Vol X 2020

ISSN : 2250-2653

RESEARCH FRONTS

A Peer Reviewed Journal of Multiple Sciences, Arts & Commerce

Vol X 2020

RESEARCH FRONTS

ISSN : 2250-2653

A Peer Reviewed Journal of Multiple Sciences, Arts & Commerce

Registered and copyright with :

Government Digvijay P.G. Autonomous College. Rajnandgaon, Chhattisgarh, India

Website : www.gdcr.ac.in **Email :** ***principal@digvijaycollege.com***

Published by:

Government Digvijay P.G. Autonomous College, Rajnandgaon. Chhattisgarh 491 441 (India)

Printed at :

Naveen Sahakari Press Maryadit, Rajnandgaon (C.G.)

Contents

From the Desk of Chief Editor . . .

I feel a sense of relief with the publication of **Research Fronts** (A Peer Reviewed Journal of Multiple Sciences, Arts and Commerce) **Vol. X 2020** in this Covid-19 Pandemic situation world-wide. As usual, a few notable features of this volume are as follows. **One**, it has maintained the diversity of research papers encompassing the disciplines of economics, geography, business management, library science and zoology. **Two**, Inclusion of research papers from Gujarat (Western India), Madhya Pradesh & Chhattisgarh (Central India) and West Bengal (Eastern India) amply demonstrates a wide spatial coverage that gives it status of national journal. **Three**, the issue of core and periphery, though applied for the major tribal languages by taking up the Chotanagpur and Its surrounding region, would attract researchers from other disciplines to venture in this direction. **Four**, Man-wild life interaction, or conflict, or co-existence is a very pertinent issue addressed in a research paper entitled Tiger Roaming for Survival – A case study of Rajnandgaon district, Chhattisgarh, India.

I take an opportunity to appreciate the authors who have made invaluable contributions not only for sending their original research papers, but also for directly helping the regular publication of this journal since 2011.

- Dr. Krishna Nandan Prasad

Assessment of Livelihood Status of the Shrimp Farmers
A Case Study of Coastal Rural Area, Purba Medinipur District, West Bengal

Brihaspati Mondal* and Moatula Ao**

Abstract

Shrimp farming is currently under development in Andhra Pradesh, West Bengal, Tamil Nadu, Maharashtra, Gujarat, Orissa, Goa and Diu and Pondicherry, with approval from the Coastal Aquaculture Authority. West Bengal is the second dominant aquaculture producing state. Shrimp culture is one of the important livelihoods approach in Purba Medinipur district. The main cultivated shrimp species in this district is L.vannamei, also known as white leg Shrimp, and Penaeus monodon, or P. monodon (black tiger shrimp).The present study was carried out to obtain information on the socio-economic status of shrimp farmers in the coastal rural area of the Purba Medinipur district, West Bengal.

Among the five coastal blocks only two main shrimp farming blocks were selected purposively, namely Khejuri II, Deshapran. The study period was carried out during the month of September – October 2019. For this study, data were collected using questionnaire interviews. For questionnaire interviews, a total of 180 currently employed shrimp farmers were randomly selected among them 90 farmers from each block were selected from Khejuri II and Deshapran respectively. Data from questionnaire were coded and entered into a database system using Quantitative data was analysed using SPSS 20 and QGIS software was used for digitizing the map of the study area.

The study reveals that the Shrimp farmers' social and economic status is far from satisfactory. They are much behind in terms of earning of income, acquiring education, consumption of social amenities and facilities, etc. Therefore, a much planned effort is urgently needed to elevate their socio-economic status in view of saving the shrimp farmers of the coastal region of the state.

---

*M. Phil. Research Scholar, Department of population Studies, Fakir Mohan University, Balasore, Odisha, India

**Assistant Professor, Department of population Studies, Fakir Mohan University, Balasore, Odisha, India

Introduction

Aquaculture is the fastest-growing food-producing sector in the world, growing from 4 million tons in 1970 to 73.8 million tons in 2014(FAO, 2016). Global fish consumption 50% comes from aquaculture and approximately 18 million people are involved, 94% of whom are from Asian (FAO, 2016). India has an estimated 1.2 million hectares (ha) of brackish water areas and 5.4 million hectares of freshwater sites to develop shrimp and fish farming, respectively. India exported 652,253 MT of shrimp in 2019, with a value of U.S. $4.89 billion. Exports have grown 430 percent in volume during the last decade. Major markets include the USA (46.7 percent), China (23.8 percent), the European Union (12.1 percent), and Japan (6.4 percent) according to the Global Aquaculture Alliance, 2019.

