

CHAPTER-7

PROBLEMS AND PROSPECTS OF FISHERY SECTOR IN THE STATE

7.0. Introduction:

The natural fisheries have been confronted with different problems. The three districts of the study area are developing region in fishery sector because there are a huge numbers of natural fisheries in the region. All these natural fisheries of the area are not registered but most of the natural fisheries of the area are registered by State Government.

The fishing is practiced as traditional occupation and also source of livelihood among the fishermen in the study area. The fishermen have been involved in this occupation by generation after generation. Though they have been involved in this occupation for a long period of time, yet socioeconomic condition of their lives has not been improved considerably. They have faced by different problems in different times. The fishery sector of the state bears immense significance as because the poorest section of the society, to whatever caste or religion they belong to, ultimately resort to fishing as the main occupation. A major chunk of population in below the poverty line and these people are engaged in fishing for their livelihood. These people have been facing various problems which are analyzed in the following.

7.1. SWOT analysis:

Before going to examine details in this chapter entitled “The Problems and Prospects of Fishery Sector in the State” a SWOT analysis has been taken. From the SWOT analysis of fishery sector following important criteria have been identified under various categories.

i. Strengths:

- Availability of natural water bodies in the study area.
- Large numbers of the beel and river fisheries in the study area are river and beel fisheries which are government registered.
- The mighty Brahmaputra and Barak are the main rivers for fish production in the state.
- Most of the rural inhabitants are involved in the fishery sector.
- Availability of various types of indigenous fish fauna having commercial importance.
- Great demand for fish because fish is the common food habit of the 95 percent people in the state.
- The fishing has been found as the main source of livelihood of the scheduled caste and scheduled tribe population in the study area.
- Most of the rural youth of SC and ST in the study area are involved in fish trading. They supply different kinds of indigenous fish to the different markets from the river and beel fisheries of the study area.
- The fish traders provide financial help to the fishermen for buying fishing materials. Due to the financial help of the fish traders the fishermen give fish to the fish traders.
- Lot of dry fish is produced in the study area which have great demand in the market
- Different kinds of local ornamental fish are also found in the river and beel fisheries in the study area which have great demand in the country.
- The fishery sector provides huge amount of revenue to the state which is a good sign for the state economy.
- The fishery sector plays an important role for socioeconomic development of the poor fish folk in the study area.
- The fishery sector is allied sector of agriculture. It enhances market for other ancillary items where a large chunk of people are involved.

ii. Weaknesses:

- The state government has not been able to include most of the river and beel fisheries in the state as registered fisheries in the government organized sector.
- The poor economic condition of the fisherman in the study area
- Low level of education is the main obstacle of socioeconomic development in the fishermen of the study area.
- Most of the fishermen are below poverty level.
- No strict rule has been imposed by the state government on the fisheries cooperative societies, SHG's, NGO's and individuals for paying the annual revenue.
- Lack of institutional finance for providing financial support to the fishermen and reluctance of insurance agencies for insurance of fish.
- Lack of organized fish marketing
- Lack of awareness about scientific fishing technique
- Poor research extension linkage
- Political interference on the leasing fisheries and short leasing period of beel and river fisheries
- No data recording and information system of the fishermen in the study area.
- The fishermen are not aware about new Government schemes and programmes.
- Though the state government has taken some steps for developing the fishery sector, the schemes and programmes of the government are not sufficient.

iii. Opportunities:

- Immense avenues for income and employment opportunities, food security and poverty elevation as well as participation and empowerment of fishermen in the study area. Ultimately the sector provides livelihood to the poor fishermen.
- The young unemployed youth are involved in the fishery sector as fishermen and fish traders.
- Landless and resource poor fishermen have opportunity to undertake fish culture in the low lying areas and ponds in the study area where the SHG, co-

operative societies and NGO take as lease based in these water bodies for fish culture.

- The State Government can provide infrastructural and financial support services to fishermen and fish traders.
- Some ancillary units of the fishery related sector have come up.
- Great opportunities for supplying indigenous fish to various markets in the states and outside the state as well as outside.
- Greater scope in the ornamental and dry fish marketing in the state.

iv. Threats:

- Natural calamities like heavy rain fall and over current of river water create problems in fishing.
- Fish sickness has been identified as basic problem of the natural beel and river fisheries in the study area.
- Indiscriminate killing of fish has threatened the fishery sector in the river and beel fisheries of the study area
- Low level of education and lack of awareness of the fishermen have created problem for knowing the various government schemes and progarmmes under the fishery development schemes.
- The fish production in the natural beel and river fisheries in the study area reduces due to fishing in breeding period.
- Imported fish also hamper the local fish trader in the study area.
- Entry of polluted water from urban area and agricultural surface run off and industrial effluents.
- No modern technology of fishing has been adopted by the cooperative societies, SHGs, NGO,S and individuals.

7.2. Analysis:

During the period of field investigation, the several problems related to the fishery sector are identified. Especially the natural fisheries and the fishermen who

have been involved in the fishery sector are affected by these problems. These problems are systematically analyzed in the following.

1. Natural Problem
2. Marketing Problem
3. Processing Problem
4. Price Fluctuation
5. Middle man Problem
6. Technological Problem
7. Sickness of the fish Problem
8. Problem of fishery settlement policy

The above problems of the study have been identified from the respondents during the survey. These problems are evaluated from the respondent by using the likert rating scale. Likert rating scale consists of a number of statements which express either a positive or negative attitude towards the object of interest. The respondent is asked to agree or disagree with each statement. Each response is given a numerical score to reflect its degree of attitude favorableness. The scores are totaled to measure the respondent's attitude. The responses may be obtained using different scale points ranging from 3 to 7. Most likert scales are constructed with 5 scale points. These measuring five points rating scales are strongly agree, agree undecided, disagree and strongly disagree. According to Likert 5 point rating scale, here the rating has been measured point wise 5 for strongly agree (SA), 4 for agree (A) 3 for undecided 2 for disagree (DA) and 1 for strongly disagree (SDA). From this rating scale the problem of the fishery sector has been examined statistically by using the statistical techniques i.e. chi square, rank correlation and ANOVA test.

Chi-square test for independence of attributes:

The chi-square test for independence of attributes is used to find out whether two or more attributes are associated or not. In order to test the associations between the attributes, or in other words, the attribute are independent. If the calculated value of χ^2 is less than the tabulated value of a certain level of significance (generally 5 %

level of significance), we may say that the result of the experiment provide no evidence for doubting the hypothesis , or in other words , the hypothesis that the attributes are not associated hold good . On the other hand, if the calculated value of χ^2 is greater than the tabulated value at a certain level of significance we may say that the result of the experiment does not support the hypothesis, or in other words, the attributes are not associated. It should be noted that χ^2 is not degree or form a relationship. It only tells us whether two principles of classification are or are not significantly related, without reference to any assumption concerning the form of relationship. The χ^2 test for independence of attributes is given by –

$$\chi^2 = \sum \left[\frac{(O_{ij} - E_{ij})^2}{E_{ij}} \right]$$

which is distributed as a χ^2 – variate with $(r-1)(s-1)$ d.f. where r is the number of rows and s is the columns .

O_{ij} = observed frequency for (i, j) cell for $r \times s$ contingency table

E_{ij} = expected frequency for (i, j) cell for $r \times s$ contingency table

Contingency table analysis: Chi – Square test of Independence

When observation are classified according to two qualitative variables or attributes and arranged in a table, the display is called a contingency table as shown in table. The test of independence uses the contingency table format and is also referred to as a Contingency table analysis.

Now the $r \times c$ contingency table is given below:

A \ B	A ₁	A ₂	.....	A _i	.....	A _r	TOTAL
B ₁	O ₁₁	O ₂₁	.....	O _{i1}	.....	O _{r1}	(B ₁)
B ₂	O ₁₂	O ₂₂	.....	O _{i2}	.....	O _{r2}	(B ₂)
:	:	:	:	:

:	:	:	:	:
B _j	O _{1j}	O _{2j}	.....	O _{ij}	.....	O _{ij}	(B _j)
:	:	:	:	:
:	:	:	:	:
B _c	O _{1c}	O _{2c}	.....	O _{ic}	.....	O _{rc}	(B _c)
TOTAL	(A ₁)	(A ₂)	.....	(A _i)	.....	(A _r)	N

Here, $E(O_{ij}) = (A_i)(B_j)/N$

It may be renowned that the variables A and B have been classified into mutually exclusive categories. The value O_{ij} is the observed frequency for the cell in row I and column j. The row and column totals are the sums of the frequencies. The row and column totals are added up to get a grand total N, which represents the sample size. The expected frequency E_{ij} , corresponding to an observed frequency O_{ij} in row i and column j under the assumption of independence, is based on the multiplicative rule of probability. That is, if two events A_i and B_j are independent, then the probability of their joint occurrence is equal to the product of their individual probabilities. Thus the expected frequencies in each cell of the contingency table are calculated as follows:

$$\begin{aligned}
 E_{ij} &= \frac{\text{Row total}}{\text{Sample size}} \times \frac{\text{Column total}}{\text{Sample size}} \times \text{Grand Total} \\
 &= \frac{R_i}{N} \times \frac{C_j}{N} \times N \\
 &= \frac{R_i \times C_j}{N}
 \end{aligned}$$

The analysis of a two way contingency table helps to answer to question whether the two variables are unrelated or independent of each other. Consequently, the null hypothesis for a chi-square test of independence is that two variables are independent. If null hypothesis H_0 is rejected, then two variables are not independent but are

related. Hence the χ^2 test statistic measures how much the observed frequencies differ from the expected frequencies when the variables are independent.

Procedure: The procedure to test the association between two independent variables where the sample data is presented in the form of a contingency table with r rows and c columns is summarized as follows:

Step 1: State the null and alternative hypothesis

H_0 : No relationship or association exists between two variables that are, they are independent.

H_1 : A relationship exists, that is they are related

Step -2: Select a random sample and record the observed frequencies (O values) in each cell of the contingency table and calculate the row, column and grand totals.

Step -3: Calculate the expected frequencies (E values) for each cell:

$$E = \frac{\text{Rowtotal} \times \text{columntotal}}{\text{Grandtotal}}$$

Step -4: Compute the value of test statistic

$$\chi^2 = \sum \left[\frac{(O_{ij} - E_{ij})^2}{E_{ij}} \right]$$

Step -5: Calculate the degrees of freedom. The degrees of freedom of the chi-square test of independence are given by the formula

$$\text{d.f.} = (\text{Number of rows} - 1) (\text{Number of columns} - 1) = (r - 1) (c - 1)$$

Step-6: Using a level of significance α and d.f., find the critical (table) value of χ^2_{α} .

This value of χ^2_{α} corresponds to an area in the right tail of the distribution.

