ROLE OF THE DIRECTORATE OF FISHERIES IN PISCICULTURE DEVELOPMENT IN MIZORAM

DISSERTATION SUBMITTED TO MIZORAM UNIVERSITY FOR THE AWARD OF THE MASTER OF PHILOSOPHY IN PUBLIC ADMINISTRASTION (SCHOOL OF SOCIAL SCIENCES)

BY

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CERTIFICATE

This is to certify that **Ms.Mal Sawmi Pachuau** has prepared a Dissertation under my Supervision on the topic *Role of the Directorate of Fisheries in Pisciculture Development in Mizoram* in partial fulfillment for the award of the Degree of Master of Philosophy (M.Phil) in the Department of Public Administration, Mizoram University, Aizawl.

This Dissertation has been the outcome of her original research work on a virgin field and it does not form a part of any other dissertations submitted for the award of any other degrees.

She is duly permitted to submit her dissertation for examination.

Dated Aizawl,
the 15th December 2011

(Dr. LALRINTLUANGA)

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GLOSSARY

Brackish water	: river or lagoon with higher salinity.
Closed Season	: a period of the year when fishing is officially forbidden to give time for breeding.
Cold Chain development	: temperature controlled storage and preservation to extend shelf life of products.
Estuarine	: the tidal mouth of a large river.
Fingerling	: a young fish up to three to four months old.
First Year Inputs	: the expenditure during the first- year of operation. It constitutes almost 60 per cent of the total expenditure.
Fish Seeds	: fish eggs or larvae
Fry	: a young fish that have just surpassed the larvae stage in their development.
Hatchery	: a facility where fish eggs are hatched bred and reared under artificial conditions.
Hectares	: one hectare equals to 10,000 square metres or 2.5 acres.
Ornamental Fish	: fish that are bred specifically for their beauty and visual appeal.
Polyculture	: the cultivation of different varieties of crops or animals
Reservoirs	: a natural or artificial lake where water is stored.

CHAPTER - I
INTRODUCTION

In India, the people have accorded high priority to Agricultural practices and Pisciculture or Aquaculture from the nutritional supplement as well as income generation point of view. Pisciculture has been taken from the word '*piscis'* meaning 'fish' and culture. It is the principle form of Aquaculture. Although the topography of Mizoram was previously considered as not suitable enough for Pisciculture Development, it has now been found that the low-lying areas of the State are suitable for Pisciculture Development. It has also been proved not only by the local inhabitants but also by people from outside the State that the quality and taste of fish available in Mizoram is better than those found in other parts of the country. Despite the absence of any positive action from the State Government to develop Pisciculture in Mizoram, there is a good scope for Pisciculture Development. Besides, the Mizos are very fond of fish as food supplement and their life is psychologically attached to fishing in the rivers.

Of late, the Mizos have realised that Pisciculture can become a good profession for augmenting their income for sustenance. Consequent upon the establishment of the Directorate of Fisheries by the State Government of Mizoram, Pisciculture has increasingly been accepted by many Mizo families as a reliable source of income to develop their economy. Thus, the present research has been taken up to study the role of the Directorate of Fisheries for Pisciculture Development to make Mizoram self-sufficient in fish production.

The first chapter of the study which is introductory in nature is divided into two parts- the first part deals with the study of the geographical features of Mizoram like its location, rivers and streams, temperature etc. whereas the second part is concerned with the Concept of Pisciculture Development and methodology.

I. Geographical Features of Mizoram

Mizoram, with an area of 21,090 sq.km,[1] is a mountainous and hilly region situated in the extreme southern corner of Northeast India. It is situated between Latitude degree 20.20 to 24.27N and Longitude degree 92.20 to 93.29.[2] The Tropic of Cancer runs through the heart of Mizoram at the place called Thenzawl.[3] It is bounded on the east and south by Burma and on the west by Bangladesh. It is also bounded by Manipur and Cachar in the North, and by Tripura in the north-West.[4]

The topography of Mizoram is composed of steep hills and deep gorges. Mizoram consists of six parallel hill ranges enclosing between them deep river valleys.[5] These hills run mostly from north with a tendency to be higher in the east of the territory and tapering in the north and south.

Districts

The entire geographical area of Mizoram is divided into 8 (eight) districts namely, Aizawl (3,576.31square kilometres), Lunglei (4,538 square kilometres), Champhai (3,158.83 square kilometres), Kolasib (1,382.51 square kilometres), Mamit (3,025 square kilometers), Serchhip (1,421.60 square kilometres), Saiha (1,399.90 square kilometres), and Lawngtlai (2,557.10 square kilometres).

Rivers

There are many rivers[6] in Mizoram but only a few of them are worth mentioning. Most of the rivers in the northern part of Mizoram flow towards the north and ultimately meet the Barak river of Assam plains. The important rivers which flow in the northern portion of the State eventually falling into the Barak are:

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1 Government of Mizoram, *Mizoram News Magazine*, August, 1984, (Directorate of Information, Public Relations and Tourism, Aizawl), p. 67.

2 Government of Mizoram, *Statistical Handbook Mizoram, 1983*, (Directorate of Economics and Statistics, Aizawl), p.6.
Also see, Government of Mizoram, *Mizoram: Some Facts*, (Directorate of Information, Public Relations and Tourism, Aizawl), p.1.

3 Thanga, L.B., *The Mizos: A Study in Racial Personality*, (United Publishers, Gauhati, 1978), p.xii.

4 Government of Mizoram, *Mizoram: Some Facts*, *Op.cit.*, p.1.

5 Thanga, L.B. *Op.cit*., p.xii.

6 Government of Mizoram, *Report on Socio-Economic Review 1979-80*, (Directorate of Economics & Statistics, Aizawl).

Tlawng (Dhaleswari) which is about 185.15 kilometres, *Tuirial* (Sonai) about 117.53 kilometres and *Tuivawl* about 72.45 kilometres.

On the other hand, most of the rivers in the southern part of Mizoram flow towards the south. The rivers that drain the southern hills are: the *Chhimtuipui* (Kolodyne) about 138.46 kilometres long and its tributaries, the *Mat* (90.16 kilometres), *Tuichang* (120.75 kilometres), *Tiau* (159.39 kilometres) and *Tuipui* (86.94 kilometres). *Khawthlangtuipui* (Karnaphuli), about 128.08 kilometres, with its tributaries namely *Tuichawng* (107.87 kilometres), *Kau*, *De*, *Phairuang* and *Tuilian* form the western drainage system. It is interesting to observe that the Kolodyne River enters Mizoram from the Haka area of Myanmar and flows in the north-western direction till it joins *Mat* River. It is very peculiar that Kolodyne River takes a half-circle bend towards the south and flows again to Myanmar (Arakan).[7] Except the Kolodyne River, all the rivers are fed by monsoon rain only. They swell rapidly during the rainy season and recede abruptly shortly after the rains.[8]

Climate

Mizoram enjoys a pleasant climate which is neither too hot nor too cold throughout the year. In the higher ridges it is fairly cool and pleasant even at the hottest season of the year. Spring generally starts from the end of February and lasts till the middle of April. The entire Mizoram is under the direct influence of monsoon. In March and April, violent storms from the north-west sweep over Mizoram marking the beginning of summer. The summer temperature varies 'from 20^0 Centigrade to 29^0 Centigrade.'[9]

It usually rains heavily from May to September, and the average rainfall for the whole Mizoram is 254 centimetres.[10] The average rainfall in Aizawl district is 208 centimetres,[11] and Lunglei records as high as 350 centimetres.[12] The North-western portion of Mizoram receives heaviest rainfall throughout the year.

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7 As Kolodyne River has not yet changed its course, anyone visiting Saiha District can see its peculiarity till date.

8 Singh, K. S., General Editor, *People of India- Mizoram, Vol. xxxiii*: *Anthropology Survey of India*, Seagull Books, Calcutta, 1995, p. 1-3.

9 Government of Mizoram, *Mizoram: Some Facts*, *Op.cit.*, p.1.

10 NEC, *Basic Statistics of North-East Region, 1980*, (Public Relation Officer, North-Eastern Council, Shillong), p.1.

11 Government of Mizoram, *Mizoram: Some Facts*, *Op.cit.,* p.1.

In autumn, rains become scanty and the temperature is usually between 25.40 centigrade and 18.70 centigrade.[13] During winter, there is little or no rain in Mizoram and is very pleasant. In winter, the temperature is usually ranging from 11^0 centigrade to 21^0 centigrade.[14] December and January are the coldest months in a year in Mizoram. In winter, the skies are wonderfully blue and in the morning the mist forming between the hills gives an enchanting view of wide stretches resembling a vast lake.

Mizo Economy

The traditional Mizo economy was wholly an agricultural economy and "the most important occupation of the society to sustain their lives was through jhuming."[15] The modus operandi was what is called 'shifting cultivation' or 'slash-and-burn method of cultivation.'[16] According to this method of cultivation, the fertility of the soil could not produce more than a single crop in a year. After harvesting, the jhum had to be "left out for a number of years to recuperate."[17] Thus the Mizos were busy in search of suitable land for cultivation every year and hence, they could have easily been described as "a nomadic tribe."[18] It is due to this unstable economy that the Mizo life was spent for shifting from one place to another in search of suitable agricultural land for the next year.

The traditional Mizo economy was such an agricultural economy that "the majority of the population was engaged in agricultural activities."[19] It is due to this people's preponderance on agriculture that there was no occupational differentiation in the Mizo society. However, with the commercialization process in operation in the wake of the British regime, the people could shift to other occupations whenever they could find one. Under the new social economy, the process of changes have given way to greater emphasis on monetary value which has induced some of the

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12 Government of Mizoram, *Mizoram: Some Facts*, *Op.cit.,* p.1.
13 Government of Mizoram, *Report on Socio-Economic Reiew 1979-80*, *Op.cit.,* p.6.
14 Government of Mizoram, *Mizoram: Some Facts*, *Op.cit.,* p.1.
15 Chatterjee, N. *The Mizo Chief and His Administration*, (Tribal Research Institute, Aizawl, 1975), p.9.
16 *Ibid*.,
17 Baveja, J.D. *The Land Where the Bamboo Flowers*, (Assam Publication Board, Gauhati, 1973), p.62.
18 McCall, A.G. *Lushai Chrysalis*, (Luzac & Co., London, 1949), p.62.
19 Ray, A.C. *Mizoram Dynamics of Change*, (Pearl Publishers, Calcutta, 1982), p.183.

people to engage themselves in fishery activities to earn money as their subsidiary income. Although Pisciculture Development could not make much headway in the past years, it has now been recognised by the Mizos as a good profession for earning their living. With the realisation of this fact, many of the Mizo families not only from the rural areas but also from the urban areas have started Pisciculture in a bigger way.

II. Concept of Pisciculture Development

Let us begin with the concept of Pisciculture Development. By Pisciculture Development, it is meant the rearing, breeding and transplantation of fish by artificial means. It is concerned with the principle form of Aquaculture. It involves raising fish commercially in tanks or enclosures, usually for food. In other words, it is the development of fish as a science or as an industry.

Pisciculture has become an important economic activity in almost every part of the world. It has been popularly known that Pisciculture was already practised in ancient China in 2000 BC and the Egyptians as far back as 2500 BC. Even in the Indian sub-continent, Fish culture is undoubtedly thousands of years old. Kautilya, in his *Arthasastra,* written between 321 and 300 B.C, also mentions of secret means of rendering fish in reservoirs poisonous in times of war.[20] Another document, which describes methods of fattening of fish in ponds and grouping them into marine and freshwater riverine forms is found in the encyclopaedia of King Somesvara, *Manasoltara*, compiled in 1127 A.D, the first ever to do so.[21] Warm-water fish culture and traditional methods of pond management was mainly confined to Bengal, Bihar and Orissa until about the end of the 19th century after which it gradually spread to other States. The Second World War focused great attention on fish farming as a source of producing cheap animal protein to feed war troops as well as growing population and fisheries development in the post-war reconstruction schemes.

The surge for fish culture continues to gain momentum and this has been manifested in the increasing number of Departments of Fisheries established in

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[20] Book XIV, Chapter I, as quoted in Hora and Pillay, Jhingran V.G. *Fish and Fisheries of India* (Hindustan Publishing Corporation, Delhi, 1991) , pp.125-126.

[21] *Ibid*.,

many States. In fact, no account of the development of fish culture in India can be complete without a mention of the contributions of Hora who sought to put fish culture in Bengal and elsewhere in the country on modern lines by writing a series of research papers and popular articles on different aspects of the subject suggesting various methods of increasing fish production in culture operations.

The People of India, especially 90 per cent of the inhabitants of the North Eastern Region, Bihar, Orissa and West Bengal, are habituated in considering fish as an important constituent of their diet and also as an important means of self-employment. So, Pisciculture has predominantly been incorporated under agriculture and allied activities as a primary sector of development.

The first official Fishery organisation in Mizoram can be traced back to 1958 when Mizoram was still under the Assam State Government. In 1972 when Mizoram became an U.T. (Union Territory), a Department of Fisheries was set up under the Agriculture Department as an independent Wing. With the efforts made by the department as well as the increase in personnel employed for the purpose, more people took interest in Fish Farming. In 1993, an all new Fishery Department was formed, independent of the Agriculture Department under the state government.[22]

Till today, it has taken up numerous activities for Mizoram to be an outstanding beneficiary of this industry. It is remarkable to know that Canada, with its suitable coastal features, made 86 billion in Aquaculture in 2009 alone.[23] China dominates the world in Aquaculture output and accounts for 30.61 per cent of the world's production while India contributes to about 2.47 per cent of the production.

Incidence of unemployment is common among the North East people who are mostly composed of Scheduled Castes and Scheduled Tribes and are less endowed at an all India level. The north-eastern region of India constituting the states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura incidentally contains 25% of inland water system of the country and is gifted

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22 "Origin of Fisheries Department in Mizoram," vide www.fisheries.mizoram.gov.in 6.11.2010.

23 Sen, K.K. *Role of Pisciculture in Economic Development* (published in The Assam Tribune), 25 July 2009.

with rich and varied ichthyofaunae.[24] The economical aspects of fishes have been so alluring and employment generating that the University Grants Commission (UGC) has introduced vocational courses like 'Industrial Fisheries' or 'Fish and Fisheries' at UG and PG level.[25] Various Universities and colleges have designed curricula to run B. F.Sc and M. F.Sc (Fishery Science) course to produce a brigade of super specialist fishery personnel who decidedly play an important role for the all round development activities of fisheries and managing the fish genetic resources. It is a boon for the North East people that St. Anthony's College, Shillong, Meghalaya offers Pisciculture as an Honours subject for B.Sc students since 2000.[26] This is to enable them to carry on an academic career or for self-employment, as North-East India offers ample scope for the development of fisheries, both on a large scale and as a profitable cottage industry. The University Grants Commission (UGC) also introduced a certificate course in Pisciculture in Pachhunga University College in Mizoram in 2008.[27] It is a special project of the UGC and is undertaken by the Zoology Department of the College. It has produced 40 alumni till date.

Although over the years, various steps have been taken for the development of this sector, the situation however has not improved to the desired extent. During the seventh plan for the first time, Fisheries Industrial Estate was set up with a view to supply all necessary inputs and other fishing requisites.[28] Much emphasis has been laid by the Government on development of fisheries during eleventh plan period through an increase in mechanized boats and commercial deep sea fishing fleet.[29]

Pisciculture plays a significant role in augmenting socio economic condition of the state. As per data available from the State Fishery Department, the fish production of the eight (8) districts of Mizoram increased from 2764 metric tones in

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[24] Nath, Pranab. and Dey, S.C. *Fish And Fisheries of North Eastern India:Arunachal Pradesh,*(Narendra Publishing House, Delhi, 2000), p-i. (Ichthyofaunae is derived from the term 'Ichthyology' meaning the branch of Zoology dealing with Fishes).