The production of farmed shrimp reached 7.0 lakh tons in 2019, of which 87% is exported to a developed country, earning a robust exchange rate of Rs.35, 000 cores (MPEDA, 2019). From 2011 to 2018, farmed shrimp industry grew by 23% and is projected to grow by 11% through 2024, far exceeding global growth rates by 5.6%. With such explosive growth, the country has established itself as the second-largest farmed-shrimp producer in the world. This is a great achievement for India. About 12 Lakh families depend directly and indirectly on the sector for their employment and income to make a living (MPEDA, 2019). Shrimp farming is currently under development in Andhra Pradesh, West Bengal, Tamil Nadu, Maharashtra, Gujarat, Orissa, Goa and Diu and Pondicherry, with approval from the Coastal Aquaculture Authority. West Bengal is the second dominant aquaculture producing state. There is 5618.22 ha of the cultivable brackish water area, including 3342 ha of potential shrimp farming (Upadhyaya 2001).

It is considered with the largest impounded brackish water area in the country covering around 2, 10,000 ha besides the coastline of 158 Km, spreading over 3 districts namely Purba Medinipur, North 24 Parganas, South 24 Parganas. Among these districts. The Purba Midnapore district occupies an important position in shrimp farming and shrimp production in West Bengal (MPEDA/NACA, 2003, Abraham et al., 2013).In the last few years, shrimp farming has emerged as one of the most important economic activities in the district. Now-a-days, shrimp culture is one of the important livelihoods approach in Purba medinipur district. The main cultivated shrimp species in this district is

L.vannamei, also known as white leg Shrimp, and Penaeus monodon, or P. monodon (black tiger shrimp). It is making a significant contribution to socio-economic development along with earning foreign exchange as well as employment, food and nutrition security for rural people.(www.business-standard.com/ April 8, 2014). Having regard to this fact, it is necessary to know farmers' efficiency, adaptive capacity and other drawback of the life of the shrimp farmer. The present study was carried out to obtain information on the socio-economic status of shrimp farmers in the coastal rural area of the Purba Medinipur district, West Bengal. The results of the survey are expected to help of policy makers find effective solutions to improve shrimp farming in West Bengal.

Objective

The present study aims to carry out to understand the socio-economic status of shrimp farmers in the coastal rural area of the Purba Medinipur district, West Bengal.

Materials and Method:

The study was conducted in Purba Medinipur district of West Bengal, This district has 80 km long coastal area which is excessive suitable for brackish water commercial shrimp farming, and development of shrimp fields. Among the five coastal blocks only two main shrimp farming blocks were selected purposively, namely Khejuri II, Deshapran. In the selected areas, primary data were used in this study. The study period was carried out during the month of September – October 2019.For this study, data were collected using questionnaire interviews. For questionnaire interviews, a total of 180 currently employed shrimp farmers were randomly selected among them 90 farmers from each block were selected from Khejuri II and Deshapran respectively. Data from questionnaire were coded and entered into a database system using Quantitative data was analysed using SPSS 20 and QGIS software was used for digitizing the map of the study area.