Step -7: Compare the calculated and table values of χ^2 . Decide whether the variables are independent or not, using the decision rule:

- Accept H_0 if χ^2_{cal} is less than its table value $\chi^2_{\alpha, (r-1)(c-1)}$
- Otherwise reject H_0

7.2.1. Natural Problem:

The natural problem is considered as basic problem in the fishery sector of Assam. During the period of field survey the natural problem has been identified as the main problem. The fishermen have confronted a number of problems while fishing which creates great hurdles in earning their livelihood. While undertaking their work problems like- rough weather, heavy rain, overflow of water, river and beel erosion etc. act as obstacles in fishing time of the fishermen. Due to heavy rain the water level of the beel and river fisheries reach to the highest point and creates heavy current in the fisheries. At the same time, due to heavy current and overflow of the water in the river and beel fisheries the land erosion occurs frequently. So the deepness of the natural fisheries decreases. Besides, the heavy current of the water breaks the bheta (one kind of fishing technique made by fishermen) in the river and beels. Such types of problems are faced frequently by fishermen of the study area because destruction caused by natural calamities, land erosion etc. occurs in the natural river and beel fisheries. During this period the fishermen cannot afford to fish in the river and beel. The following table no.7.1 reveals on the natural problem.

Sl. No	Table No.7.1: Opinion of the respondents on natural problems (District-wise)								
	Natural Problems	Districts						Nos. of Respondents	Total %
		Sivasagar		Nagaon		Cachar			
		Nos. of respondents.	%	Nos. of respondents	%	Nos. of respondents	%		
1	SA	1	0.62	16	14.41	0	0	17	4.09
2	A	120	75.47	59	53.15	99	68.27	278	66.98
3	DA	27	16.98	25	22.52	46	31.72	98	23.61
4	UD	11	6.92	11	9.90	0	0	22	5.30
Total		159		111		145		415	100.00

Source: Primary Survey

Note: SA-Strongly agree, A-Agree, DA-Disagree, SDA-Strongly disagree, UD-undecided

The above table focuses that the natural problem hamper to the fishermen in different aspect for fishing in the river and beel fisheries. It is measured on five point likert scale having items like strongly agree, agree, disagree and undecided (neither agree nor disagree). Out of the total 415 respondent's 71.08 percent respondent agree or strongly agree that the fishermen have been faced by natural problems and its affect on fishing, only 23.61 percent disagree and 5.30 percent neither agree nor disagree.

The district wise analyses of the problem of fishermen and natural fisheries in the study area have been shown in the above table. In the table 76.09 percent respondents of Sivasagar district agree that natural problems adversely affect on the fishermen and fisheries.

In the Nagaon district, the 67.56 percent respondents agree that the natural problems hamper the fishery sector. The respondents of Cachar district also agree the same problem. The 68.27 percent respondents of the Cachar district also agree.

This problem of the sector has been examined by the chi square test, rank correlation and ANOVA which has analyzed in the following.

Districts/ Natural problem:

Null Hypothesis: There is no association between the districts and natural problem faced by the fishermen.

Alternative Hypothesis: There is association between the districts and natural problem faced by the fishermen.

Chi-Square Tests

	Value	df	P- Value
Pearson Chi-Square	68.952	6	.000

Since the P- Value is less than 0.05, the null hypothesis may be rejected. Thus according to the chi-Square test, there is association between the districts and natural

problem faced by the fishermen. From this result it can be mentioned that there is no evidence for doubting the hypothesis. It is proved that the natural problem is really stood as the basic obstacle of the fishermen and natural fisheries in the study area.

7.2.2 Marketing Problem:

The growth of any business unit depends not only on production capacity but also on the marketing connectivity or marketing network. Good marketing facilities can increase the scope of future development of the producer or a business unit. From the study it is found that the transportation and communication system is very backward in the rural area where fish are available. A modern, quick dependable marketing system is very necessary for perishable product like fish. The use of preservative is also a rare case in the rural area. Because fish is a perishable product and fishermen have to sell this perishable product within a very short term period. Sometimes in the study area it is seen that most of the fishermen cannot sell their fish within a specific time period. The local fish traders, the market intermediaries carry fish by bicycle or through ordinary motor vehicle. They cannot supply the fish to different places within a very short term period. Besides, the basic infrastructure of fish market is very poor and fails to cover entire the fish production centre which is in remote place of the study area.

The fish market in the state may divide into several groups, such as,

- i. Rural market
- ii. Urban market
- iii. Regulated market
- iv. Non-regulated market etc.

Most of the rural markets are of non-regulated type, urban fish markets are more or less regulated. Regulated markets may provide some certain facilities to the fish traders whereas non-regulated markets fail to equipped adequate facilities. There is a common feature of fish market in the study area is that they sit side by side with other daily markets. The regulated fish market in the urban areas avail certain facilities

like water, shed, electricity, storage space etc. They pay a minimum charge for availing these facilities. Non-regulated fish markets have no such type of facilities so buyers and sellers face different types of problems.

According to the fishermen of some backward place within the study area, the fishermen have been faced with another some important problems i.e. lack of able customers and inadequate infrastructural facilities in the fish producing area. In the study area it is seen that most of the rural people are poor and they are not in a position to buy fish at higher price and also these people are not much health conscious. So, the fishermen cannot get reasonable price for lack of capable customers. On the other hand the fishermen in the study area are not aware about market price because most of the fishermen are uneducated and they don't have the market knowledge.

The following table has shown the district-wise marketing problem faced by the fishermen during the period of field study.

Sl. No	Table No.7.2: Opinion of the respondents on marketing problems (District-wise)								
	Marketing Problem	Districts						Nos.of Respondents	Total %
		Sivasagar		Nagaon		Cachar			
		Nos.of respondents.	%	Nos.of respondents	%	Nos. of respondents	%		
1	S.A	01	0.62	17	15.31	0	0	18	4.34
2	A	51	32.07	63	56.75	31	21.38	145	27.71
3	DA	74	46.54	21	18.92	75	51.72	170	40.96
4	UD	33	20.75	10	9.0	39	26.89	82	19.76
Total		159		111		145		415	100.00

Source: Primary Survey

The table reveals that the 32.69 percent respondents of Sivasagar district, 72.06 percent in Nagaon and 21.38 percent of respondents in Cachar districts agree that marketing of fish selling is the basic problem of the fishermen because of different problems such as infrastructure, modern technology, ignorance of the fishermen on price and knowledge etc. On the other hand in the respondents of three districts respectively 20.75 percent in Sivasagar, 9 percent in Nagaon and 26.89 percent respondents in Cachar district takes undecided role on the marketing problem.

This problem has been analyzed by the help of the following statistical tools like chi square, correlation and ANOVA. The district wise fish marketing problem is analyzed in the following.

Districts/ Marketing problem

Null Hypothesis: There is no association between the districts and marketing problem faced by the fishermen.

Alternative Hypothesis: There is association between the districts and marketing problem faced by the fishermen

Chi-Square Tests

	Value	df	P-value
Pearson Chi-Square	94.083	6	.000

Since the P- Value is less than 0.05, the null hypothesis is rejected. Thus according to the chi-Square test, there is association between the districts and marketing problem faced by the fisherman. So, it is clear that the marketing problem hampers the growth of fishery sector where direct impact goes on fishermen.

7.2.3. Fishing Processing Problem:

In the survey it is found that the fishermen usually prepare fishing plan in the river and beel fisheries during the period of August to January. More equipment's are

required for fishing such as net, boat, bamboo, woods, labour and other ancillary items. Most of the fisheries co-operative societies, SHG's, and NGO in the study area give protection (bandh) in the river fisheries for fishing properly. Without protection or bandh in the river fisheries, the fishermen cannot catch the fish within the river because the river fisheries are free and floating. So the protection (bandh) is necessary for fishing in some river fisheries. This fishing technique is more expensive and complex in the river fishery like Brahmaputra, Barak and other tributaries also. Majority of the fishermen of cooperative societies, self-help group, non-government organization and some individuals cannot bear the huge amount of capital for giving bandh (protection) and purchase the fishing equipment. Ultimately the fishermen of the organization go for borrowing to some private money lenders, relatives and friends. They have to take money for fishing processing with a higher interest from the private money lenders which creates great problems for the fishers and SHG,s, NGO and cooperative societies. Even the SHG,s, NGO and cooperative societies are not able to pay the annual revenue of the registered fisheries. So the fishermen are facing various types of problems for the fishing. The following table no-7.3 shows the district-wise fishing processing problem faced by the fishermen.

Sl. No	Table No.7.3: Opinion of the respondents on processing problem faced by fishermen (District-wise)								
	Processing for fishing plan	Districts						Nos.of Respondents	Total %
		Sivasagar		Nagaon		Cachar			
		Nos.of rspdnts	%	Nos.of rspnd	%	Nos.ofr espnd	%		
1	SA	0	0	23	20.72	6	4.13	29	6.99
2	A	31	19.49	56	50.45	50	34.48	137	33.01
3	DA	111	69.81	23	20.72	67	46.21	201	48.43
4	UD	17	10.69	9	8.11	22	15.17	48	11.56
Total		159		111		145		415	100.00

Source: Primary Survey

From the above table it has been found that 40 percent respondent agree and strongly agree that the processing of fishing in the river and beel fisheries is very difficult task for the fishermen. They have been facing some problems for fishing. Due to natural threats the fishermen cannot process timely in fishing. On the other hand some fishing process like Bheta (mentioned in previous chapter) is very expensive, hard and painful activity. Sometime some fishermen cannot process the fishing activities due to deepness of water in the river and sometime they face problem for reducing the water level of the rivers. It is frequently occurred at the Brahmaputra River. Most of the respondents (48.43 percent) disagree and 11.56 percent neither agree or nor disagree because these fishermen catch the fish in the beel fisheries and some small river fisheries. They do not face the fishing processing problems at the small river and beel fisheries.

The district-wise processing problem of the fishermen also explain from the above table. According to the above table the 19.49 percent fisherman of Sivasagar district agree that they have been faced by the processing of fishing problem. Due to lack of finance the 19.49 percent fishermen cannot take the expensive method for fishing. In the Nagaon district 71.17 percent agree, 20.72 percent disagree and 8.11 percent have no response in this problem. On the other hand in the context of Cachar district it is seen that the 38.61 percent fishermen agree with this problem because the respondents of the district want to use the fishing technique which is more expensive than the other process .But this process of fishing is not possible for the fishermen of Cachar district due to the fishermen are not sound in economic position. The 46.21 percent respondents in the district are not agree and 15.17 percent takes undecided role in the district. The fishermen in the district are not able to investment the huge amount of money for fish processing.

To understand this problem it has also been examined by the following statistical to

Districts/Processing problem:

The analysis of fish processing problem of the study has also been examined by using the statistical techniques i.e. chi square, correlation and ANOVA which have analyzed in the following.

Chi-Square Tests:

Null Hypothesis: There is no association between the districts and processing problem faced by the fishermen.

Alternative Hypothesis: There is association between the districts and processing problem faced by the fishermen.

Chi-Square Tests

	Value	df	P- Value
Pearson Chi-Square	97.506	6	.000

Since the P- Value is less than 0.05, the null hypothesis may be rejected. Thus according to the chi-Square test, there is association between the districts and processing problem faced by the fishermen.

7.2.4. Price Fluctuation:

Price fluctuation is also seen as the problem of the fisherman in the study area. The price of any commodity depends on demand and supply. The fluctuation of price of fish is depending upon the demand and supply of fish. This problem has been identified during the time of favorable fishing seasons when fish are available in the river and beel fisheries. In the study area it is found that the fishermen suffer price fluctuation problem during the month of September to January because during the period different kinds of fish become available in the market from the different river and beel fisheries. Fish price varies from day to day even from time to time or

morning to evening during the period. Usually, there is a seasonal variation of price as production varies from season to season. So, due to huge supply of fish in the market the price of the fish automatically decreases. Sometime the price of fish increases due to various causes like ban period of fishing, sickness of fish and people use fish in some holistic and festive occasion. The price fluctuation of fish depends on other different factors such as transportation cost, cost of production, commission of the middle man, profit margin of producer; market rent, infrastructural facilities and storage cost etc. In the study area the fishermen have faced from the above mention factors for fluctuation of price. Some times the price fluctuation is occurred due to source of imported fish supply. In the following table the district wise price fluctuation problem has shown.