[25] Gupta ,S.K and Gupta ,P.C. *General and Applied Ichthyology : Fish and Fisheries* (S. Chand and Company Ltd, Delhi, 2006), p.1

[26] Interview with Ms.Evangeline Rengsi, a faculty member of St Anthony's College, Shillong on 17.03.2010.

[27] Interview with Dr.Lalchhandama, Head of Department of Zoology, Pachhunga University College on 1.9.2010.

[28] Sen, K.K. *Role of Pisciculture in Economic Development*, *Op.cit.,*

[29] *Ibid*.,

2008-2009 to 2916 metric tones in 2009-2010 thereby registering an increase of 9.12 per cent and a price amounting to Rs 262 lakhs.[30] It will be desirable to see attainment of self-sufficiency in respect of food for the famished, and also providing employment and livelihood to thousands of families belonging to the Scheduled Tribes and of people living Below Poverty Line in Mizoram. Emphasis should be made on raising the outcome of fishery sectors to make considerable increment in overall growth rate.

Potentially, the vast and varied fishery resources of India are one of the richest in the world. They pertain to two types of water, namely the fresh and brackish. They sustain two categories of fisheries which, depending upon the system of management adopted for development, are classified as either culture fish or capture fish.[31] In the former system called Pisciculture, which generally obtains in smaller water bodies that can be manipulated by man, the fish seed has to be sown, tended and nursed, reared and finally harvested when grown to table-size. In the case of capture fisheries, however, which pertain to the rivers, estuaries and large reservoirs as well as big lakes, when they are designated as riverine, estuarine and lacustrine respectively, man has only to reap without having to sow, nature herself sowing the seed through self-propagation of the species.

The belief in the inexhaustibility of capture fishery resources has been belied since long. Experience has shown that uncontrolled fishing and highly destructive devices of fish capture deplete fishery resources and are followed by great economic distress. The purpose of fishery regulation is to obtain maximum sustained yield of fish from waters and assure a recurring bountiful harvest of fish without depleting the resources and wastage of fish effort.[32] In the past, regulations, based on empirical knowledge, were imposed to cater to maximum sustained yield. These regulations assumed the forms of protective legislation on mesh limit, legal sizes, closed season, declaration of sanctuaries, limit on catches, restriction of effort, prohibition of use of destructive methods of fishing, etc. The basis for the above

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30 Government of Mizoram, *District wise Number of Fish farmer, Area and Production*, (Directorate of Fisheries), 2010.

31 Jhingran, V.G. *Fish and Fisheries of India, Op.cit*., pp.61-62.

32 *Ibid.,* pp.125-126.

regulations is the belief that every fish should be given a chance to breed at least once.

The Indian Fisheries Act which came into being in 1897 (Government of India, 1956) gives provisions in the section 8 and 10 of the General Clause Act that, if any person uses any dynamite or other explosive substance in any water with intent thereby to catch or destroy any of the fish that may be therein, he shall be punishable with imprisonment for a term which may extend to two months, or with fine which may extend to two hundred rupees and also if any person puts any poison, lime or noxious material into any water with intent thereby to catch or destroy any fish, he shall be punishable with imprisonment for a term which may extend to two months, or with fine which may extend to two hundred rupees.[33]

Provision against public nuisance such as pollution exists in the India Penal Code, Criminal Code and State and Local Acts, by which legal powers are conferred upon State Inspectors of Factories for ensuring proper treatment of industrial effluents before disposal.[34]Such provisions have not prevented pollution, possibly due to lack of a professional agency to determine and recommend treatment measures required to abate pollution. The prohibition of indiscriminate fishing by means of fixed engines or construction of wires has been enforced from time to time in Chennai, Madhya Pradesh, Kerala, Haryana, Punjab, Delhi etc.

While the Indian Fisheries Act and the legislations framed by different State Governments exist, the machinery for the enforcement of the regulations in most cases is so inadequate that the objectives of formulating these are hardly fulfilled. Despite legal prohibition, the capture and destruction of brood fish and juveniles in large quantities are commonly practiced all over the country and are largely responsible for the impoverishment of the freshwater fisheries. Legislations based on empirical knowledge are of doubtful utility. There is thus a need to discard legislations of suspect import and instead formulate and enforce regulations based

[33] *Ibid.,* pp.125-126.
[34] *Ibid*., p.127.

on the analytical approach of unit populations of different species of fish in Indian capture fishery waters. The Indian Fisheries Act is under revision.[35]

Dudley Seers, in his seminal paper argues that development involves "the realisation of the potential of human personality" and went on to suggest that this was best achieved through the "reduction of poverty, unemployment and inequality".[36] Pisciculture compliments this document as Pisciculture encompasses profound components of self reliance and increased cultural independence which can usher in a raise in national income, poverty reduction and more equitable distribution of wealth and income. So, the scope of Pisciculture brings within it all the relevant factors needed to accelerate the pace of socio-economic development of Mizoram.

Pisciculture also plays an important role in the process of Sustainable Development. Future generations, not just the present generations, need earth resources and what they will produce. The legacy of the concept of Sustainable Development is attributed to the Report of the World Commission on Environment and Development entitled *Our Common Future*[37] which defines it as development that "meets the needs of the present without compromising the ability of future generations to meet their own needs". Thus, it seeks to satisfy the compulsions of equity within generations of the humans and also of inter-generational equity.

Pisciculture has obtained maximum sustained yield of fish from waters and assures a recurring bountiful harvest of fish without depleting the resources and wastage of fish effort. As long as there is availability of waterbodies, it can be manipulated by man, fish seeds sown, tended and nursed, reared and finally harvested. It has also been mentioned earlier that The Indian Fisheries Act has even constituted provisions that every fish should be given a chance to breed at least once so that the resources would not get depleted. Also, sustainable employment can be nurtured with the ongoing trend of culture of fishes. As the question of Sustainable Development remains the greatest challenge to the world community, Pisciculture ensures stability, protection of life-supporting natural systems, establishing adequate

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35 *Ibid*., p.128.

36 Sapru, R.K. *Development Administration* (Sterling Publishers Private Limited, Delhi, 1994) p. 4.

37 World Commission on Environment, *Our Common Future: Second Impression*, (Oxford: Oxford University Press, 1987).

environmental standards and ample potential for income-producing human community.

Review of Literature

The scholars have undertaken review of the following literature to prove out whether the present study is feasible or not.

K.K.Sen in his article "Role of Pisciculture in Economic Development" published in *The Assam Tribune* on July 25, 2009 mentions how fish farming can facilitate livelihood for poor fishermen and how Pisciculture can be a source of alleviation of the poverty of India as a nation. The article also states that the production of fish in India is not adequate to meet the demands of its consumption rate and, probably, this can be increased significantly through modern improved technology in order to improve nutritional standard and augment foreign exchange earning of the nation. He emphasises the needs for multiplication of fish seed and feed production for economic wellbeing of the fisherman families and nutritional improvement of consumers.

Robert Rosanglura, the Secretary of ZOFISFED, Government of Mizoram, in his report on *Mizoram Fish Farmer Study Tour cum Exposure Visit to Tripura* during 4th to 9th October 2010 states how much Mizoram is lagging behind in fish farming in comparison to the other North Eastern States and then suggests the remedial measures to be taken up by the State Government. This report also highlights that, while selecting the beneficiaries of the Scheme for Pisciculture Development, Tripura Government has always given priority to the weaker sections of the society, the Self Help Group (SHG), the Scheduled Caste members and people living Below Poverty Line (BPL) in Tripura.

A Mustard oil cake manufacturing plant, initially funded by the government, is basically run by a Self Help Group and the State Government has been purchasing metric tones of oil cakes produced by the plant every year. The Tripura Government has also implemented National Welfare Scheme for Fishermen Families which includes centrally sponsored housing loans, safe drinking water, Financial

Assistance under Saving-cum-Relief Programme and Group Accident Insurance Scheme for fishermen.

Remsiama, Joint Director (Directorate of Fisheries), in his article "Pisciculture in Mizoram" published in *Lengngha Magazine*, an Official Organ of Directorate of Fisheries, Government of Mizoram, Issue No. 15, 2009-2010 mentions how there was a small number of fish farmers in Mizoram in 1972 and how this number has risen to thousands now. According to him, the reason for this increase can be credited to the financial assistances from the Central Government since 1996, through the FFDA (Fish farmer Development Agency) and from the NFDB (National Fisheries Development Board) since 2007. He also brought into light the advancements and measures taken by the Directorate of Fisheries of Mizoram to enhance fish production in Mizoram through Awareness Campaigns, Extension and Training, Subsidized Fish Seeds, Cold Storage-cum-Ice Plant machinery, and Adoption of Scientific Methods of Fish Culture.

K. Sahoo, in his Article on "Pisciculture for more Jobs stressed" published in *The Statesman*, Bhubaneswar on January 31, 2010 gives a report on the two day awareness-cum-training programme organised by Central Institute of Freshwater Aquaculture (CIFA) in Bhubaneswar in a bid to generate job opportunities among the villagers of the different districts through Aquaculture. According to him, the programme underscored the importance of Pisciculture in generating jobs and as a means to reduce the extent of nutrition related disorders among the locals. The writer has further said that the National Rural Employment Guarantee Scheme (NREGS) has been launched for the People Living Below Poverty line (BPL) families in 19 districts of the State. Alongside this Scheme, CIFA has installed portable hatchery with a view to ensuring availability of seeds of commercially important fish at a moderate cost for poor families. It is significant to note that more than 200 people, including 35 women from various blocks, who were interested in Pisciculture, participated in the aforesaid two-day programme. CIFA is interested in the socio-economic development of 100 Scheduled Caste and Scheduled Tribe families through Aquaculture with support of the Biotechnology Department, Government of India.

"*Manipur Fisheries*" published by the Directorate of Fisheries, Manipur on 0ctober 31, 2006 reveals the effort made by the State Government for enhancement of fish production in the state not only for achieving self-sufficiency but also for exporting to the neighbouring states. They provide technical guidance to financial assistance from the financial institutions such as Banks, NABARD, NEC etc for enabling the poor fish farmers for taking up Aquaculture. Training is given to the fish farmers at the grass root levels on the latest technologies in fisheries as well as to the educated un-employed youths of the state. This can generate self employment through scientific fish culture in the rural areas for upliftment of their socio-economic conditions. They arrange for life insurance coverage and also provide basic amenities for the welfare of the fishermen along with providing subsidy and loan to small and marginal farmers.

Although the above works are commendable, all of them do not include the study of the role of Directorate of Fisheries for Pisciculture Development in Mizoram. Hence, the present study has been taken up with a definite purpose.

Objectives of the Study

The objectives of the proposed study are:

- to trace the origin of Directorate of Fisheries in Mizoram and its organisational structure
- to study personnel administration in the Directorate of Fisheries
- to study the methods of implementation of Projects and Schemes for Pisciculture Development by the Directorate of Fisheries
- to estimate the prospect of Pisciculture Development for socio-economic development of the people in Mizoram and
- to examine the underlying obstacles in the way of Pisciculture Development in Mizoram.

Area of the Study

The area of study covers the entire state of Mizoram whose climatic condition, having both temperate and semi-tropical climate and the Monsoon-influenced rainfall, is conducive to Aquaculture. However, the present study will concentrate on the role of Directorate of Fisheries for Pisciculture Development especially in the two districts of the State, namely Mamit and Kolasib, where the involvement of people in fish farming is comparatively high due to the availability of Valleys or Low Lying Areas which can easily be developed for Fish Rearing.

Research Questions

We have formulated the following research questions:

(1) Has the Directorate of Fisheries taken steps to harness the potential of Pisciculture for future economic development of the State?

(2) Can Pisciculture become one of the contributing factors to catapult the State's economy to a higher status?

(3) Can North Eastern Council (NEC) and the Ministry of Development for North Eastern Region (DONER) play a constructive role for Pisciculture Development in Mizoram?

(4) Will it be appropriate for the State Government to use rural development agents such as NABARD, NREGS and even the State's own NLUP for enhancing the capacity of Directorate of Fisheries to take up Projects of Pisciculture in a bigger way in Mizoram?

Methodology

This study has been based on primary and secondary data collected, through questionnaire and interviews, from fish farmers and sellers, serving and retired officers and staff of the Directorate of Fisheries as well as Agriculture Department, Government of Mizoram, and leaders of concerned Societies; published and unpublished records and original documents of the concerned Departments,

Statistical Handbooks of Mizoram and Mizoram Gazette, etc. The secondary data will also be collected from books, journals and newspapers and will be extensively used for the present study.

Chapterisation

The entire work is divided into five chapters. The first Chapter is introductory in nature which has dealt with the geographical features of Mizoram and the concept of Pisciculture Development.

The second chapter has attempted to explore the Origin of Directorate of Fisheries and then study its Organisational Set-up.

The third chapter has identified different Projects and Schemes for Pisciculture Development and examined the process of their Implementation.

In the fourth chapter, an attempt has been made to assess the prospect of Pisciculture Development for Socio-Economic Development in Mizoram.

The fifth chapter is the final chapter which has brought out the summary and findings of this work.

It is the purpose of this work, therefore, to find out the place of Fisheries in the economic life of the Mizos in Mizoram. It is a rational study of the prospect of Pisciculture for uplifting the socio-economic status of the people, to create employment opportunities and utilisation of available natural water resources. It focuses on the panorama of boosting the state economy by way of increasing per capita production of fish for per capita consumption and per capita income.

CHAPTER - II
ORIGIN AND ORGANISATIONAL STRUCTURE OF DIRECTORATE OF FISHERIES

Organisations are created for the attainment of a purpose or goal. It would be futile if we were to work on our desired goals without any proper organisation. The real importance of organisation does not only rest on its structure alone, but also on the plans and schemes and its whole staffing system. The use of human resources, money and materials is the mechanism for attainment of the organisational goals. It is a matter of fact that our life is inextricably inter-woven in all sorts of organisation. In public administration, when new tasks have to be done, it has usually first to be seen whether they can be assigned to one of the existing departments or units.[38] It is only when the task is too big to be undertaken by one of the existing departments or too dissimilar to the activities undertaken by them that a new department is created. The creation and origin of the Directorate of Fisheries also has more or less followed this pattern of organisational foundation.

I. Origin of Directorate of Fisheries

Mizoram began to experience some sorts of fishery activities when it was one of the districts of Assam State. To be more specific, in 1958, the Fisheries Department of Assam started its activities in the erstwhile Mizo District by setting up a small space in the District Agriculture Office which functioned under the Superintendent of Fisheries, Cachar, Silchar Superintendent of Fisheries, Hill District, Shillong, alternatively. However, soon after the elevation of the Mizo Hills to a Union Territory (U.T.) status in 1972, the new Government had set up an independent Fishery Wing under the Agriculture Department to take up Pisciculture Development in the territory.

