CHAPTER - X

SUMMARY

AND CONCLUSION
10.1 SUMMARY

The major findings of the study may be summed up as follows:

1.1 Orissa is one of the important states of the country so far as fisheries is concerned. It has abundant freshwater, brackishwater, and marine resources. The coast line of 480 Kms with a continental shelf of 32,279 sq Kms forms the marine fisheries resources of Orissa. The state has freshwater resources of 7,06,222 ha and brackishwater resources of 4,17,537 ha. The population of the state is 3.7 percent of the population of the country but the contribution of the state to the national fish production is 4.3 percent. The fish eating population of the state is 2.84 crores which is 80 percent of the state’s population.

1.2 There are 329 marine fishermen villages in Orissa with a population of 1,66,433 and 6899 inland fishermen villages having a population of 6,35,791. About 35 percent of the marine fishermen population and 24 percent of the inland fishermen population are actively engaged in fishing activities.

1.3 Orissa ranks 6th among the states of the country so far as inland fish production is concerned. But the state lags behind all other states except Goa in the field of marine fish production. Orissa possesses 5.9 percent of the coast line of the country but the contribution of the state to the total marine fish production of the country is only 4.3 percent. The marine fish production per km of coast line in Orissa is 235 mt, while the all India average of fish production is 322 mt.
As compared to other maritime states, Orissa has very less number of fishing boats used in the marine fishing operation. In 1994-95, there were only 16 traditional boats used per km of coast line in Orissa as against 26 in West Bengal, 27 in Tamil Nadu and 55 in Andhra Pradesh. Similarly, the number of mechanised boats used per km of coast line was 8 in Orissa as against 13 in Andhra Pradesh and 14 each in West Bengal and Tamil Nadu in 1994-95.

The number of fish landing centres in the marine sector of Orissa is less than the number of landing centres available in other states of India. There is only one landing centre available per km of coast line in Orissa as against 3 each in West Bengal and Maharashtra, 4 each in Andhra Pradesh and Tamil Nadu, 5 in Gujarat and 8 in Goa. Due to limited number of landing centres and poor infrastructural facilities available at other places, there is overcrowding of mechanised boats at few places like Paradeep, Chandipur, Kasafal and Dhamra where relatively improved infrastructural facilities are available.

Preservation and processing facilities available in the state are inadequate. The freezing capacity as well as the cold storage capacity are the lowest in Orissa among all the states except Goa.

The contribution of non-mechanised boats to the total marine fish production of the state has declined over the years. It was 52.51 percent in 1985-86 which declined to only 33.4 percent in 1996-97.

Jagatsinghpur district has the highest contribution to the marine fish production of the state while it is the lowest in Ganjam district. Marine fish production per km of coast line is 524 mt in Jagatsinghpur district while it is only 100 mt in Ganjam. This has been on account of the use...
of a greater number of mechanised boats in Jagatsinghpur district and very less number of mechanised boats in Ganjam district. The number of mechanised boats used per km of coastline is 16 in Jagatsinghpur district while it is only 2 in Ganjam.

Of the total fish production in the state, 61 percent is marketed for consumption inside the state, 37 percent is marketed for consumption in other states and only 2 percent is exported.

The per capita fish consumption in Orissa is very low. It is only 7.5 kg per annum in the state as against 20 kg in Kerala. The consumption of marine fish is not popular in the state particularly in the non-coastal districts. To meet the demand, large quantities of freshwater fish are purchased from the neighbouring states like Andhra Pradesh.

The performance of the fishery co-operatives in the state is poor. In the inland sector, the membership of the co-operatives is disappointing. In the marine sector, the participation of the co-operatives in mechanised fishing is poor. In 1996-97, the number of mechanised boats operated by the marine fishery co-operatives was only 1 percent of the total number of mechanised boats used in the state although it was 15.6 percent in 1984-85. Due to mismanagement, some co-operatives are in a moribund state and some have already liquidated.

The projection of demand and supply shows that the demand for fish would increase at a faster rate than the supply leaving large deficits in the future years.