Study Area : West Bengal is one the important states of eastern India. Its southern part has coastal land of Bay of Bengal. Purba Medinipur district is one them that enjoys 80 km long coastal area which is excessive suitable for brackish water commercial shrimp farming, and development of shrimp fields. It is divided into 5 blocks. Of the five coastal blocks, only two main shrimp farming blocks were selected purposively. The study area experiences tropical Monsoon climate which is moderated with the oceanic influence that keeps the climate hot and humid throughout the year. The study area is depicted in Fig.1

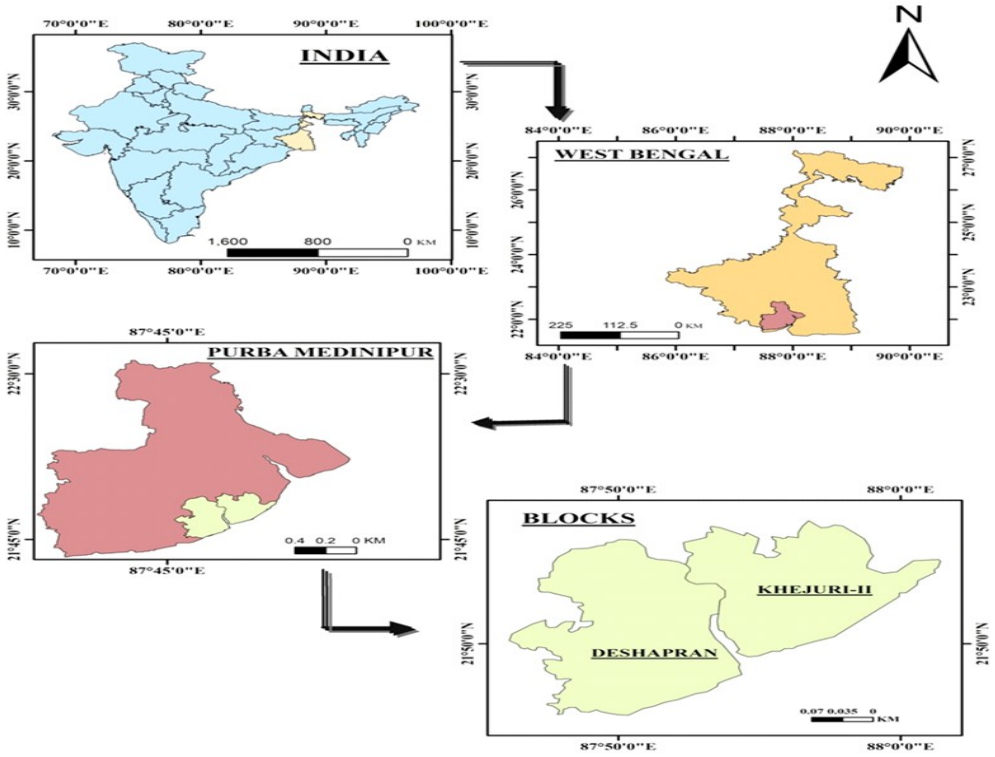

Fig. 1: Study Area

Analysis

Sustainable Livelihood Framework" (SLF), one of the most widely used livelihood frameworks for development practice. Focus our international development efforts on eradicating poverty and fostering economic growth that benefits the poor. We can do this by supporting sustainable development goals and policies at the international level. Chambers Conway' has definition of Livelihoods: "A livelihood comprises the capabilities, assets, and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base."

Livelihood assets also affect positive livelihoods. Farmers need a variety of resources to engage in shrimp farming. The presence of such resources can provide better livelihoods to the farmers. As indicated above, sustainable livelihood framework, there are five types of capital depending on the livelihood of farmers. Below is a detailed discussion of the farmers' capital.

Human capital

Human capital is discussed, in terms of race, education, age and type of family, number of family members, etc.

Age structure:

The age structure is an indication not only of the future pattern of population growth but also of the degree of economic growth, dependency of child and old age group on the economically productive age group (Sinha,B.N.1987). Knowledge of the age structure of farmers is important in estimating potential productive human resources. Planning of education, health, and employment generation requires sufficient data on relevant age structures (N, Ahmed, 2001).The age of the farmers is categorized into 3 groups, - up to 27 years, 28-37 years, and above 37 years. Table 1 shows that 43.9% of the farmers come under the age of up to 27 years, 47.8% come under the age group of 28- 37, the remaining 8.3% come under above the age of above 37 years. An average age of the farmers is 29 years. However, the result indicates that most of farmers come under the age group of 28-37 years.

