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RESEARCH WORK

ON

"SPATIOTEMPORAL CHANGE OF FISHERIES"

[A CASE STUDY ON MOYNA BLOCK OF PURBA MEDINIPUR DISTRICT, WEST BENGAL, INDIA]

Submitted By

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CERTIFICATE

This is to certify that **MS. ARCHANA SAMANTA**, Roll- **PG/VUEGG19/GEO-IVS** No.**002** has prepared a dissertation work on "***SPATIO-TEMPORAL CHANGES OF FISHERIES: A CASE STUDY OF MOYNA BLOCK, PURBA MEDINIPUR***" 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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Last I am thankful to all of my classmates for good cooperation during preparing the study report.

Date- 14.08.23

Archana Samanta
Signature

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 one block of Purba Medinipur 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 has been presented in five chapters. The first is the introduction of the study area, objective, methodology, literature review, and description of the study area. The Second chapter spatiotemporal change of fisheries in the study area and the third chapter discusses the socio-economic condition of stakeholders. The Final chapter discusses the problem and prospective and conclusion.

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Chapter 1: INTRODUCTION

1.1 INTRODUCTION: Fish and fisheries play an imperative part in the socio-economic expansion, accomplishing the demand for animal protein, protein, prospect for employment, and poverty mitigation of the huge population fishing and aquaculture are significant economic situations of the rural population, pisciculture in the lowland paddy field in Moyna block of Purba Medinipur 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 produce more products within a short period. They are used a lot of fish feed, medication, chemical fertilizer, lime, and other chemical components.

In this field survey, it was found that most of the fishermen have been associated with fish farming for a long time and they prefer polyculture fish farming because the cost of monoculture fish farming is very high. At the cost of fish farming in this Moyna area is good as well as the income is good so most of the people are interested in fish farming instead of paddy farming in the land.

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 Moyna area increasing, quality of soil depends on the soil nutrients like organic C,N,K, and P because all physical and chemical properties significantly depend on these parameters physic-chemical and biological properties significantly depend on these parameters physic-chemical properties of soil salinity crop production get severely hampered due to saline infiltration.

1.2 STATEMENT PROBLEM: The study was undertaken in the Moyna block of East Midnapur district of West Bengal. The study revealed that fishermen in the study area faced major problems, those were-

(1) Lack of good road condition
(2) Transportation cost is very high
(3) Adulterated fish feed
(4) Price of fish feed is very high
(5) Scarcity of water in the summer season
(6) Flood problem

(7) Maintaining the fish pond bund is a problem

(8) Market price of fish is less

(9) Lack of fund

(10) Lack of proper marketing system.

(11) No facilities for storing fish.

1.3 LITERATURE REVIEW

Tarun kumar bera, Bidhn Chandra patra and Ganesh Chandra Rana (2015), socio economic aspects on paddy alternate fish culture at Moyna 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 Moyna located in 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 Moyna 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 Moyna, 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 Moyna 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 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.

Atanu Ojha, Abhisek Chakrabarty (2018), Brackish water aquaculture development and its impacts on agriculture land: A case study on Moyna block of Purba Medinipur 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 effcct on traditional Five village of Moyna block in Purba Medinipur 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 ha 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

1.4 OBJECTIVE OF THE STUDY AREA

1. To understand the spatio-temporal change of the extension of fisheries in the study area.
2. To assess the socio-economic condition of the survey population of the study area.
3. To suggest way forward for the future development of fisheries.

1.5 METHODOLOGY

- **Data Collection Method:**
- **Sampling Method:**

1. Sample size calculation:

Sample size calculation 60 households have been selected from 4 villages of Moyna block Purba Medinipur households have been chosen through the sample random sampling method.

2. Data collection method:

A household survey has been conducted by the researcher to collect the primary data. From different website reports and literature secondary data has been collected.

Phase	Work done
Pre-field	Literature Review Questionnaire framing
field	Sample size calculation household survey through semi-structure questionnaire
Post field	Data analysis

3. Data analysis method:

The collected primary and secondary data has been analyzed by using the following method- **i. Simple statistical technique:**

Some simple cartograms like Bar diagrams, Pie diagrams, have been prepared through Microsoft Excel to represent the primary data collected from the household survey. **ii. Normalized Difference Water Index (NDWI):**

On the basis of downloaded Landsat satellite images NDWI maps for thirty years at 10-year interval, have been prepared through ArcGIS software. One is used to monitor changes in the water content of leaves, using near-infrared (NIR) and short-wave infrared (SWIR) wavelengths, proposed by Gao in 1996:

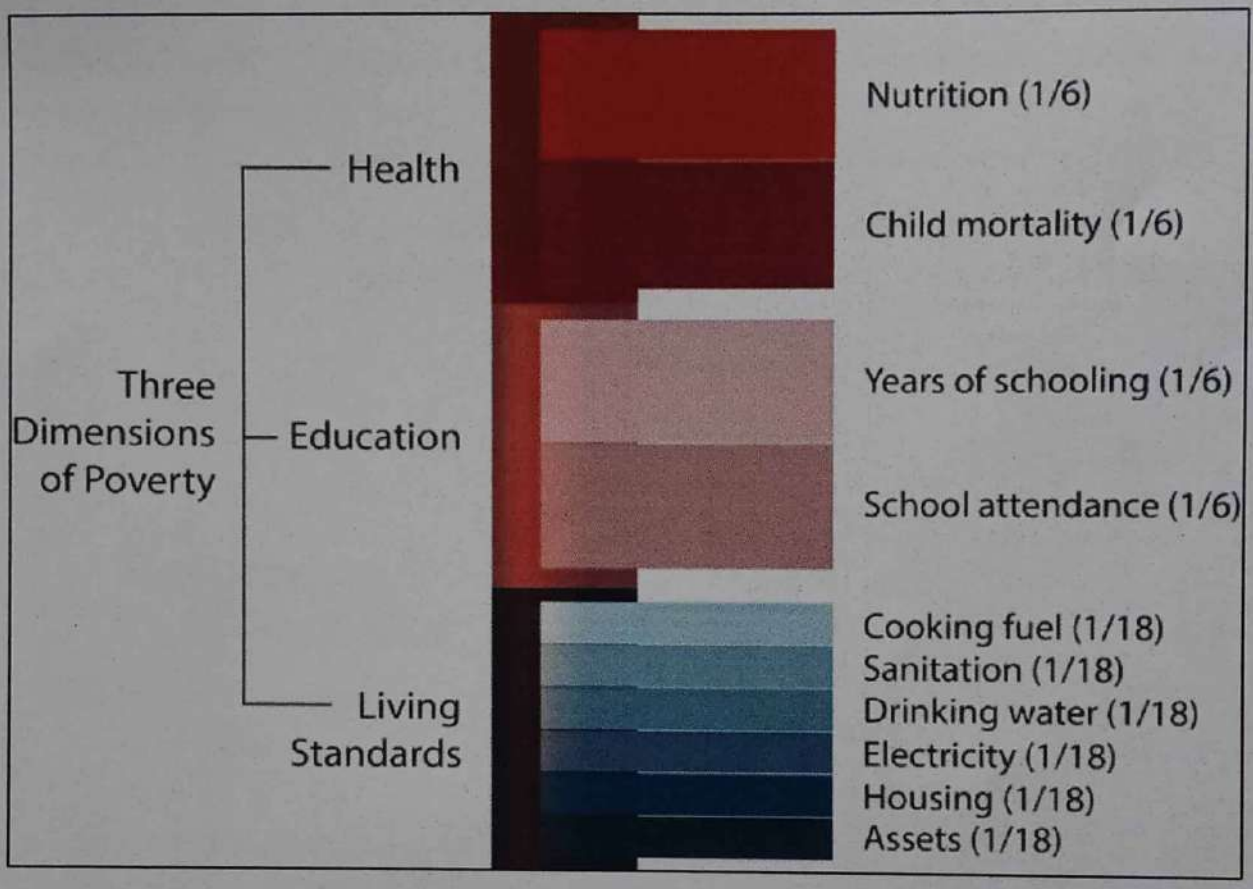
Formula:
NDWI = (Xnir - Xswir) / (Xnir + Xswir)

Another is used to monitor changes related to water content in water content in water bodies, using green and NIR wavelengths, defined by McFeeters (1996):

NDWI = (Xgreen – Xnir) / (Xgreen + Xnir)

iii. Multidimensional Poverty Index:

To assess the socio-economic condition of the surveyed population, a multidimensional poverty index has been calculated for each of the four villages and represented through simple cartograms.



Source: OPHI (2018). *Global Multidimensional Poverty Index 2018: The Most Detailed Picture to Date of the World's Poorest People.*

1.6 ABOUT THE STUDY AREA

The study area Anandapur, Gourangachak, Sudampur, Tilkhoja village is situated at the south and south East in Moyna of Purba Medinipur District of West Bengal. Moyna CD block is an administrative division of the Tamluk subdivision of Purba Medinipur district in the Indian state of West Bengal. The total area of this block is 154.5km.sq. and the average elevation from Mean Sea Level is 6m (20ft). The block is surrounded by the Kangsabati River in the Southern part, the Western part is bordered by the Paschim Medinipur district, and the northern part by the Panskura CD block.

It has 1 Panchayat Samity, 11 Gram Panchayat, 159 Sansads (village Councils) 85 Mouzas, and 85 inhabited Villages. The total population of which 222927 out of which 220360 were rural and 6,597 were urban (2011 census).

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 shrimps farming hot spots along the east coast of India. This study area was selected for aquaculture because most fish farming activities are developed by river water supply. The study area main river are Keleghai, and Kangsabati. The Climatic condition of this area is basically tropical monsoon type and rainfall has occurred by the influence of southwest monsoon in the months, of June to October.

