutritional requirements is very important as it helps to form a balanced diet of proteins, lipids, and energy as well as for optional growth of the fish species. From the field survey we found that 100 % household of the study area use Burn,88.88% household use Nut, 77.77% household use mustard cobs and 62.22% household use feed as fish food.

Table No: 7.7 Use Of Various Food		
Food category	number	%
Burn	45	100%
Feed	28	62.22%
Nut cobs food	40	88.88%
Mustard cobs food	35	77.77%
Source: Field survey 2023		

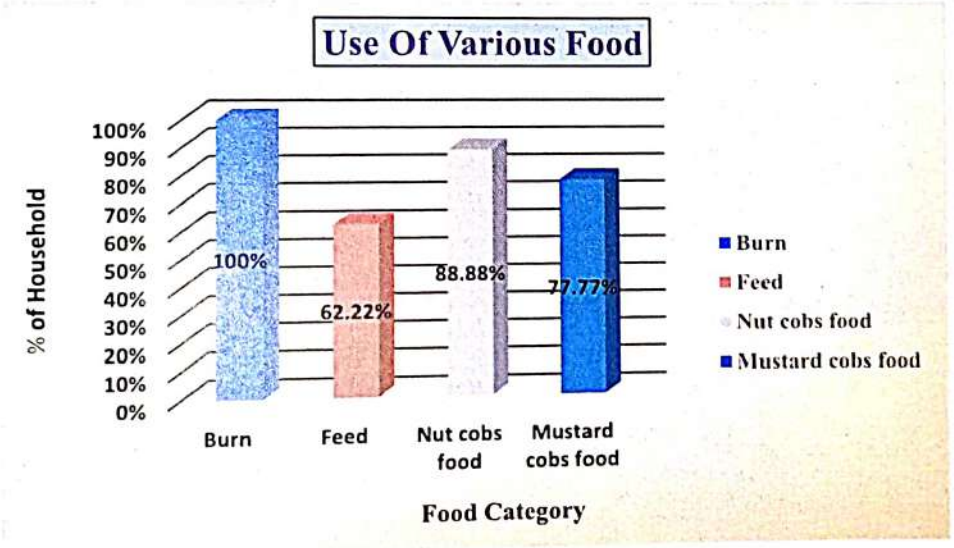

Fig No: 7.7 Use of Various Food

7.8Use of Medicine:

Fish medicine is the study and treatment of fish diseases. These drugs also known as aquaculture drugs, play an important role in maintaining fish health and ensuring that fish are disease free. They helped improve fish productivity and add value to the final product. According to the field survey 100% households in the study area use lime to make fishery water clear, 88.89% households use vitamins and 66.66% households use other medicines.

Table No: 7.8 Use Of Medicine		
Medicine	Number	%
vitamin	40	88.88%
lime	45	100%
others	30	66.66%
Source: Field survey 2023		

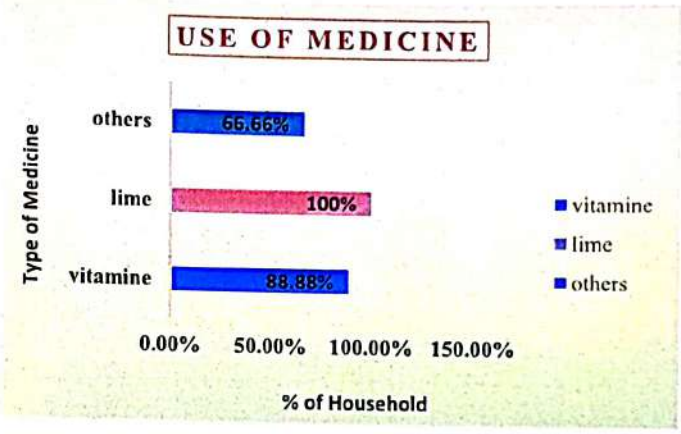

Fig No: 7.8 Use of Medicine

7.9Name of Fishes:

Fish farming is a form of aquaculture where fish are commercially caged and sold as food. In the fisheries of the study area, common species of freshwater fish such as rohu, Catla, common carp etc. are cultivated. From the survey data it can be understood that almost all households cultivate Rahu carp, Mrigal carp, Catla. Only seven percent households cultivate silver and 5 percent households cultivate other common carp.