It is worth mentioning here that the Mizoram National Front (MNF) Movement (Insurgency Movement of Mizoram) took place in 1966. The Mizo Hills,

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[38] Sharma, M.P and Sadana, B.L, *Public Administration in Theory and Practice* (Kitab Mahal, Sarojini Naidu Marg, Allahabad, 2005), p.170.

one of the districts of Assam, was in such a turbulent condition that the then Fishery Officer, Mr M.K. Das, recommended the closing down of the Fishery Department to the extent of sending a proposal for its obliteration to the Directorate of Fisheries, Assam, through the Deputy Commissioner. But it received a setback when the members of the Fishery Association under the leadership of the following Mizo gentlemen-Thangkhuma, Chala, Laldawla and Chuauhnuna- appealed to the Assam Government to roll back the proposal.[39] They further claimed that the Department like any other Departments had full potential of achieving its desired objectives and that it was the most important possession of the state to secure the overall goals of the Fishery Sector. [40]

The proposal was then annulled and the Fishery Department was back on its feet again. Although the Fishery Wing of the Agriculture Department was not yet properly prepared to take up Pisciculture Development as it ought to be, there was a noticeable increase in the number of people taking interest in Fish Farming following the efforts put in by the Agriculture Department in general and its Fishery Wing in particular. As the time rolled by, in view of the prospect for Pisciculture Development in the area, the State Government, in July 1993, elevated the Fishery Wing to a full-fledged Directorate to accelerate Pisciculture development activities under the auspices of Agriculture Department. As of today, there are already 71 (seventy one) cooperative fishery societies in Mizoram.[41]

II. Organisational Structure

The co-ordinated activities of the Directorate are carried out through a strong organisational structure. Though it is one of the youngest Directorates of Government of Mizoram, Directorate of Fisheries has been enlarged along with the passage of time to meet the necessary infrastructure for Pisciculture Development in Mizoram. The onerous functions and responsibilities are planned and prepared to accomplish a commom objective through this organisational framework.

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39 "Origin of Fisheries Department in Mizoram," Vide www.fisheries.mizoram.gov.in 6.11.2010.

40 *Official Record of Directorate of Fisheries,* Government of Mizoram.

41 Government of Mizoram, *Statistical Handbook Mizoram, 2010*, (Directorate of Economics and Statistics) Aizawl, Table: 8.2.

(a) Directorate

Consequent upon the bifurcation of Fishery Wing, along with Horticulture, from the Directorate of Agriculture to become a full-fledged Directorate, the new Directorate, like its sister organizations- Horticulture and Minor Irrigation, has underwent lots of horizontal and vertical growth of manpower and also of activities and funds. Let us examine the organisational structure of Fishery Directorate.

The new Directorate of Fisheries is located in the Capital Headquarter of the State. Though Directorate of Fisheries was initially put under the charge of a Joint Director, it is, now, headed by a full-time Director supported by one Joint Director, Deputy Director and Assistant Director each. The internal organisational structure of the Directorate is divided into Establishment Unit, Accounts Section, Technical Staff Unit and Database Unit.[42]

The Establishment Unit of the Directorate of Fisheries comprises of an Assistant, 1 (one) Upper Division Clerk (UDC), 1 (one) Under Divisional Clerk (LDC), 1 (one) Stenographer, 3 (three) Drivers, 1 (one) Power Pump Operator (PPO), 1 (one) IV Grade and 1 (one) fisherman as a peon and is placed under the charge of one Office Superintendent.[43]

The Accounts Section is composed of an Assistant, 1 (one) LDC and 1 (one) peon.

The Technical Staff of the Directorate is headed by an Assistant Director. The Technical Staff of the Directorate is composed of 3 (three) Fishery Extension Officers, 1 (one) Junior Engineer, 2 (two) Fishery Demonstrators, 1 (one) LDC, 1 (one) IV Grade and 1 (one) fisherman.[44]

The Department has a Database Unit under the Scheme Development of Inland Fisheries Statistics (CSS) with 1 no. of Deputy Director (Statistics), 1 no. of Technical Assistant and 2 nos. of Investigators for transmitting various information resources of fisheries data of the state to the Ministry.

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42 Interview with Mr Lalsiamliana, Statistical Assiatant of the Directorate of Fisheries, Government of Mizoram, on 11.4.2011.

43 Citizen Charter 2011(Fisheries Department, Government of Mizoram, 2011) Annexure.

44 *Ibid.,*

At present, the Directorate has altogether 12 (twelve) Group 'A' Officers, 49 (forty-nine) Group 'B' Officers and Staff, 53 (fifty-three) Group 'C' Staff and 32 (thirty-two) Group 'D' Staff out of which the strength of Gazetted Officers is 25 (twenty-five) in number.[45]

(b) District Offices- District Fisheries Development Offices

The whole of Mizoram State is divided into 8 (eight) districts, namely, Aizawl District, Lunglei District, Saiha District, Kolasib District, Mamit District, Champhai District, Serchhip District and Lawngtlai District. At the district level, there are 8 (eight) District Offices each of them being headed by one District Fisheries Development Officer (DFDO).[46] Out of the aforesaid 8 (eight) District Fishery Offices, the three District Fishery Offices at Lawngtlai, Serchhip and Champhai have been recently inaugurated in 2011. It is significant to note that each of the 8 (eight) District Fishery Offices is taking care of Pisciculture Development at the Sub-Divisional level.

Aizawl District Fishery Office is headed by one District Fishery Development Officer (DFDO) who is also acting as the Chief Executive Officer (CEO) of FFDA. Its Technical staff includes 2 (two) Fishery Extension Officers, 5 (five) Assistant Fishery Officers, 7 (seven) Fishery Demonstrators, 3 (three) Fishery Managers, and one PPO. The Clerical staff is comprised of 1 (one) Head Assistant, 1 (one) UDC, 1 (one) LDC, 3 (three) IV Grade and 1 (one) IV Grade Farm.

The Lunglei District Fishery Office is under the District Fishery Development Officer (DFDO) who is also the CEO of FFDA. The Technical staff includes 2 (two) Fishery Extension Officers, 4 four Assistant Fishery Officers, 3 (three) Fishery Demonstrators. The Clerical staff under 1 (one) Head Assistant comprises of a UDC, an LDC, 2 (two) Drivers, 3 (three) IV grade and 2 (two) IV Grade Farm.

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45 *Ibid.,*

46 While each of the existing District Offices continues to be headed by one District Fisheries Development Officer (DFDO), the newly inaugurated 3 (three) Districts are headed by Fishery Extension Officer (FEO).

The Kolasib District Fishery Office is under the District Fishery Development Officer (DFDO) who is also the CEO of FFDA. The Technical staff includes a Fishery Extension Officer, 2 (two) Assistant Fishery Officers and three Fishery Demonstrators. An UDC, LDC, peon and 1 (one) IV Grade makes up the Clerical staff.

The Mamit District Fishery Office is under the District Fishery Development Officer (DFDO) and who is also the CEO of FFDA. The Technical staff has 1 (one) Fishery Extension Officer, Assistant Fishery Officer and a Fishery Demonstrator. The Clerical staff is composed of an LDC, UDC and a IV Grade.

The Saiha District Fishery Office is under the District Fishery Development Officer (DFDO) who is also the CEO of FFDA. The Technical staff comprises of 2 (two) Fishery Extension Officers, 1 (one) Fishery Demonstrator and 1 (one) Fisherman. The Clerical staff comprises of an UDC and 3 (three) IV Grade.

The Champhai District Fishery Office is under the Fishery Extension Officer (FEO) who is in charge of the District Fishery Development Officer. The office has 1 (one) Assistant Fishery Officer and 3(three) Fishery Demonstrators.

The Serchhip District Fishery Office is under the Fishery Extension Officer (FEO) who is in charge of the District Fishery Development Officer and the entire technical staff includes 2 (two) Assistant Fishery Officers and 2 (two) Fishery Demonstrators.

The Lawngtlai District Fishery Office is also under the Fishery Extension Officer (FEO) who is in charge of the District Fishery Development Officer. The Technical staff includes 1 (one) Assistant Fishery Officer and 2 (two) Fishery Demonstrators and the Clerical staff has 1 (one) UDC.[47]

[47] *Op.cit .,*

III. Personnel Administration-Methods of Recruitment and Promotion of Personnel in Fisheries

Human resources or manpower is recognised as being central in personnel administration because it is the total quantitative and qualitative human assets or people in an organisation. The Personnel administration of the Directorate of Fisheries is treated as one of the basic resources utilised for the achievement of organisational goals. The staffing system determines what is one responsible for and to whom is one responsible. The Directorate is also characterised by sound recruitment and promotion system bounded by rules. The Personnel administration of the Directorate of Fisheries is basically concerned with the determination of the process or movement of the whole organisation.

In exercise of the powers conferred by Article 309 of the Constitution of India, the Governor of Mizoram makes the following rules relating to the creation of posts and recruitment of the personnel of the Directorate of Fisheries. Every government servant is required to undergo training or pass a Departmental Examination as may be prescribed from time to time. Nothing in the rules affect reservation and other concessions required to be provided for the Scheduled Castes, the Scheduled Tribes and other categories of persons in accordance with the Orders issued in this regards by the Central Government or the Government of Mizoram from time to time.

(a) Director [48]

The Rules for the creation of post of Director and recruitment may be called the Mizoram Sericulture Department Service (Group 'A' post) Recruitment Rules.

The number of post of Director is 1 (one) or as sanctioned by the State Government from time to time. The post of Director is a selection post and is classified as General State Service Group 'A' Gazetted (Non-Ministerial).

The method of recruitment is by 100% promotion failing which by deputation. According to the normal practice, the promotion to the Director post is

[48] The Mizoram Gazette EXTRA ORDINARY published by Authority, VOL-XXXVI Aizawl, Monday 29.10.2007, Kartika 7,S.E. 1929, Issue No.289, pp.1-4.

from Joint Director of Sericulture having not less than 5 (five) years regular service in the grade. The deputation can be by officers under Central or the State Government holding analogous posts. Period of deputation shall ordinarily not exceed 3 (three) years.

(b) Joint Director[49]

The Rules for the appointment of Joint Director have been called the Mizoram Fishery Department (Group 'A' posts) Recruitment Rules.

The number of post is 1 (one) or may be sanctioned from time to time. It is a selection post and is classified under the General Central Service Group 'A 'Gazetted (Non-Ministerial).

The method of recruitment is by transfer or deputation (including short-term contract/probation). The period of probation is 1 (one) year. The promotion is from Deputy Director of Fisheries with a minimum qualification of B.Sc (Zoology) with training in Inland Fisheries having 5 (five) years service in the grade or B.F.Sc with 5 (five) years service in the grade. Transfer on deputation is from Officer from Central/State/U.T Administration with M.F.Sc or M.Sc (Zoology) with training in Inland Fisheries and working experience of 2 (two) years service in extension or research work in the field or 5 (five) years in the post or holding analogous post, period of deputation scale ordinarily not exceeding 3 (three) years. This post is exempted from consultation with the U.P.S.C.

(c) Deputy Director[50]

The rules for the appointment of Deputy Director have been called the Government of Mizoram Fisheries Department (Group 'A' posts) Recruitment Rules.

The number of post is 1 (one) or as sanctioned from time to time. It is by selection and it is classified under the General State Service Group 'A' (Gazetted)

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[49] *The Mizoram Gazette EXTRA ORDINARY* published by Authority, VOL-XVII Aizawl, Thursday 8.12.1988, Agrahayana 17, S.E. 1910, Issue No.136(A), pp.1-4.

[50] The Mizoram Gazette EXTRA ORDINARY published by Authority, VOL-XIX Aizawl, Tuesday 16.1.1990, Pausa 26, S.E. 1911, Issue No. 5, pp.1-4.

Non-Ministerial. The educational qualification required for direct recruits are M.F.Sc with 3 (three) years service in Group 'B' posts in Fisheries discipline or M.Sc (Zoology) trained in Inland Fisheries from a recognised Institute with 3 (three) years service in Group 'B' Posts in Fisheries discipline. The period of probation is 2 (two) years and this post is exempted from the purview of the U.P.S.C. The method of recruitment is by 100% promotion/transfer on deputation without deputation (duty), allowance in case the post(s) is/are filled up by transfer on deputation of employee of the Government of Mizoram.

The promotion is from persons holding B.F.sc with 5 years regular service in the Grade of Assistant Director of Fisheries / District Fisheries Development Officer / other posts of the same grade in Fisheries discipline or B.Sc (Zoology) trained in Inland Fisheries with 5 (five) years regular service in the Grade of Assistant Director of Fisheries / District Fisheries Development Officer / other posts of the same grade in fisheries discipline. The transfer deputation is on Officers holding similar posts in other Government without deputation (duty) allowance in case the posts are filled up by transfer on deputation of employee of the Government of Mizoram (period of deputation ordinarily not exceeding 3 (three) years. This post is exempted from the purview of U.P.S.C.

(d) Assistant Director[51]

The rules for the appointment of Assistant Director have been called the Government of Mizoram Fisheries Department Group 'A' (Gazetted) posts Recruitment Rules, 1991.

The number of posts may be 4 (four) or as may be sanctioned from time to time. It is a selection post and is classified under General State Service Group 'A' (Gazetted) Non-Ministerial. The period of probation is 2 (two) years and the method of recruitment is by 100% promotion, failing which by Direct Recruitment; failing both by Transfer on Deputation.

[51] The Mizoram Gazette EXTRA ORDINARY published by Authority, VOL-XX Aizawl, Tuesday 22.1.1999, Magha 2, S.E. 1912, Issue No. 13, pp.1-4.

The promotion is from Fishery Officer/Fishery Extension Officer having a minimum qualification of Diploma in the concerned field from a recognised Institute with not less than 5 (five) regular service in the grade. Transfer on Deputation is from Officers from Central/States/U.T Administrations holding analogous posts with a minimum qualification of B.F.Sc or B.Sc (Zoology) trained in Inland Fisheries from a recognised Institute.

The educational qualifications required for direct recruitment are M.F.Sc from a recognised University or M.Sc (Zoology) from a recognised University and having training in Inland Fisheries from a recognised Institution. It is desirable if the person has working knowledge of Mizo language of Middle School Standard, relaxable to candidates from Chhimtuipui District, Mizoram. This post is exempted from the purview of U.P.S.C.

(e) District Fisheries Development Officer (DFDO)[52]

The rules for the appointment of District Fishery Development Officer have been called the Government of Mizoram Fisheries Department Group 'A' (Gazetted) posts Recruitment Rules.

The number of posts may be 4 (four) or as may be created from time to time. It is a selection post and is classified under General State Service Group 'A' (Gazetted) Non-Ministerial. The period of probation is 2 (two) years and the method of recruitment is 100% promotion, failing which by Direct Recruitment; failing both by Transfer on Deputation.

The promotion is from either Fishery Officer (FO) or Fishery Extension Officer (FEO) having a minimum qualification of Diploma in the concerned field from recognised Institute with not less than 5 (five) years regular service in the grade. Transfer on Deputation is Officers from Central/State/U.T Administrations holding analogous posts with a minimum qualification of B.F.Sc or B.Sc. (Zoology)

[52] The Mizoram Gazette EXTRA ORDINARY published by Authority, VOL-XX Aizawl, Tuesday 22.1.1991, Magha 2, S.E. 1912, Issue No. 13, pp.1-4.

trained in Inland Fisheries from a recognised Institute, (period of deputation will ordinarily be not exceeding 3 (three) years.

The educational qualifications required for direct recruitment are M.F.Sc from a recognised University or M.Sc (Zoology) from a recognised University and having training in Inland Fisheries from a recognised Institution. It is desirable if the person has working knowledge of Mizo language of Middle School Standard, relaxable to candidates from Chhimtuipui District, Mizoram. This post is exempted from the purview of U.P.S.C.

(f) Fishery Extension Officer (FEO)[53]

The rules for the appointment of Fishery Extension Officer have been called the Mizoram Fisheries Department Group 'B' (Non-Gazetted) posts Recruitment Rules.

The number of post may be 17 (seventeen) or as sanctioned from time to time. It is a selection post in case of Promotion and it is classified under the General State Service Group 'B' (Non-Gazetted) Non-Ministerial. The period of probation is 2 (two) years and the method of recruitment is 40% by Promotion, 60% by Direct Recruitment if failing both, by Transfer on Deputation.

The promotion is from Assistant Fishery Officer (AFO) and its equivalent Posts in the line in the Fisheries Department having Training in Fishery Demonstrator Course from recognised Institute with minimum of 5 (five) years regular service in the grade. Transfer on Deputation is from Officers from Central/State/U.T. administrations holding analogous posts having qualification of B.F.Sc or B.Sc (Zoology) trained in Inland Fisheries of recognised Institute with at least 2 (two) years experience in the grade.