The fisherfolk of the inland sector are distinctly different from the fisherfolk of the marine sector. The fisherfolk of the inland sector of
Orissa are of the local origin. But the fisherfolk of the marine sector consist of the local Oriya fisherfolk partly mixed with the fisherfolk from West Bengal and also the fisherfolk migrated from Andhra Pradesh. The fisherfolk from West Bengal and the native Oriya fisherfolk are settled in the north coast while the migrant fisherfolk from Andhra Pradesh have their settlements in the south coast. The migrant fisherfolk have very poor habitation and settlement as compared to the inland fisherfolk. But the civic amenities like drinking water and electricity etc. are conspicuously absent both in the marine and inland fishing villages.

2.2 In the inland sector, the traditional fishermen are engaged in capture fishing in rivers, lakes, estuaries, reservoirs and canals. But culture fisheries are undertaken mostly by the people of non-fishing communities. In the marine sector where only capture fishing is adopted, the traditional fishermen are engaged in fishing activities mostly with the use of non-mechanised country crafts but the mechanised fishing is undertaken by the people of non-fishing communities.

2.3 The marine fishermen households have more number of earning members than the inland fishermen households. In the marine sector, 38 percent of the fishermen population are earning members while it is 26.5 percent in the inland sector. The number of females and non-adult males in the earning group is higher in the marine sector than in the inland sector.
2.4 In the inland sector, 52 percent of the earning members are engaged in fishing activities while it is 70 percent for the marine sector. Engagement in activities related to fishing such as fish trading, boat/net making and repairing is 8 percent in the inland sector while it is 15 percent for the marine sector. Thus, employment of the fisherfolk outside fishing and fishing related activities is 40 percent in the inland sector while it is 15 percent in case of marine sector.

2.5 Although the income of the inland fishermen households from activities other than fishing is higher than the income of the marine fishermen households, the total income of the marine households from all activities is higher than the income of the inland households due to much higher income earned from fishing. But the per capita income of both the marine and inland fishermen is much low when compared with the per capita income of the state.

2.6 Most of the fishermen households have no fishing boats and they are also indebted to the money lenders and fish merchants. The indebtedness is very high in case of the migrant fishermen.

2.7 The educational status of the fisherfolk is very low both in the marine and inland sectors. As against the literacy rate of 49.1 percent in the state as per the census of 1991, the literacy rate of the marine fisherfolk as per the present study is only 15.7 percent and it is 22 percent for the inland fisherfolk.

2.8 As regards the expenditure made by the fisherfolk, it is observed that the marine fishermen households spend more on drugs and beverages.
than the inland fishermen households. But the fisherfolk of both the marine and inland households spend very little on education.

3.1 Orissa coast is the richest of all the Indian coasts. The findings of the FSI reveal that the potential yield of marine fish resources in terms of CPUE is the highest in Orissa among the maritime states of the country. The findings also show that the depth range of 50-100m in the sea has the maximum concentration of fish resources.

3.2 Prawn grounds of Orissa are among the world’s most productive ones for their high yields and also for the superior quality of the species occurring in fairly high proportions. Orissa coast abounds in the most precious prawn species like *P. monodon* and *P. indicus* and the grounds off Puri and Ganjam coasts are found to be most productive.

3.3 The estimated potential yield of marine fish resources of Orissa varies from 120 to 285 thousand tonnes per annum and that of marine prawn resources 7100 tonnes.

3.4 From the seasonal abundance of prawn it is observed that in the north coast of Orissa, *P. monodon* and *P. indicus* are abundant during October-December. In the south coast, *P. monodon* is abundant during April-August and *P. indicus* is abundant during January-February and June-August.