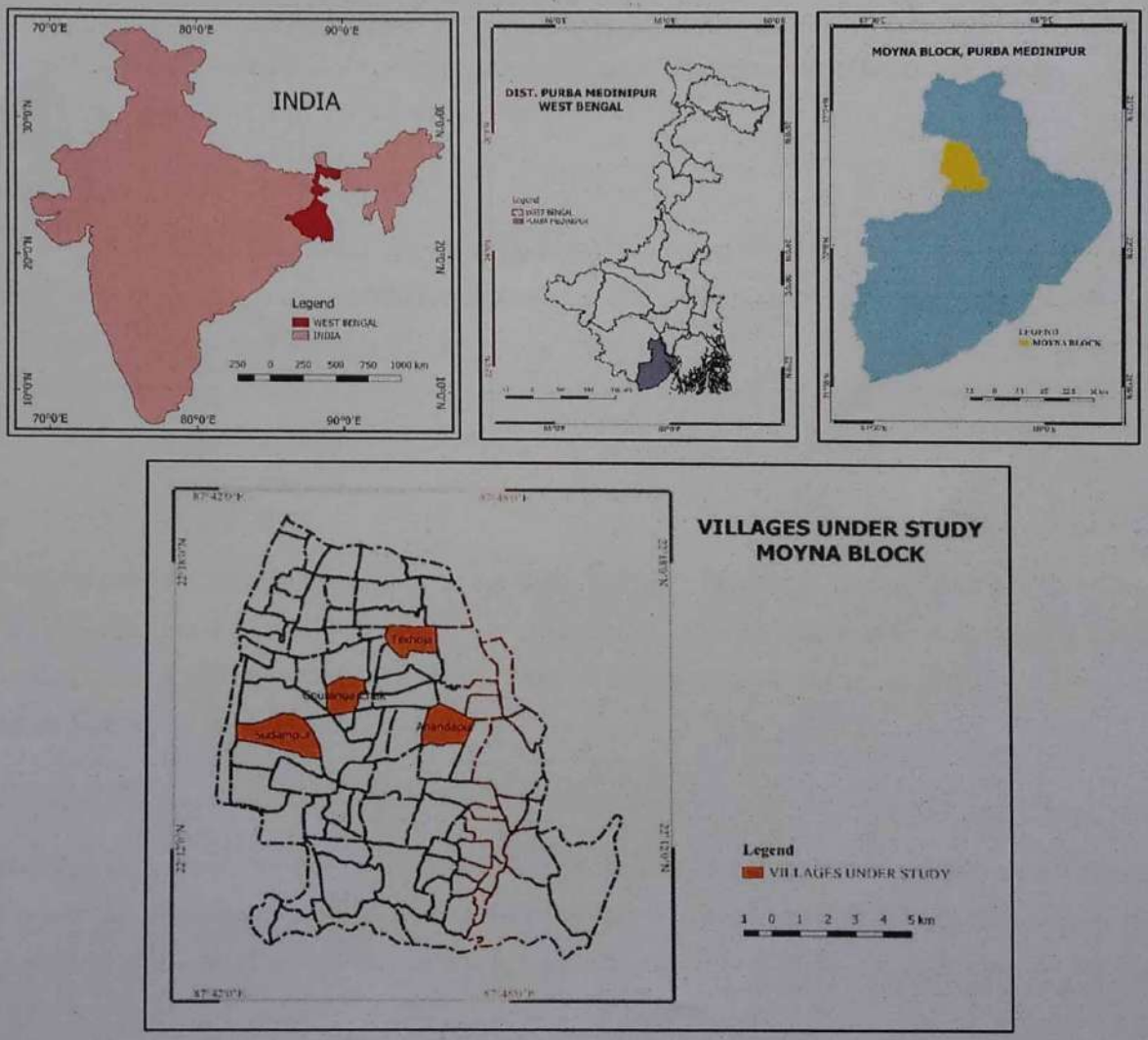


Figure no. 1: Location of the study area

1.7 DRAINAGE SYSTEM:

Inadequate drainage outlet causing waterlogging 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 Moyna 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 and R. Chandia in the east and west respectively, R. Keleghai in the south and by the Bakshi Canal in the north. 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 geomorphologically termed as drainage congestion, resulting in annual seasonal waterlogging 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. Haldi.

1.8 CLIMATE CONDITION:

The study area 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.

1.9 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.

1.10 ANNUAL PRECIPITATION:

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

1.11 LIMITATION OF STUDY AREA:

1. The sample size of the study was very limited to acquire more reliable and relevant data.

2. Lack of previous information on relevant topics. Only a small amount of data is available for reference.

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

4. Lack of financial assistance from any source in carrying out the study at times was a major hurdle faced by me.

5. The time period is very short to work out.

Plate no. 1: Some glimpses of fishermen working in the study area.

a) **Shrimp cultivation at village Anandapur,**

b) Fishermen collecting fish at Sudampur village

CHAPTER-2 SPATIO-TEMPORAL CHANGE OF FISHERIES IN THE STUDY AREA

2.1 Introduction

The calculated NDWI index, we need imagery from two different wavelengths, namely nearinfrared and shortwave Infrared band imagery. And the NDWI ratio is calculated as:

NDWI = (G-NIR) / (G+NIR)

A short-wave infrared imagery band is used because the high absorption of light by water occurs at this wavelength. NIR band is used because water does not absorb this part of the electromagnetic spectrum, thus the calculated NDWI index is resistant to atmospheric effects, making it distinguishable from NDVI.

The NDWI index is characterized by a more stable decrease in value upon reaching critical anthropogenic load, which can give an indication of the ecological state of forests. The value of the NDWI index can range from (-1.0 to + 1.0). The high values correspond to and coating of high plant fraction, whereas the low NDWI value corresponds to low vegetation content and cover with low vegetation. NDWI rate will decrease during periods of water stress.

- **NDWI (2003)**

In 2003 the NDWI value ranged from (0.056 to 0.227). Where the maximum value of 0.227 represents the water bodies, those were found mainly in the northwestern part and some parts of the southern side. Non-water bodies value is (-0.223) non-water bodies are seen in this map's eastern and northern parts. So, it is understood that water bodies mostly developed in the 2003-year western part than the other part.

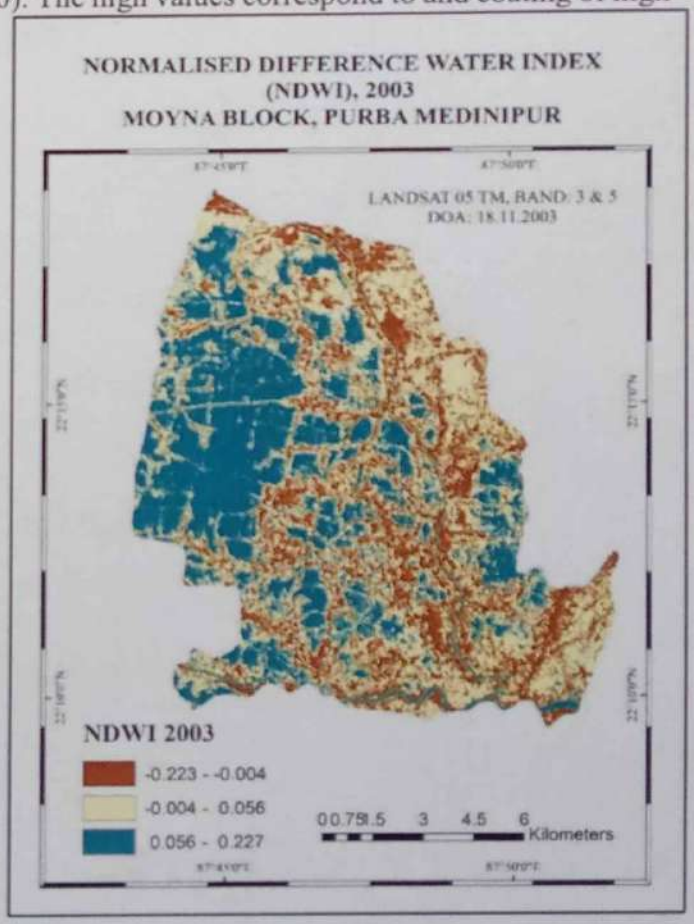


Fig. No. 2(a) Normalised Difference Water Index map of the year-2003

NDWI (2014)

In 2014 the NDWI highest value is 0.190. In this case, the water bodies are mainly seen in the western and southern sides. The map shows that water bodies in the southern side increased in the year 2003 and the land area decreased in this year. As these images are post-monsoon period so the water bodies range decreasing 0.037 than the previous year.