Table No: 7.9 Name Of Fishes		
Type of fish	Number	%
rohu carp	45	100%
mrigal carp	45	100%
catla carp	45	100%
silver carp	7	15.55%
others	5	11.11%
Source: Field survey 2023		

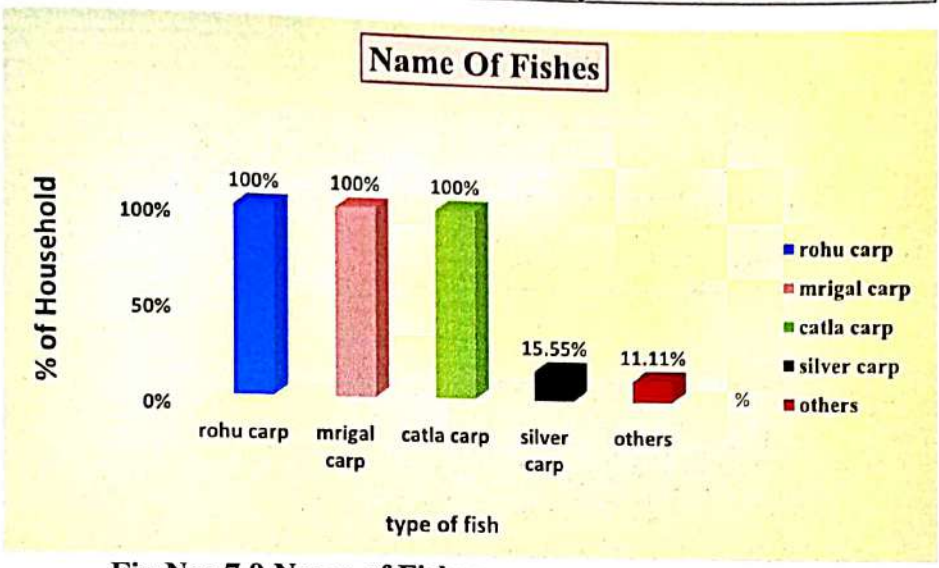

Fig No: 7.9 Name of Fishes

Plate No: 7.9 Rohu Carp

Plate No: 7.10 Catla Fish

7.10 Amount of Production:

Production rate in term of manufacturing refers to the number of goods that can be produced during a given period of time. This diagram shows that 66.66% fish production is produced less than 50 tonne. 12 % fish production is produced between 50 to 70 tones. And 23% fish production is produced is greater than 70 tonne. survey in the Nandakumar block here fish production is moderate compared to the cost of fisheries due to virous and many fish die due to poor quality of water.

Table No: 7.10 amount of production		
amount	number	%
<50 tonne	30	66.66%
50 - 70 tonne	5	12%
>70 tonne	10	23%
source: field survey 2023		

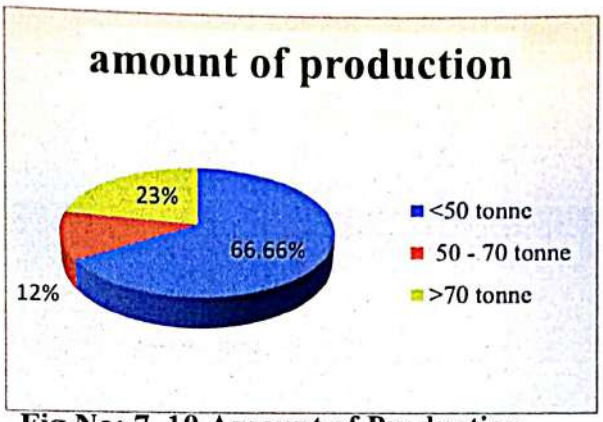

Fig No: 7. 10 Amount of Production

7.11 Expenditure of fisheries:

The cost fish farming is very high as various inputs are used such as land excavation through the equipment water supply, fish feed, fertilizer, lime, nets, and operation and maintenance, labor etc. however if fish production is done well , the profit is much well because nowadays the demand for fish is high for maintaining good health. This diagram shows that 20% of fish farming is cost between 3 to 7 lakhs, and 56% fish farming less than 3 lakhs and 24.44% greater than 7 lakhs.

Table No: 7.11 expenditure of fishery		
amount	number	%
<3 lakhs	25	56%
3 - 7 lakhs	9	20%
>7 lakhs	11	24.44%
source : field survey 2023		