Sl. No	Table No.7.4: Opinion of the respondents in the price fluctuation problem faced by the fishermen								
	Price fluctuation	Districts						Nos. of Respondents	Total %
		Sivasagar		Nagaon		Cachar			
	Nos. of rspdnts.	%	Nos. of rspnd	%	Nos. of respnd	%			
1	SA	05	3.14	4	3.60	3	2.06	12	2.89
2	A	47	29.56	39	35.13	64	44.13	150	36.14
3	DA	96	60.37	13	11.71	28	25.22	137	33.01
4	UD	11	6.91	55	49.54	50	45.04	116	27.95
Total		159		111		145		415	100.00

Source: Primary Survey

In the above table it is seen that 39.03 percent respondents agree and strongly agree that price fluctuation is one of the problem faced by the fishermen. But it is seen that 27.95 percent respondents take undecided role on that problem.

The district-wise analysis of price fluctuation problem faced by the fishermen respectively in Sivasagar 32.7 percent, 38.73 percent in Nagaon and 46.19 percent in Cachar district. On the other hand, some of the respondents in the three districts take undecided role i.e. in Sivasagar 6.91 percent, Nagaon 49.54 percent and Cachar 45.04 percent.

This problem of the fishery sector has been measured by following statistical technique. It is examined by chi square test.

Chi-Square Tests:

Districts/ Price fluctuation problem

Null Hypothesis: There is no association between the districts and price fluctuation problem faced by the fishermen.

Alternative Hypothesis: There is association between the districts and price fluctuation problem is faced by the fishermen.

Chi-Square Tests

	Value	df	P- Value
Pearson Chi-Square	110.543	6	.000

Since the P- Value is less than 0.05, the null hypothesis may be rejected. Thus according to the chi-Square test, there is association between the districts and price fluctuation problem faced by the fishermen.

7.2.5 Problem of Middleman:

In the study it is observed that the fishermen, local fish traders, market channel and middleman are playing crucial role in fish marketing. It creates serious problem

among the fishermen in the study area. The middlemen are in the links with the fisherman, village fish traders and the wholesalers. Sometimes the middlemen provide financial support to the fishermen. Many times the price rates of the fish are fixed by middlemen in presence of the fishermen, local fish traders and wholesalers. The middlemen always patronize the traders for getting commission which are badly affected by the fishermen as well as customers.

The following table describes the district-wise middle man problem in the fishery sector of the study area.

Sl. No	Table No.7.5: Opinion of the respondents in the middle man problem in the fishery sector								
	Middle man problem	Districts						Nos. of Respondents	Total %
		Sivasagar		Nagaon		Cachar			
		Nos. of respondents	%	Nos. of respondents	%	Nos. of respondents	%		
1	SA	0	0	12	10.81	0	0	12	2.89
2	A	51	32.07	56	50.45	83	74.77	190	45.78
3	DA	95	59.74	20	18.01	22	15.17	137	33.01
4	UD	13	8.17	23	20.72	40	27.58	76	18.31
Total		159		111		145		415	100.00

Source: Primary Survey

The above table explains that most of the fishermen have been exploited from the different groups of middlemen who are acting as helping group in the activities of fishing, fish selling and pricing of fish for their benefit. So without any cost, the middlemen are able to earn a part of profit from the fishermen. Here, the 48.67 percent

fishermen agree that the middleman has been identified as one of the most important obstacle because due to role of middleman the fishermen have been facing price problem in the market. On the other hand, the 18.31 percent respondents in the study area do not response about this problem.

In the district-wise analysis, the 32.07 percent respondents of Sivasagar district, 61.26 in Nagaon and 74.77 percent in Cachar districts agree that this problem hampers the growth of fishery sector in the study area. This problem has been explained with the help of following statistical tool.

Districts/ Middle man problem

Null Hypothesis: There is no association between the districts and middle man problem faced by the fisherman.

Alternative Hypothesis: There is association between the districts and middle man problem faced by the fisherman.

Chi-Square Tests

	Value	df	P- Value
Pearson Chi-Square	116.126	6	.000

Since the P- Value is less than 0.05, the null hypothesis may be rejected. Thus according to the chi-Square test, there is association between the districts and middle man problem faced by the fishermen.

7.2.6 Technological Problem:

Modern technologies are also applied as the main instrument in the fishing sector, now a day in the states like Kerala, Tamil Nadu, Orissa, Andhra Pradesh etc. In Assam, technological use in fishery sector is a great challenge. The fishing in the state is fully based on the traditional way. Basically in the state of Assam the technological awareness has not been grown up among the fishermen in fishing sector.

But in the state of Kerala, Andhra Pradesh, Tamilnadu, Orissa and other sea area fishers in India most of them use the technology in fishing sector and at present they are very much aware about the modern technology in fishing. Of course the governments of these states are very aware about the growth of agriculture and allied sector. The governments of the states have been adopting various schemes and programmes for developing the fishery sector.

In the study area it has seen that the fishermen are engaged in fishing in the river and beel fisheries in fully traditional way. The fishermen in the area have not been able to use the machine boat and other modern technology for fishing due to lack of finance. Also, fishermen are not aware about modern technology. Due to non-use of the modern fishing technology the fishermen could not catch fish in the long time because physically they cannot do the much hard working.

The fishermen in the state still practicing their age old traditional methods of fish capture using country boats and gears. The motorized boat and many other improved types of equipment are yet to be introduced in the state for fishing.

In the purpose of fish trading some infrastructural facilities like scientifically equipped vehicle and preservatives, use of oxygen in transportation of seed etc. are highly desirable. But such facilities are not sufficient in the study area. So fishermen have been facing such types of problems.

The fishermen have been fishing in the river and beel fisheries from the long time by using traditional fishing equipment's. They cannot use the machine boat for fishing activities during the heavy flood situation also because they do not have sufficient amount of capital for investing in the fishing sector. The 36.62 percent fishermen agree that the technology is useful element for fisheries and 26.98 percent respondents are fully ignored; they do not show any positive or negative response on this problem. So from this analysis it is clear that most of the respondents opine that due to the technological problem the fishery sector could not grow at a faster pace. The technological uses of the fishermen have been observed in the study area though the primary investigation which has been analyzed in the following table.

Sl. No	Table No.7.6:Opinion of the fishermen in the technological problem faced by fishermen								
	Technol ogical problem	Districts						Nos. of Resp onde nts	Total %
		Sivasagar		Nagaon		Cachar			
		Nos.of rspdnts	%	Nos.of rspnd	%	Nos.of respnd	%		
1	AG	38	23.90	46	41.44	46	31.72	130	31.32
2	SA	17	10.69	4	3.60	1	0.69	22	5.30
3	DA	84	52.83	12	10.81	54	37.24	150	36.14
4	SDA	01	0.63	0	0	0	0	1	0.24
5	UD	19	11.94	49	44.14	44	30.34	112	26.98
Total		159		111		145		415	100.00

Source: Primary Data

The district-wise technological problem has been observed in the field study. In this analysis Sivasagar 34.59 percent, Nagaon 45.04 and Cachar 32.41 percent respondents agree. On the other hand 11.94, 44.14 and 30.34 percent respondents of the three districts play undecided role regarding this problem. Therefore from this analysis it is easily defined that this problem really hampers for growth of fishery sector in the state. It is examined by using the statistical tool.

Districts/ Technological problem

Null Hypothesis: There is no association between the districts and technological problem faced by the fishermen.

Alternative Hypothesis: There is association between the districts and technological problem faced by the fishermen.

Chi-Square Tests

	Value	df	P- Value
Pearson Chi-Square	81.219	8	.000

Since the P- Value is less than 0.05, the null hypothesis may be rejected. Thus according to the chi-Square test, there is association between the districts and technological problem faced by the fishers.

7.2.7 Fish Sickness or Fish Disease Problem:

In the survey the sickness or fish disease has been found as one of the serious problem in the river and beel fisheries of the study area. It creates a great problem among the fishermen. The various diseases affect the fish growth in the natural fisheries. The ulcerative disease syndrome (UDS) has taken epidemic turn since 1988 in the state. Different preventive steps have been taken so far, but, it has failed to get success. The fisher folk have been suffering very badly due to this disease for last few couples of years. Basically during the period of winter the sickness of the fish has been occurred in the river, beel, ponds and tanks and wetland. In the study area most of the beel fisheries are faced by the problem because in the beel fisheries the flow of water is totally blocked during the winter season. The population of fish has decreased in the river and beel fisheries due to sickness. Some species of fish are destroyed in the natural fisheries. So, most of the fishermen leave the fishing occupation due to scarce and decrease the quantity of fish in the natural water body. In the study area most of the respondents opined and suspected for the following causes of the sickness of fish in the river and beel fisheries.

1. Use of different chemicals and fertilizers in the agricultural field.
2. Water pollution.
3. High rate of stocking density.

For the above causes the disease of fish has increased in the river and beel fisheries and as a result most of the indigenous species of fish reduces from the natural fisheries. So, the fishing occupation has been challenged in the present time. The problem has been examined in the following statistical method.

Sl. No	Table No.7.7: Opinion of the fishermen in the fish sickness problem (District-wise)								
	Sickness of the fish problem	Districts						Nos. of Respondents	Total %
		Sivasagar		Nagaon		Cachar			
		Nos. of respondents.	%	Nos. of respnd	%	Nos. of respnd	%		
1	A	50	31.44	50	45.04	80	55.17	180	43.37
2	SA	29	18.23	2	1.80	0	0	31	7.47
3	DA	60	37.73	10	9.0	20	13.79	90	21.68
4	UD	19	11.94	49	44.14	45	31.03	113	27.22
5	SDA	01	0.62	0	0	0	0	01	0.24
Total		159		111		145		415	100.00

Source: Primary Survey

In the above table it has explained that the majority of the respondents respectively 49.67 percent of Sivasagar, 46.84 percent of Nagaon and 55.17 percent respondents of Cachar district agree that sickness of fish creates the big problem among the fishermen in the study area because, due to the sickness of fish the indigenous fish of river and beel fisheries in the state has been reduced. In fact it is seen that the fish of the beel fisheries in the study area are badly affected than the river fisheries. The water of the beel fisheries are not flowing to the river and other beel fisheries in the winter season. So, the sickness has much affected the fish in the beel fisheries. From the assessment of the study regarding the problem of sickness it has been defined that the sickness has adversely affected the fishery sector in the study area of the state.

Districts/ Fish diseases problem

Null Hypothesis: There is no association between the districts and fish diseases problem faced by the fishermen.

Alternative Hypothesis: There is association between the districts and fish diseases problem faced by the fishermen.

Chi-Square Tests

	Value	df	P- Value
Pearson Chi-Square	109.186	8	.000

Since the P- Value is less than 0.05, the null hypothesis may be rejected. Thus according to the chi-Square test, there is association between the districts and fish diseases problem faced by the fishermen.