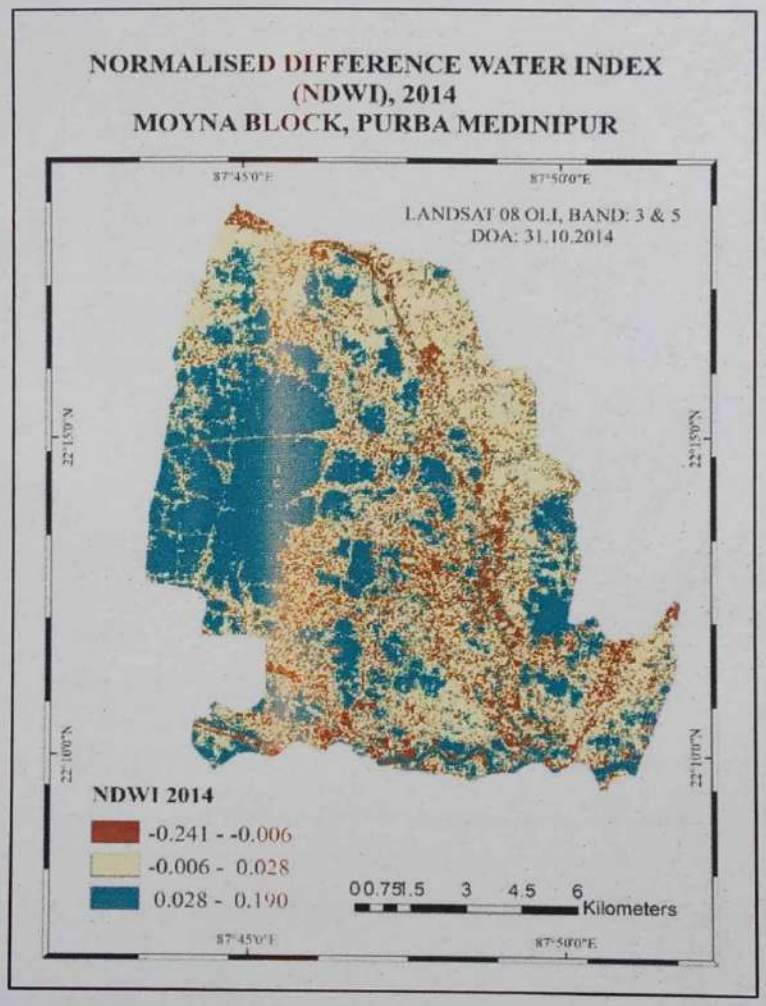


Fig No. 2(b) Normalised Difference Water Index map of the year-2014

NDWI (2022)

However, when looking at 2020, the NDWI value range from (0.060-0.212). In this case except for a small portion of the southern-eastern, all over the area reflect water bodies and land are dominant in this year than the previous year. The highest value of NDWI is 0.212 and increasing the NDWI value in 2014 is 0.190.

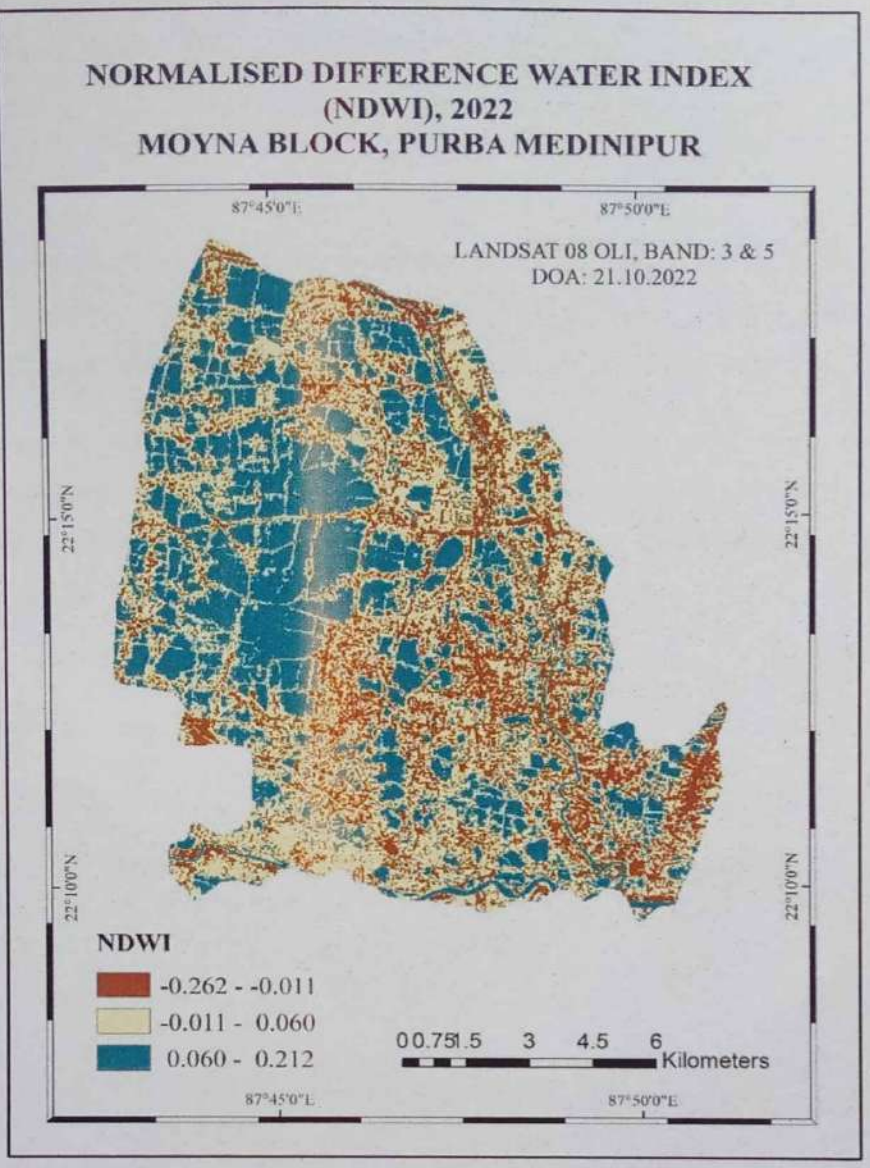


Fig. No. 2(c) Normalised Difference Index map of the year-2022

- **Change Detection Analysis**

Comparing these three NDWI maps shows that water bodies have decreased slightly from 2003 to 2014 because in this image are post monsoon period but water bodies increased in 2022 compared to 2014.

In the year of 2003, the water bodies were found southwestern and northwestern but 2014- and 2022-year water bodies gradually increase in the northeastern southeastern parts. Just like water bodies almost spread out the portion of the study area in 2022, land area is more dominant in this

year than the previous year. The main cause of this kind of change is the conversion of agricultural lands into fish farming areas.

Conclusion

The image subtraction method has been applied for detecting the change in fisheries land in the study area. After analysis of the three different year's images, the final result shows that the use of land is changed from agricultural land to fisheries land.

The regular flooding in the area may force the changed portion of local people to change their cultivation and few portions of the study area show that the agricultural land is converted into fisheries land which is measured in the past few years. It was also observed that the existing fisheries land is changed in its shape and size.

CHAPTER 3: SOCIO-ECONOMIC CONDITION OF FISHERMEN IN THE SURVEYED VILLAGES

3.1.1 Cast Composition

A Caste is a form of social stratification characterized by endogamy, hereditary transmission of a style of life. According to a field survey, all fishery owners in Moyna block in Purba Medinipur district are divided into many different castes such as SC, ST, and OBC. It shows that the majority of the fishery owners belong to the general category which is around 36.67%. SC and OBC-B fishery owners (25%) and (21.67%) respectively. The lowest fishery owners' group is OBC-A with only 16.67%.

Table No: 1 Cast Composition

Category	Number	(%)
General	22	36.67%
SC	15	25%
OBC-A	10	16.67%
OBC-B	13	21.67%

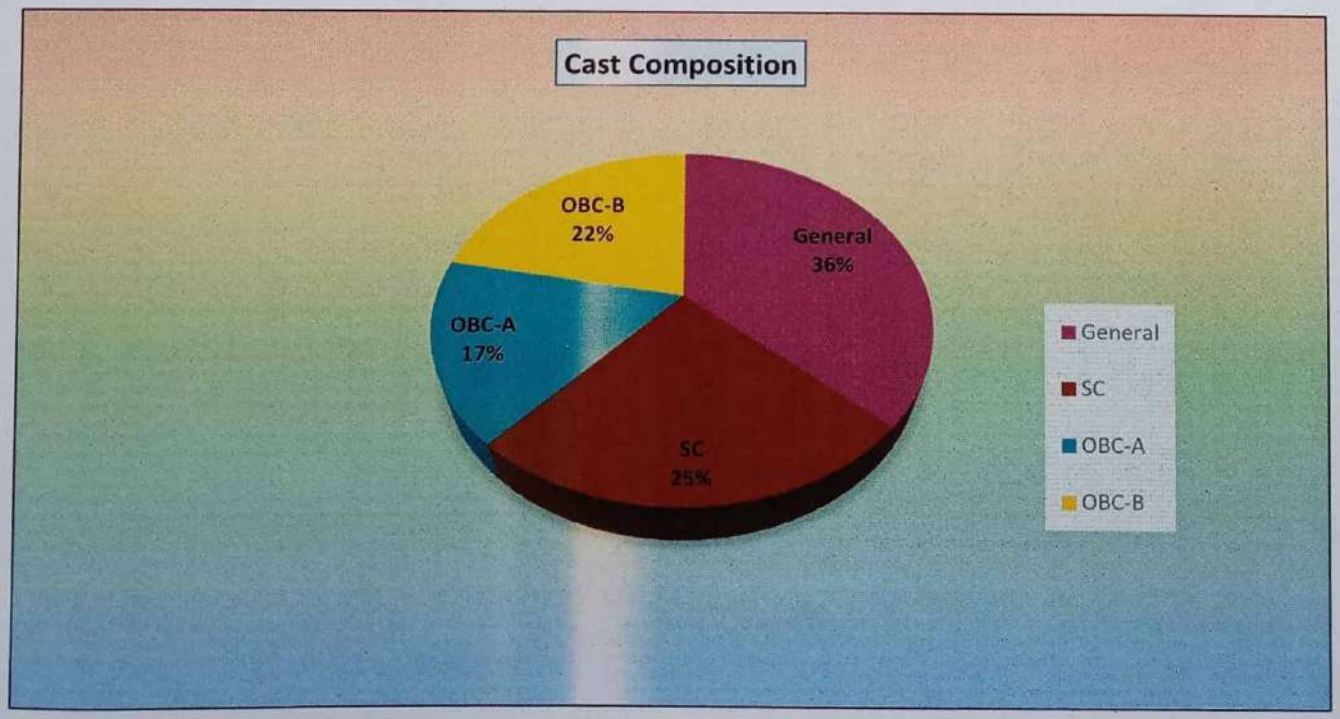


Fig No: 3 Caste Composition

3.1.2 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 groups such as (<35), (35-45), (>45). It appears that 35-45 this group has a greater number of owners belongs which is around 66.67% and 15%, 18.33% are found <35, <45 in this group.