Table 1 Age-structure of Respondents

Total Respondents =180		
Age structure	Numbers	%
Up to 27	86	47.8
28 - 37	79	43.9
Above 37	15	8.3

Primary survey- 2019

Caste Category

In the above table 2 it shows that the highest production (50%) is produced by the most of the SC farmers, followed by the General farmers 38.9%, and the OBC farmers only 11.1%

Table 2 Caste-wise Distribution of Respondents

.

Total Respondents =180		
Category	Numbers	%
GEN	81	45.0
SC	57	31.7
OBC	42	23.3

Primary survey- 2019

Education

Education has an important impact on the modernization of farm business operation and it helps a person to have day-to-day information about the modern techniques together with technological changes in various production processes. The farmers in the study area categorized into five types based on their education viz. Illiterate, Primary, MP, HS, and Bachelor. The result shows that 22.8% of the farmers have primary level of education, 23.3% M.P level, 20.6% H.S. level, and 17.2% Bachelor level, and remaining the 16.1% are illiterate. However, the result shows that most of farmers' belong to low educated group and even some of them have not received any education yet.

Experience

Experience can maintain the sustainability of shrimp farming. It depends on the experience of the farmers on the farm management, market trends etc. However, 32.2% of the farmers have an experience of up to 2 years, 51.7% of the farmers have 3 – 5 year experience, and only 16.1% of the farmers have above 5 years' experience. The result shows that maximum of the farmers have 3-5 years' experience. The farmers have an average of 3.51 years of experience in shrimp farming.

Family type:

In India, family are classified into two types – Joint Family and Nuclear Family. In Joint family, there are several members (such as mothers, fathers, brothers, sister - in low, uncles, Aunt, etc.). In Nuclear family, only Parents and their children. The family functions as a unit for income generation, consumption, reproduction, and social interaction; however, extensive commingling and intermixing occurs among separate nuclear households. 60.0% of the farmers live in the joint families and 40.0% of the farmers live in the nuclear families.

Family member:

The size of the family has a substantial impact on the income and expenses of the family. The farmer's family has been divided into four categories. 48.3% of the family have up to 4 members. 38.9% of the family have 5- 7 members, and 12.8 % of the family have above 7 members. The average number of members of the farmers' family is 4.94, which is higher than the average number of members of the country, all members above the age of

15 years are involved in shrimp farming; they usually work in the management of the gher, feeding the fish, etc.

Table 3 Size of the Family

Total Respondents =180		
Family members	Numbers	%
Up to 4 (Small)	87	48.3
5 -7(Medium)	70	38.9
above 7(Large)	23	12.8

Primary survey- 2019

Natural capital

Natural capital refers to natural resources, such as land, gher area, and salt water, larvae, and soils, etc. These natural resources play an important role in the shrimp production of farmers. These natural resources are discussed below.

Pond size

The size of the pond size can play an important role for shrimp cultivation as it can reflect the availability of capital, managerial capacity and the potential to manage and utilize resources efficiently. The average pond size under the cultivation of shrimp farmers is 3 bigha. The largest pond is 25 Bigha and the smallest is 1 Bigha. It is found that 36.1% of the farmer pond size is up to 4 bigha, 54.4% of the farmer is 5- 10 bigha, 9.4% of the farmer is above 30 bigha.It is understood that most of the farmers are in the middle size of pond.

Pond ownership:

The study reveals that, 74% of farmers cultivate shrimp on their own Pond, only 10 % is lease and the remaining 16 % farmers are Both (lease and own Pond).

Financial capital

Financial capital includes savings (cash as well as liquid assets), credits (formal and informal) it also affects shrimp farming. Shrimp farming requires a great deal of financial support from the gher construction to the harvesting requires. So through the financial analysis of the farmers, we can know their financial status.

Occupation

Occupation is an attitude to population; it exerts a vital role in social, economic, cultural and demography activity. Occupation is a system on the character of work by which people earn money. The farmers were engaged in various types of occupation. In the present study, the main occupation of the farmers is that which their main source of income is. 31% of the farmers are considering shrimp farming as their main occupation, but the others like -agriculture farmers (44%),labour(13%),Others(12%)are considering shrimp farming as their secondary occupation because it a good source of income so most of the people are attracted by this occupation.