3.5 Orissa has a share of 21 percent of the brackishwater area of the country. The BFDAs have identified 32,586 ha as feasible prawn culture area. Puri district has the largest feasible prawn culture area having a share of 43.2 percent followed by 13.35 percent in Jagatsinghpur, 12.96 percent in Kendrapara, 10.53 percent in Balasore,
10 40 percent in Bhadrak and 9 54 percent in Ganjam district But the state has utilised only 29 percent of the feasible prawn culture area so far The utilisation of the area is 48 2 percent in Ganjam district, 45 7 percent in Jagatsinghpur, 37 5 percent in Kendrapara, 24 5 percent in Puri, 18 7 percent in Balasore and only 8 3 percent in Bhadrak district.

3 6 The potential of brackishwater fish resources has been estimated at 65,935 mt and the potential of brackishwater prawn resources has been estimated at 40,000 mt.

3 7 The potential of freshwater prawn resources has been estimated at 35,726 mt Among the freshwater prawn species *M rorenbergii* and *M malcolmsoni* are the most important species which are abundant in Orissa While *M malcolmsoni* which is a river prawn is popular in the non-coastal areas, *M rosenbergii* is popular in the coastal areas.

3 8 The brackishwater prawn seed hatcheries set up in the state have failed to meet the demand and therefore the prawn farmers have to depend on the natural sources.

4 1 In the marine sector, the production of prawn as compared to fish is discouraging The share of prawn in the total marine fish landings was 7 2 percent in 1985-86 which came down to 5 1 percent in 1996-97 The production of penaeid prawn has been declining in the recent years Of the total marine prawn production in the state, the production of penaeid prawn was 71 percent in 1985-86 which fell to 52 percent in 1996-97 The production of penaeid prawn in the state was 3566 mt in 1996-97 as against the estimated potential of 7100 mt.
Thus, the exploitation of penaeid prawn resources in the marine sector is 50 percent.

4.2 The marine fish resources available in the 50-100m depth zone has remained unexploited. The designs of the existing trawlers have become obsolete as they fail to undertake fishing operation in the 50-100m depth zone. The designs of the fishing nets have also not been improved.

4.3 Mariculture has become popular in other countries but it is yet to be adopted in India as well as in Orissa. The inshore and off-shore regions of Orissa provide ample scope for mariculture of prawns. But the policy and planning for adopting this technology have not been formulated as yet.

4.4 The brackishwater sources are the principal pockets for prawn production in Orissa. The contribution of brackishwater sources to the total prawn production of the state is 50 percent while the contribution of marine sources is 47.5 percent and freshwater sources only 2.5 percent. In spite of this, the exploitation of the brackishwater prawn resources is only 17.3 percent of the estimated potential.

4.5 The production of prawn from brackishwater capture sources in Orissa has been declining but from culture sources it has been increasing very fast in the recent years. Prawn production from culture sources is encouraging in Balasore and Bhadrak districts but discouraging in other districts. The production of prawn from culture sources is 2.5 mt per ha in Balasore district and 2.3 mt per ha in Bhadrak. But it is less than 1 mt in other districts.
4.6 Intensive prawn farming which is the latest farming technology has not been adopted in Orissa. Semi-intensive prawn farming is confined to only few places of Balasore and Bhadrak districts.

4.7 The culture of freshwater prawn which was started in Orissa in 1991-92 has not made any progress. The production of freshwater prawn from culture sources is only 0.5 percent of the estimated potential. The production of hatchery based freshwater prawn seeds is also in the experimental stage.

4.8 The brackishwater prawn farms established in Orissa are exposed to internal impact of pollution due to inefficient management practices. The Chilka fishery has been severely affected due to fast degradation of environment as a result of which the production of fish as well as prawn from the lake has considerably declined.

5.1 Prawn trade is an important segment of fishery economics. Prawn produced in Orissa has three trade channels—trade inside the state, trade outside the state in India and export. About 70 percent of the prawn produced in the state is exported to foreign countries, 10 percent is despatched for trade in other states and 20 percent is left for trade inside the state.