Table No: 2 Age Composition

Age Group(yrs)	Number	(%)
<35	9	15%
35-45	40	66.67%
>45	11	18.33%

Source: Field survey 2023

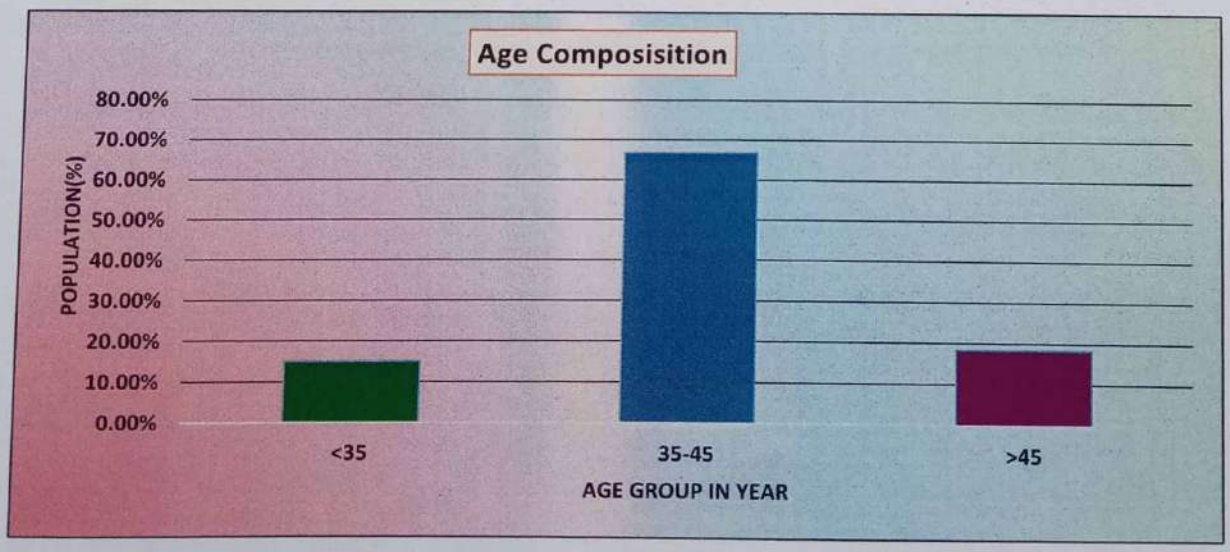


Fig No: 4 Age Composition

3.1.3 Level of Education:

Level of education refers to the level of formal education that have completed. There are education levels divided into three levels i,e secondary(VII-X), higher secondary (XI-XII), and graduate. The Field survey showed that most of the fishery owners are in secondary education which is 53.33%, higher secondary has 31.67% and graduate has 13.33%. So, it is understood that the education level of fishery owners is low.

Table No: 3 Level of Education		
Education Level	Number	(%)
Secondary education	32	53.33%
Higher Secondary education	19	31.67%
Graduate	8	13.33%
Source: Field survey 2023		

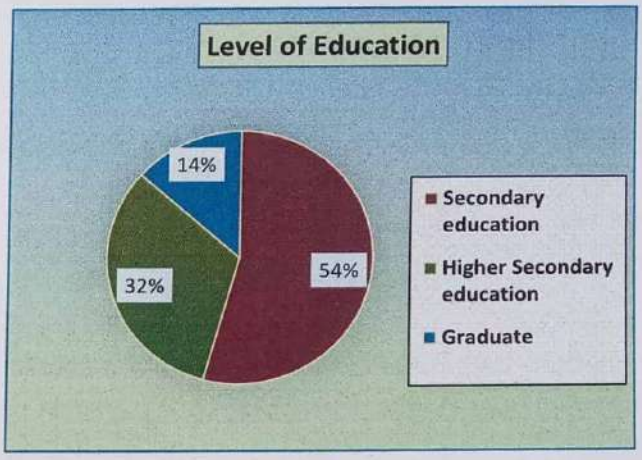


Fig No: 5 Level of Education

3.1.4 Gender Composition:

Gender composition of the human population is one of the basic demographic characteristics, as changes in gender composition largely reflect the underlying socioeconomic and cultural patterns of society in different ways. The field survey revealed that the total number of all fisheries owner's households is 340 in which the number of females is 49 and with a sex ratio of 965 per thousand males.

Table No: 4 Gender Composition	
Total Member	340
Male population	173
Male Ratio	51
Female Population	167
Female Ratio	49
Gender Ratio	965
Source: field Survey 2023	

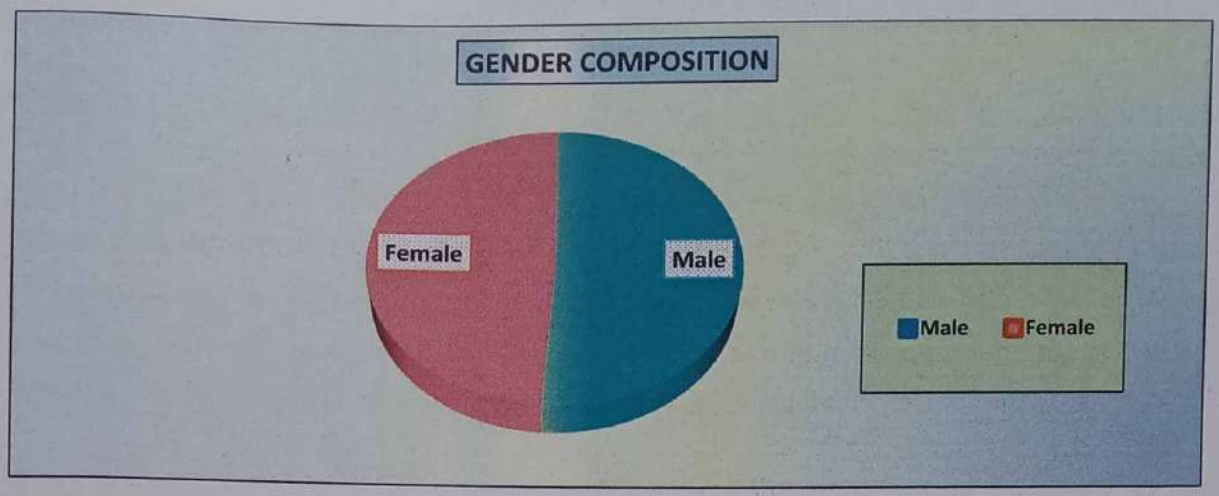


Fig No: 6 Gender Composition

3.1.5 Duration of Profession:

In this field survey, the duration of professional is divided into several parts they are (5 year), (10 year), (15year), (20 year). In this case, it has been seen that most fisheries owners have been associated with this profession for about 10 years which is 43.33%.

41.47% and 6.67% of the fisheries ownership associated with this professional for 15 years and 20 years or more. So the area is favorable for fish farming so the fisheries owners are involved for many years and their economic condition will be good.

Table No: 5 Duration of Profession		
year	number	(%)
5 Year	5	8.33%
10 Year	26	43.33%
15Year	25	41.67%
20Year or more	4	6.67%
Source: Field Survey 2023		

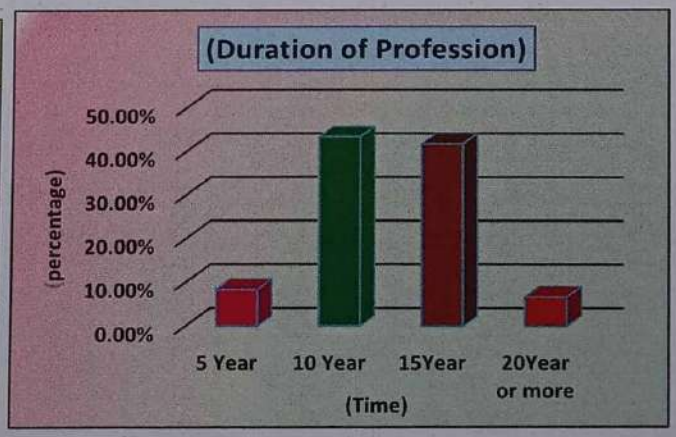


Fig No: 7 Duration of Profession

3.1.6 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 dividends. It is seen that 33.33% of fishery owners have a >25 Acre fishery area and 46.67% of fishery owners have a 15-25 Acre fishery area. 20% of people have <15 Acre fishery area. As a result, in this Moyna area fishery is very high and agriculture decreasing.