The educational qualification required is B.F.Sc. of a recognised University, or B.Sc (Zoology) of a recognised University with training in one 1 (one) year Course in Inland Fisheries Development and Administration or 10 (ten)

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[53] The Mizoram Gazette EXTRA ORDINARY published by Authority, VOL-XX Aizawl, Wednesday 23.10.1991, Kartika 1, S.E. 1913, Issue No. 159, pp.1-4.

months Course in Inland Fisheries Extension Method and Techniques. The post is exempted from the purview of U.P.S.C.

(g) Junior Engineer (JE)[54]

The rules for the appointment of Junior Engineer have been called the Mizoram Agriculture Department (Fisheries Wing) Group 'B' posts Recruitment Rules.

The number of post may be 1 (one) or as sanctioned from time to time and it is classified under the Group 'B' (Non-Gazetted) Non-Ministerial. The probation period is 2 (two) years and the educational qualification requires High School Leaving Certificate with 3 (three) years Diploma in Refrigeration and Air Conditioning from Government recognised Institute and Industrial Centre. It is by 100% Direct Recruitment failing which by transfer on deputation. The promotion is from Officer from Central/State Research Institute with 3 (three) years Diploma in the concerned discipline with not less than 3 (three) years experience in the grade. This post is exempted from the purview of M.P.S.C. (Mizoram Public Service Commission)

(h) Fishery Officer, Assistant Fishery Officer and Fishery Demonstrator[55]

The rules for the appointment of Fishery Officer, Assistant Fishery Officer and Fishery Demonstrator have been called the Fishery Department (Class III posts) Recruitment Rules.

The post of Fishery Officer is a Selection post and the period of probation is 2 (two) years. The number of post may be as sanctioned from time to time. The educational qualification requires B.Sc with Zoology and training in Inland Fishery from a recognised Institute. The method of recruitment is 80% direct recruitment and 20% promotion failing which transfer/deputation. The promotion is from

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[54] The Mizoram Gazette EXTRA ORDINARY published by Authority, VOL-XXVIII Aizawl, Monday 5.4.1999, Chaitra 15, S.E. 1921, Issue No. 63, pp.1-4.

[55] The Mizoram Gazette EXTRA ORDINARY published by Authority, VOL-IV Aizawl, Monday 10.10.1975, Asuina 18, S.E. 1897, Issue No. 42, pp.9-16.

Assistant Fishery Officer with not less than 5 (five) years service in the grade. Transfer deputation is on officials holding similar posts in other Governments (period deputation ordinarily not exceeding 3 (three) years.

The post of Assistant Fishery Officer is a selection post and the period of probation is 2 (two) years. The number of post may be as sanctioned from time to time. The method of recruitment is 100% direct recruitment and the promotion is from Fishery Demonstrator, who has received training in Fishery and has 5 (five) years service in the grade.

The Fishery Demonstrator post may be 6 (six) or may be as sanctioned from time to time. It is by 100% direct recruitment and the probation period is of 2 (two) years. The educational qualification required is Matriculation with training in Fishery Demonstrator course from a recognised Institute. Working knowledge of Mizo language of Middle School standard is desirable. It may be relaxed in case of candidates belonging to Chhimtuipui District.

(i) Upper Division Clerk[56] and Lower Division Clerk[57]

The rules for the appointment of Upper Division Clerk and Lower Division Clerk have been called the Mizoram Ministerial Group 'C' posts Recruitment Rules.

These two posts are of Non-selection post and the probation period is of 2 (two) years. They are under the classification of General Central Service Group C. The educational qualification for UDC is a Bachelors Degree of a recognised University and for LDC, Matriculate/Higher Secondary or its equivalent and Typist speed of 30 words per minute. The method of recruitment is 90% direct recruitment and 10% promotion. Promotion is from Group D staff to educationally qualify for appointment to the post subject to the condition that they will have to possess a typing speed of 30 words per minute within 6 (six) months of their promotion.

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[56] The Mizoram Gazette EXTRA ORDINARY published by Authority, VOL-IX Aizawl, Thursday 10.10.1980, Asvina 18, S.E. 1902, Issue No. 50, pp.1-6.

[57] The Mizoram Gazette EXTRA ORDINARY published by Authority, VOL-XXVIII Aizawl, Monday 17.9.1999, Bhadra 26, S.E. 1921, Issue No. 242, pp.1-4.

(j) Driver[58]

The Rules for the appointment of Driver have been called the Mizoram Drivers and Handyman Recruitment Rules.

The posts of Driver Grade I, Grade II and Grade III and Handyman are under the General State Service Group 'C' Non-Gazetted and Non-Ministerial. The number of posts may be as sanctioned from time to time. The educational qualification required for the appointment of Driver is Matriculation and above, having professional licence in heavy, medium, light motor vehicles with at least 5 (five) years experience in professional driving.

Grade III drivers who have completed 5 (five) years of regular and unblemished service records will be eligible for promotion to Grade-II by screening and on the basis of Annual Performance Report/Records. Grade II drivers who have completed 15 (fifteen) years of regular and unblemished service records will be eligible for promotion to Grade-I by screening and on the basis of Annual Performance Report/Records.

(k) Power Pump Operator[59]

The Rules for the appointment of Power Pump Operator have been called the Mizoram Agriculture Department (Group 'D' post) Recruitment Rules.

It is a non-selection post and it is classified under Group 'D' Non-Gazetted and Non-Ministerial. The number of post may be 2 (two) or as sanctioned from time to time. It is by direct recruitment and the period of probation is of 2 (two) years. The educational qualification is Class VIII passed and conversant with working knowledge of various components of Power Pump and their maintenance and be able to carry out Minor Repair. Promotion, transfer or deputation is not applicable.

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[58] The Mizoram Gazette EXTRA ORDINARY published by Authority, VOL-XXV Aizawl, Thursday 29.8.1996, Bhadra 7, S.E. 1918, Issue No. 349, pp.1-7.

[59] The Mizoram Gazette EXTRA ORDINARY published by Authority, VOL-XVII Aizawl, Monday, 8.2.1998 Magha 19, S.E. 1909, Issue No. 17, pp.1-4.

IV. Delegation of powers and Functions to the functionaries at the District, Sub-Division and Block Levels

The delegation of powers and functions may be divided into two sectors: (i) Financial Management of the Department and (ii) Developmental Management of the Department.[60]

Financial Delegation: The financial power is vested only with the District Officer and they are at Scheduled Three of the Delegation of Financial Power, as notified by the Government of Mizoram.

At present, there is no sub-division office and Block office in respect of the department. Therefore, questions of financial power for those levels do not exist.

Developmental Delegation: The Developmental functions are at four levels, the District Officer, the Fish Extension Officer, the Assistant Fishery Officer and the Fishery Demonstrator.

District Fishery Development Officer (DFDO): The District Fishery Development Officers are responsible for the overall extension and development activities in the district including financial management of the Department pertaining to the District.

There is also a member secretary for the Boards constituted for CSS and NFDB programmes. However, the district level board for CSS and NFDB are the proposing and recommending unit on the basis of which the state level management committee undertakes financial selection of activities and beneficiaries. The execution of all the activities in the district level are the responsibility of District Officers, Fish Extension Officer (FEO), Assistant Fishery Officer (AFO) and Fishery Demonstrator (FD) and they are the assisting authorities in all developmental and extension activities in the district.

The District Officer is also responsible for disbursement of subsidy, submission of progress reports, length to lab and lab to length transmission of

[60] Interview with Mr M.A. Razi, the Deputy Director of Fisherie, Government of Mizoram on 17.8.2011.

information pertaining to problems encountered by the farmers as well as dissemination of new and improved technology among the farmers through the various machineries at various levels viz FEOs, AFOs, and FDs.

Fishery Executive Officer: The FEOs are basically entrusted with overall extension and developmental activity in the circle and block who are generally assisted by the AFOs and FDs.

Assistant Fishery Officer: In the present administrative set up, the AFOs are basically entrusted with the task of looking after the government farms besides assisting the DFDOs towards implementation of CSS and NFDB schemes etc.

Fishery Demonstrators: The FDs are basically the grass root agency directly connected with the farmers. And they are entrusted with the task of development and extension in a cluster of village assigned to each. They are controlled by the respective District Officer under which they fall.

The organisation of the Directorate is run with the principle of a chain of command, delegation, authority, responsibility and an efficient staffing system. The Promotion and Recruitment policies and procedures are planned and developed in accordance with the personnel policies and organisational goals to be achieved. The necessary qualifications required for a post signify securing appropriate candidates for filling that position and that they are mentally and physically fitted to the jobs they are expected to do. The Directorate of Fisheries encompasses the complex co-ordination of different personnels of different authorities under a common structure pursuing a common goal.

CHAPTER - III

IMPLEMENTATION OF PROJECTS AND SCHEMES FOR PISCICULTURE DEVELOPMENT

Government's assistance is necessary particularly in the initial stages, and special attention is required to educate fishermen in principles of coordination. The Fisheries Department plays an important role in conveying the information on various schemes and programmes of Central Sponsored and State Schemes implemented by various agencies from time to time and familiarise the fish farmers with the guidelines, patters of assistance etc for availing the service rendered by the Agencies. Since its inception, the Directorate, in addition to its own State Plan, has undertaken numerous Centrally Sponsored Schemes and Projects under its wing for the growth of the Fishing Industry in Mizoram and its associated prospects. The contributions of the Fish Farmers Development Agency (FFDA), National Fisheries Development Board (NFDB) and the North East Council (NEC) have catapulted the scenario of Mizoram Fisheries onto new heights. As much as the FFDA and NFDB have been committed entrepreneurs for different schemes and projects till present, the North Eastern Council (NEC) has played a passive role in the last few years. The hatcheries at places of *Darlak*, *Thenzawl*, *Zobawk* and *Zawlnuam* were created with the assistance of the North East Council (NEC) during the 9th five year plan and the 10th five year plan.[61] Let us examine some of the Major Pisciculture Development Projects and Schemes and the methods of their implementation by the Directorate of Fisheries from time to time.

State Plan and Centrally Sponsored Scheme

Brief description of schemes and programmes under the State Plan and Centrally Sponsored Scheme:[62]

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61 Interview with Mr. M.A. Razi, Deputy Director of Fisheries, Government of Mizoram on 5.6.2010

62 Citizen's Charter (Fisheries Department, Government of Mizoram, 2011) p.2.

A. FRESHWATER AQUACULTURE[63]

The scheme aims at augmenting fish production of the state in its culture sector to meet the consumption requirements and production mainly by giving subsidy to the deserving fish farmers under various Central Sponsored Schemes (CSS) such as:-

(i) FFDA (CSS)[64] - Under the scheme, the fish farmers are provided with assistance in the form of subsidy in cash for construction of new ponds/renovation of existing ponds and in kind (inputs) viz fish seeds, prawn seeds, fish feed etc for fish/prawn culture. Assistance is also provided for setting up fish seed hatchery, ornamental fish hatcheries etc as per the approved pattern of Government of India's assistance. The objectives of this Project are-

(a) to expand water areas horizontally and vertically in culture sector through various State Plan schemes and CSS, NEC programmes etc for augmenting fish production.

(b) to increase productivity of fish from freshwater resources.

(c) to augment fish seed production to meet the fish seed requirement in the state.

(d) to generate employment through fish farming and its allied ventures for improving socio-economic conditions of rural poor fish farmers.

The beneficiaries of the different schemes are selected by a Selection Board. The beneficiaries include those farmers who have a minimum plot of land of 2 hectares and farmers who have a maximum plot of land of 1.0 hectares.

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63 *Ibid*., p.2.

64 *Ibid*., p.3.

(ii) Development of capture fisheries (CSS)[65] - Fish farmers are given assistance for setting up fish farming units under Coldwater Fisheries and cage/pen culture units under Riverine Fisheries as per approved norms of Government of India. Expenditure on developmental activities mentioned above is shared on 75:25 basis by the Government of India and State government.

(iii) National scheme of Welfare of Fishermen (CSS)[66] - The scheme provides assistance to the fishermen for construction of fishermen houses, community hall and drinking water facilities at selected places in cluster approach under the Government of India's approved pattern of assistance. It also provides training to the fishermen in fisheries aspect. The expenditure on these developmental activities is shared on 75-80% (Government of India) and 20-25% (State Government). During 2009-10, 10 (ten) fish farmers of Hortoki in Kolasib District had their house constructed under the low housing schemes. A common village well is also under construction under the provision of this scheme in Hortoki.[67]

(iv) National Fisheries Development Board (CSS)[68] - With the main thrust for augmentation of annual fish production from the aquaculture sector in the state, the fish farmers are provided with assistance to the extent of 20% of cost of scheme. In order to develop the reservoir fisheries and to facilitate reservoir fish production on sustainable basis the NFDB scheme provides assistance to the government or quasi government organization by stocking fingerlings in the reservoir.

During the 11th Five Year Plan Period under National Fisheries Development Board programmes, three reservoirs/lakes viz Serlui 'B', Teirei and Palak were stocked with advanced fingerlings of economic varieties. The scheme also envisages development of Domestic fish marketing system by providing assistance to the government or quasi government organisation for setting up retail outlets, cold chain development etc to reduce post harvest losses, enhance revenue and improve hygienic conditions of the fish markets.

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65 *Ibid*., p.4.
66 *Ibid*.,
67 Interview with Mr C.Laldawngliana, the Kolasib District Fishery Development Officer, Government of Mizoram on 14.11.2011
68 Citizen's Charter *Op.cit*., p.5

(v) Strengthening of Database and Information Net-working in the Fishery Sector (CSS)[69]

The scheme started actual implementation during 2004-2005 and continued till date with the following Officer/staff:-

Deputy Director (Statistics)	- 1 no.
Technical Assistant	- 1 no.
Investigator	- 2 nos.

Under the Central assistance the Department has developed I.T facilities in the Directorate and 3 (three) Districts viz Aizawl, Lunglei and Saiha for transmitting various information resources of fisheries data to the Ministry after undertaking survey of resources and fish/fish seed production of the state.

B. INFORMATION, EXTENSION AND TRAINING (CSS/State Plan)[70]

The scheme aims at improving information and extension service in respect of fishery development in the state through creation of more infrastructures, educating the farmers on modern technology of fish farming, post harvest technology and marketing using efficient techniques of information and extension. The scheme is implemented under the CSS programme of Extension and Training and State Plan Fund. The scheme emphasises training of fish farmers, organising workshops/seminars, publication of magazines, booklets, training manuals etc for dissemination of package practices, awareness, human resource development and evaluation studies.

Under the CSS programme, one unit of State level laboratory-cum Farmers training centre have been established at Lengpui for water quality and fish health investigation as well as training of fish farmers. Another two units of Farmers Training Centres have also been established at Lunglei and Saiha. Further, the scheme envisages training of in-service and fresh personnel in various fisheries courses at Fishery Institutes in the country besides organising farmers' tours outside the state.

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69 *Ibid*., p.6.
70 *Ibid*.,

C. FISH SEED PRODUCTION-CUM-FARMING[71]

In order to produce quality fish seeds and to meet the requirement of the state, 8 (eight) fish seed farms were developed by the Department, out of which 4 (four) fish seed farms were leased out to ZOFISFED (Zoram Fish Federation) for fish seed production. The Department is now maintaining 4 (four) fish seed farms at Lengpui, Tamdil, Zobawk and Ngengpui for production of fish seeds.

D. INLAND FISH MARKETING (State Plan)[72]

The scheme aims at improving the fish marketing network of the state for evenly distribution of the harvested fishes to major markets and in the interior areas of the state. Under the scheme, two Ice Plant-cum-Cold Storage at Bawngkawn and Kolasib and one Ice Plant at Bilkhawthlir have been established and running successfully for providing quality ice blocks, cold storage facility etc to the fish farmers/sellers at subsidised rate for preservation and marketing of fishes.