5.2 Prawn continues to dominate the fishery products export industry in Orissa contributing as high as 90 percent both in terms of volume and value. Orissa started exporting prawns in the year 1969 and thereafter the export has been increasing year after year. Between 1985-86 and 1996-97, the volume of prawn export increased by more than 3 times and the export in terms of value increased by more than 10 times.
5 3 The export of prawns through Paradeep port which is the only commercial port of Orissa has stopped since 1992-93 and the prawns produced in the state are now diverted to other states for export. Exports from the state are now made mainly through Vizag Port although they are also channelized through Calcutta and Madras ports. Export of prawns through the ports of other states has been made due to poor shipping arrangements at Paradeep Port and also due to better competitive prices offered by the exporters of other states.

5 4 The IQF which is the latest freezing technology ensuring better prices for the exportable products is not widely adopted by the freezing plants of the state. The HACCP which is accepted as the world market standard for quality assurance is not being applied by the prawn processors of the state.

5 5 The internal trade system is very backward in Orissa. Transport facilities to most of the places of the state are not available. There is no provision of support prices to safeguard the interests of the fishermen as well as the consumers.

5 6 Free competition rarely exists in fisheries. The prices of prawns are determined by the monopsonistic power of the intermediaries. In Orissa, there are six types of intermediaries who are involved in the process of prawn trade and who exploit the fishermen at various stages. Although the retail prices are much higher, the prawn producer gets only a very low share of the consumer rupee. A prawn producer gets 46.2 percent of the consumer rupee when prawn is marketed.
inside the state but he gets only 38.9 percent of the consumer rupee when marketed outside the state.

5.7 Unscrupulous dealings like underweighing, misquoting prices and wrong grading are the common occurrences in the prawn trading practices in Orissa. The fishery co-operatives have not been effective to save the poor fishermen from the exploitation of the middlemen.

5.8 The prices of prawn are higher at Paradeep landing centre than at Chandipur. The lower prices at Chandipur have been due to small degree of competition among the prawn traders and due to absence of any processing plant at this centre and nearby.

5.9 There is considerable wastage of prawns due to lack of scientific processing. The vessels going out for fishing in the sea do not have arrangements of brine chilling. The MPEDA has developed insulated ice boxes for preserving valuable catch on board but they are not widely used by the vessels.

5.10 Not only the ice and cold storage facilities are inadequate but also there is no quality packaging of prawn products.

6.1 Fishery sector in Orissa was not considered as an important sector till the beginning of the Third Plan. It was only the Third Plan which started giving importance to this sector by increasing plan outlays and expenditures. The fifth Plan gave strong impetus for the development of fisheries and during this plan period private entrepreneurs were encouraged by institutional finance to take up mechanised fishing. Infrastructural base was strengthened by establishing jetties and harbours and some ice and freezing plants were also set up in the State.
Fisheries Co-operatives were transferred to the Fisheries Department from the control of Co-operative Department.

6.2 In the subsequent plan periods, plan outlays and expenditures have been considerably raised for the development of fisheries. From an expenditure of only Rs 28.72 lakhs incurred in the First Plan, the expenditure increased to Rs 267.04 lakhs in the Seventh Plan. In spite of the phenomenal increase in expenditure over the years, the share of fisheries expenditure in the total expenditure of the state has been less than 1 percent in all the plan periods except the First Plan.

6.3 It is observed that the funds allocated for the development of fisheries have not been efficiently utilised. There have been large short-falls in the actual expenditure in all the plan periods.

6.4 As regards the physical targets and achievements, it is found that the achievements in acquiring mechanised fishing boats have been less than the targets in almost all the plan periods. It has not been possible to acquire even a single deep-sea fishing vessel so far. However, it is observed that the species available in the deep sea are not popular in the market and hence deep-sea fishing is not a lucrative business.

6.5 There has been violation of the Orissa Marine Fishing Regulation Rules, 1983 as a number of boats have been operating without being licensed. The operation of some unauthorised fishing trawlers has resulted in ecological damage which has threatened the fishing industry in terms of the depletion of fish resources and deprived the traditional fishermen of their means of livelihood.
6.6 More than 80 percent of the brackishwater areas available in the state are under the possession of the Government and therefore the development of brackishwater fisheries depends largely on the use of Government land. The Government has the land use policy to lease out the Government land for prawn farming. But the forest land problem in the state has complicated the lease provision.