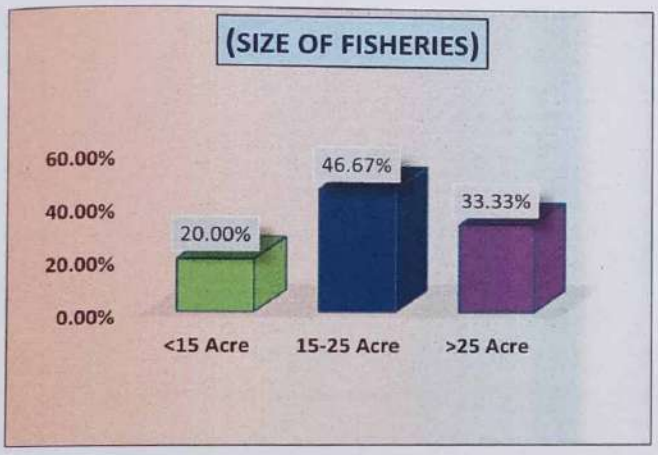


Table No: 6 Size of Fisheries

Area	Number	(%)
<15 Acre	12	20%
15-25 Acre	28	46.67%
> 25 Acre	20	33.33%

Source: Field Survey 2023

Fig No: 8 Size of Fisheries

3.1.7 Type of Pisciculture

There are Pisciculture are two types – Polyculture and Monoculture. Polyculture is also called composite or mixed fish farming. Polyculture lets rearing different species of compatible fishes in a shared pond. It is a beneficial kind of Pisciculture. Monoculture is a system that allows the farming a single species of fish. It offers high production and quality. These fishes are popular among consumers. An Example of monoculture fish is shrimp.

In this field survey 80% area is associated the polyculture and 20% area is associated the Monoculture because monoculture has high cost and risk.

Table No: 7 Type of Pisciculture		
Type	Number	(%)
Monoculture	12	20%
Polyculture	48	80%
Source: field survey 2023		

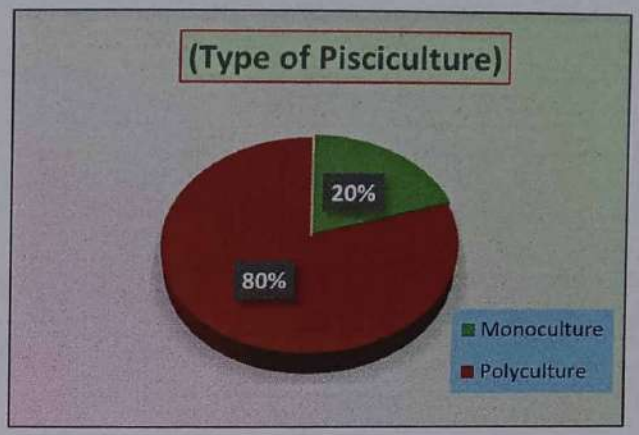


Fig No: 9 Type of Pisciculture

3.1.8 Overall income fisheries

Income means the amount of money received in exchange for products or service. For an individual, for example, their gross income is the sum of total earnings from wages or salaries, return on investments, dividends earned on stocks, and other receipts. From this field survey, it is seen that about 66.67% of fisheries owners earn an annual income from 6 to 10 lakh and 16.67% of fisheries owners earn more than 10 lakh and 18.33% of fisheries owners earn less than 6 lakhs from fisheries.

So the income in fisheries in the Moyna area is almost agricultural land in that area is decreasing and the amount of fish farming is increasing.

Table No: 8 Overall Income of Fisheries		
Income	Number	(%)
>6 lakh	11	18.33%
6 to 10 lakhs	39	66.67%
<10 lakh	10	16.67%
Source: Field Survey 2023		

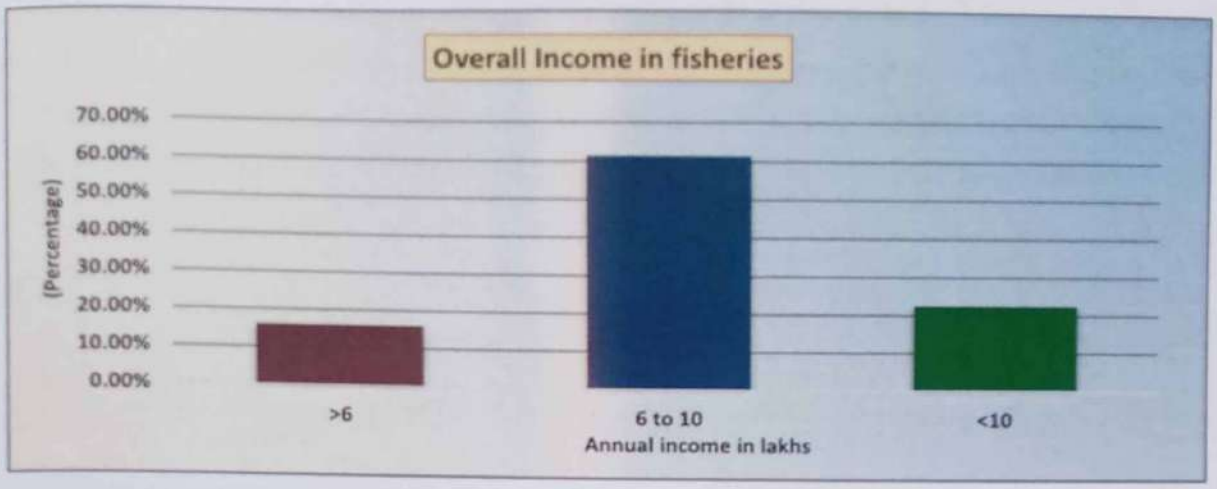


Fig No: 10 Overall Income in fisheries

3.1.9 Amount of production

Production rate in terms of manufacturing refers to the number of goods that can be produced during a given period of time. This diagram shows that 58.33% fish production is between 40 to 60 tonne, 16.67% fish production is less than 40 tonne and 25% fish production is greater than 60 tonne. Survey in the Moyna area have shown that fish production is moderate compared to the cost of fisheries due to various viruses, and many fish die due to poor water quality.

Table No: 9 Amount of Production		
Amount	Number	(%)
<40 Tonne	10	16.67%
40-60 Tonne	35	58.33%
>60 Tonne	15	25%
Source: Field Survey 2023		

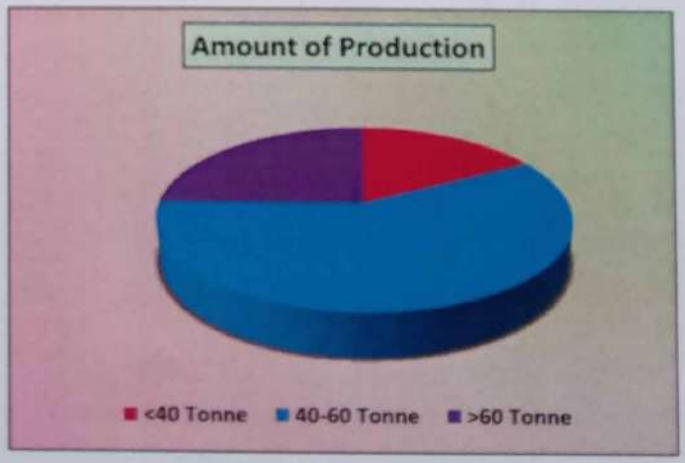


Fig No: 11 Amount of production

3.1.10 Expenditure of Fisheries:

The cost of fish farming is very high as various inputs are used such as land excavation through the equipment water supply, fish feed, fertilizer, lime, nets, technical services, operation and maintenance, labor etc. However, if fish production is done well, the profit is much higher because nowadays the demand for fish is high for maintaining good health. This diagram found that, 66.67%% of fish farming costs between 5 to 8 lakh, 16.67% greater than 8 lakh, and 18.33% less than 5 lakh.

Table No: 10 Expenditure of Fisheries

Amount	Number	(%)
< 5 Lakh	11	18.33%
5 to 8 Lakh	39	66.67%
> 8 Lakh	10	16.67%

Source: Field Survey 2023

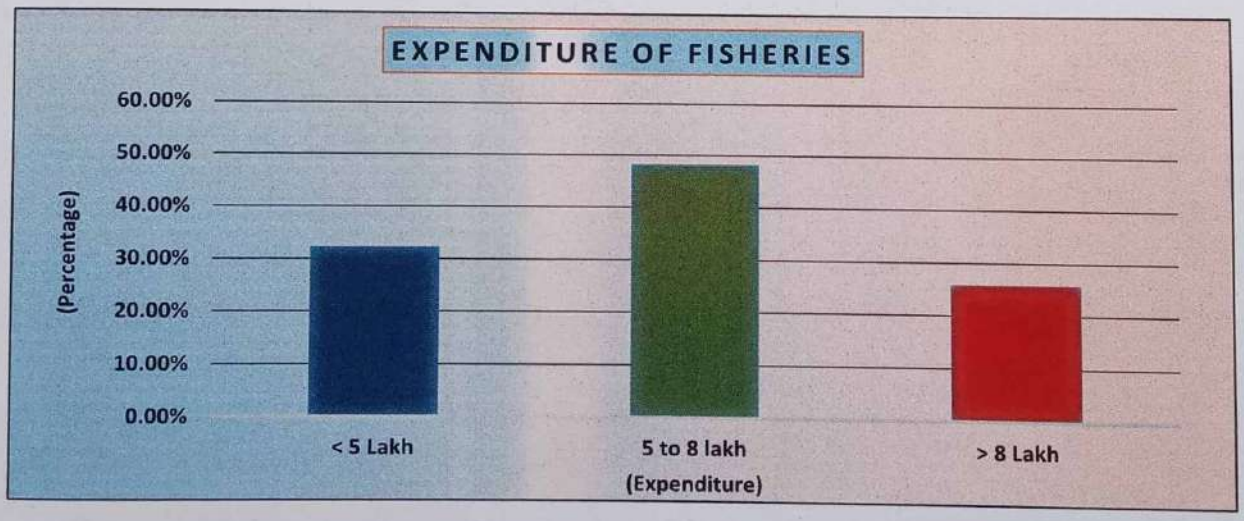


Fig No: 12 Expenditure of Fisheries

3.1.11 Duration of fish production

The duration of fish production is very important to fishermen because the shorter the time the fish can be raised and supplied to the market, the higher the profit. Survey in the Moyna block of Purba Medinipur district show that 70% fish are produced within more than 6 months and 30% fish are produced within 3 to 5 months.