The Fishery Department thrives ahead towards rendering services to the farmers and achieving a committed goal for augmenting of fish production level and upliftment of socio-economic conditions of the poor farmers in the region.

ANNUAL PLAN 2011-2012[73]

During the Annual Plan 2011-2012, it is envisaged to create another 822 hectares of new ponds and renovate 600 hectares of existing ponds under Freshwater Aquaculture scheme including NLUP (Special Assistance) scheme to bring an additional fish production in the state which will give a sustainable income to the fish farmers'.[74] Towards extension of fishery technology and encouraging of private sectors in augmenting fish production in the state, it is targeted to train up around 800 farmers during Annual Plan 2011-2012 besides involving progressive farmers

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71 *Ibid.*, p.7.

72 *Ibid.,*

73 Government of Mizoram*, Details and Schemes of Annual Plan 2011-2012* (Directorate of Fisheries)

74 Government of Mizoram*, Details and Schemes of Annual Plan 2011-2012 Op.cit.,*

for production of diversified and economic species like ornamental fishes to enhance fish production.

In order to improve the marketing of fishes in the state, provision has been made for state matching share (Rs.15 lakhs) for setting up 2nos Retail fish market and 5nos Retail outlet under NFDB (CSS) programme with an outlay of Rs.120 lakhs during 2011-2012 besides maintenance of existing Ice plants/Cold storages in Aizawl, Kolasib, Bilkhawthlir under marketing scheme which will tremendously assist the fish farmers to supply good quality of fishes to the consumers and ensure remunerative return to improve their income. To enable the Department to function properly with the District Fisheries Offices in the state and to accomplish the proposed goals of development, it is imperative to provide minimum requirement of manpower for functioning the Districts and the Directorate efficiently. With the existing fishery technical manpower strength of 68 persons (from Director down to the level of Fishery Demonstrator), who are mostly occupied with development activities, extension service has been very poor resulting to low unit areas productivity. Therefore, 16 new posts are proposed for creation and upgradation to fill up the vast deficiency of staff/Officers and to mitigate the imbalance of manpower in the Department during the Annual Plan 2011-2012 urgently.

The Annual Plan scheme 2011-2012 of the Department proposes an outlay of Rs.1395 lakhs as per the policy, strategy and development needs.

1. FISH SEED PRODUCTION-CUM FARMING[75]

Fish seeds being a crucial input for boosting up fish production and its continuous availability are a must to enhance fish yield in the state major input for fish culture. The present requirement of fish seeds for distribution to the private pisciculturists is in tune of Rs. 3.80 crores. Therefore, the thrust during Annual Plan 2011-2012 is to strengthen the existing 4 (four) number of Departmental fish seed farm to enhance fish seed production for which provision for maintenance, repair, upgradation of the existing seed farms has been made under the scheme. In the past, 8 (eight) seed farms have were developed of which 4 (four) farms have been handed

[75] *Ibid*., p.2.

over to the ZOFISFED for fish seed production. In these regards while the Cooperative Department is supposed to take care of the financial aspects. Therefore, the Department is left with 4 (four) farms i.e. Lengpui, Tamdil, Zobawk and Ngengpui for production of fish seeds.

The financial outlay for this scheme under the Annual Plan 2011-2012 is Rs. 20 lakhs.

2. FRESHWATER AQUACULTURE[76]

This scheme aims at augmenting table size fish production of the state in its culture sector to meet 11kg per capita by the end of 2014-2015 through:

-Creation and development of new water bodies (ponds and tanks)

-Renovation of existing water bodies (ponds and tanks)

-Supply of first year input viz fish seed, feed, lime etc to the aforesaid ponds and tanks.

-Supply of fish seed, feed, harvesting equipment, health care medicine, drainage pipe etc to the existing farmers under subsidized rate.

The financial outlay for this scheme under the Annual Plan 2011-2012 is 191 lakhs.

3. DEVELOPMENT OF INLAND CAPTURE FISHERIES (RESERVOIRS / RIVERS ETC)[77]

The state of Mizoram has 600 hectare of water area in the form of rivers and streams spread over 1100 km of Riverine stretches offering a very low estimated landing of 400 M.T annually. In the recent past 2 (two) Hydel Projects namely, *Serlui* 'B' and *Teirei* has been impounded offering a total of estimated impoundment of 4000 hectares. These reservoirs can offer a sustainable yield and could be an excellent resort for setting jhumia families in capture fisheries to do away with the

[76] *Ibid*., p.3.
[77] *Ibid*., p.4.

disastrous practice of jhum cultivation. Therefore, this scheme aims at developing the riverine and reservoirs fisheries sector by way of adopting and clamping conservation measures in line with provision of Mizoram Fisheries Act, 2002 to obtain sustainable optimum yield from these capture fisheries resources to offer livelihood and permanent settlement to a considerable number of jhumia families.

The anticipated expenditure for this scheme is Rs 16 lakhs for establishment of cage or pen culture unit, purchase of nets and gears and purchase of mechanized boats which are the ancillary activities towards conservation and development of reservoir fisheries.

4. DEVELOPMENT OF COLD WATER FISHERIES AND ORNAMENTAL FISH CULTURE[78]

This scheme aims at survey and investigation of cold water species available in the natural ecosystem (rivers and open waters) of the state, conserve those species to protect them from extinction and replenish the natural ecosystem for sustained yield from the rivers and open waters, it further aims at introducing culture of ornamental fishes in private sector to develop entrepreneurship for self employment with research and development and extension facilities with the State Fisheries Department. It also aims the setting up of small scale backyard hatchery of ornamental fishes including rearing unit and also training of entrepreneurs exclusively for hatchery, rearing and fabrication unit for ornamental fishes under state plan fund.

The proposed outlay during the Annual Plan 2011-2012 for this scheme is Rs. 3 lakhs.

[78] *Ibid*., p.5.

5. DEVELOPMENT OF INLAND FISHERIES STATISTICS (DATABASE)[79]

The scheme provides for maintenance of the on-going Centrally Sponsored Scheme for Development of Inland Fisheries Statistics through information, networking, survey etc. The scheme is functioning with 100% grants-in-aid from the Central Government towards salary of staff. However since the Government of India does not provide any fund for maintenance of the I.T facilities once given by them, an outlay of Rs.1 lakh has been proposed for maintenance of the equipments and Office expense in the Annual Plan 2011-2012.

6. INLAND FISH MARKETING[80]

Fish marketing scenario in Mizoram is very poor due to lack of infrastructure like housing, transport facilities, dearth of adequate preservative material like ice block etc. Though the production from culture sector has improved considerably, landing in the main markets are not optimum due to lack of the above facilities. It has been found that sometimes the fishes produced in Mizoram (Kolasib District and Mamit District) 60% of the produces are marketed in the neighbouring states of Assam and Tripura. This inhibits the local farmers to get remunerative return from their produces which may be remedied if proper marketing facilities like ice and transportation are provided to the fish growers for bringing their produces to the main markets in Mizoram.

Therefore the scheme aims at improving the fish marketing network of the state for optimum landing of the locally produced fishes to the major markets of the states. With the emphasised aims and objective stated above, the scheme proposes to undertake the following activities –

-Maintenance of the existing infrastructure such as Cold Storage, Ice Plant and marketing vehicles, purchase of packing materials, production of ice and marketing of fishes from farmers ponds to the major market under State Plan sector.

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[79] *Ibid*., p.6.
[80] *Ibid*., p. 7.

-Establishment of retail market and outlets under National Fisheries Development Board programmes by arranging matching share from the state plan and to run the assets involving capable entrepreneurs (societies/individuals)

7. INFORMATION, EXTENSION AND TRAINING[81]

The existing extension facility available with the State Fishery Department is very poor both in terms of infrastructure and manpower. While the manpower part is taken care of under Direction and Administration, the infrastructure part and carrying out efficient extension service has to be taken care under this scheme. The scheme aims at improving information and extension service in respect of fishery development in the state through furnishing of Trading Centres with teaching aids etc for starting, functioning, educating the farmers on modern technology of fish farming, post harvest technology, marketing etc using efficient techniques of information and extension. This scheme proposes to do the following:

- Publication of magazines, booklets, manuals, display of advertisement etc

- Purchase of extension materials and equipments

- Furnishing Training Centres at Lunglei and Saiha Districts with teaching aids etc.

- Farmers tour to outside state

- Training of in service/fresh personnel as well as stipend and book grants for B.F.Sc certificate

- Organising Workshop/Seminar

- Training of fish farmers

8. NEW LAND USE POLICY[82]

The scheme envisages adoption of sustainable farming for generating sustained income for the farmers to uplift the economy in the rural and urban areas. The scheme further aims at construction of fishermen's houses, community hall and

[81] *Ibid*., p.8.
[82] *Ibid*., p.9.

providing drinking water facilities for the fishermen under CSS, National Scheme of Welfare of Fishermen. Thereby, the scheme is committed to offer livelihood and self-employment to rural people in culture fisheries sector.

II QUESTION OF FUNDING- DIFFERENT SOURCES

The most prominent funding agency of the Fishery Department of Mizoram is the Fish Farmers Development Agency (FFDA). The FFDA scheme was initiated as a pilot project by the Department of Agriculture & Corporation, Government of India in 1974-75.[83] It was implemented in some states of the country in order to utilise village tanks and ponds for the purpose of aquaculture by setting up district level agencies. The scheme was further introduced to more states and thus the number of agencies also increased.

FFDA's are provided with necessary funds, Extension Service Units and required infrastructure so as to develop freshwater fish culture in each district. The FFDAs enjoy reasonable autonomy in their operation.

The first FFDA was started in Palakkad district of Kerala in 1976.[84] Two more FFDAs were sanctioned in Thissur and Kollam districts in 1978. Other FFDAs were established subsequently. India now has 429 Fish Farmers Development Agencies (FFDA's).

Organisation of FFDAs[85]

FFDAs are District level Organisations. Formerly the FFDSs were registered under the Charitable Societies Act, as autonomous bodies with District Collectors as chairman and District Fisheries Officers as Chief Executive Officers. All the districts heads of interested MLAs, MPs and representatives of farmers are members of the Managing Committee of FFDAs.

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83 "Introduction to Fish Farmers Development Agency" vide www.fishnetkerala.gov.on 12.5.2011
84 *Ibid.,*
85 *Ibid*., p.2.

The specific objectives of the FFDA schemes[86] are the following

Its main objective was to popularize fish farming, create employment opportunities, diversify aquaculture practices, and provide assistance to fish farmers with a view to create a cadre of well organized and motivated fish farmers fully engaged in aquaculture. So far, a network of about 429 FFDAs has been sanctioned under this programme covering almost all the major potential districts in the country. These agencies provide a package of technical, financial and extension support to fish farmers (fishermen). In order to boost fish production, assistance in the form of subsidy is given to fish farmers for construction of new ponds, renovation or reclamation of ponds and tanks, first year inputs (fish seed, fertilizers, manures, etc.), integrated fish farming, running water fish culture, establishment of fish seed hatcheries, etc. Assistance for purchase of aerators is also given to the progressive fish farmers to further enhance the productivity of fish. Subsidy for the above mentioned activities are given at double the rates to the fish farmers of Scheduled tribes.

Since the inception of the scheme till 1997-1998, FFDAs have brought about 4.5 lakh hectares of water area under scientific fish culture and trained 5.77 lakh fish farmers/fishermen in improved practices of fish farming. The number of beneficiaries covered under the scheme is 8.30 lakh. The most significant achievement of FFDAs since inception is that they have been able to create a cadre of dedicated fish farmers in the country. The national average productivity from FFDA supported ponds has risen from 50 kg/ha/yr in 1974-75 to about 2202 kg/ha/yr during 1997-98. FFDAs with their large network will have to depend on modern culture technologies such as polyculture, sewage-fed fish culture, integrated fish farming with poultry, pigs, ducks and horticulture, Pen culture, Cage culture,

[86] *Ibid*., p.2.

Running water fish culture, Fresh water pearl culture, mono and polyculture of air breathing fishes, and freshwater prawn culture, etc. However, FFDAs will also have to take into consideration that sustainable aquaculture is the key to solve many problems of developing countries.

Schemes of the FFDA in Mizoram Fishery Scenario

The FFDA has started functioning in Mizoram since 1996.[87] It has implemented effective measures to enhance fish production in Mizoram through its centrally sponsored schemes. "Development of Inland Fisheries and Aquaculture" in States and U.Ts during financial year 2011-2012[88] with an outlay of Rs.24.00 crores (Rupees Twenty four crores only) is the latest project to be taken up by the FFDA in Mizoram. The expenditure on assistance for developmental activities will be shared on 75:25 basis by the Government of India and the State Government. In addition, the state will be required to bear full cost of staff salary including any increase, maintenance of vehicle, office contingencies and acquisition of land etc. The cost towards purchase of vehicles will however, be continued to be shared on 50:50 basis between the Government of India and the State Government. It may be ensured that 16.2% and 8% of funds are targeted for CS and ST farmers/beneficiaries respectively under Scheduled Castes Special Plan (SCSP) and Tribal Sub Plant (TSP) as per directives of Planning Commission.

All components under the scheme will be provided assistance in the form of subsidy for identified activities to individual beneficiary, self help groups, women groups, fishery cooperative societies and the National Federation of Fishermen's Cooperative Limited (FISHCOPFED). Funds will be channelized to these entities through State Government and funds to FISHCOPFED will be sanctioned directly by the Department. Priority will be accorded to SHG and Cooperatives to implement schemes and access findings.

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87 Remsiama, Joint Director of Fisheries, Government of Mizoram, *Pisciculture in Mizoram* (published in Lengngha Magazine, an official organ of the Directorate of Fisheries), Issue No. 15, 2009-2010.

88 *Development of Inland Fisheries and Aquaculture in States and U.T's during 2011-2012* (Ministry of Agriculture, Department of Animal Husbandry, Dairying and Fisheries, New Delhi, 15 July 2011) p.1.

State Governments are requested to send their proposals, complete in all aspects for various components under the scheme. The components must be accompanied by detailed progress reports of the central share released during the preceding years and reasons for shortfalls, if any etc. The availability of budgetary provision in the State Budget should be specifically indicated in the proposal. In addition, the State Government and FISHCOPFED will have to furnish an undertaking that no funding has been accessed by the agency for the same project either from National Fisheries Development Board (NFDB) or any other agencies. Preference should be given to the fish farmers belonging to the Below Poverty Line (BPL) category in the implementation of the Scheme by the State Government.

Quarterly Annual progress reports indicating physical and financial achievements shall be furnished periodically. The accounts of the Implementing agency shall be subject to audit by Chartered Accountants appointed by the agency. The schemes and projects of the "Development of Inland Fisheries and Aquaculture" in Mizoram can be enumerated as below:

1. Development of Freshwater Aquaculture[89]

i) Construction of new ponds

ii) Reclamation/ Renovation of ponds/tanks

iii) Cost of inputs

iv) Fresh water fish seed hatchery

v) Fish feed units

vi) Establishment of trout and freshwater prawn seed hatchery

vii) Provision of soil and water testing kits to each FFDA

viii) Setting up integrated units, including hatcheries for ornamental fishes.

[89] *Ibid*., p.4.

2. Development of Brackish water Aquaculture[90]

i) Renovation or construction of Brackish water fish farms

ii) Establishment of Demonstration-cum-Training Center

iii) Network of Diagnostic Laboratories for Aquatic Animal Health

3. Coldwater Fisheries and Aquaculture[91]

i) Farming units for coldwater fish species

ii) Units for running water fish culture

iii) Feed units

iv) Purchase of vehicle

4. Development of Waterlogged areas[92]

i) Development of waterlogged areas

ii) Inputs (fish/prawn) seed, feed, manure, fertilizers, preventing measures for disease, transportation charges etc.