7.2.8. Problem of Fishery Settlement Policy:

The fishery settlement policy creates a big problem in the registered fisheries of the state which has been faced by some lease party of fisheries in the study area. Due to bias fishery settlement policy adopted by the government for political interference and other causes some non-eligible parties are able to get settlement for running these fisheries in a particular time period. But it is unfortunate that before completing the agreement time period of the leasing fishery the group (cooperative society, self-help group, NGO and individual) could not run the fishery properly because they cannot repay the government revenue timely. At last the group or party has been recognized by the government as defaulter and for that cause the government has cancelled the leasing agreement from the party. Besides some special cases has occurred between the authority and parties in various times. Sometimes some parties move to the court for searching actual justice against the authority and some fishery cases have been hanging in the court from the long time .Some cases of the fisheries have been settled

and some cases have not been settled yet. So the government has lost the huge amount of revenue from these registered fisheries.

From the primary study the problem of the fishery sector has been analyzed in the following table. The following table is shown by the district-wise representation of the respondent which has been explained. Here, 48.67 percent respondents agree and strongly agree that the problem of fishery settlement policy is badly affected in the fishery sector of the study area. 31.80 percent respondent does not response the problems.

The district-wise analysis it has found that 61 percent fishermen in Sivasagar district agree that wrong fishery settlement policy of the government loses the huge amount of revenue in the state. In Nagaon district the 50.44 percent respondents agree and in Cachar district 33.79 percent. In the district of Cachar the 37.24 percent respondents have no response in the problem.

Sl. No	Table No.7.8: Opinion of the fishermen in the fishery settlement problem faced by fishery sector								
	Problem of fishery settlement policy	Districts						Nos.of Respo ndents	Total %
		Sivasagar		Nagaon		Cachar			
	Nos.of rspdnts	%	Nos.of rspnd	%	Nos. of respnd	%			
1	AG	69	43.39	37	33.33	48	33.10	154	37.11
2	DA	34	21.38	05	4.50	42	28.96	81	17.96
3	SA	28	17.61	19	17.11	01	0.69	48	11.56
4	UD	28	17.61	50	45.04	54	37.24	132	31.80
Total		159		111		145		415	100.00

Source: Primary Survey

Districts/ Problem of fishery settlement policy problem

Null Hypothesis: There is no association between the districts and wrong fishery settlement policy problem faced by the fishermen.

Alternative Hypothesis: There is association between the districts and problem of fishery settlement policy faced by the fishermen.

Chi-Square Tests

	Value	df	P- Value
Pearson Chi-Square	62.827	6	.000

Since the P- Value is less than 0.05, the null hypothesis may be rejected. Thus according to the chi-Square test, there is association between the districts and fish diseases problem faced by the fishermen.

7.3. Spearman's Rank Correlation:

The Spearman's rank correlation is the non-parametric version. Spearman's coefficient measures the strength and direction of association between two ranked variables.

Spearman's correlation coefficient is a technique which can be used to summarize the strength and direction (negative or positive) of a relationship between two variables. The result will always be between 1 and minus 1.

In statistics a rank correlation is any of several statistics that measures an ordinal association the relationship between ranks of different ordinal variables or different ordinal variables or different rankings of the same variable, where a ranking is the assignment of the ordering labels first, second, third etc.

In the study the Spearman's rank correlation has been used for examining the problems of the fishery sector of the study area. Here it is observed the rank correlation.

Correlation analysis

Null Hypothesis H_0 : the observed correlation coefficient is insignificant

Alternative Hypothesis H_1 : the observed correlation coefficient is significant

7.3.1 Natural Problem

Between Districts	Spearman's Rank Correlation Coefficient	P-value	Decision
Sivasagar and Nagaon	-0.17	0.08	Insignificant
Sivasagar and Cachar	-0.025	0.77	Insignificant
Cachar and Nagaon	0.142	0.13	Insignificant

The correlation of natural problem between (Sivasagar and Nagaon), (Sivasagar and Cachar) and (Nagaon and Cachar) is insignificant. So, there is no correlation of natural problem between (Sivasagar and Nagaon),(Sivasagar and Cachar) and (Nagaon and Cachar).

7.3.2. Marketing Problem

Between Districts	Spearman's Rank Correlation Coefficient	P-value	Decision
Sivasagar and Nagaon	0.014	0.88	Insignificant
Sivasagar and Cachar	-0.098	0.24	Insignificant
Cachar and Nagaon	-0.117	0.22	Insignificant

The correlation of marketing problem between (Sivasagar and Nagaon), (Sivasagar and Cachar) and (Nagaon and Cachar) is insignificant. So, there is no correlation of marketing problem between (Sivasagar and Nagaon), (Sivasagar and Cachar) and (Nagaon and Cachar).

7.3.3. Processing Problem

Between Districts	Correlation Coefficient	P-value	Decision
Sivasagar and Nagaon	-0.109	0.25	Insignificant
Sivasagar and Cachar	0.038	0.65	Insignificant
Cachar and Nagaon	-0.053	0.58	Insignificant

The correlation of processing problem between (Sivasagar and Nagaon), (Sivasagar and Cachar) and (Nagaon and Cachar) is insignificant. So, there is no correlation of processing problem between (Sivasagar and Nagaon), (Sivasagar and Cachar) and (Nagaon and Cachar).

7.3.4. Middle Man Problem

Between Districts	Correlation Coefficient	P-value	Decision
Sivasagar and Nagaon	-0.109	0.25	Insignificant
Sivasagar and Cachar	0.038	0.65	Insignificant
Cachar and Nagaon	-0.053	0.58	Insignificant

The correlation of middle man problem between (Sivasagar and Nagaon), (Sivasagar and Cachar) and (Nagaon and Cachar) is insignificant. So, there is no correlation of middle man problem between (Sivasagar and Nagaon), (Sivasagar and Cachar) and (Nagaon and Cachar).

7.3.5. Price Fluctuation

Between Districts	Correlation Coefficient	P-value	Decision
Sivasagar and Nagaon	0.008	0.93	Insignificant
Sivasagar and Cachar	-0.034	0.69	Insignificant
Cachar and Nagaon	-0.190	0.04	Significant

The correlation of price fluctuation problem between (Sivasagar and Nagaon) and (Sivasagar and Cachar) is insignificant. So there is no correlation of natural problem between (Sivasagar and Nagaon) and (Sivasagar and Cachar). The correlation of price fluctuation problem between Cachar and Nagaon is significant. They are negatively correlated but not highly correlated, so when the price fluctuation problem increases in Cachar will slightly decrease in Nagaon and vice versa.

7.3.6. Technological Problem

Between Districts	Correlation Coefficient	P-value	Decision
Sivasagar and Nagaon	0.013	0.90	Insignificant
Sivasagar and Cachar	0.020	0.81	Insignificant
Cachar and Nagaon	-0.008	0.93	Insignificant

The correlation of technological problem between (Sivasagar and Nagaon), (Sivasagar and Cachar) and (Nagaon and Cachar) is insignificant. So, there is no correlation of technological problem between (Sivasagar and Nagaon), (Sivasagar and Cachar) and (Nagaon and Cachar).

7.3.7. Fish Diseases Problem

Between Districts	Correlation Coefficient	P-value	Decision
Sivasagar and Nagaon	-0.19	0.05	Insignificant
Sivasagar and Cachar	0.010	0.91	Insignificant
Cachar and Nagaon	-0.127	0.18	Insignificant

The correlation of fish diseases problem between (Sivasagar and Nagaon), (Sivasagar and Cachar) and (Nagaon and Cachar) is insignificant. So, there is no correlation of fish diseases problem between (Sivasagar and Nagaon), (Sivasagar and Cachar) and (Nagaon and Cachar).

7.3.8. Problem of Fishery Settlement Policy

Between Districts	Correlation Coefficient	P-value	Decision
Sivasagar and Nagaon	-0.09	0.34	Insignificant
Sivasagar and Cachar	0.006	0.94	Insignificant
Cachar and Nagaon	0.102	0.29	Insignificant

The correlation of problem of fishery settlement policy between (Sivasagar and Nagaon), (Sivasagar and Cachar) and (Nagaon and Cachar) is insignificant. So, there is no correlation of wrong fishery settlement policy problem between (Sivasagar and Nagaon), (Sivasagar and Cachar) and (Nagaon and Cachar).

7.4. ANOVA Test:

ANOVA is a powerful statistical tool used to test differences between two or more means. It is the basic purpose to test the homogeneity of several means. The term analysis of variance was introduced by Prof. R. A. Fisher in 1920's to deal with problem in the analysis of agronomical data. According to him, ANOVA is the "Separation of variance ascribable to one group of causes from the variance ascribable to other group. "By this technique the total variation in the sample data is expressed as the sum of its non-negative components where each of these components is a measure of the variation due to some specific independent source or factor or cause. The analysis of variance consists in the estimation of the amount of variation due to each of the independent factors separately and then comparing these estimates due to assignable factors with the estimate due to chance factor, the latter being known as experimental error or simply error. *(Gupta, S.C and Kapoor, V.K 2008)*

Since it has to test whether the fisheries problems of the three districts are statistically significant or not, in the case it has been used ANOVA test to compare the means of the three districts.

7.4.1 ANOVA test in Natural Problem:

The following table no.35 presents the descriptive statistics of three districts. In the three districts the mean value of natural problem in Nagaon district is 3.5946, the Sivasagar is 3.5912 and Cachar district is 3.3655 and standard error of three districts are Nagaon 0.09438, Sivasagar 0.06066 and Cachar 0.07757 respectively. In this table high mean value of the Nagaon district indicates that the natural problems hampers in the fishery sector comparatively more than the other two districts of Sivasagar and

Cachar. In the following figure the mean of natural problem of the three districts have been shown by a curve.

Table -7.9: District wise Natural Problems(Descriptive statistics)				
Districts	N	Mean	Std. Deviation	Std. Error
Cachar	145	3.3655	0.93403	0.07757
Sivasagar	159	3.5912	0.76484	0.06066
Nagaon	111	3.5946	0.99433	0.09438
Total	415	3.5133	0.89507	0.04394

Source: Primary Survey

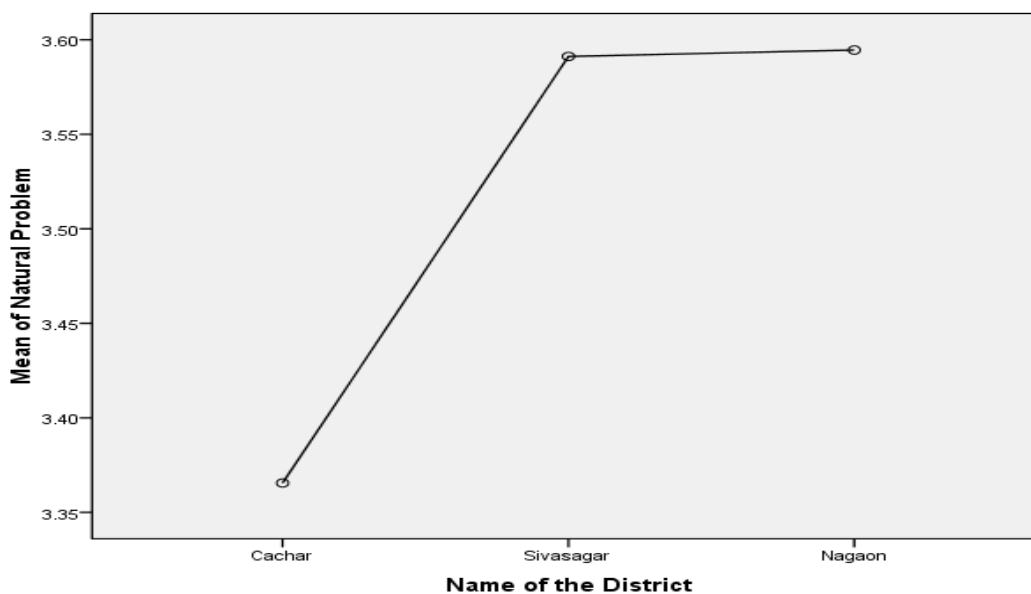


Figure No-15

On the other hand the problem has been examined by using the statistical tool ANOVA. Here the test of ANOVA has done.