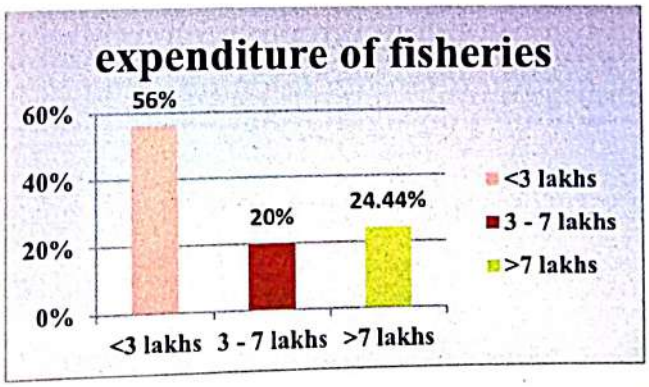

Fig No: 7.11 Expenditure of fishes

7.16 Statement of problems:

Inland brackish water fisheries are a provider of source of income, employment, necessary nutrients engagement of rural and marginal workers, livelihood for farmers. It makes a valuable achievement to social and economic development of this study area. Most of the peoples are engaged in fishing activities i.e. net weaving, repairing, fish feeding, distribution of small shrimp, etc.

For the increasing fisheries land and decreasing agricultural land of this study area many associated problems environment.

1. Increase the salinity of the soil.

2. Production of paddy and other crops is decreasing, resulting in a shortage of food.

3. The rich people are getting richer, and as a result, social and economic discrimination has increased.

4. An Illegal farming system developed.

5. Crop production is not good for the increasing of soil to lease the land.

6. Often, the pressure of politicians or large businessmen, and land owners are forced to lease the land.

7. Antibiotic use for shrimp disease which directly affects soil, water, agriculture, and also in human health by getting food.

8. The ecosystem is being interrupted.

9. As this shrimp is mainly exported, in the local market shrimp deficit is going on.

10. Unconsciousness to fresh water fish farming for low profit.

11. Increasing shrimp disease for the attacking of viruses and bacteria.

12. The primary cost is much higher, so shrimp farming is not possible for poor farmers.

13. Lack of trained labour.

14. It is not possible to cultivate more amounts of fish in a short space on the same land for a long time.

15. It is very inconvenient for agriculture in fishery land in the future.

7.17 Positive impact of fishery

The farmed fish provides high quality protein for human consumption. Fish farming can be integrated into the existing farm to create additional income and improve its water management. The farmers can select the fish species with desired characteristics to raise.

1. The farmed fish provides high quality protein for human consumption.
2. Fish farming can be integrated into the existing farm to create additional income and improve its water management.
3. The farmers can select the fish species with desired characteristics to raise.
4. Fish in a pond are not accessible to everyone. Thus, they are secured and are harvested at will.

7.18 Negative impact of fishery

Fish farming is the practice of captive-raising fish for consumption or other human use. It's also known as aquaculture. Fish farms can be located in freshwater lakes, indoor tanks or saltwater cages in the open ocean. Shellfish such as shrimp are also farmed.

Disease

Keeping fish in close proximity increases the chances of disease. If a fish gets sick with a contagious virus, it's likely to transfer to other fish in the farm. Fish are also vulnerable to infestations of parasites. Farmed salmon in particular are susceptible to outbreaks of sea lice, according to the British Broadcasting System (BBC). In Maine in 2000 an outbreak of anemia in an aquaculture facility led to 2.5 million fish being killed, according to a Time magazine article.

Environment

Fish farms can have a harmful effect on the local environment. For example, antibiotics and chemicals used to treat fish can leach into surrounding soil and waters, according to the Time magazine article "Is Fish Farming Safe?" This can poison agricultural land. Fish farms can also generate large amounts of effluent, which can harm the immediate location.

Protein Efficiency

Many farmed fish--such as salmon, bass and cod--are carnivorous. They require large amounts of protein to sustain their fast growth and energy requirements. This protein is often derived from smaller bait fish ground up into pellets. Yet it takes five pounds of fish-meal to create a pound of salmon, according to the Woods Institute for the Environment at Stanford University.

Set-up Costs

Starting up a fish farm can be expensive, particularly in saltwater environments. Fish farmers have to factor in containment areas, such as underwater cages in open seas or large ponds inland. Fish feed, staff, maintenance, disease control, packaging, transport and stocking the facility with fish are all costs associated with aquaculture projects.

Worker Safety

Worker safety in fish farming depends on individual facilities and national regulations. However, there are risks involved in aquaculture. For example, workers may be exposed to Weil's disease from fish feed and water contaminated by infected rats, according to the UK Health and Safety Executive. Working in isolated locations near water also puts people at risk of accidental drowning