6.7 The prawn farms have been established in violation of the C R Z Act and in many cases the BFDAs have not been consulted. The Supreme Court banned the establishment of aqua farms beyond 1000 metres of the Chilka lake. But the prawn farms continue to flourish under the patronage of the influential people.

6.8 There are some welfare policies for the benefit of the fishing community. Since aquaculture business involves high risks and uncertainties, the prawn insurance policy has come as a great help to the prawn farmers in overcoming such risks. The introduction of accident insurance scheme promotes incentives to undertake hazardous sea fishing. There is saving-cum-relief scheme to support the poor fishermen during lean fishing season. However, this scheme is not very effective in the state. The progress of the "National Welfare Fund For Fishermen" scheme has been very slow as only 439 houses have been provided to the fishermen community between 1987-88 and 1995-96.

7.1 Prawn resources available in the state pose no problem to undertake investment in prawn industry. Prawn also holds high market potential. But the degree of exploitation of prawn resources at present is very low. The technology for the culture of freshwater prawn has not been
developed in the state. About 71 percent of the brackishwater feasible culture area is left unused. There is indiscriminate trawling operation resulting in overcrowding of vessels in limited fishing areas and the number of trawlers used is less than the number recommended by the feasibility report.

7.2 Infrastructure which is the prerequisite for investment planning is poor in Orissa. The fish landing centres are not equipped with all the facilities as required by the fishing vessels. Most of the prawn farms have been established without any facility of communication, ice, cold storage and electricity etc.

7.3 The institutional finance is not available to the traditional fishermen. On the other hand, the mechanised fishing is heavily financed but the repayment of loans is very poor and therefore some of the financial institutions have stopped financing and others are reluctant to continue financing.

7.4 The economic feasibility analysis of investment projects shows that the investment in mechanised fishing by trawlers operated from Paradeep base is not economically feasible while the investment in prawn farming projects both under extensive and semi-intensive prawn farming technologies is found feasible.

10.2 CONCLUSION

The foregoing discussions lead to the following conclusions and suggestions:

10.2.1 Marine fish production in Orissa is less than the all-India average due to severe underutilization of potential fish resources in the state.
Marine fish production is very much low in Ganjam district. There are only a few motorised country crafts which are used in the mechanised fishing operation in this district. The use of trawlers in the district has not been possible as yet due to lack of proper landing facilities. It is, therefore, necessary to step up marine fish production in Ganjam district by increasing the number of motorised country crafts and introducing the use of trawlers through the development of landing centres and other infrastructural facilities.

10.2.2 There is heavy-congregation of mechanised fishing boats at few places such as Paradeep, Chandipur, Kasafal and Dhamara. In order to reduce such congregation of boats, it is necessary to divert some of the boats to other places which do not have adequate number of mechanised boats.

10.2.3 The designs of the trawlers at present used in the state are obsolete as they fail to exploit the fish resources in the sea beyond 50 metre depth. Since the 50-100 metre depth zone is the most productive and also left unexploited, it is essential to introduce intermediate-size stern trawlers of 15-20 metre OAL to tap the fish resources in this productive zone. Improved infrastructural facilities need to be provided by the Government for the smooth operation of these trawlers. The existing harbours should be developed and new harbours should be established.

10.2.4 There is a sharp decline in the production of penaeid prawn from the sea due to intensification of natural prawn seed collection.
There is also by catch destruction of juveniles of prawn and other economic varieties of fishes during the process of natural seed collection. Therefore, the Government may consider imposing complete restriction on natural seed collection effectively through the Orissa Marine Fisheries Regulation Authority.