ANOVA

Null Hypothesis: H_0 : The mean natural problems in all the three districts are homogeneous.

Alternative Hypothesis: H_1 : At least two districts the mean natural problems are not equal.

Sources of variation	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.865	2	2.433	3.067	.048
Within Groups	326.812	412	.793		
Total	331.677	414			

Since the P- Value is less than 0.05, it may reject the null hypothesis. Thus according to the ANOVA test, the mean natural problems in all the three districts differ significantly.

7.4.2 ANOVA test in Marketing Problem:

In the study very comprehensive observation is done through this survey that the mean value of the Nagaon district is numerically high in the marketing problem. The fish marketing problem also hampers on the fishers and fish traders in the study area. In this analysis the mean value of the Nagaon district is 3.6847 and the standard error is 0.09048. So it is seen that the fishery sector of three districts have been affected by marketing problems. On the other hand the district wise mean of marketing problem in the Nagaon district is high value. It represents 3.6847 mean.

The following analysis of the marketing problem has been shown by defining the district wise mean value and standard deviation. Here it has seen that the mean value of Sivasagar district is 2.8679, Cachar district is 2.6966 and Nagaon district is 3.6847. On the other hand the standard error of three districts is respectively 0.07088, 0.06661 and 0.09048. The highest mean value represents in the Nagaon district. High mean value indicates for the district of Nagaon that the marketing problem hampers the fishermen than the other two districts. So, from this analysis it has been cleared

that the fisheries of Nagaon district is more affected by the marketing problem. This analysis has been shown in the following table and graph.

Table No-7.10: District wise Marketing problems (Descriptive statistics)				
Districts	N	Mean	Std. Deviation	Std. Error
Cachar	145	2.6966	0.80212	0.06661
Sivasagar	159	2.8679	0.89381	0.07088
Nagaon	111	3.6847	0.95329	0.09048
Total	415	3.0265	0.96648	0.04744

Source: Primary Survey

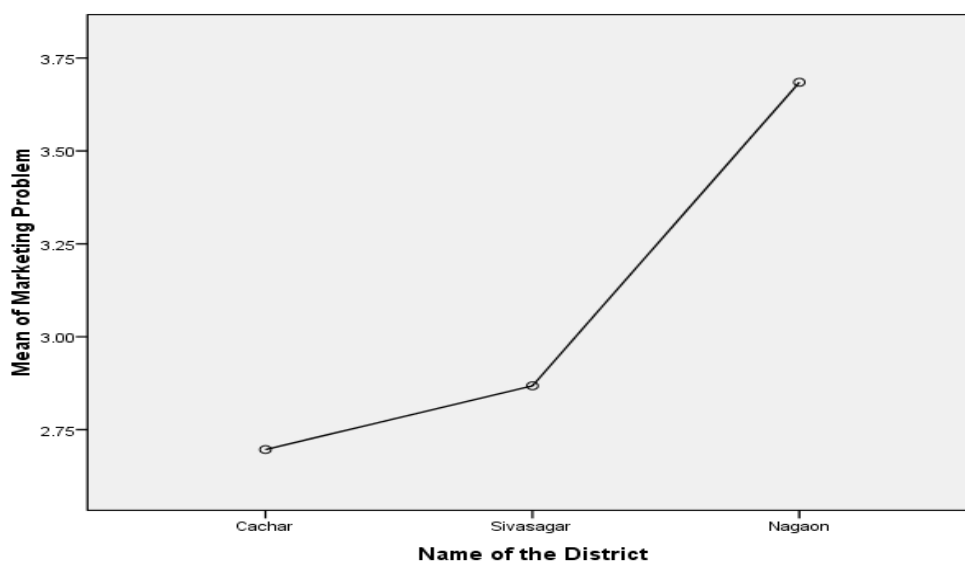


Figure No-16

ANOVA

Null Hypothesis: H_0 : The mean marketing problems in all the three districts are homogeneous.

Alternative Hypothesis: H_1 : At least two of the mean marketing problems are not equal.

Sources of Variation	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	67.870	2	33.935	43.850	.000
Within Groups	318.839	412	.774		
Total	386.708	414			

Since the P- Value is less than 0.05, we may reject the null hypothesis. Thus according to the ANOVA test, the mean marketing problems in all the three districts differ significantly.

7.4.3 ANOVA TEST in Fishing Processing Problem:

In the following table it has found that the highest mean value of Nagaon district is 3.7117 and the standard error is 0.09695. On the other hand the mean value of Sivasagar district is 2.4969 and standard error is 0.06364 and Cachar district is 2.9655 and standard error is 0.08213. From this analysis it is clear that the fishermen of Nagaon district have been faced much problem than the fishermen of Sivasagar and Cachar districts.

Districts	N	Mean	Std. Deviation	Std. Error
Cachar	145	2.9655	0.98892	0.08213
Sivasagar	159	2.4969	0.80248	0.06364

Nagaon	111	3.7117	1.02147	0.09695
Total	415	2.9855	1.0471	0.0514

Source: Primary Survey

The following figure is shown in the fish processing problem of the three districts in the study.

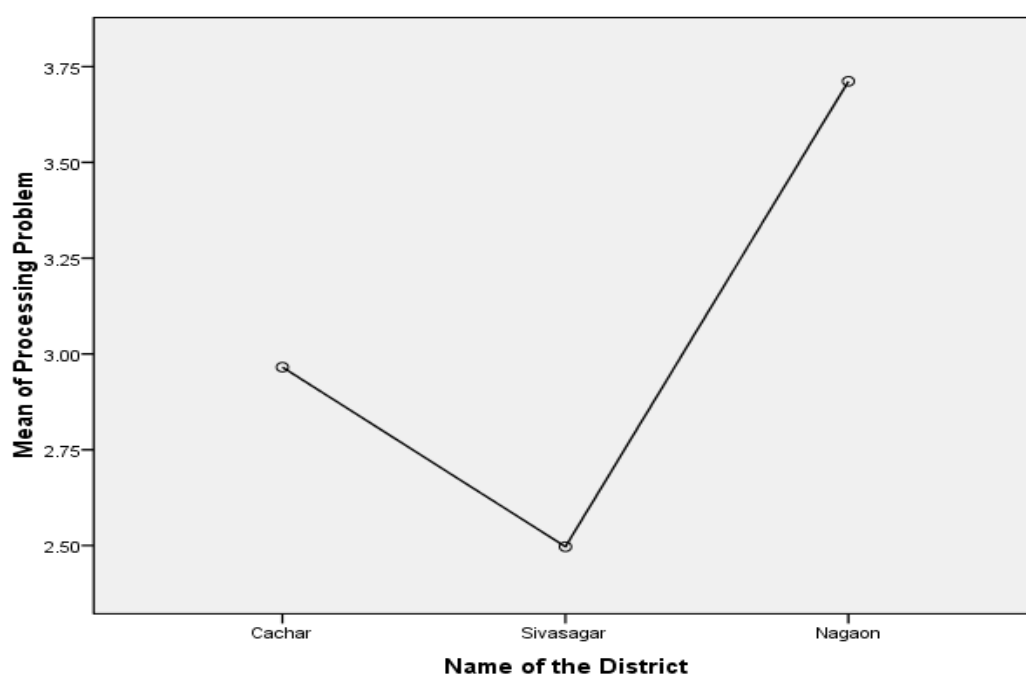


Figure No-17

ANOVA

Null Hypothesis: H_0 : The mean processing problems in all the three districts are homogeneous.

Alternative Hypothesis: H_1 : At least two of the mean processing problems are not equal.

Sources of variation	Sum of Squares	df	Mean Square	F	Sig.
Between	96.562	2	48.281	55.665	.000

Groups					
Within Groups	357.351	412	.867		
Total	453.913	414			

Since the P- Value is less than 0.05, we may reject the null hypothesis. Thus according to the ANOVA test, the mean processing problems in all the three districts differ significantly.

7.4.4 ANOVA test in Price Fluctuation Problem:

Again this problem of the fishery sector has examined by using ANOVA. In the study the price fluctuation problem of the fishers have been analyzed in the following.

Table -7.12: District wise Price Fluctuation Problems(Descriptive statistics)				
Districts	N	Mean	Std. Deviation	Std. Error
Cachar	145	3.2897	0.79859	0.06632
Sivasagar	159	2.7547	0.98544	0.07815
Nagaon	111	3.3063	0.72354	0.06868
Total	415	3.0892	0.8951	0.04394

Source: Primary Survey

In the above table it is also found that the mean value of Nagaon district is slightly high than the Cachar and Sivasagar district. The mean value of the three districts have respectively 3.2063, 3.2897 and 2.7547 and the standard error 0.06868, 0.06632 and 0.07815. In this analysis mainly the price fluctuation affects the fishers of Nagaon district.

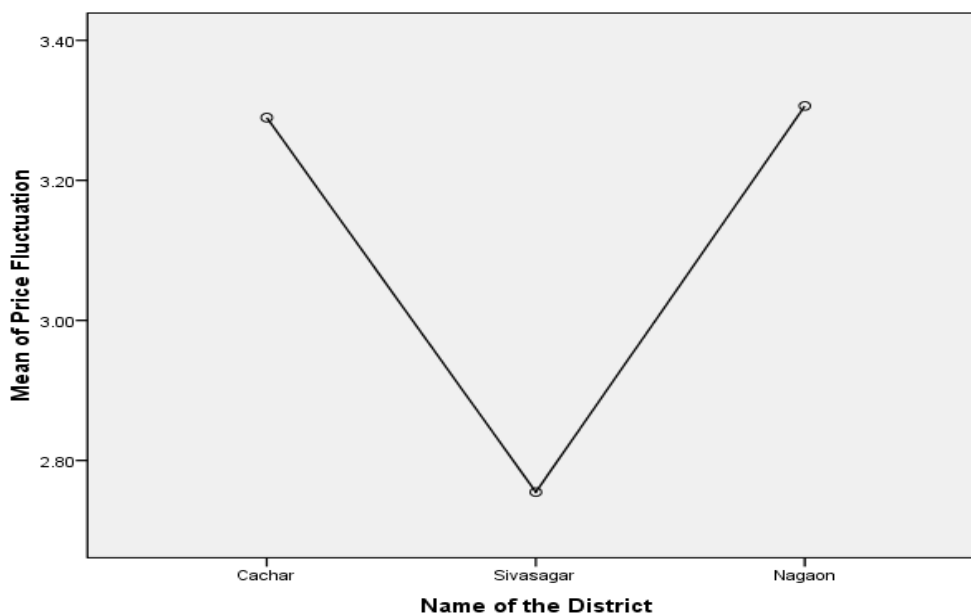


Figure-18

ANOVA

Null Hypothesis: H_0 : The mean price fluctuations problems in all the three districts are homogeneous.