Table No: 11 Duration of Fish Production		
Duration	**Number**	**%**
3 to 5 Month	**18**	**30%**
6 Month or more	**42**	**70%**
Source: Field Survey 2023		

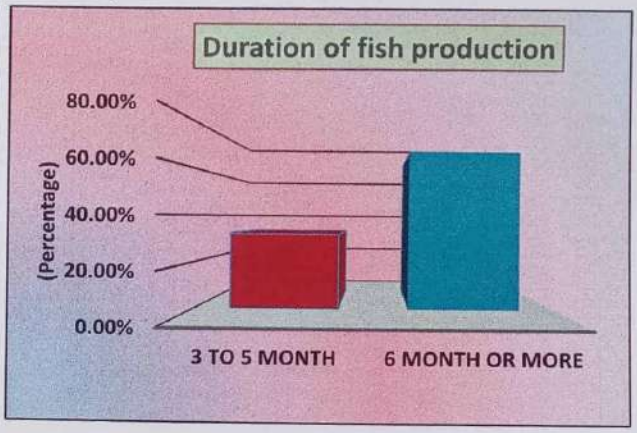


Fig No: 13 Duration of fish Production

3.1.12 Feeding type of fisheries:

Almost all fishermen use fish food to increase the production of fish, but since the cost of fish food is very high, they give many other foods along with that food like Rice bran, Sesame cake, Crop grain, Blood and innards of bird or animal. In this survey the fish feed are divided three type- Fish meal, wheat barn and other (Rice bran, Sesame cake, crop grain). In this case show that 100% of the fishermen use the fish meal and 40% of the fishermen use Wheat barn and 60% of fishermen use other fish meal.

Table No: 12 Feeding Type of Fisheries		
Feeding Type	**Number**	**(%)**
Fish Meal	**60**	**100%**
Wheat Barn	**24**	**40%**
Other	**36**	**60%**
Source: Field survey 2023		

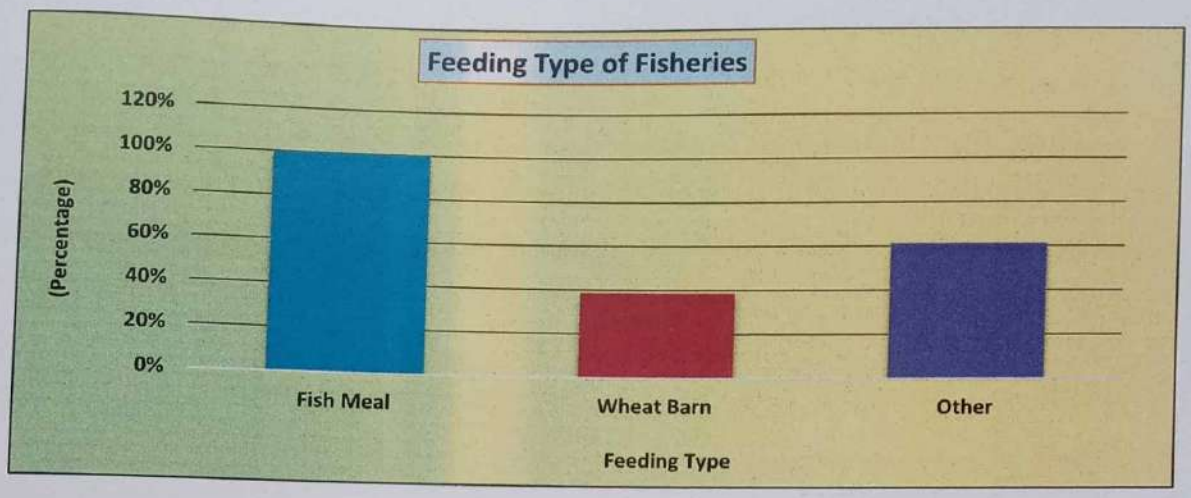


Fig No: 14 Feeding type of fisheries

3.1.12 Water comes from

Fish farming requires a lot of water. A survey of this Moyna area in Purba Medinipur district revealed that most of the fisheries take water from cannel. Since there are many types of fish farming in that area like Silver carp, Rohu, Nile tilapia, etc the water is treated with various medicines to keep the fish alive. There is water that comes from fisheries are divided into two type- canal and river. In this case, are found 75% of the water comes from the canal and 25% of the water comes from the river.

Table No: 13 Water Come from Fisheries

Water come	Number	(%)
Cannel	45	75.00%
River	15	25.00%

Source: Field survey 2023

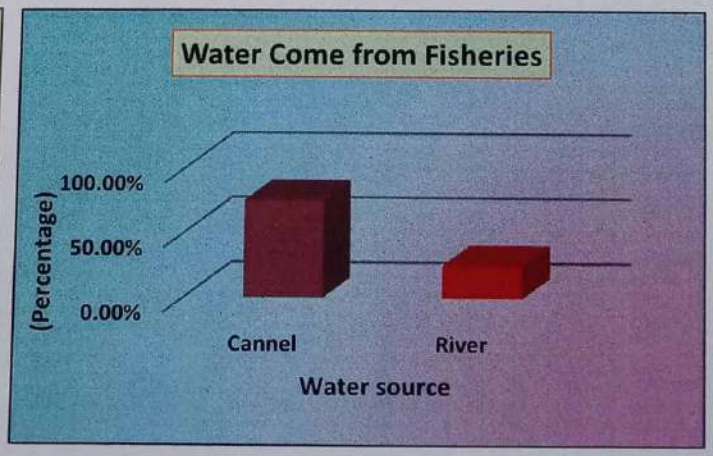


Fig No: 15 Water come from Fisheries

3.1.13 Main area engaged

The survey of Moyna in Purba Medinipur district shows that almost 100% agricultural land has been converted into fish farming land so the amount of agricultural land in that area is gradually decreasing and the amount of fisheries in increasing because the amount of profit in fisheries is very high than the agriculture.

Table No: 14 Main Area Engaged

Type	Number	(%)
Agriculture	60	100%
Forest	0	0%

Source: Field Survey 2023

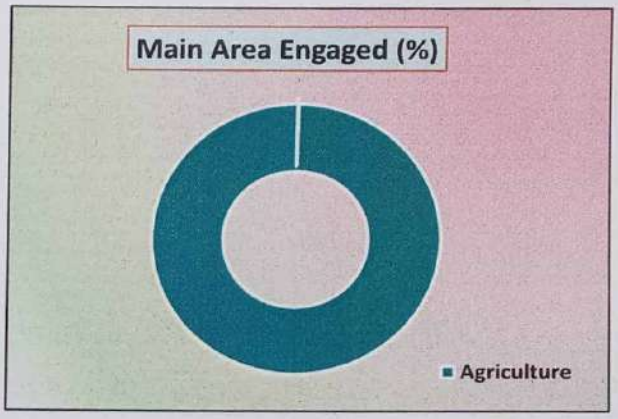


Fig No: 16 Main area Engage

3.2 Multidimensional Poverty Index

3.2.1 Health Condition

Health condition in a region depends on nutrition and child mortality rate. If the nutrition condition is good and the child mortality rate is low in a region, so the health status of this region is considered good Survey in Moyna area shows that 28.33% people are undernourished and child mortality rate is 15%. So the health condition fisheries owner member is good because their economic condition is better.

Table No: 15 Nutrition rate

Nutrition rate	Number	(%)
Yes	17	28.33%
No	43	71.67%

Source: Field survey 2023

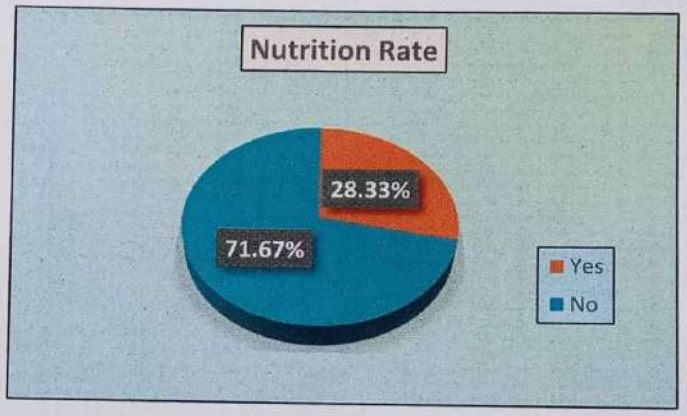


Fig No: 17 Nutrition rate

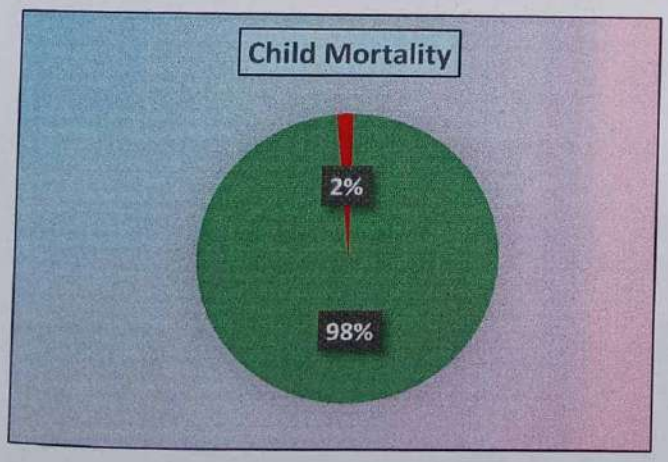


Table No: 16 Child Mortality

Child Mortality	Number	(%)
Yes	9	15%
No	51	85%

Source: Field survey 2023

Fig No: 18 Child Mortality

3.2.2 Source of drinking water:

Water a basic necessity of humans. The Source of drinking water is very important of the socioeconomic condition of fisheries owners. According to the field survey, it is understood that 35% of fisheries owner's source of drinking water is tap and 43,33% of fisheries owner source of drinking water is personal submersible and 21.67% tubewell is the source of drinking water. So the socioeconomic condition of the fisheries owner of the Moyna area is almost good.