10.2.5 Mariculture which has already become popular in other countries is yet to be adopted in India as well as in Orissa. Mariculture sector has all the potential for development into a major activity in Orissa. Therefore, the Central Government should enact a legislation which would allow state government to legislate on leasing of demarcated areas in territorial waters on a long-term basis and integrate the same with technology transfer, culture and financial support.

10.2.6 Exploitation of brackishwater prawn resources in Orissa is only 17.3 percent of the estimated potential as the state has utilised only 29 percent of the feasible prawn culture area. It is found that 80 percent of the brackishwater area are under the possession of the Government. In order to raise the standard of the poor fishermen and other weaker section of the community, the Government have decided to give priority to these people in the allotment of Government land on lease. But as these people have neither the ability nor capacity to adopt modern aquaculture technology in prawn farming, it is suggested that the available Government land should be equally distributed between small, large and medium farmers. The large farmers may be encouraged to adopt modern farming technology and transmit the same to the small farmers so that there is a balanced growth in prawn farming.
There is also an urgent need to involve the financial institutions, extension machinery of the Government, research and educational institutions for upgrading the technical know-how of the poor farmers.

10 2 7 There are huge tracts of coastal lands beyond 500 metres of High Tide Line from the sea, both private and Government, which are recorded as agricultural land. But these lands are actually lying vacant without any sort of agricultural activities due to the effect of saline water incursion and water logging during the rains. These lands should, therefore, be verified and reclassified as waste lands. Similarly, there are some lands which are not actually forest lands although they are recorded as forest lands. All these lands can be put to better use particularly for prawn farming.

10 2 8 Most of the identified prawn culture areas are located in inaccessible islands and mangrove swamps. Easy approach to these areas is a pre-requisite for development of the projects. The common facilities like motorable roads, water ways and protective embankments etc. should be created by the Government.

10 2 9 Taking into consideration the availability of brackishwater site conditions in different coastal areas, experiences from existing small-scale prawn culture, non-availability of essential infrastructure in many areas, constraints in the supply of seed and feed, large number of impoverished coastal villages and their level of perception, knowledge and skill, magnitude of investment and credit support, environmental effects of prawn farming and
inadequacy of technical manpower etc., it is important to review the technology options for developing brackishwater aquaculture and to recommend appropriate technology policy package. This will contribute to steady growth rate in prawn production and also contribute to increased income for the poor farmers.

10.2.10 To facilitate the operation of small farmers especially in a highly capital intensive scheme like prawn farming, the "Satellite Farming" system should be encouraged. The essential inputs are to be available locally to the farmers. The infrastructure development such as approach road, electricity and salt water facilities etc. are beyond the reach of small farmers. Under the "Satellite Farming" system, small farmers can get the due share from the rich farmers without any exploitation.

10.2.11 We are in an era of technoplosion and major breakthroughs are taking place in aquaculture in different parts of the world. Research for coastal aquaculture development in India is still in the nascent stage when compared to South East Asia. Therefore, our country has to borrow the technology already developed elsewhere to save time and money. Aquaculture scientists of our country should be given proper exposure in the latest technology development through overseas training.

10.2.12 It may be recalled that many industries world over have perished for their own lapses in maintaining a clean environment and pollution control measures. Prawn farming has to be sustainable and eco-friendly in nature so that it can survive for a longer period.
Sustainable prawn farming is possible by clear-cut scientific and regulatory measures. Like any other industry, pollution control norms should be framed for prawn farming as per the Central Water Act and it should be strictly followed by all farms. Close interaction between prawn farmers and regulatory state agencies is very much required in this respect.

A very positive viewpoint is that with proper regulatory measures for environmental protection, social commitment is required. A dynamic and positive state aquaculture policy incorporating the final verdict of the Hon’ble Supreme Court should be framed for the long-term growth of the prawn industry.

10.2.13 Chilka Lake, which offers the best potential resources for development of brackishwater prawn culture, requires conservation measures. The planning for commercial prawn farming in the periphery and inner areas of the lake calls for a multi-disciplinary scientific approach so that the natural prawn fishery of the lake, natural habitat of the migratory birds, and above all, the dependence of thousands of poor fishermen families on the prawn fishery resources of the lake remain unaffected.