5. Productive utilisation of Inland Saline/Alkaline Waters for Aquaculture[93]

i) Cost for construction

ii) Input cost

6. Inland Capture Fisheries (Reservoirs/Rivers etc)[94]

i) Fish Seed Rearing Units/Seed Rearing Units

ii) Input cost (seed, feed, manures, fertilizers, preventive measures for diseases etc)

iii) Craft and gear (nets, boats etc). This should be shared by group of beneficiary

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90 *Ibid*., p.6.
91 *Ibid.,* p.7.
92 *Ibid*., p.8.
93 *Ibid*., p.9.
94 *Ibid*., p.10.

iv) Construction of landing centers

v) Riverine Fisheries Conservation and Awareness Programme.

III EXPLORING OTHER FUNDING AGENCIES

National Fisheries Development Board (NFDB) is another funding agency of the Fisheries Department of Mizoram. The NFDB was launched by Shri Sharad Pawar, the Union minister for Agriculture in 2006 in Hyderabad.[95] It was formed as an autonomous body under the Ministry of Agriculture, Department of Animal Husbandry, Dairying and Fisheries, Government of India. It started functioning in Mizoram in 2007, one year after its inception.[96]

Fish and fish products have presently emerged as the largest group in agricultural exports of India, with 5.2 lakh tonnes in terms of quantity and 7,000 crores in value.[97] This accounts for around 3% of the total exports of the country and nearly 20% of the agricultural exports. The NFDB is mandated to play a critical role in this direction. An amount of Rs. 620 crores have been earmarked for development of intensive aquaculture and proposed activities are expected to generate substantial investments resulting in an annual production of 26.5 lakh tonnes of fish as well as creating employment opportunities in the rural areas.

The components of assistance for the Pisciculture development in Mizoram are:-

1. Intensive Aquaculture in existing ponds and tanks[98]

The NFDB proposes to bring the potential areas within Mizoram territory under intensive aquaculture in the next six years. The following criteria will be used to select farmers to implement the scheme.

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95 "About Indian Fisheries" vide www.nfdb.ap.nic.in 7.7.2011.

96 Remsiama, Joint Director of Fisheries, Government of Mizoram*, Pisciculture in Mizoram Op.cit*.,

97 Shaleesha. A and Stanley V.A. *Involvement of Rural Women in Aquaculture: An Innovative Project*, The ICLARM Quarterly (Volume. 23, No.3 July-September, Chennai 2000), pp.14-16.

98 *Op.cit*., vide www.nfdb.ap.nic.in 7.7.2011.

i) Past performance of the farmer in undertaking freshwater aquaculture.

ii) Willingness/entrepreneurship of the farmer to take up fish culture on scientific lines.

iii) Assurance of the farmer to invest working capital money from second year onwards obtained from the sale of the first crop duly utilising the NFDB assistance toward the first year input costs.

iv) Bank's consent to provide the loan/commitment of the farmer to invest 80% of the unit cost on his own.

2. Intensive Aquaculture in new ponds and tanks[99]

Besides enhancing production and productivity from the existing tanks, the NFDB also envisages to tap additional areas under freshwater aquaculture, which will not add only to the fish production but will also generate additional employment, especially in the interior areas. The following criteria will be used to select farmers to implement the scheme. The following criteria will be used to select farmers to implement the scheme

i) Past performance of the farmer in freshwater aquaculture including record of his training in the said activity.

ii) Willingness/entrepreneurship of the farmer to take up fish culture on scientific lines.

iii) Clear title of the land.

iv) If pond/tank taken on lease, a minimum lease period of 10 years would be preferred.

v) Assurance/willingness of the farmer to invest working capital money from second year onwards obtained from the sale of the first crop duly utilising the NFDB assistance towards the first year input costs.

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[99] *Ibid*., p.2.

vi) Bank's consent to provide loan/commitment of the farmer to invest 80% of the unit cost on his own.

3. First-year one time inputs for intensive Aquaculture in ponds and tanks[100]

In aquaculture, the inputs constitute almost 60 per cent of the total expenditure. To enable the farmer to adopt scientific farming practices and optimise the per hectare yield, it is essential to provide partial support for input costs during the first year of operation. It is assumed that the profits obtained from the sale of the first crop will be revolved by the farmer in the subsequent years and make farming operations sustainable. Here, the support towards first year inputs will be available for one time to farmers, those who have availed assistance for construction /renovation ponds/tanks.

4. Establishment of Hatcheries for production of fish seed[101]

Availability of fish seeds in Mizoram is not satisfactory as it faces difficulties in procurement of quality seeds in required quantities. Further, the seeds have to be transported over long distances, which add to the cost of inputs. Therefore, to meet the requirements of farmers in seed-deficit and areas of aquaculture of the country which includes Mizoram, it is proposed to support entrepreneurs/farmers in setting up of about 500 hatcheries for production of quality fish seed. The following criteria will be used for selection of entrepreneurs/farmers for setting up of fish hatcheries:

i) Existing aquaculture areas, which are presently deficit in seed production but otherwise promising.

ii) New areas of aquaculture where seed might be a constraint.

iii) The prospective entrepreneurs/farmers should preferably have received training in hatchery operations.

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100 *Ibid*., p.3.
101 *Ibid*., p.4.

iv) Willingness/entrepreneurship to take up fish seed production on scientific lines.

v) Clear title of the land where the hatchery will be set up.

vi) If land taken on lease, a minimum lease period of 10 years would be preferred.

vii) Commitment of the farmer to contribute towards working capital money.

viii) Bank's consent to provide the loan/commitment of the entrepreneur to invest 80% of the unit cost on his own.

5. Establishment of fish seed rearing units for production of fish fingerlings[102]

Requirement of quality fingerlings is a prerequisite for reservoir development. Presently, there is inadequate seed rearing facilities for rearing of spawn/fry to fingerlings, even though there is a demand for stock size fingerlings. Therefore, there is every need for creation of infrastructure facilities for rearing of spawn/fry to fingerlings. To meet the requirements of fish fingerlings, it is proposed to support the entrepreneurs/farmers in setting up of fish seed rearing units for production of quality fingerlings. The following criteria will be used to select farmers/entrepreneurs for subsidy to take up the creation of infrastructure facilities for rearing spawn/fry to fingerlings in earthen ponds:

i) Past performance of the farmer in fresh water hatchery including record of his training in the said activity.

ii) Willingness/entrepreneurship of the farmer to take up seed rearing to fingerlings on scientific lines.

iii) Adequate water facility throughout the year.

iv) Clear title of land

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102 *Ibid*., p.5.

v) If pond/tank taken on lease, a minimum lease period of 10years would be preferred.

vi) Willingness of the farmer to contribute towards working capital.

vii) Bank's consent to provide the loan/commitment of the entrepreneur to invest 80% of the unit cost of his own.

6. Training and Demonstration Programmes[103]

Skill upgradation is an important component of any production-oriented activity. The NFDB's objectives of increasing fish yield levels from the ponds and to bring in new areas under the fold of aquaculture can be adversely impacted if the technical skills of the farmers are inadequate. Therefore, to meet this important requirement of human resource development in freshwater aquaculture, the Board envisages mobilisation of existing facilities available under public and private sectors to impart training to the fish farmers. The following criteria shall be applicable for selection of farmers to receive training:

i) Should be a practicing inland fish farmer with proven record.

ii) Should be having ownership of a pond in his name or a valid lease or should be a part of a group of farmers/cooperative/association/self-help group.

iii) Should be willing to upgrade the existing fish culture practices.

iv) Should be willing to provide balance investment cost or be willing to avail institutional finance.

v) Should not have participated in any training programme organised by the Fish Farmers Development Agency (FFDA) on freshwater aquaculture at least six months prior to training under the NFDB Programme.

vi) Should not be a defaulter to any of the financial institutions.

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103 *Ibid*., p.6.

CHAPTER - IV

PROSPECT OF PISCICULTURE DEVELOPMENT FOR SOCIO-ECONOMIC DEVELOPMENT

A number of factors viz., temperature, light, rain, water, turbidity of water, diseases, toxic pollutants, pH, hardness and salinity of water, dissolved oxygen etc. play a vital role in fish culture. The temperature and light intensity both have profound effect because fish cannot breed above or below the critical temperature which may be variable according to the species of fish.[104] Land based culture systems in inland areas have the greatest potential because aquaculture can be integrated with agriculture on current agricultural land in small holdings and commercial farms. Considerable potential lies in the integration of aquaculture and irrigation systems, and aquaculture can also make use of land that is unsuitable for agriculture such as swamps or saline areas.

The area of Kolasib District which is 83 sq kilometers from Aizawl city has a total area of 1382 sq kilometres and its total area of Fish Ponds in hectares is 997.[105] Besides its low valleys, the area has low structural hills. It is also characterised by the unconsolidated sediments deposited by streams or rivers in a narrow fluvial valley.[106] They are found mainly among *Ser Lui, Chem Lui, Tuichhuahlen Lui* and areas in and around Hortoki, *Saihapui, Saiphai, Buhchang* and Bairabi. Their production of fish in 2010 was 6,250 quintals. 90 percent of the population of Kolasib District eat fish.[107] It has an advantageous geographical terrain as it is bordered by Cachar District of Assam on the north east and the Aizawl District on the east. Inter-state trade in Fishes is carried out between the vendors of Assam and the fish farmers of Kolasib. Most of the fish farmers prefer to sell off their fish to the Assamese buyers.

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104 Upadhyay, V.B. and Shukla, G.S. *Economic Zoology* (Rastogi Publications, Meerut, 2008), p. 273.

105 Government of Mizoram, *Statistical Handbook Mizoram, 2010*, (Directorate of Economics and Statistics, Aizawl).

106 Government of Mizoram, *Natural Resources Atlas of Mizoram* (Mizoram Remote Sensing Application Centre), Aizawl June 2009.

107 Interview with Mr. C.Laldawngliana, the Kolasib District Fishery Development Officer, Government of Mizoram on 14.11.2011.

The area of Mamit District is 103 sq kilometers from Aizawl city and has a total area of 3025 sq kilometres and its total area of Fish Ponds in hectares is 828.[108] The low structural hills cover almost the entire district including Linear Ridge, Flood Plain and Valley Fill areas. Valley Fills are found mainly along *Tut* River, *Teirei* River and the tributaries and along the streams which confluence with *Langkaih* River.[109] Flood Plains are low lying plains and are found along the major rivers. Their production of fish in quintals in 2010 was 6,020. The place also has advantageous terrain with the state of Tripura on its west and Aizawl in the east.

I. Demand for fishes in the Market- feedback from Sellers in the Market, Total Demand for Fishes

For this chapter, personal interviews were conducted on 10 (ten) fish farmers of Kolasib, 10 (ten) fish farmers of Mamit and 10 (ten) fish farmers of Aizawl during the month of October 2011. The response of the interviewees was same in the context of shortage of production and slow development of the Fisheries Sector. Though they have lamented the growth of the fishery sector over the years in terms of activities and functions, their responses summarised the inadequacy of assistance and support provided by the government in fishery activities. While Fish Seeds are considered to be the most crucial input for enhancing fish production, Fish Seeds which are provided from the government are not satisfactory in terms of quality and quantity. The Ice Plant cum Storage Facilities also fails to produce required amount of ice blocks for the preservation of captured fish due to shortage of power in the region. The financial assistance schemes for the renovation of existing ponds are also found to be meagre as the poor fish farmers usually end up using from their own savings in order to accomplish the said task. Weak extension systems and lack of local examples of intensified aquaculture also limit farmer's ability and willingness to risk intensification. Increased investment is required in the production system. And it is a prerequisite to include development of markets and access to finance.

The overall rate of fish demands of the Mizos can be indicated best from the fish sellers, whom some of them have been in the profession for more than 20

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108 Government of Mizoram, Statistical Handbook Mizoram, 2010 *Op.cit.,*

109 *Ibid*.,

(twenty five) years. A questionnaire was conducted during the month of October 2011 targeted for fish vendors in the districts of Aizawl, Mamit and Kolasib. The questions were structured in such a way as to find out the rate of production of local fish, its demands and consumption habits, preservation problems, and its potential as a means for earning livelihood for fish vendors.

Table 4.1
Identification of Aizawl Fish Vendors

Sl. No. of the vendors	Sex	Age	No. of years in business	No. of family members	No. of workers (govt. or non-govt.)
1	F	35	10	4	2
2	F	47	12	5	1
3	F	45	8	3	1
4	F	37	7	7	1
5	F	58	13	3	1
6	F	51	24	6	1
7	F	40	9	5	2
8	F	36	1	9	2
9	F	44	11	5	1
10	F	39	7	6	2
11	F	51	18	4	1
12	F	38	8	8	2
13	F	49	12	6	1
14	F	55	25	9	3
15	F	44	14	2	1
16	F	34	10	7	2
17	F	38	13	5	2
18	F	42	16	3	1
19	F	51	22	6	1
20	F	47	12	4	2
21	F	45	8	8	2
22	F	52	24	3	1
23	F	45	16	3	1
24	F	29	2	5	1
25	F	37	7	4	1

26	F	28	2	2	1
27	F	31	8	2	1
28	F	40	7	5	1
29	F	47	10	6	2
30	F	40	6	6	1

Source: Field Survey

In Aizawl District, the questionnaires were given out at three fish markets- Bara Bazaar which is the central point of the city, Chanmari Bazaar in the North and Thakthing Bazaar in the South. Ten questionnaires each were sent out to the three centres making the respondents 30 (thirty) in number. Not a single male respondent was found which clearly denotes that marketing of fish is solely confined to women in Aizawl.

They are mostly between the age group of 29 to 58 years. So the profession is relatively practised by women during their thirties till they reach their late fifties. 17 (seventeen) of the respondents have been engaged in it for more than a decade which implies that it is a steady profession and that there is stability in the tenure. There are 19 (nineteen) respondents who have written 1 (one) in the number of workers among family members. This supports the fact that the nineteen families solely depend on fish vending to sustain the income of the family.

Table 4.2
Opinion of the Aizawl Respondents

Sl.No.	Query	No. of Respondents	Percentage
1	**Which is sold more**		
	a) Local fish	4	13
	b) Fish imported from the plains	26	87
	Total	**30**	**100**
	If a), state the reason		
	a) cheaper	0	-
	b) fresher	4	100

	c) nutritional value	0	-
	Total	**4**	**100**
	If b), state the reason		
	a) cheaper	14	54
	b) fresher	4	15
	c) nutritional value	8	31
	Total	**26**	**100**
2	**Production of local fish is sufficient**		
	a) Yes	0	-
	b) No	30	100
	c) Can't say	0	-
	Total	**30**	**100**
3	**Frequency of spoilage**		
	a) Most of the time	0	-
	b) Sometimes	6	20
	c) Hardly	24	80
	Total	**30**	**100**
	Reason		
	a) Inadequate preservation	27	90
	b) Transportation problems	0	-
	c) Others	3	10
	Total	**30**	**100**
4	**Increase in consumers**		
	a) Yes	27	90
	b) No	0	-
	c) Can't say	3	10
	Total	**30**	**100**
5	**Quantity of sales per week (in kgs.)**		
	a) 20-30	2	7
	b) 30-40	4	13
	c) 40-50	4	13

	d) above 50	20	67
	Total	**30**	**100**
6	**Income incurred in a week (Rs.)**		
	a) Below Rs. 1,000/-	10	33
	b) Rs. 1000/- - Rs. 2,000/-	16	53
	c) Above Rs. 2,000/-	4	13
	Total	**30**	**100**
7	**Reliable source of income**		
	a) Yes	24	80
	b) No	4	13
	c) Can't say	2	7
	Total	**30**	**100**

Source: Field Survey

87 per cent of them have replied that fish imported from the plains is sold more than local fish because it is cheaper, fresh and has more nutritional value. Though 90 per cent of them have claimed that there is a rise in the consumption rate of fish over the past years, 100 per cent of them have admitted that the production of local fish is far from sufficient in order to meet the growing demands. 20 per cent of them also revealed that there is spoilage of fish sometimes because of inadequate preservation and transportation problems. On an average the number of fish sold in kgs in a week for every respondent is 49 kgs incurring an amount of Rs.1470 for a single person. So 80 per cent of them have asserted fish marketing or fish vending as a reliable source of income.