Total households' income

The total household's income of the farmers is based on all the sources of income (like agriculture, poultry, animal husbandry, and others. The total household's incomes of the farmers have 3 categorized. It is noticed in Table 4 that 56% of the farmers' total household income is low (Rs. 4 lakhs), 34% of the farmers' total income is Medium (Rs. 4 lakhs to Rs. 7 lakhs); only 10% of the farmer's total household income is high (More than Rs. 7 lakhs).

Table 4 comparisons between households' income and shrimp income

Income	Total households income	Total shrimp farming income
Minimum	80000	40000
Average	395912	363780
Maximum	1200000	1200000

Annual income from shrimp farming:

It is noticed that 31% of the farmers come under the low income group (200000),46% come under the medium income group (210000 – 500000), and rest of the farmers 23% come under the high income group (above 710000). In the given table ( ) it shows that the majority of the farmers come under the medium income group. Here, only the net incomes of the farmers are calculated after deducting the expenditure from the total income.

Loan availability

One finds that the 180 Shrimp farmers, only 46% of the farmers' received loan for shrimp farming. The Majority of the farmers (54%) do not received any loan for shrimp farming because they are influence of local money leaders and rich persons. NGO stated that, only rich farmers' got loan for shrimp farming but poor farmers is not get Loan. Out of the180 interviewed farmers only 88 framers received loan from different sources. It is noticed that the most of the farmers received loan from money lenders with 6% of interest (31%), only 13.9% received from banks with 3% of interest and 3.9% received from NGOs with 4% of interest. It is indicated that most of the farmers' received loan from money lenders for these farming. Few farmers stated that they mortgaged jewelry and legal documents of land for receiving the loan from money lenders.

Physical capitals

Physical capital is basically infrastructure that includes roads, buildings, shelters, water supply, and sanitary facilities, electricity, cooking energy, technology, and transport, health facility recreational items and home equipment's. As the focus of this research is on the coastal fisher communities, their assets include fishing craft and gear, property, houses and other amenities.

Housing conditions

The housing condition reflects the capability of a person, better the living standard will be the buildup of house (Aluri, Venu, Singh, 2016). In the study area there are three main types of house: 1) Katcha houses made of bamboo, wood, stack roof, mud flooring, etc. 2)Semi pucca - made of Katcha bricks, wood, tin, roof tiles, asbestoses, etc. and 3) Pucca, proper, good quality of house-made of pucca bricks, cement, marbles, and mosaic floor.

It is observed from the data analysis that 16.1% of the farmers have katcha house, while 32.2% of the farmers' have semi pucca house and 51.7% of the farmers have pucca house. The results indicate that most of the farmers' have Pucca house due to higher incomes. Pucca houses are healthier than Katcha and semi-pucca houses.

Ownership of the house

Food, clothing, and housing are the basic necessities of each person. Ownership of houses usually represents the economic condition of the farmers. Majority of the farmers (91.7%)

have their own houses, only 8.3% of the farmers do not have their own houses (Fig.13). The majority of the farmers live in self-house which are indicating that the economic condition of the farmers is good.

Electricity facilities

The access to electricity in a house helps the effective utilization of spare time; gives more entertainment and widening the knowledge base and awareness. Today electricity is a vital matter for both agriculture and industrial development of any society. In the study area electricity is supplied for the people by the government. Data reveals that about 95.6% of the farmer households have electricity access, while only 4.4% of the households do not have electricity. The results indicate that most of the farmers have accessed electricity as their income is high.

Health facilities

The farmers in the area study take four types of health facilities, viz clinics, village doctors, hospitals and MBBS doctors. The number and quality of health facilities in a country or region is depending on the prosperity and living conditions of the people in that region.