Table No: 17 Source of Drinking water		
Source	Number	(%)
Tap	21	35%
Tube well	13	21.67%
submersible	26	43.33%
Source: Field survey 2023		

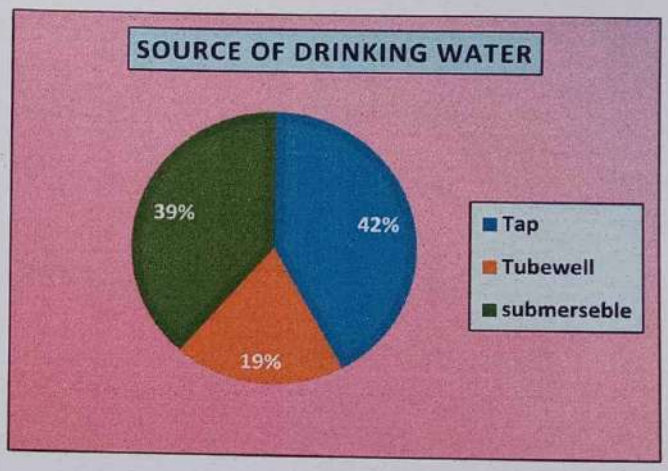


Fig No: 19 Source of Drinking Water

3.2.3 Housing type

Housing is very important for human survival. The socioeconomic status of a person is known to some extent by looking at the housing type. In this case, housing types are divided into three types – Kutcha, pucca, and semi-pucca. In this survey, it can be seen that 63.33% of fishery owners have pucca houses, 20% of fishery owners have semi-pucca houses and 16.67% have kutcha houses. So most of the fishery owners in the Moyna area are is a good economic condition.

Table No: 18 Housing Type in Fisheries owner		
Type	Number	(%)
Kutcha	10	16.67%
Semi Pucca	12	20%
Pucca	38	63.33%
Source: Field survey 2023		

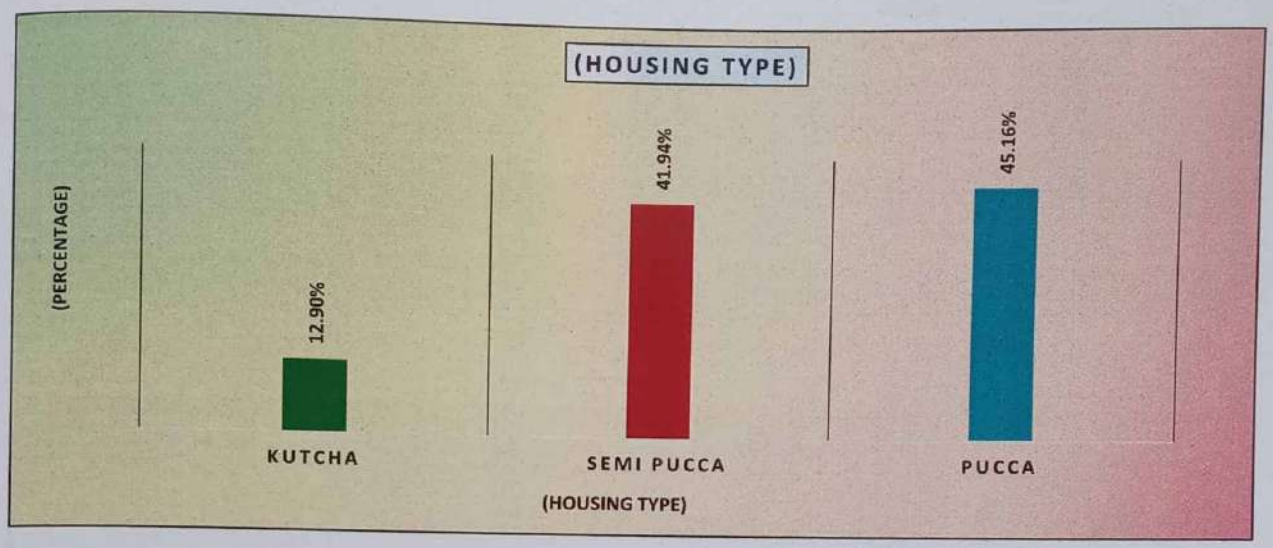


Fig No: 20 Housing type

3.2.4 Assets of all fisheries

Moyna block are situated in Purba Medinipur of West Bengal household wealth comprises of combinations of household asset. From this survey it can be shown that Television, Mobile, Electric fan, are the main household assets in the all fisheries owner house because mobile and television significant communication asset. In this case 100% population have television, mobile and electric fan, 80.66% of fishery owner have a bike,45.16% of fishery owner have refrigeration.

Table No: 19 Assets of all fisheries Owner		
Assets type	Number	(%)
Television	31	100%
Mobile	31	100%
Computer	10	32.26%
Electric Fan	31	100%
Water filter	8	25.81%
Refrigeration	14	45.16%
Bike	31	100%
bicycle	25	80.66%
Source: Field survey 2023		

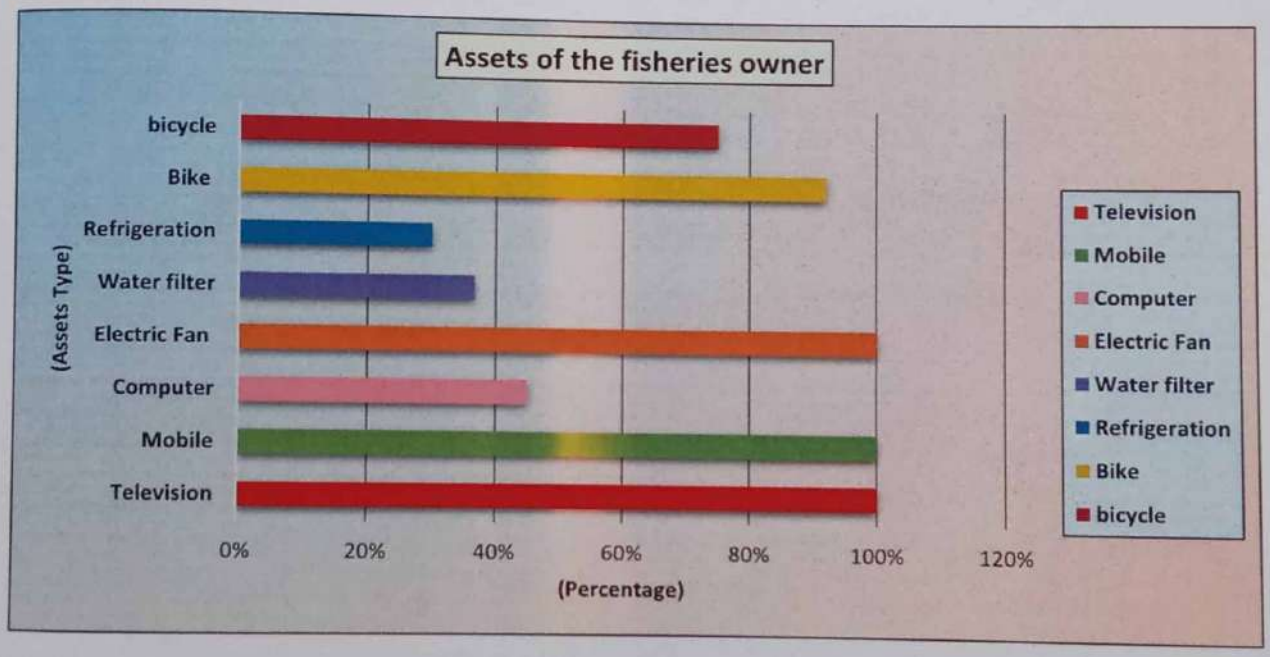


Fig No: 21 Assets of the fisheries owner

3.2.5 Cooking fuel

The study area of Moyna block located in Purba Medinipur District. The almost total household i,e…..total 60 household depend on LPG fuel for cooking. Also, many households depent on fuelwood and cow dung for cooking as the number of rural area in Moyna block is high.