Table 4.3
Identification of Kolasib Fish Vendors

Sl. No. of the vendors	Sex	Age	No. of years in business	No. of family members	No. of workers (govt. or non-govt.)
1	F	36	1	12	5
2	F	50	12	4	2
3	F	52	13	9	3
4	F	43	9	5	1

5	F	41	11	5	2
6	F	36	1	5	1
7	F	29	1	3	1
8	F	59	18	7	2
9	F	33	5	4	1
10	F	50	10	7	3
11	F	49	15	5	2
12	F	28	4	4	1
13	F	32	8	7	2
14	F	51	22	3	1
15	F	46	9	6	1

Source: Field Survey

In Kolasib District the questionnaires were given out at three markets; Diakkawn Bazaar, Venglai Bazaar and Bangla Kawn Bazaar. Five questionnaires each were sent out to the three centres making the respondents 15 (fifteen) in number. Not a single male respondent was found which clearly denotes that marketing of fish is solely confined to women in Kolasib. They are mostly between the age group of 32 to 59 years. So the profession is relatively practised by women during their thirties till they reach their late fifties. 7 (seven) of the respondents have been engaged in it for more than a decade which implies that it is a steady profession and that there is stability in the tenure. There are 7 (seven) respondents who have written 1 (one) in the number of workers among family members. This supports the fact that the seven families solely depend on fish vending to sustain the income of the family.

Table 4.4

Opinion of the Kolasib Respondents

Sl.No.	Query	No. of Respondents	Percentage
1	**Which is sold more**		
	a) Local fish	4	27
	b) Fish imported from the plains	11	73
	Total	**15**	**100**
	If a), state the reason		
	a) cheaper	0	-

	b) fresher	3	75
	c) nutritional value	1	25
	Total	**4**	**100**
	If b), state the reason		
	a) cheaper	8	73
	b) fresher	2	18
	c) nutritional value	1	9
	Total	**11**	**100**
2	**Production of local fish is sufficient**		
	a) Yes	0	-
	b) No	14	93
	c) Can't say	1	7
	Total	**15**	**100**
3	**Frequency of spoilage**		
	a) Most of the time	0	-
	b) Sometimes	3	20
	c) Hardly	12	80
	Total	**15**	**100**
	Reason		
	a) Inadequate preservation	12	80
	b) Transportation problems	2	13
	c) Others	1	7
	Total	**15**	**100**
4	**Increase in consumers**		
	a) Yes	15	100
	b) No	0	-
	c) Can't say	0	-
	Total	**15**	**100**
5	**Quantity of sales per week (in kgs.)**		
	a) 20-30	2	13
	b) 30-40	2	13
	c) 40-50	4	27

	d) above 50	7	47
	Total	**15**	**100**
6	**Income incurred in a week (Rs.)**		
	a) Below Rs. 1,000/-	6	40
	b) Rs. 1000/- - Rs. 2,000/-	5	33
	c) Above Rs. 2,000/-	4	27
	Total	**15**	**100**
7	**Reliable source of income**		
	a) Yes	11	73
	b) No	0	-
	c) Can't say	4	27
	Total	**15**	**100**

Source: Field Survey

73 per cent of them have replied that fish imported from the plains is sold more than local fish because it is cheaper, fresher and has more nutritional value. Though 100 per cent of them have claimed that there is a rise in the consumption rate of fish over the past years, 93 per cent of them have admitted that the production of local fish is far from sufficient in order to meet the growing demands. 20 per cent of them also revealed that there is spoilage of fish sometimes because of inadequate preservation and transportation problem. On an average the number of fish sold in kgs in a week for every respondent is 46 kgs incurring an amount of Rs.1370 for a single person. So 73 per cent of them have asserted fish marketing or fish vending as a reliable source of income.

Table 4.5
Identification of Mamit Fish Vendors

Sl. No. of the vendors	Sex	Age	No. of years in business	No. of family members	No. of workers (govt. or non-govt.)
1	F	31	1	5	1
2	F	47	13	4	1
3	F	52	13	3	1
4	F	57	11	9	3

5	F	58	23	8	3
6	F	53	14	5	1
7	F	34	2	7	2
8	F	56	21	5	1
9	M	45	10	6	3
10	F	50	12	4	1
11	F	33	13	7	2
12	M	45	11	3	1
13	F	55	19	4	1
14	F	34	4	3	1
15	F	44	8	3	1

Source: Field Survey

In Mamit District the questionnaires were given out at three markets; Mamit Bazaar, Darlak Bazaar and Kanhmun Bazaar. Five questionnaires each were sent out to the three centres making the respondents 15 (fifteen) in number. Two male respondents were found which denotes that there is active marketing of fish to the point of breaking the gender barrier in the trade. The thirteen women respondents were mostly between the age group of 31 years to 58 years. So the profession is relatively practised by women during their thirties to late fifties. Most of the respondents have been engaged in it for more than a decade which implies that it is a steady profession and that there is stability in tenure. More than half of the respondents have written 1 (one) in the number of workers among family members. This supports the fact that the ten families solely depend on fish vending to sustain the income of the family.

Table 4.6

Opinion of Mamit Respondents

Sl.No.	Query	No. of Respondents	Percentage
1	**Which is sold more**		
	a) Local fish	5	33
	b) Fish imported from the plains	10	67
	Total	**15**	**100**
	If a), state the reason		

	a) cheaper	0	-
	b) fresher	5	100
	c) nutritional value	0	-
	Total	**5**	**100**
	If b), state the reason		
	a) cheaper	1	10
	b) fresher	0	-
	c) nutritional value	9	90
	Total	**10**	**100**
2	**Production of local fish is sufficient**		
	a) Yes	0	-
	b) No	13	87
	c) Can't say	2	13
	Total	**15**	**100**
3	**Frequency of spoilage**		
	a) Most of the time	0	-
	b) Sometimes	1	10
	c) Hardly	14	90
	Total	**15**	**100**
	Reason		
	a) Inadequate preservation	1	10
	b) Transportation problems	0	-
	c) Others	14	90
	Total	**15**	**100**
4	**Increase in consumers**		
	a) Yes	12	80
	b) No	0	-
	c) Can't say	3	20
	Total	**15**	**100**
5	**Quantity of sales per week (in kgs.)**		
	a) 20-30	2	13

	b) 30-40	4	27
	c) 40-50	4	27
	d) above 50	5	33
	Total	**15**	**100**
6	**Income incurred in a week (Rs.)**		
	a) Below Rs. 1,000/-	4	27
	b) Rs. 1000/- - Rs. 2,000/-	5	33
	c) Above Rs. 2,000/-	6	40
	Total	**15**	**100**
7	**Reliable source of income**		
	a) Yes	14	93
	b) No	0	-
	c) Can't say	1	7
	Total	**15**	**100**

Source: Field Survey

67 per cent of them have replied that fish imported from the plains is sold more than local fish because it is cheaper, fresher and has more nutritional value. Though 80 per cent of them have claimed that there is a rise in the consumption rate of fish over the past years, 87 per cent of them admitted that the production of local fish is far from sufficient in order to meet the growing demands. 10 per cent of them also revealed that there is spoilage of fish sometimes because of inadequate preservation and transportation problem. On an average the number of fish sold in kgs in a week for every respondent is 43 kgs incurring an amount of Rs. 1290 for a single person. So 93 per cent of them have asserted fish marketing or fish vending as a reliable source of income.

There is not much variation in the achieved data from the questionnaires collected from the three districts, be it Mamit or Kolasib which are the two most potential areas for Aquaculture in the state. The overall response highlights the inadequacy of fish production in Mizoram.

II. Prospect of Pisciculture for Socio- economic Development of the State

Mizoram, a fairly homogenous and literate population, has been unable to keep pace with the economic and industrial development as recorded elsewhere in the country. This may be due to geographical disadvantages or absence of essential infrastructure facilities, inadequate number of skilled local manpower and insufficient enterprise to take up the challenges of the manufacturing sector.

Agriculture and its allied activities occupy a very important place in the economy of Mizoram. The economies of the constituent states of the region are underdeveloped and agrarian with a very weak industrial base and an inflated service sector mainly in the government. Income wise, north-east states have not done well either. Their per capita NSDP is lower than the all-India average except for Arunachal Pradesh. The per capita income of Mizoram for the year 2009-2010 is estimated at Rs. 44,758/- as against the previous year's estimate of Rs. 38,145/-.[110] There is very little scope for either medium or large scale industrial units and as such, small industries dominate the industrial scenario acquiring a prominent place in the socio-economic development of the state. The total number of small scale units registered me at the national level is Rs. 46,492/- for the year 2009-2010.

Accounting for only 0.09 percent of India's total population (1, 21, 01, 93,422), Mizoram ranked the 29th most populous among the State and Union Territories as per the 2011 population census. Its population stood at 10, 91,014, consisting of 552, 339 males and 538, 675 females. The state's population is projected at 11, 56,393 in 2021.[111]

Regardless of it all, the Gross State Domestic Product (GSDP) of Mizoram is continuously increasing over the year. According to the latest available data found, GSDP at constant factor cost (2004-2005) prices is expected to attain an amount of Rs. 4,64,217/- lakhs in 2010-2011 against quick estimates of Rs. 4,26,839/- lakhs for the year 2009-2010 showing a growth of about 9% over the previous year. GSDP at factor cost at current prices is projected to touch Rs. 6, 29,710/- lakhs in 2010-

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110 Planning & Programme Implementation Department (2011), Economic Survey: Mizoram, Government of Mizoram, Aizawl.

111 *Ibid*.,

2011, a change of about 14% over the previous year's figure of Rs. 5, 49,793/- lakhs.[112]

This indicates that Mizoram has not achieved acceptable economic standards. It has yet to maximise innovations for strengthening the outputs from various resources. It has to focus its attention on the continuing problems and the growing demands of the people. It would be a mistake if the importance of Pisciculture were not fully recognised as a task to bring about socio-economic development of the state. Pisciculture can operate as an instrument of the development process of the state itself. The establishment of small industries have proven to be more profitable as there is little capacity for the establishment of medium or large scale industrial units. Pisciculture can be a remunerative source of income with comparatively less investment with proper development. With the assistance provided by the government, people are driven to take up fishery activities to earn money as their subsidiary income. As long as there is availability of water bodies, it can be manipulated by man, fish seeds sown, tended and nursed, reared and finally harvested. It can substitute the industrial scenario which acquires a not so much prominent place in the socio-economic development in the present situation. As per data available from the State Fishery Department, the fish production of the 8 (eight) districts of Mizoram increased from 2764 metric tones in 2008-2009 to 2916 metric tones in 2009-2010 thereby registering an increase of 9.12 per cent and a price amounting to Rs. 262 lakhs.[113] If there is a transformation of more people taking up fishery activities, the outcome will surely be multi dimensional such as generating more employment, more contribution to the economy, self sufficiency and satiating the fish demands of the rising population. So it is a positive fact that development of Pisciculture can credit to the upgradation of improved economic status, changing life style and various other socio-economic factors.

Though Fish Culture in Mizoram has started off as a small scale industry, there has been a spectacular growth in the production of fish over the years due to the substantial increase in consumption of fish and mainly because of the

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112 *Ibid*.,

113 Government of Mizoram, *District wise Number Of Fish farmer, Area and Production*, (Directorate of Fisheries), 2010.

consumer's confidence in its nutritional benefits and its easy availability. It is expected that the growth in fish consumption will continue and increase substantially in the years to come.

Fishery resources should be utilised to meet the important requirements and to make an impact on the economic deficit. In addition to being a great economic value for man, it provides several important bye-products also.

(i) Fish as Food[114]

Fish have been used as an item of food since ancient times. Besides large amount of protein, fish contains 1-10% fat in muscles liver, brain, connective tissue and mesenteries. Various minerals present in the fish are Ca, Mg, K, Na, P, Fe, Cu, Mn, etc which constitute 1-2%. Fish is also an important source of vitamins such as A, B and D. Fish liver, kidney and spleen are the chief sources for vitamin B. Thus, fish has a high nutritional value as compared to the meat of cattle, pig and poultry, and is an excellent source of all essential amino acids. It is easily digestible as compared to beef and poultry.

(ii) Fish as food for Cattle[115]

Fish, which have little value as food for man, are dried and ground to crushed bone and flesh. The minced mass is then cooked and pressed and then dried in the sun. This is called 'fish meal' and is used as food for cattle, pig and poultry. Fish meal contains 50-70% protein, 2-15% oil and 10% minerals and is thus highly nutritive for animals. It contains a high percentage of calcium phosphate along with vitamins and is valuable for cattle and poultry, for increasing milk and egg production. Fish meal is produced in Maharashtra, Andhra Pradesh, Tamil Nadu, Bengal and Kerala.

(iii) Fish Oil[116]

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[114] Khanna, S.S. & Singh, H.R.. *A Textbook of Fish Biology and Fisheries*, (Narendra Publishing House, Delhi, (INDIA), 2006), pp.346-347.
[115] *Ibid.,* p.347.
[116] *Ibid.,* p.347 .

This is one of the most important bye products of fish industry, and is of two kinds (a) liver oil and (b) body oil.

Fish liver oil is of considerable medicinal value due to its high vitamin contents and is prepared from the liver of several species of fish. The quantity of fat and vitamins varies in different species.

The oil obtained from the whole body of fish is called 'body oil', and has less vitamin content. It has many uses such as in the manufacture of paints and varnish, for preparing cheap soap and in leather and steel industry. It is also used in making candles, in the manufacture of certain chemicals, cosmetics, lubricants, printing ink and for smearing of boats for preservation.

Certain species of molluscs are used for Ayurvedic medicine for cure of disease like asthma, rickets etc.

(iv) Fish Manure and Guano[117]

These are the products from inferior quality of fish, which is unfit for human consumption. Fish manure is the bye product of curing yards and oil extracting plants. The residue from these industries is dried to form manure, which contains a high percentage of phosphate and nitrogen

Fish guano is the bye-product from plants extracting body oil from sardines. When mixed with soil, it forms excellent manure, better than cattle manure.

(v) Fish Silage[118]

This is a good animal food which is of high nutritive value. Fish, which is not consumed by man, is mixed with diluted sulphuric acid and formic acid and the product is used as animal feed.

(vi) Fish Glue and Isinglass[119]

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117 *Ibid*., pp.347-348.
118 *Ibid*., p.349.
119 *Ibid.*,

Fish glue is a liquid and is used as an adhesive for stamps, labels, etc. It is also used for making paper boxes, shoes and furniture. It is prepared from bones, skin and connective tissue of fish.

Isinglass is prepared from the inner silvery layer of air bladder of fishes. It is used for clearing wine, beer, making edible jelly and in preparing adhesive. It is also used in confectionary as a substitute for gelatine.

(vii) Fish Leather[120]

The skin of fish is treated, dried and tanned to prepare leather, which is used for making shoes, bags, suitcase and other ornamental articles. The quality of the skin varies in different species.

(viii) For preparing Insulin[121]

Pancreas of large sized fishes is used as a raw material for preparing insulin.

(ix) Fish Flour and Biscuits[122]

Fish flour is a high quality fish meal. It is mixed with wheat flour and baked to manufacture biscuits.