10.2.14 Guidelines need to be worked out for planning future prawn farming in the state in consultation with technical experts and prawn farmers. A “Coastal Management Plan” should be prepared by the Government taking into consideration the area already developed and the area proposed to be developed in future for
prawn farming in the state keeping in view the norms provided in the CRZ and State Pollution Control Board

10 2 15 The strategies for future development of prawn farming may be followed as under

a) Systematic approach in resource identification and planning for satellite farming

b) Eviction of unauthorised activities and declaring the farms without registration as illegal

c) Brackishwater land lease policy is to be finalised so that a proper plan for prawn farming can be drawn up

d) Legal and regulatory restrictions under Forest and Environment Act involved in land use policy is to be streamlined

e) Pollution Control Board may come up with specific package for prawn farming involving fisheries personnel

f) Provision of effluent treatment for all types of farming activities

g) State Government may plan to provide common infrastructural facilities such as approach roads, power supply, common intake canals and outlet canals Thus, aquaculture estate can be established for better farming

h) There should be a plan for assured supply of quality seeds and feed properly certified by trained personnel and the use of hatchery seeds should be mandatory

i) Indiscriminate capture of wild seed to be totally banned as depletion of prawn fishery in the sea and Chilka lake has already started
j) Rural credit financing institutions may come up with full support for the growth of the prawn farming sector

k) Prawn farms and hatcheries to be fully covered under insurance

l) Training facilities in the state to be strengthened so that every prawn farm and hatchery can get technical personnel

10 2 16 In order to overcome the problems of uncertain supplies of prawn seeds from natural sources, controlled breeding of desired species in modern hatchery is the only way out. Mass production of seed is an integral part of the commercial prawn farming and therefore, both the activities should go simultaneously.

10 2 17 In semi-intensive aquaculture, artificial diet plays the vital role for increasing output. Formulation of suitable low-cost artificial diets having high acceptability, digestion coefficient and conversion efficiency is an urgent need for rapid expansion of semi-intensive prawn culture.

The culture of freshwater prawn in Orissa has been neglected as the production of hatchery bred prawn seeds is in the experimental stage in the state. Sincere efforts should therefore, be made to evolve the technology in the production of prawn seeds in the hatcheries.

In the absence of an organised system of marketing of fish, the traditional fishermen are forced to depend upon the middlemen resulting in poor financial return for their products. A marketing system capable of protecting the interests of both producers and consumers is immediately needed in the state.
operatives should perform the marketing activities for the benefit of the fishermen

10 2.19 Presently, the commercial and nationalised banks are not giving substantial loans to fishermen as they are afraid of risk involved in fisheries. They should provide loans to the fishermen through co-operatives. The loans as far as possible should be purpose oriented and given on the credit worthiness of a member instead of attaching any property as security.

10 2.20 The organisation of fishermen co-operatives should aim not only to improve the economic conditions of fishermen but also to mobilise the resources and increase investment in the fishing industry. The co-operatives have to render much needed service and uplift the fishermen from the clutches and bondages of middlemen. The credit society may be formally linked up with a marketing, processing, and production co-operative so that it can confer greater economic benefits to the fishermen producers. Integrating vertically all the economic functions such as producing fish, processing and sorting it and finally marketing the fish should be centrally performed by one society.

To improve the efficiency of the fishery co-operatives, there should be proper financial and technical supervision and control by the governmental agencies.

10 2.21 The Government should examine the question of eliminating unnecessary links in the prevalent trade practices through suitable measures.
Marketing regulations through fixing of minimum prices and directing catches for different end purposes can put the product to economic end uses and help the fishermen to obtain a reasonable price. Proper legislation with regard to marketing of fishes has to be initiated. When there are huge landings, it should be restricted by legislation not to allow the prices to go to a lower level. Support prices have to be given by Government until the industry becomes a viable one.