Table No: 20 Cooking Fuel

Type	Number	(%)
Cow Dung	8	25.81%
LPG	60	100%
Fuel Wood	23	74.19%

Source: Field Survey 2023

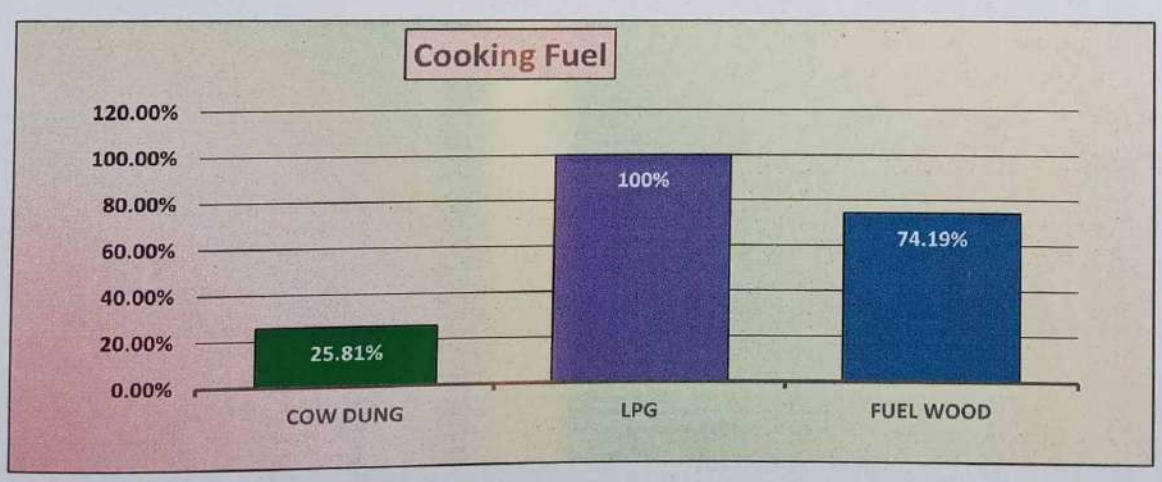


Fig No: 22 Cooking Fuel

Multidimensional Poverty Index:

The global Multidimensional Poverty Index(MPI) is an international measure of acute multidimensional poverty covering over 100 developing countries. It complements traditional monetary poverty measures by capturing the acute deprivations in health, education, and living standards that a person faces simultaneously.

The MPI Assesses poverty at the individual level. If a person is deprived in a third or more of ten (weighted) indicators the global MPI identifies them as "MPI poor". The extent or intensity of their poverty percentage of deprivation they are experiencing.

The formula of the Multidimensional Poverty Index:

$$MPI = H \times A$$

Where,

H = Incidence of Poverty (the percentage of the population who are poor)

A = The Intensity of Poverty (the percentage of deprivations suffered by each person or household on average)

Table No:21 Calculation Of MPI For Four Villages

Name Of Village	Incident Of Poverty(H)	Intensity of poverty(A)	MPI Value
Anandapur	0.50	0.361	0.181
Sudampur	0.40	0.361	0.144
Tilkhoja	0.30	0.259	0.078
Gourangachak	0.60	0.389	0.233

By surveying four villages in Moyna block in Purba Medinipur district it was found that MPI (Multidimensional Poverty Index) value is 0.078 in Tilkhoja village so the number of poor in that village is less and in Gouragachak village MPI value is 0.233 so the number of poor in this village is high.

CHAPTER -4 ANALYSIS OF THE PROBLEM IN THE STUDY AREA

4.1 Analysis of the Problem in the study area

India is to sustain 16 percent of the world's population on 2.4 percent of the global land area. It has to feed its burgeoning population using 3 percent and 5 percent of global farmland water resources. Hence, its dependence on fisheries resources for the production of additional food is obvious and shall become more and more obligatory. Fisheries are playing a key role in the changing profile of Indian economic growth.

A survey of Moyna block in Purba Medinipur district of West Bengal shows that excessive fish farming is causing various problems which are discussed below.

- **Environmental problem of the fishery area:**
  1. Increase the salinity of the soil.
  2. The ecosystem is being interrupted.
  3. Habitat damage
  4. Water pollution
  5. Antibiotics are used for fish disease which directly affects soil, water, agriculture, and also in human health by getting food .
  6. Increasing shrimp disease for the attacking of viruses and bacteria

- **Economic Problem of the fisheries area:**
  1. Production of paddy and other crops is decreasing resulting in a shortage of food.
  2. The primary cost is much higher, so fish farming is not possible for poor farmers.
  3. Lack of trained labor.
  4. It is not possible to cultivate more amount of fish in a short space on the same land for a long time.
  5. Crop production is not good for the increasing of soil to lease the land.

❖ **Social Problem of the Fisheries area:**

1 The rich people are getting richer and as a result, social and economic discrimination has increased.
2 An Illegal system developed.
3 Often the pressure of politicians or large businessmen and land owners is forced to lease the land.

CHAPTER-5 SUGGESTION AND CONCLUSION

5.1 Analysis of the suggestion for future betterment

For the socioeconomic development of Moyna block in Purba Medinipur district many problems have been created and also pollute the natural environment. In this situation, the suggestions for future betterment are given below.

1. Permission of Government for brackish water shrimp
2. The Government will have to be stricter about giving permission.
3. To provide training to the workers.
4. The use of antibiotics will be reduced.
5. Freshwater shrimp culture should be increased gradually.
6. How to increase income from different crops should be arranged.
7. Must specify specific places for brackish water farming where only this will be cultivated.
8. Where the cultivation is good for fertile soil, there is no brackish water fishing to cultivate.
9. To increase awareness among the people.
10. The project is to supply the equipment for fisheries (net, machine, vessel, etc).
11. Reformation of water bodies.
12. Testing of water and soil lab should be increased.
13. Banking and insurance system for fishermen.
14. Providing training and credit for non-fish related sources of income in order to maintain the diversity of livelihood of the people.
15. Established Fisheries Resource Center (FRCS) in this study area to provide technical support.
16. We may suggest that the Government should intervene and appoint experts to supervise and look after the scientific method for site selection of fish farms
17. Appropriate food and medicine for increasing production and taking the steps for minimizing or stopping leakage of saline water from ponds.

1. 5.2 Conclusion:

The ultimate conclusion of the study was that the Moyna block has undergone a massive NDWI alternation between 2003, 2014, and 2022. During the chosen 30-year of study period, there was significant increasing fisheries land and agriculture land was likely to decline due to a loss in paddy cultivation every year.

Almost every year paddy cultivation face some serious problems like natural disaster (flood, drought, cyclonic rainfall etc.) inflation the high price of agricultural inputs (high-yield variety seeds, chemical fertilizers and pesticides, etc).

On the other side, fisheries have evolved as a more profitable and secure method of cultivation. As a result, fisheries quickly expanded and occupied the majority of the agricultural area. It should be necessary to immediately stop the transformation of agricultural land and the natural environment. The government should issue stringent guidelines on how to make use of and maintain the environment to time the construction of fisheries different awareness programs should be taken about the impact of the use of harmful fertilizer and medicine on the immediate growth of fish by the fisherman Government should give fisheries licenses or permission when new fisheries are developed. The construction of illegal fisheries is taught to be decreased by the licensing of fisheries.

5.3 Field Photo:

Fig No: 23 Some photos of survey area

5.3 Reference:

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Questionnaire of the fishery

Village: Gram Panchayat:

District: Block:

State:

- General information of the respondent

1.Name:	2. Gender: Male/Female/Other	3.Age(yrs.):
4. Relationship with Head of Household:	5.Total Members: Male: Female:	6.Education:
7. Category: Gen/SC/ST/OBC-A/OBC-B	8. Occupation: only fishery/Other	9.Marital Status:

- Type of Fisheries

10. Duration of being in this profession?	
a. 5 year	b. 10 year
c. 15 year	d. 2o year

11. Size of the fishery? Area:

12. Method used to farming?	
a. Extensive fish farming	b. Intensive fish farming

13. Type of pisciculture?	
a. Monoculture(Species)	b. Polyculture(Species)

14. Overall income from the fishery?

15. Amount of production from this fishery?

16. Use of inputs in fish production?

Input type production	Expenditure
Setup cost (Pond, facility, equipment etc)	
Fish feed	
Fertilizer	
Lime	
Net	
Fencing	
Transportation cost	
Technical services	
Operation and maintain	
Labour	

17. Fishery related business?

a. Direct market place	b. Direct trade	c. Restaurants	d. Processing	e. None

18. Period engaged fishery farming?

a. Less than 1 month	b. 1-2 month
c. 3-4 month	d. 6 month or more

19. Main area of engagement?

a. Agriculture	b. Fishery
c. Forest	d. Hotel

- Description of fish farm

20. Water used		
a. Fresh	B. Salt	c. Brackish

21.Feeding				
a. Food scraps	b. Ration	c. Vegetables	d. millet	e. Other

22. Maintence status of aquaculture species		
a. Poor	b. Good	c. Acceptable

23. People involved in care of fish			
a. Family members	b. personshired	c. Members of the association	d. others

24. The water comes from					
a. Tap	b. Well	c. River	d. lack	e. Estuary	f. Sea

- Economic Condition

Dimension	Indicators	Y/N
Health	Nutrition	
	Child mortality	

- Education Condition

Dimension	Indicators	Year
	Year of schooling	
	School Attendance	

- Standard of living condition

	Indicators			
Dimension	Cooking fuel	Cow dung Kerosene Bio gas	Fuel wood Electricity LPG	
	Sanitation	Yes	No Type: Private/Community/Open Defecation	
	Drinking water	Source:		
	Electricity	Yes	No	
	Housing	Kutcha/semi pucca/pucca		
	Assets	Radio Television Mobile Computer	Electric Fan Water Filter Refrigerator Bike	Bi-cycle Others

- Problem and Prospects

1. Increasing the sanitation of soil.
2. Water pollution.
3. Ecosystem is being interrupted.
4. Habitat damage

- Social problem of the Fishery area

1. Production of paddy and others crops are decreasing, resulting in shortage of food.
2. Crop production is not good for the increasing of soil saline, so poor farmers forced to lease land.
3. It is very inconvenient to re-agriculture in fishery lands in future.

- Economic problem of the fishery area

1. The rich people are getting richer, as a result social and economic discrimination has been increasing.
2. Primary cost is much higher.
3. It is very inconvenient to re-agriculture in fishery lands in future.