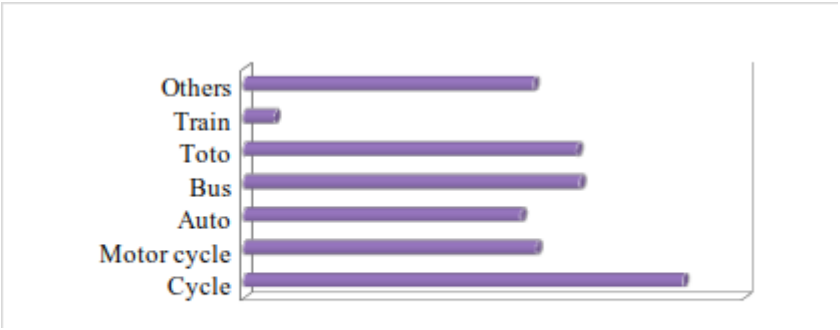

Figure 2 Health facility of the farmers' family

Fig. 2 shows that 13.3% of the farmer's family receive health benefits from the village doctors, 16.7% of the farmer's family receives health benefits from the clinic, 31.6%of the farmers' family receive health benefits from primary and village hospital, and 37.8% takes health benefits from MBBS doctors. According to some farmers, there is only one health centre in the locality and also the quality of treatment is poor, so they have to go sub-divisional, district, and state hospitals for treatment.

Source of Drinking and Cooking water

The provision of clean and safe drinking water is considered to be the most valued elements in society (Tellegen et al., 1996). Lack of drinking water hinders the development of a local economy and the removal of social marginality (Pasiak, 1995). It seen that, the drinking and cooking water is coming from four different sources - tank, tap, pond and tube well, etc.

The above figure (16) shows that 3.5% of the households of the shrimp farmers take drinking and cooking water from the tank, 46.1% of the farmer use tap only for drinking water, 47.4% of the farmer use Tube- well for cooking and drinking water. Only 1.5% of farmers use pond water for cooking. The results show that many families of the farmers still use impure water for cooking and drinking, which causes them various physical problems.

Out of the total 180 farmers only 41% have their own tube- wells, the rest do not have their own tube-wells, some of them collect drinking water from public taps, schools or neighbors, but they use pond water for cooking, which causes them various health problems like diarrhea, typhoid, amebiosis, dysentery, etc. Farmers also stated that, in the summer time they also have to face the water scarcity, because in time the maximum amount of ground water is used for irrigation for the Rabi crops.

Sanitary Facilities:

The study area shows that there are two types of toilets 1) katcha toilet - made of bamboo with leaf shelter and inadequate drainage disposal, and 2) pucca toilet - made of bricks with good drainage disposal. 77% of the farmer's households use pacca sanitary, while only 23 % of the farmer's family use katcha sanitary. The result shows that the most of the farmer families use pacca sanitary. According to a government officer, most farmers have built their own sanitary, with the rest being government-funded. Although there is enough sanitary awareness among the people in this area, few people are not aware yet.

Using fuel for cooking:

In the study area, 6 main cooking fuel are used: 1) cow-dung, 2) paddy- straw, and 3) wood including tree branches and dry leaves 4) Kerosene 5) LPG 6) Electricity etc. Cow-dung can be mixed with straw and dried until hard to provide odourless cooking fuel. In

general children and women go out to collect cow-dung and women are involved in processing this dung cake own premises. 8.9% of the farmers use paddy straw for cooking, 14.8% use cow dung, 21% use wood, 10.9% use Kerosene, 23% use LPG and 20.5% use electricity. The result shows that the most of the farmers use LPG and electricity for cooking due to high income, it is also seen that large number of farmers still use paddy straw, cow dung, wood and kerosene for cooking due to low income.

Means of transportation

Transportation means to movement of the people and goods from one place to another place. The present economic development of any region totally depends on the development of the transport system.

Figure 3 Means of Transportation

In the study area five main types mean of transportation facilities are available. It is noticed from the above Fig. 3 that 22% of farmers use cycle as their means of transportation.14.6% use motor cycle, 13.9% use auto, 16.8% use Bus, and 16.7% use Toto, remaining 16 % use others like train, machine van, etc. as their means of transportation.

The result indicates that the most of the people use light transport. One school teacher pointed out that only one PWD road is connected to this area; most of the village roads are made of mud. Even the bus is accessible 3 -8 km away and the train is also available 27 km away from this area.