10.2.22 A cold chain system for distribution of fish throughout the country by linking the major production, production-cum-transit, consumption and consumption-cum-transit centres through a network of freezers and cold storages should be established to get over the present fish marketing constraints.

A separate exclusive transport society can be organised for transporting the fish, giving freedom of marketing to fishermen themselves. In Maharashtra, there is one transport society which takes the catches of its members and delivers them at the potential markets. This kind of society may also be organised in Orissa.

10.2.23 For short distance transportation of iced fish involving a journey of less than 16 hours of duration, non-returnable cheap containers may be used and for distances involving duration beyond 16 hours, insulated plywood boxes with 25 mm foamed polystyrene may be used.

10.2.24 The growing demand now-a-days is towards IQF prawns in consumer packs. As the demand for prawns in other countries is
ever increasing, the time is ripe for the Indian exporters to add value to their product by processing prawn as IQF product and packing in consumer packages instead of exporting in the traditional block frozen form.

10 2 25 There has been increasing diversion of prawns from Orissa to other states for export resulting in heavy monetary loss to the exchequer. To check such diversion, improved shipping arrangements at Paradeep port should immediately be made with due attention to quality control.

10 2 26 The basic role of Government, Health and Food Authorities should be to ensure the appropriate application of HACCP technology which is an essential strategy to seafood handling, processing, and marketing both for export and domestic markets. The National Regulatory Agencies responsible for seafood safety and quality and the seafood industry have to work together towards the concrete application of HACCP at national and international level. The ISO 9000 and HACCP should go side by side with the spirit of convergence hypothesis so that quality control and remunerative price objectives are both simultaneously accomplished.

10 2 27 It may be observed that excessive reliance on prawns cannot sustain the export growth of the industry in the long run. There is an urgent need to diversify the product-mix through exploitation of other varieties of fish and to evolve an integrated development policy.
The socio-economic conditions of the traditional fishermen using non-mechanised crafts are far from satisfactory. There is great need to improve the living conditions of these fishermen. Efforts should be made to provide basic infrastructural facilities like pucca road, drinking water supply, sanitation facilities, transportation, schools and medical facilities etc.

In view of heavy capital investment, it may not be possible for a single fisherman to own a fishing boat. But there can be ownership vessel society where 10 fishermen can join together and purchase a boat. The “rampani operation” in Karnataka is a good example where the big rampani net is jointly owned by a large number of fishermen. Societies may also be organised for insurance of fishing vessels, repair of fishing equipment and craft, cold storages and fish processing etc for providing economic benefits to the members.

Vigorous efforts are called for to motivate the fishermen for undergoing training so that bank loans are availed of by them for the purchase of mechanised vessels with assistance from the state and the centre.

There can be no improvement in the socio-economic status of the fisherfolk so long as they are not educated. Therefore, special attention should be given for the education of the fishermen community by having suitable educational institutions. The fishermen should also be educated to refrain from the evils of drinking and to develop the habits of saving instead.
10 2 29 The per capita fish consumption in Orissa is very low. It is observed that there has been no improvement in the consumption of fish by the people of the state over the years. There is consumers' dislike for marine fish. To boost up domestic consumption, it is essential to educate the consumers about the nutritive value of marine fish through propaganda.

10 2 30 The share of fisheries in the total plan allocation of the state is less than 1 percent. Therefore, it is essential that the share is increased considerably. The Government should also see that the funds available for various fisheries schemes are efficiently utilised to meet the targets.

The central assistance to the state is very meagre. Therefore, to urge the Central Government for the release of adequate central assistance, it is essential that the state Government prepares and presents appropriate Centrally sponsored schemes in time and also meets the state's share unfailingly.

10 2 31 It is observed that investment in mechanised fishing by trawlers is not economically feasible at present in Orissa. But investment in brackishwater prawn farming projects both under extensive and semi-intensive farming technologies is found economically feasible although it is highly feasible in case of the latter. Therefore, greater attention should be given to undertake semi-intensive prawn farming by a large number of farmers under co-operative fold.