Alternative Hypothesis: H_1 : At least two of the mean price fluctuations problems are not equal.

Sources of variation	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	28.847	2	14.424	19.622	.000
Within Groups	302.854	412	.735		
Total	331.701	414			

Since the P- Value is less than 0.05, we may reject the null hypothesis. Thus according to the ANOVA test, the mean price fluctuation problems in all the three districts differ significantly.

7.4.5 ANOVA test in Middleman Problem:

The following table shows the district wise middlemen problem which hampers to the fishermen.

Table -7.13: District wise Problem for Middleman(Descriptive statistics)				
Districts	N	Mean	Std. Deviation	Std. Error
Cachar	145	3.4207	0.74227	0.06164
Sivasagar	159	2.7233	0.92032	0.07299
Nagaon	111	3.5405	0.91238	0.0866
Total	415	3.1855	0.93343	0.04582

Source: Primary Survey

From the above table no-7.12 it has seen that the mean value of Nagaon district is more than the Cachar and Sivasagar district. The mean value of Nagaon district is 3.5405 where Cachar and Sivasagar districts have 3.4207 and 2.7233 and the standard error is respectively 0.0866, 0.06164 and 0.04299. So, from the observation of the analysis it can reveal that the fishermen of Nagaon district are more affected than the other two districts of Sivasagar and Cachar. The district wise representation of mean value on the middleman problem has been shown in the following graph.

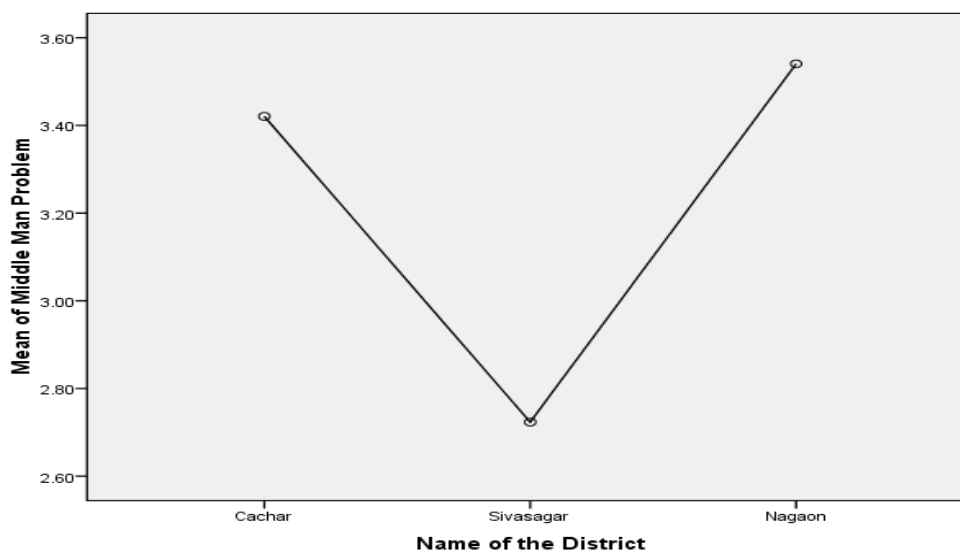


Figure - 19

ANOVA

Null Hypothesis: H_0 : The mean middle man problems in all the three districts are homogeneous.

Alternative Hypothesis: H_1 : At least two of the mean middle man problems are not equal.

Sources of variation	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	55.984	2	27.992	37.846	.000
Within Groups	304.729	412	.740		
Total	360.713	414			

Since the P- Value is less than 0.05, we may reject the null hypothesis. Thus according to the ANOVA test, the mean middle man problems in all the three districts differ significantly.

7.4.6 ANOVA test in Technological Problems:

The district wise technological problems of the fishermen have been analyzed in the following table.

Table No- 7.14- District-wise Technological Problems of the Fishermen(Descriptive statistics)				
Districts	N	Mean	Std. Deviation	Std. Error
Cachar	145	2.9586	0.84882	0.07049
Sivasagar	159	2.9119	1.10456	0.0876
Nagaon	111	3.3784	0.72681	0.06899
Total	415	3.053	0.94643	0.04646

Source: Primary Survey

Although it is seen that without the using of technology in fishing creates problems among the fishermen in the study area basically the technology cannot much hamper for fishing in the river and beel fisheries. The fishermen in the study area are very expert on fishing in traditional way. According to some fishermen in the study area the technology will bring negative effect in fishing because in the river and beel fisheries the fishers do fishing very carefully without any disturbances. In the event of using motor boat and other things fish will get scattered.

In the above table the district wise technological problem has been analyzed .Here it has found that the mean value of Nagaon district is high i.e 3.3784.The Cachar district the mean value 2.9586 and Sivasagar district i.e 2.9119.From this analysis it is clear that comparatively the fishermen of Nagaon district agree more than the fishermen of Sivasagar and Cachar district that lack of technological uses hamper the fishery sector in the study area. The following figure has shown the mean value of technological problem in the three districts.

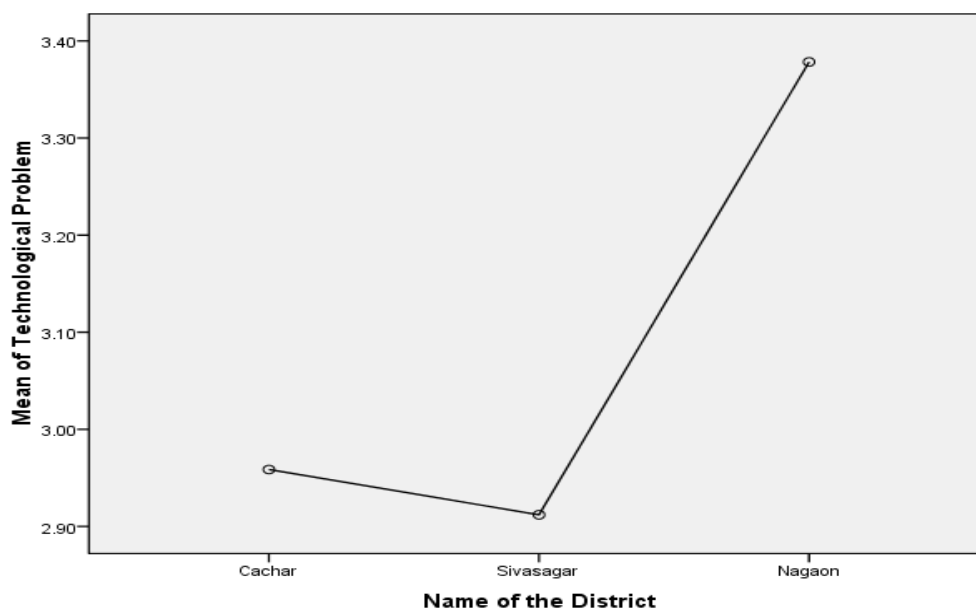


Figure -20

ANOVA

Null Hypothesis: H_0 : The mean technological problems in all the three districts are homogeneous.

Alternative Hypothesis: H_1 : At least two of the mean technological problems are not equal.

Sources of variation	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	55.984	2	27.992	37.846	.000
Within Groups	304.729	412	.740		
Total	360.713	414			

Since the P- Value is less than 0.05, we may reject the null hypothesis. Thus according to the ANOVA test, the mean technological problems in all the three districts differ significantly.

7.4.7 ANOVA test in Fish Sickness or Fish Disease Problems:

In the following table it has seen that the mean value of Cachar district is high than the Nagaon and Sivasagar district. The mean value of the three districts are respectively 3.4138(Cachar), 3.3964(Nagaon) and 3.2893(Sivasagar) on the other hand the standard error of the three districts are 0.06(Cachar), 0.09287(Nagaon) and 0.09287(Sivasagar).

From this analysis it is found that the sickness of fish has adversely affected in the river and beel fisheries in the Cachar district. The Nagaon and Sivasagar districts are also affected by the fish sickness problems. The following figure also indicates the fish sickness problem in the three districts

Table No: 7.15. Fish Sickness or Fish Disease Problems(Descriptive statistics)				
Districts	N	Mean	Std. Deviation	Std. Error
Cachar	145	3.4138	0.72252	0.06
Sivasagar	159	3.2893	1.1711	0.09287
Nagaon	111	3.3964	0.67796	0.06435
Total	415	3.3614	0.91126	0.04473

Source: Primary Survey

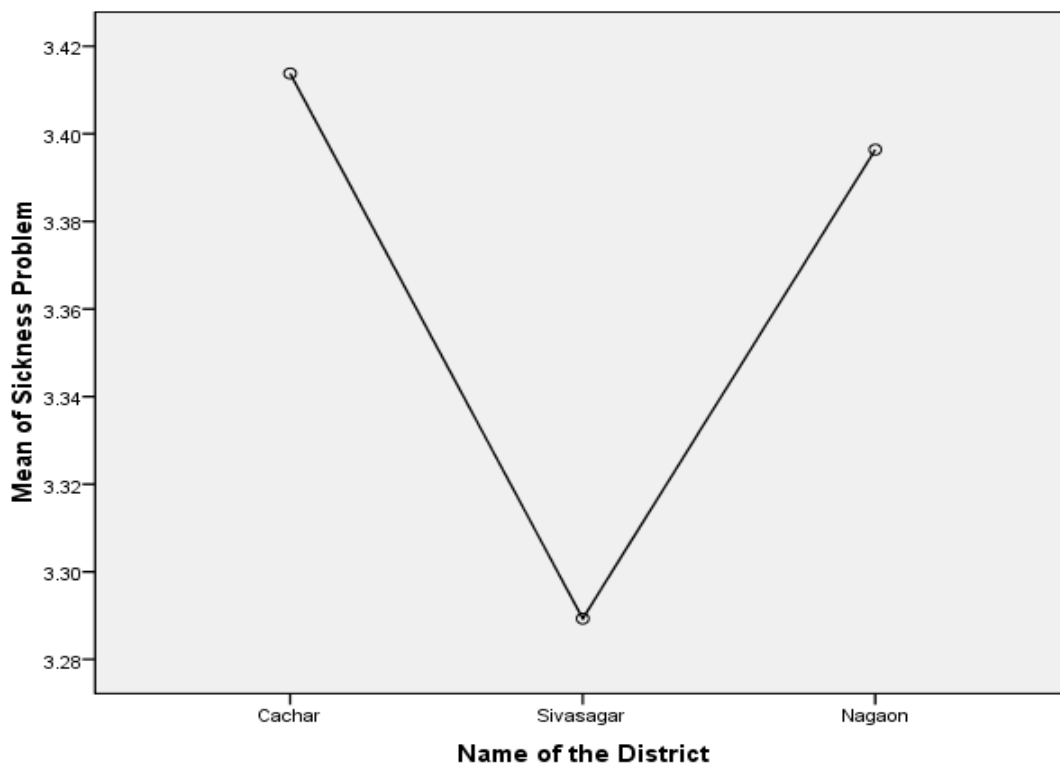


Figure-21

ANOVA

Null Hypothesis: H_0 : The mean sickness problems in all the three districts are homogeneous.