CHAPTER – VIII

Major Findings and Suggestion

8.1 Major Findings

1. The study areas sex ratio is 752 females per 1000 males.
2. The age composition data reveals a high percentage of the population in the study area lives bellow 35 years (59%), and a low percentage of people above 45 years (4.89%).
3. A substantial gender gap exists in literacy rates in the study area, with a difference of 38.15%.
4. Survey data indicate that the majority of people (58.06) are educated secondary level.
5. We can see that about82% of male and female are not conscious about their marriage age.
6. Many people in the study area are engaged in pisciculture (66.66%) with the monthly family income around 1000 to 20000 rupees.
7. In the study area all houses (45) have electricity connection which achieved universal household electrification.
8. River and cannel water is the primary source of irrigation for fish farming with almost all household.
9. According to the field survey fisheries owner use different types of fish like rohu carp, mrigal carp, catla, silver carp, etc.
10. About 56% households spend bellow 3 lakh and 24.44% households spend above 7 lakh rupees on fisheries.
11. Almost all households in the study area use burn as fish feed.
12. 88% of households in the study area use vitamins as fish medicine, resulting in a rapid increase in fish production.
13. In the study area 23% households have fish production above 70 tonnes and 10% households have fish production bellow 50 tones.

8.2 Suggestions

Fishery was developed around the agricultural land of Nandakumar block in Purba Medinipur, various problems have arisen in that area and there has also been natural environment pollution in this scenario, suggestions for future socio-economic development are given bellow.

1. Government permission should be obtained for brackish water shrimp farming .
2. Government needs to be strict on permitting.
3. Appropriate training should be given to worker in fish farming
4. Reduce the use 0f antibiotics to protect agricultural land from erosion.
5. Fresh water shrimp farming should be increased gradually.
6. How to increase income through farming of various crops entered on fisheries, should be arranged
7. Specific areas should be designated for brackish water cultivation, where only this will be cultivated.
8. The soil should be rehabilitated by draining and drying the fishery water every one or two years.

8.3 Conclusion

From the current study in Nandakumar block revealed the information about physical background, socio- cultural landscapes, and demographic background of the study area from the secondary data source and also know about the Information on pisciculture. Both fisheries and settlement areas increased significantly during this period. Every year there was a fear of loss of agricultural land due to loss in paddy cultivation.

Almost every year rice cultivation faces some serious problems like natural calamities (floods, droughts, cyclones, lightning etc.) inflation, high cost of agricultural inputs (high yield variety seeds, chemical fertilizers and pesticides etc.), high labor wages. , etc.

On the other hand, aquaculture has evolved as a more profitable and safer method. As a result, fisheries expanded rapidly and occupied most of the agricultural area, and the development of fisheries in the study area provided employment opportunities for many people. To protect the natural environment, the conversion of agricultural land and natural environment, wetlands, ponds etc. to artificial fisheries should be stopped immediately. The government should issue strict guidelines on how to use and maintain the environment while constructing fisheries. Fishermen should immediately undertake various awareness programs about the effects of using harmful fertilizers and drugs on fish growth, the government should issue fishery licenses or permits during new fisheries. Illegal fishing should be reduced with fishing licenses.

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Socio Economic Impact of Fisheries of

Bargoda godar ,Nandakumar,Purba medinipur

Town/vill.....

Municipality/ward..... Block.....

District..... State.....

1.General information of the respondent:

Name..... Gender: male/female/others

Relationship with head of house hold..... Age.....

Contuct number .....

2. General house hold information(tick approiate option)

House hold ID.....

Name of the head(house hold)..... Gender: male/female/others

Ctegory: GEN/SC/ST/OBC-A/OBC-B Poverty status: APL/BPL

3. Family member information

Name(family member)	Age(yrs)	Sex(m/f)	Marital status (m/um/w)	Age of marriage	Level of education	occupation

Bank account: yes/no

Major health problem: yes/no

If yes like.....

4. Family sized:

Small sized family (<4)..... Medium size (5-8).....

Big size family (>9) .....

5. Monthly income from fisheries :(Income groups in Rs)

<5000	
5000-10000	
10000-20000	
20000-30000	
>30000	

6. Size of fisheries:

No. of fisheries	Size of land holding(in acre)

7. Use of various food: .....

.....

8. Use of medicine :

.....

9. Best season for growing of fish: Summer/monsoon/winter/autumn.

10. Best temperature of growing of fish. 15 c- 25 c /25 c-35 c.

11. Source of water. Rivers/canal/wells/tube wells.

12. Name of fishes.

a	rohu carp	
b	Mrigal carp	
c	Catla carp	
d	Silver carp	
e	others	

13. Any government scheme provide for fisheries: yes/no if yes: .....

.....

14. Fisheries are seized by flood. Yes/no

If yes amount of loss.....

15. Major problems in fisheries – .....

.....

.....

16. Major impact of fisheries:

Positive impact	Negative impact

17. Possible suggestions by the respondent.

a. .....

b. .....

c. .....

Name of surveyor