Recreational item

Three items are commonly acquired by farmer' households for recreational purposes 1) Radios, 2) Cassette players 3) televisions. The acquisition of such goods can be used as an indirect measure of wealth and consumption, and is also associated with attributed to more 'modern' developing conditions, with wider access to outside influence and commonly, a departure from traditional forms of entertainment and rural social interaction (N.Ahmed, 2001). It is noticed out of the total household of the farmers only 84% (152) have recreational item only 16% (28) have not any recreational item.

The study shows that 32.9% of the households of the farmers are using the radio, 28.2% of the households of the farmers are using the Cassette player and remaining 38.9% of the households of the farmers are using Television. The results indicated that most of the households of the farmers are using television for listening to Songs, watching movies, Serial and news (Both State and National), Because so many farmer cannot read the newspaper due to lack of their education. They are preferred watching the news through the television. Few farmers are using the radio for listening Song, Natok, weather news, etc. due to low income. Few farmers only prefer cassette player to invest short time for entertainment.

Home Equipment

Home equipment is an indicator of the living conditions of the members of the shrimp farmers' family. The possession of high value amenities by a family reflects the better living condition and economic condition of the household**.** Five modern items are commonly used by the household of the farmers for Home equipment purposes 1) Mobile 2) Computer 3) Freeze 4) Two-wheeler 4) Four Wheeler.

It is found that 34% of the households of the farmers are using mobile for home equipment, 14.9% of the households of the farmers are using computer, 21.9% of the households of the farmers are using freeze, 21.9% of the households of the farmers are using two-wheeler and remaining 7.8% of the households of the farmers are using four-wheeler. The result indicates that the majority of the household of the farmers are using high value equipment's (like, computer, freeze, and four wheeler) because of their high income and education.

Social capital

Social capital means the social resources upon which people draw a pursuit of other livelihood objectives, social capital generally rest in the structure of relations among people society, such as experience, group participation (formal and informal) networks and connectedness membership of more formalized group and relation trust, reciprocity and exchanging DFID, 1999.Social capitals may have direct impact on the other capitals,

it also helps the better livelihood of the rural people and remove the shocks and different lacks of other capital

Experience acquired from different sources

All the farmers have experience on shrimp farming from different sources - The maximum of farmers have experience on shrimp farming from private aqua consultant (29.5%), followed by the self-culture farmers 28.1%, Feed technician farmers 21.4%, friends& neighbors farmers16.1%, and NGO farmers only 4.9%.

Table 5 Experiences Acquired by the Farmers

Experience acquired	Total
	N=180
	%
Self-culture	28.1
Friend neighbours	16.1
NGO	4.9
Private aqua consultants	29.5
Feed technician	21.4

Table 5 shows that in the perspective of the highest production (above 30 quintals)produce the highest farmers who have gained experience from private Aqua consultants(83.3%),followed by 75% from feed technician and self-culture,47.2% from friends and neighbours,only25% from NGO

Training

In recent years, CIBA, ICAR, BMP, MPEDA, NGO, and others institutions are providing training to the shrimp farmers in India However, out of the total (180) interviewed, only 21% of the farmers received training for shrimp farming, maximum of the farmers did not received any training for shrimp farming.

Technology utilization

Technology also plays a greater role in the shrimp farming. It also helps in various parameters, such as to monitor water quality, stocking density, shrimp growth, and feed conversion rates, among other things. However, out of the total (180) interviewed only 30% of farmers use technology for shrimp farming. Maximum of the farmer do not use technology for shrimp farming (25)

Participation of the shrimp farmers

The study unravels the fact that 4.3% of the farmers participate in the local government, 37.2% participate in NGO/club, 18.7% participate in trade unions, and 39.8% participate in organizing festivals. The result shows that the most of the farmers are attending festivals and organizing NGOs / clubs due to high incomes, but are not given the opportunity to join the local government and trade unions.

Conclusion

A thorough analysis of data related to various aspects of socio-economic status of Shrimp Farmers of Purba Medinipur district of West Bengal clearly reveals that there has been poor status of these farmers. That is why, at present, their social and economic status needs great improvement. Despite various government progammes, more efforts are needed so that the shrimp farmers can enjoy a much better production environment, much satisfactory marketing of their products by getting a highly elevated income that would make capable of getting graded education of their children with nutritional food for a sound health.