Alternative Hypothesis: H_1 : At least two of the mean sickness problems are not equal.

Sources of variation	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.360	2	.680	.818	.442
Within Groups	342.423	412	.831		
Total	343.783	414			

Since the P- Value is greater than 0.05, it may accept the null hypothesis. Thus according to the ANOVA test, the mean sickness problems in all the three districts are homogeneous.

7.4.8 ANOVA test in the Problem of Fishery Settlement Policy:

In the study it has been observed that how this problem affects the fishery sector. The following table shows the status about the fisheries settlement policy of the government. In the table it is seen that the mean value of Nagaon district is high. The mean value of three districts are 3.6306 (Nagaon), 3.5723 (Sivasagar) and 3.0552(Cachar) and the standard error of the three districts are 0.07777, 0.08053 and 0.06694 respectively. Therefore it is cleared from the table that the Nagaon district has been more affected by this problem. The following figure is also shown the district wise problem of fishery settlement policy adopted by the Government.

Table No-7.16. Problem of Fishery Settlement Policy (Descriptive statistics)				
Sivasagar	N	Mean	Std. Deviation	Std. Error
Cachar	145	3.0552	0.80605	0.06694
Sivasagar	159	3.5723	1.01544	0.08053
Nagaon	111	3.6306	0.8194	0.07777
Total	415	3.4072	0.93014	0.04566

Source: Primary Survey

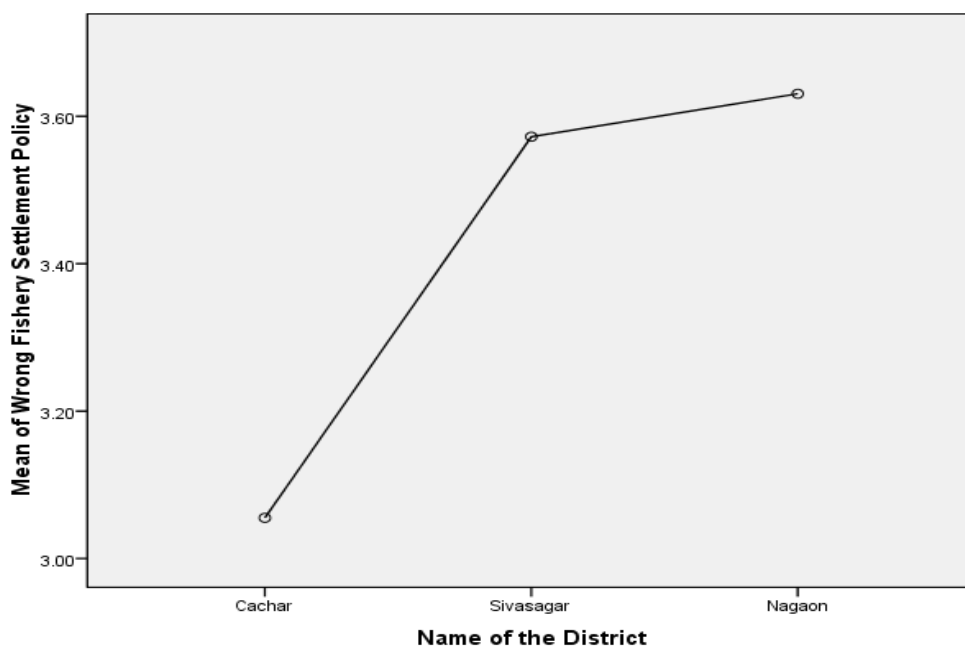


Figure-22

ANOVA

Null Hypothesis: H_0 : The mean problem of fishery settlement policy in all the three districts is homogeneous.

Alternative Hypothesis: H_1 : At least two of the mean problem of fishery settlement policy is not equal.

Sources of variation	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	27.846	2	13.923	17.365	.000
Within Groups	330.333	412	.802		
Total	358.178	414			

Since the P- Value is less than 0.05, it may reject the null hypothesis. Thus according to the ANOVA test, the mean problem of fishery settlement policy in all the three districts differ significantly.

7.5. Short description the problems through the statistical tools.

Above the all problems of the fishery sector in the study area have been examined systematically by using the statistical tools viz chi square, Rank correlation and ANOVA. In the following table no-41, the all problems of the fishery sector are distinctly verified and shown.

Sl.No	Problems	Null Hypothesis	Chi square	P-value	Decision
1	Natural Problem	The natural problem faced by the fishermen is independent of the districts	68.952	.000	Rejected
2	Marketing Problem	The marketing problem faced by the fishermen is independent of the districts	94.083	.000	Rejected
3	Fishing processing problem	The fishing processing problem faced by the fishermen are independent of the district	97.506	.000	Rejected
4	Price fluctuation problem	The price fluctuation problem faced by the fishermen are independent of the districts	110.543	.000	Rejected
5	Problem for middleman	The middleman problem faced by the	116.126	.000	Rejected

		fishermen are independent of the district			
6	Technological problem	The technological problem faced by the fishermen are independent of the district	81.219	.000	Rejected
7	Fish sickness or fish disease problem	The fish sickness or fish disease problem faced by the fishermen are independent of the district	109.186	.000	Rejected
8	Problem of fishery settlement policy	The problem of fishery settlement policy faced by the fishermen are independent of the district	62.827	.000	Rejected

Source: Primary Survey

In the above table these problems have been tested by the chi-square. Since the P-Value of the above mentioned problems are less than 0.05, the null hypothesis may be rejected. Thus according to the chi-Square test, there is association between the districts and the every particular problems of fishery sector.

According to the Spearman's Rank Correlation analysis in the following table no-7.17, seven problems of the study area are found insignificant except the Price fluctuation problem between Cachar and Nagoan. The correlation of the problem of price fluctuation between Cachar and Nagoan is significant. They are negatively correlated but not highly correlated, so when the problem of price fluctuation increases in Cachar will slightly decrease in Nagoan and vice versa.

Table No: 7.18. Spearman's Rank Correlation analysis					
Problems	Null Hypothesis	Between Districts	Spearman's Rank Correlation Coefficient	P-value	Decision
Natural Problem	The observed correlation coefficient is insignificant	Sivasagar & Nagaon	-0.17	0.08	Insignificant
		Sivasagar & Cachar	-0.025	0.77	Insignificant
		Cachar & Nagaon	0.142	0.13	Insignificant
Marketing Problem	The observed correlation coefficient is insignificant	Sivasagar & Nagaon	0.014	0.88	Insignificant
		Sivasagar & Cachar	-0.098	0.24	Insignificant
		Cachar & Nagaon	-0.117	0.22	Insignificant
Fishing processing problem	The observed correlation coefficient is insignificant	Sivasagar & Nagaon	0.07	0.46	Insignificant
		Sivasagar & Cachar	0.064	0.44	Insignificant
		Cachar & Nagaon	-0.044	0.0.65	Insignificant
Price fluctuation problem	The observed correlation coefficient is insignificant	Sivasagar & Nagaon	0.008	0.93	Insignificant
		Sivasagar & Cachar	-0.034	0.69	Insignificant

		Cachar & Nagaon	-0.190	0.04	Significant
Middleman Problem	The observed correlation coefficient is insignificant	Sivasagar & Nagaon	-0.109	0.25	Insignificant
		Sivasagar & Cachar	0.038	0.65	Insignificant
		Cachar & Nagaon	-0.053	0.58	Insignificant
Technological Problem	The observed correlation coefficient is insignificant	Sivasagar & Nagaon	0.013	0.90	Insignificant
		Sivasagar & Cachar	0.020	0.81	Insignificant
		Cachar & Nagaon	-0.008	0.93	Insignificant
Fish Sickness problem	The observed correlation coefficient is insignificant	Sivasagar & Nagaon	-0.19	0.05	Insignificant
		Sivasagar & Cachar	0.010	0.91	Insignificant
		Cachar & Nagaon	-0.127	0.18	Insignificant
Problem of Fishery Settlement Policy	The observed correlation coefficient is insignificant	Sivasagar & Nagaon	-0.09	0.34	Insignificant
		Sivasagar & Cachar	0.006	0.94	Insignificant
		Cachar & Nagaon	0.102	0.29	Insignificant

On the other hand, in the entire problems of the study are also examined by the ANOVA. The following table shows the brief statistical explanation. Here, it is found

that except the fish sickness problems other seven problems the null hypothesis are rejected.

Sl. No	Null Hypothesis	F	Sig	Remark
1	The mean natural problem in all three districts are homogenous	3.067	.048	Significant
2	The mean marketing problem in all three districts are homogenous	43.850	.000	Significant
3	The mean fishing processing problem in all three districts are homogenous	55.665	.000	Significant
4	The mean price fluctuation problem in all three districts are homogenous	19.622	.000	Significant
5	The mean middleman problem in all three districts are homogenous	37.846	.000	Significant
6	The mean technological problem in all three districts are homogenous	37.846	.000	Significant
7	The mean problem of fishery settlement policy in all three districts are homogenous	17.365	.000	Significant
8	The mean sickness problem in all three districts are homogenous	.818	.442	Insignificant

7.6. Prospects of Fishery Sector in Assam:

The previous chapter of the study has been stated that fishing is an important source of livelihood for a particular section of the people of the state. More than 1.3 percent of the state is directly or indirectly involved with this sector. The state has greater opportunity for development of fishery sector. In this chapter an attempt is

being made to analyze various factors for the future development of fishery sector in the state.

7.6.1. Scope of Increasing Productivity at availability of water bodies

The study area has available water bodies which have been explained in chapter no. 4. The state has tremendous prospects of fishery sector because the state is blessed with abundant water resources and it has the capacity to become the biggest producer and exporter of fish in the country. The Fishery Department of State Government has been running very successfully in registered river and beel fisheries through the various registered cooperative societies, self-help group, non-government organization and individuals. The sector has immense potential and must vigorously engage itself for deriving maximum benefits. These natural water bodies in the state are more productive. Though the capture fisheries dominate the fish production in the state and about 75 percent of total production was estimated during the previous period in the state but per hectare production is comparatively much lower than the culture fishery.

There is an immense scope of fish production in these water bodies. In future also there is a great possibility that the natural fish production will increase extensively because most of the Natural River and beel fisheries are still connected with each other and the water is freely flowing where fish can get opportunity to move in the water body.

7.6.2. Useful Soil and Water Quality for Fish Productivity:

The water and soil of the river and beel fisheries in the study area is of good quality and therefore the water bodies and soil in Assam are fertile for fish production. Soil and water are the main factors for fertility of the growth of fish in the river and beel fisheries. The quality of water and soil vary from region to region and source to source. Although the recent information of the quality of the water bodies in the state is not available nevertheless two study reports have mentioned here. The following table shows the water and soil quality of different water sources of Assam. In the table no.45, the standard water quality as suggested by Benarjea (1967). A comparison of

these factors like 'pH,' dissolved oxygen, alkalinity, etc. which are vital factors of fish growth lying in the productive range in Assam.

Table: 7.20. Quality of different water bodies in Assam			
Particulars	Pond	Beels	River (Brahmaputra)
<u>Water quality</u>			
pH	7.2-8.4	6.0-7.5	7.6-7.9
Total alkalinity (mg l ⁻¹)	---	12.0-80.0	63.0-79
Dissolved oxygen	8.2-10.16	3.0-15.0	6.56- 8.67
Nitrogen (mg l ⁻¹)	0.09-0.12	trace- 1.72	0.07- 0.10
Phosphate (mg l ⁻¹)	0.11-0.12	0.64-10.0	0.07- 0.17
Soil Qualifity pH	-	4.4- 6.4	-
Organic Carbon(%)	-	0.6- 7.0	-
Available phosphorus(mg/100gm).	-	0.22-3.0	-

Source: Project report of CICFRI, Guwahati

Another study Deka, T.K (1999) mentioned the water quality of the beels in Assam on the basis of the study "Social, economic and policy respects of Fisheries" which is given in the following table.

Table No:7.21. Quality of water of the beel in Assam	
Parameters	Range
Soil quality:	
Organic carbon (%)	2.80 - 5.90

p ^H	5.10 - 5.80
Water quality:	
Transparency (cm)	48.00 - 121.00
Temperature (°C)	18.50 - 31.50
Dissolved oxygen (ppm)	4.27 - 11.20
p ^H	6.40 - 7.60
Free carbon-di-oxide (ppm)	2.00 - 12.00
Total hardness (ppm)	13.90 - 35.60

Source: Social, economic and policy respects of Fisheries

In the study the beels of upper Assam shows high average yield potential (1245 kg/ha/yr) followed by the lower Assam (1221 kg/ha/yr) and central Assam (1060 kg/ha/yr). The beels of the Barak valley with yield potential of 1093 kg/ha/yr was poor compared to upper and lower Assam areas of Brahmaputra valley.

While interaction amongst the respondents and some people, the respondents opined that the fish are very tasty due to fertile soil of the river and beel fisheries in the study area. So, some beel and river fisheries have earned good name among the people of the state because in these fisheries fish are very tasty and has greater demand. The fertility of the water and soil vary from place to place but for the state of Assam the environment of the natural fisheries are about same. Basically, the river fisheries in the state more or less still protected from the pollution so that fish can move freely and in very short term the fish can grow very fast. Hence, the fish production of natural fisheries is able to give the sufficient amount of fish.

7.6.3. Man Power:

In the study area a significant man power has been found engaged in fishery sector. Most of the people of fishing community in the rural area are involved as shareholders in the co-operative societies, self-help groups and some non-government organization which run the different beel and river fisheries. They have enough

experience for fishing in the river and beel fisheries but they do not have idea about the use of modern fishing technology. Only by using the traditional fishing instruments they have been catching fish from the long time. In the field study it is seen that most of the labour in fishing are involved in very nominal daily wages. At present, most of the educated youth of the study area have formed some self-help groups, NGO's and some co-operative societies for running the registered fisheries from the government because the fishery sector in the study area provides huge opportunities for livelihood to the rural youth. Besides, there are immense opportunities of the fishermen for getting involved in various segments directly or indirectly.

7.6.4. Suitable Environment of Fish Production:

In the river and beel fisheries of the study area there is a good environment for fish production. Mainly the Mighty Brahmaputra and Barak River creates favorable environment for fish production due to interlinking with the different tributaries and beels. Therefore fish can freely move from one river to other. On the other hand, in the study area flood is considered as the important source for fish production in the natural fisheries. It is seen that during the time of rainy season the water covers the low lying areas, rivers, beels, agricultural land and other water areas. This is the best time for breeding because fish always want for the free and open water for breeding. During the flood period the fish production increases in comparison to rest of the seasons in the water bodies. From the field study it has become evident that there is a good opportunity and prospects for fish production in the river and beel fisheries which is considered as blessing for state economy. The author Sonmoina Bhuyan and Dipanjan Kashyap describe in their study "An evaluation of natural aquatic resource system: Floodplain lake (Beels) fisheries of Assam" that the environment of Beel and River Fisheries for fish production in the state maintains the following qualities.

- a. These water bodies are naturally highly productive.
- b. It has varied biodiversity compare to any natural inland water bodies.

- c. Auto stocking of fish species as these water bodies are natural breeding ground.
- d. Apart from fish these are the provider of aqua-flower (water lily, lotus), fodder and aquatic fruits (trapa).
- e. Source of income for a section of people.
- f. Source of irrigational water

7.6.5. Prospects of Dry Fish and Marketing:

The dry fish is also one of the most favorable fish item among the people of the North East Region. Most of the people in the North east states especially like Assam, Nagaland, Meghalaya, Manipur and Mizoram consume dry fish. The fish item in the states is the most popular and demandable. The dry fish marketing is also taking part in the state economy of Assam. A chunk of people are directly or indirectly involved with the dry fish production process and marketing. Jagiroad in Morigoan district is popular for its Asia's largest dry fish market. The dry fish marketing is functioning where transactions worth about Rs.40 core take place every year and government collect a good amount of revenue from the dry fish traders coming from different places in the country and abroad. This fish item has been exported to the foreign countries since long time from the North east region.

In the study it has been observed that after flood the various kinds of small fish are available in the natural water bodies which are useful for making dry fish. Due to availability of fish during that period the price of these kinds of fish are very low and so, the dry fish producers purchase the raw fish at the low price from the fishermen for making the dry fish. The price of dry fish is higher than that of the raw fish. Due to having greater demand of this food item in the country, there exists a huge opportunities to expand the production of dry fish. On the other hand, it has an extensive market in the state. Most of the dry fish traders of the nearest states come to the state market regularly. So the fishermen have good opportunities to make dry fish and in this way they can earn good amount of money from this sector.

7.6.6. Better Opportunities for connecting in the state with the foreign market (South East Asia):

In the field study it is seen that there are many small and big fish markets in the state. The markets of the study area have already been mentioned in the previous analysis. The existing fish markets have been supplying various kinds of local (indigenous) fish to the consumers. Sometimes fish are available in the markets and sometimes these are very scarce. On the other hand, there is a greater opportunity and prospects of fish marketing in the study area because the boarder of the state of Nagaland and Arunachal are nearby the district of Sivasagar. Meghalaya, Mizoram, Manipur, Tripura and the nearest country Bangladesh are also situated near the Cachar district of Assam. So there is a bigger marketing scope or prospects for fish selling in the state.

Act East Policy (AEP) of India is being projected as the new economic development strategy for India's North Eastern Region. It has also good prospect in the near future for extension of the market in the region. At present Act East Policy plays an important role in South East Asia and other nearest economy of the region. There will be a good connectivity with the countries like Cambodia, Thailand, Vietnam, Myanmar, Philippines, Malaysia, Nepal, Bhutan and China. So, the indigenous fish market of the North East India has great prospect for exporting and importing fish among these countries which may result the openness of the economy, regional integration, employment generation and favorable economic environment in the region.

7.6.7. Adequate scope of Ornamental Fish Market:

Ornamental fish is more popular segment of the fishery sector in the world. This fish culture is now a great demandable profession in the global market. The prospect of aquarium for our country is very bright in present and near future also. As a profession, the activities of aquarium preparation are very feasible and gaining popularity among the educated. The involvement of educated entrepreneurs can increase the prospect of this work. In the country like India it is considered as the most

profitable an indispensable sector. People in the world take hobbies for playing with ornamental fish. The World trade of ornamental fish is valued at about US\$ 427.29 million (FAO, 2001). India's overall trade presently is over Rs 150 million. These species have been exporting to south Asian countries and some other countries. In north east India, North Eastern Development Financial Institutions (NEDFI) is taking keen interest for promoting the development of culture of ornamental fish. With a view to develop the ornamental fish sector in North-eastern region of India, MPEDA under Ministry of Commerce, Government of India has recently established a Sub-regional office at Guwahati which have jurisdiction over all the states of the region.

In the North East Region, the adequate numbers of ornamental fish are found in the river and beel fisheries which did not have greater importance earlier as the valuable or marketable fish in the region. The people of North East Region had no knowledge and idea about the market value of the ornamental fish but now some of the entrepreneur and fish traders of the region have come to know about the ornamental fish and its market value within the country and abroad. About 80 percent of ornamental fish from India to International market are exported via Kolkata Airport, of which the major share (more than 80 percent) is contributed from North Eastern Region. The state has several species out of which 50 species of fish have ornamental value of international importance which are found in the river and beel fisheries of the state. For the greater demand of the ornamental fish in the country and availability of ornamental fish in the natural water bodies, the state has immense possibilities to grow the various ancillary units related with ornamental fish industry and there is greater scope for generating employment in these ancillary units.

7.6.8. Ample Livelihood Opportunities in the future of the Rural Economy:

On the basis of the survey it can be revealed that the fishery sector has a good prospect for providing livelihood to the people of rural area. It increases the employment opportunities for the significant proportion of rural people of the state. From the analysis of the study it is found that most of the people of fishing community in the riverin area of the state accept fishing as the main occupation. The people of the

area are engaged in the sector through some co-operative societies, self-help groups and non-government organization. Especially in Sivasagar and Nagaon districts the majority of scheduled caste populations are involved in the sector and in Cachar district the majority fishermen are involved in minority (Muslim) population. The most important thing is that the poor and less educated people in the study area of the fishing community chose this occupation and at the same time they are able to give their contribution to the state government from their respective fisheries co-operative societies, self-help groups and some non-government organization. Mainly the Brahmaputra and Barak rivers provide huge source of livelihood to the poor people of the state and there are immense potentialities for involvement of more fishermen, fish traders and dry fish producers etc. in the fishery sector.

7.6.9. Opportunities of Growth for Fish based Industries:

Due to availability of water bodies and different kinds of fish in the state there is a big possibility to grow some fish based industries like net making, ice supplying, warehousing, different processing of fish item in the state where most of the people will get directly and indirectly employment opportunities. The marketing and fishing segments can bring more change by using the technology but still the fishermen of the state are using the traditional fishing instrument where they have to spend much time on the fishing.

7.6.10. Prospects of Establishment of some Institutions and Research Centre:

Despite the availability of the research institutions, training centers and other funding agencies of the country, the state of Assam lacks in research institutions and training Centre on pisciculture. There is enough scope and potentialities of fish production in the natural and individual sectors of the state if the fishers earn more knowledge from the workshops, training and other developmental programme organized by such institutions. In the state there is an immense opportunity to make dry fish scientifically, introduce ornamental fish and indigenous fish in the domestic

and foreign market. Therefore it needs make more institutions and research centers for expansion of fishery sector in the state.

7.6.11. Better Scope for availing the Government Financial Support:

The fishermen have many opportunities for improving their socio-economic condition through using some government schemes. At present, Government has launched many schemes and programme for promoting the fishery sector in the country where people will able to get employment opportunities. The Union Government also framed the national policy for developing the fishery sector and it has been included as agriculture allied sector and also introduced in the country as industry sector. The government provides financial assistance to the fishermen under the fishermen welfare schemes and sometimes some schemes are provided to the fishermen through the nationalize bank at subsidiary rate. In the study area it is found that some respondents avail the government financial support under the different government schemes and programmes. Even some fishermen in the study area get opportunities for borrowing from the nationalized banks for purchasing the fishing assets and other productive purpose.

Form the entire study it can be stated that the fishery sector is able to reduce the rural unemployment problem and poverty in the state of Assam.