References

ADB, (2005), “An Evaluation of Small-scale Freshwater Rural Aquaculture Development for Poverty Reduction, “Operation Evaluation Department, *Asian Development Bank* (ADB), Manila, Philippines.

Ahmed, A.K.M.M. (1986), “an economic analysis of coastal shrimp culture in a mixed farming system, Chittagong - Cox's Bazar region, Bangladesh. *In the First Asian Fisheries Forum*, Manila, Philippines, pp. 153- 156.

Ahmed, N., Brown, J.H., and Muir, J.F., (2008), “Freshwater prawn farming in gher systems in southwest Bangladesh,” *Aquaculture Economics and Management* 12: 207–223.

Alagarswami, K. (1981), “Prospects of coastal aquaculture in India. Proceedings seminar on role of small scale fisheries and coastal aquaculture in integrated rural development,” 6-9 December 1978. Bulletin 30- A, Madras CMFRI.

Ali, M.H., Akbar, M.A. and Rahman, M.H. (1982), "Utilization of fish ponds Mymensingh district," *Bangladesh Journal of Agricultural Economics*, 5(1-2):103- 114

Allison, E.H., Ellis, F. (2001), "The livelihoods approach and management of small- scale fisheries," Marine Policy 25, 377-388.

Allison, E.H., Horemans, B. (2006), "Putting the principles of the sustainable livelihoods approach into fisheries development policy and practice," Marine Policy 30, 757-766.

Ashley, C., Carney, D. (1999), "Sustainable Livelihoods: Lessons from Early Experience," DFID (Department for International Development), London, UK, pp. 1e64.

Bebbington, A. (1999), "Capitals and capabilities: a framework for analyzing peasant viability, rural livelihoods and poverty," World Development 27, 2021-2044.

Carney, D. (1998), "Sustainable Rural Livelihoods: What contribution can we make?,"Papers presented at the Department For International Development (DFID), National Resources Advisers Conference, London, UK.

Chambers, R. (1992), "Rural Appraisal: Rapid, Relaxed and Participatory," IDS (Institute of Development Studies) discussion paper 311, 390 pp.

Chambers, R., Conway, G.R., (1992), "Sustainable Rural Livelihoods: Practical Concepts for the 21st Century,"IDS Discussion Paper 296. IDS (Institute of Development Studies), University of Sussex, UK, pp 1-33.

Chambers, R. (1994), "The origins and practice of participatory rural appraisal," World Development 22, 953-969.

DFID, (1999), "Sustainable Livelihoods Guidance Sheets" DFID (Department for International Development), UK.

Ellis, F. (2000), "Rural Livelihoods and Diversity in Developing Countries". *Oxford University Press*, London, UK FAO, (2016), "The state of world fisheries and aquaculture - Contributing to food security
and nutrition for all, "Food and Agriculture Organization, Rome, p29.

Farrington, J., Carney, D., Ashley, C., Turton, C. (1999), "Sustainable livelihoods in practice: early applications of concepts in rural areas Natural Resources Perspectives" pp 42, 1-15.

Kumaran, M., Ravisankar, T., Anand, PR. (2017), "Knowledge level of shrimp farmers on better management practices (BMPs) of PenaeusVannamei farming: a comparative assessment of east and west coasts of India," Indian J Fish 64:93-99.

Paul, B.G., Vogl, C.R. (2012, "Key performance characteristics of organic shrimp aquaculture in Southwest Bangladesh," Sustainability 4, 995-1012.

Pravakar, P,.Sarker,B.S,.Rahman,M,.Hossain,M,(2013) "Present status of fish farming and livelihood of fish farming in shahrastiupazila of chandpurdistrict, Bangladesh, "*American – Eurasian J.Agric.Environ.Sci*.,13(3): 391 -397,2013.

Scoones, I. (1998), "Sustainable rural livelihoods: a framework for analysis," IDS Working Paper 72, Institute of Development Studies (IDS), Brighton, UK.

***