(x) Fish Sausage[123]

This is very common in Japan, Russia and U.S.A. It is prepared from the fish, which are not generally used as 'food fish', and are less valuable. The meat is mixed with salt, sugar and spices to improve taste and flavour. The cooked meat is finally packed, and the preparation is very popular especially in Japan.

(xi) Artificial Pearl[124]

Artificial pearls are prepared from hollow glass beads, which are polished with material prepared from the scrapping of the silvery covering of the scales of

120 *Ibid.*, p.349.
121 *Ibid*., p.350.
122 *Ibid*., p. 350.
123 *Ibid*., p.349.
124 *Ibid*., p.350.

some fish species. The hollow beads are then filled with wax, and are used in jewellery.

(xii) For Decoration[125]

Several species of ornamental fish are beautifully coloured, and are kept in aquaria, ponds and lakes for decoration. Some of the aquarium fishes are bred and maintained by stockists who earn their livelihood from them.

(xiii) Biological Control[126]

Several species of fish feed on insect larvae and are used to control mosquitoes, which spread diseases. The fishes which feed on mosquito larvae are used as a means to control the mosquito population.

The benefits of Pisciculture in development relate to health and nutrition, employment, income, reduction of vulnerability and farm sustainability. Aquaculture in small farming systems provides high animal quality protein and essential fatty acids, vitamins and minerals especially for vulnerable groups such as pregnant and lactating women, infants and pre-school children generally at prices affordable to the poorer segments of the community. It creates "own enterprise" employment, including for women and children, and provides income through sale of what can be a relatively high value product. In addition to a focus on overall economic growth, attention has to be paid to specific human concerns, such as reduction in the level of property, promotion of employment and satisfaction of the basic needs of all the people, especially poor people in the rural areas.

Indirect benefits include an increased availability of fish in local rural and urban markets and concomitant reduction in household expenditure through sparing consumption of other income generating farm products. An important, though often overlooked benefit which is particularly relevant for integrated agriculture-aquaculture system is their contribution to increased farm efficiency and sustainability. Agricultural by-products such as manure from livestock and crop residues can serve as fertilizers and feed inputs for small-scale and commercial

125 *Ibid*., p. 350.
126 *Ibid*.,

aquaculture. Fish Farming in rice fields contributes to integrated pest management and integrated management of vectors of medical human importance. Ponds become important as on-farm water reservoirs for irrigation and livestock in areas where there are seasonal water shortages. In view of all these benefits, it is perhaps not surprising that aquaculture production has grown rapidly since the 1970s, and has been the fastest growing food production sector in many countries for nearly two decades; the sector exhibiting an overall growth rate of over 11.0 percent per year since 1984.

In Mizoram, women engaged in aquaculture are seldom found as their participation is mainly confined to selling and marketing of fishes. In the neighbouring state of Tripura, we find numerous fish ponds and tanks which are taken care of by the Women Wing of the Self Help Group and also women of the Scheduled Caste and Scheduled Tribe.[127] To ensure that women utilise their full potential, it is necessary to provide capacity building support which will eventually lead to their empowerment.

Backyard ornamental fish breeding has been found to offer immense scope for improving the livelihood of rural women. The ornamental fish are usually regarded as weed or forage fish (prey of more valuable game fish), but internationally they are considered as ornamental or decorative fish. To harness the wealth from the ornamental, a lot has to be done for creating awareness and to protect them from deliberate destruction.[128]

In 2000, a project was undertaken in Keelamanakudi Village in Tamil Nadu state with 30 under privileged women to train them in breeding and culture of ornamental fishes.[129] The project allotted three circular concrete tanks of 0.5 t water, holding capacity each with a 2.5 cm diameter, for each of the participating families. They were also provided with the necessary equipments and appliances needed to complete the project. Training with the aid of charts, posters, live specimens, and demonstrations was conducted to demonstrate techniques. The women sold the

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127 Rosanglura Robert. Government of Mizoram, *Report on Mizoram Fish Farmer Study Tour cum Exposure Visit To Tripura* (9 October 2010).

128 Nath Pranab and Dey S.C. *Fish And Fisheries of North Eastern India : Arunachal Pradesh* (Narendra Publishing House, Delhi, 2000), p.190.

129 Shaleesha. A and Stanley V.A. *Involvement of Rural Women in Aquaculture: An Innovative Project*, The ICLARM Quarterly (Volume. 23, No.3 July-September, Chennai 2000), pp.14-16.

ornamental fish every month to the local aquaria and retailers and earned Rs. 500-800 every month. After two years of continuous monitoring, they earned Rs. 1,200 every month from their activity. Culture of ornamental fishes in the backyards of households requires very little space, skill and time.

The Annual Plan of the Fisheries Department has also visualised the introduction of culture of ornamental fishes through the setting up of backyard hatchery of ornamental fishes with research and development and extension facilities with the State Fisheries Department. If this plan is successfully implemented, it will develop entrepreneurship for self employment in private sector for a number of womenfolk of Mizoram, be it rural or urban.

CHAPTER-V
CONCLUSION

Development has become the catchword in developing countries. The roles and functions of the government have increased tremendously in the process of development. The Departments created by them are the instruments to reach the goals of development. Every institution or every departmental organisation is striving for the accomplishment of their own goals and motives. The Fishery Department of Mizoram has high ambitions not only to augment fish production, but also to accelerate the prospect of Pisciculture to contribute to socio-economic progress.

The entire work is divided into five chapters. The first Chapter is introductory in nature which has dealt with the geographical features of Mizoram and the concept of Pisciculture Development.

The second chapter has attempted to explore the Origin of Directorate of Fisheries and then study its Organisational Set-up.

The third chapter has identified different Projects and Schemes for Pisciculture Development and examined the process of their Implementation.

In the fourth chapter, an attempt has been made to assess the prospect of Pisciculture Development for Socio-Economic Development in Mizoram.

The fifth chapter is the final chapter which has brought out the summary and findings of this work.

Summary and findings

For this study, fish farmers from different districts were interviewed to find out the increasing rate of consumption, the productivity rate, and the income yielded,

and the increasing yield through intensified production. It was concentrated on the districts of Mamit and Kolasib which are the two most potential areas for Pisciculture development in Mizoram. It can be firmly concluded from the interviews that many of the technical aspects of Aquaculture are relatively under developed, and there is a knowledge gap between what is known globally and what is available to farmers.

The responses of the interviewees were same in the context of shortage of production and slow development of the Fisheries Sector. This is because of the inconsistency of fish production in Mizoram. There is no year round production of fish which greatly affects the profit of fish vendors and the fish farmers. Though there is tremendous preference for local fish over the fish from the plains, all of the interviewees remarked that there is no progress in production of fish even as the consumption rate goes on increasing over the years. The total area of fish ponds in hectares of Mamit district is 828 with 1702 registered fish farmers and their fish production in 2011 was 6,020 quintals. The total area of fish ponds in hectares of Kolasib district is 997 with 1965 registered fish farmers and their overall production of fish in 2010 was 6,250 quintals. The production rate is very small in quantity owing to the effort put in by the fish farmers assisted by different schemes and the availability of suitable lands. While Fish Seeds are considered to be the most crucial input for enhancing fish production, they claim that the fish seeds which are provided from the government are not satisfactory in terms of quality for which they have to consort to imported fish seeds which are better in quality and has higher survival rate. And in terms of quantity, the fish seeds provided do not amount to what is required to impound a standard fish pond. They also believe that the present small time fish markets do not play any regulatory function in marketing the price of fish. It is a prerequisite to set up a fish auction market to standardise the market price of fish. They also state that the Ice Plant cum Storage Facilities do not produce enough ice blocks as much as needed by fish farmers for the preservation and transportation of fish. When this grievance was stated to the officials in charge of the facilities, it was commented as due to shortage of power in the region. The financial assistance schemes for the renovation of existing ponds are also found to be meager especially for the less endowed fish farmers as they usually end up using from their own savings in order to carry out the tasks. The fish farmers also asserted that they

do not have access to standardised fishing gears and tools which can enhance fish yields. This greatly limits their ability and willingness to risk intensification of Aquaculture.

The Directorate of Fisheries has yet a long way to go in augmenting fish production in Mizoram. This is evident from the questionnaires which were given out to the fish vendors at all fish markets in the districts of Aizawl, Kolasib and Mamit. A collective study of the responses from the three districts is taken into view in the study of these findings. 78 per cent of them has answered that fishes imported from outside the states are sold more in the market. These foreign fishes come from the neighbouring states like Assam, Tripura and Cachar District. This led to a staggering 95 per cent of them who demands and asserts that there is scarcity and insufficiency of local fishes to be sold in the market. Augmentation of the sector has to be met so that there will not be a congruence between the demand rates and the production rate. This is proven by a whooping 90 per cent who observed that there is an increase in the consumption rate of fish and will rise over the years to come. 16 per cent revealed that there is spoilage of fish at times when there is irregularity of transportation and unsatisfactory means of preservation. They further admitted from the questionnaires that the average of fish (imported from other states) sold in a week for each vendor is 49 kgs in Aizawl, 46 kgs in Kolasib and 43 kgs in Mamit and the weekly income obtained from it can be estimated at Rs. 1470 in Aizawl, Rs. 1370 in Kolasib and Rs. 1290 in Mamit. 81 per cent of the fish vendors have stated that they can rely on Aquaculture as the main source of income for supporting their family. If this can be achieved alone from marketing fishes coming in from other states, then it is an obvious fact that there will be a tremendous increase in employment if there was sufficient fish to be marketed from its own state. This could also boost the female working population of Mizoram which according to the latest census is 56%. This clearly proves that development of Pisciculture can credit to the upgradation of improved economic status, changing life style and various other socio-economic factors.

The Directorate of Fisheries is very young as compared to the other departments under the state government. At present, the Directorate has altogether 12 (twelve) Group ‘A’ Officers, 49 (forty-nine) Group ‘B’ Officers and Staff, 53

(fifty-three) Group 'C' Staff and 32 (thirty-two) Group 'D' Staff out of which the strength of Gazetted Officers is 25 (twenty-five) in number. Shortage of personnel in fishery administration and lack of official supervision could hinder its expansion and development. Man Power Planning is crucial to ascertain the onerous functions and tasks of the Directorate. The skills and capacity of the personnel can be an important attribute for the success and failure of the activity. At the district level, there are 8 (eight) District Offices headed by District Fisheries Development Officer (DFDO). Out of the aforesaid 8 (eight) District Fishery Offices the three District Fishery Offices at Lawngtlai, Serchhip and Champhai were recently inaugurated in 2011. Whereas district offices are supposed to be headed by a District Fishery Development Officer (DFDO), the newly established three district offices are under the head of Fishery Extension Officers (FEO). Upgradation of the post of the functionaries is an immediate necessity. There is a need to take dynamic advances to strengthen these three new District Offices, under which there is a total of 1056 hectares of land to be developed for Aquaculture. The maturity of these three offices into a full fledged functional office will symbolise the overall development of Pisciculture in Mizoram.

The Fisheries Department is committed to programmes and schemes for development of fish production and socio-economic upliftment of fish farmers. For this reason, a Citizen's Charter has been published to take into account any queries or questions on technical guidelines and redressal of grievances related with production of fish and relevant matters. The Citizen's Charter will give the readers a glance at the fisheries development activities of the Fisheries Development, Mizoram and its objective in brief. For details on any information of any schemes, the Directorate of Fisheries and District Offices can be contacted during the office hours. This ensures that the principle of Transparency is upheld in the Department.

Since its inception, the Directorate, in addition to its own State Plan, has undertaken numerous Centrally Sponsored Schemes and Projects under its wing for the growth of the Fishing Industry in Mizoram and its associated prospects. The prominent agencies include National Scheme of Welfare of Fishermen, Development of Capture Fisheries, National Fisheries Development Board (NFDB), Fish Farmers Development Agency (FFDA). It has to be mentioned that the North

Eastern Council (NEC) has played a passive role in the last few years. The hatcheries at places of *Darlak*, *Thenzawl*, *Zobawk* and *Zawlnuam* were created with the assistance of the North East Council (NEC) during the 9th Five Year Plan and the 10th Five Year Plan. The same can be said for National Bank for Agriculture and Rural Development (NABARD) which has chose to play an uncooperative role in the development of the Fisheries Sector. This is because of the unavailability of matching shares between the institutions and the government. The expenditure on assistance for developmental activities is to be implemented through these institutions and is to be shared on ratio basis with the state government. In addition, several schemes permit that the state will be required to bear full cost of staff salary including any increase, maintenance of vehicle, office contingencies and acquisition of land etc. If the government is disinclined to put in its matching share to implement the projects, then the other half has to play but an inactive role.

Suggestions for Improvement

The State of Mizoram has as good as 24,000 hectares of potential fishery resource in its culture sector including the Autonomous District Council areas falling in the southern district of Saiha and Lawngtlai. Out of the above resource so far only 3970 hectares have been developed till 2010-2011. The development can be accelerated by harnessing the potential resources with the assistance of the Directorate as well as the successful implementation of the State Schemes and Central Sponsored Schemes

The augmentation of the fish production in Mizoram can be met with an introduction of, what is known as Cluster Approach. By Cluster Approach, we mean the fishermen living in groups or in a common society which is prevalent in all the top fish producing states in India like Andhra Pradesh, West Bengal and Orissa. In India it is known as Fishing Community, and it has not been practised in Mizoram till now. Commonly known as group of fishermen living in some area and engaged in more or less same pattern of fishing in the same water area. Numerous lands and fish ponds in Mamit and Kolasib district are owned by people settling in Aizawl. So as of the present scenario, fish farming for them is only a hobby or just a seasonal or

part-time job. What needs to be put into practice is to undertake the actual work in the field and form close liaisons with the fishing community. In such community, fishermen often mutually assist each other in all walks of their profession such as fish production, fish processing, fish marketing, fisheries infrastructure, fishing units, purpose of operation, working expenses and identification of common problems. The system makes it easier for the government to render services to them and can intensify fish production.

Another suggestion is the creation of a full grown Fish Hatchery in Mizoram. A hatchery is a facility where eggs are hatched, bred and reared under artificial conditions. Fish hatcheries are used to cultivate and breed a large number of fish in an enclosed environment. They raise the fish until they become juvenile fish and are ready to be transferred to on-growing systems, i.e. fish farms to reach harvest size. Though a number of hatcheries have been set up at various places in Mizoram, the only functional hatchery is the one in Darlak at Mamit District which can meet the demands of fish seeds in the said district and its neighbouring villages. If one hatchery can satiate the needs of fish seeds in that many areas, then it is a matter of question what extraordinary changes will be bought with the creation of more hatcheries. The dependence on other states for fish seeds will be tremendously reduced with the state's own manufactured fish seeds of low cost, easy availability and of good quality control.

Feed Mill industries should also be set up by the government to provide fish feed for the growing number of cultivated fish. The raw materials for preparing the fish feed includes maize, rice grains and mustard seeds which are plentiful in Mizoram. Not only will this be a source of fish food production, but it will also be an important source for generating labour employment to many people in the Feed Mill Industry. It will also boost the value of the agricultural crops and commodities.

Absence of Fish Auction Centres makes the price of fish sold unreasonably. The government should create a proper Fish Auction Centre to improve and regulate the sales of fish. The centre should be handed over to the Department of Fisheries or it should be made in charge of it. This will not only standardise the market price of fish exported to other states but also fish imported from other states. It will have an impact on the quality of fish produced in Mizoram.. It would also improve the

hygiene of the fish and also reduce wastage. Since the process of marketing of fish in Mizoram is not under any authorised fishery body, it results in the creation of imperfect market situations especially the determination of fish prices.

A very advantageous and resourceful promotion of fish culture is the cultivation of ornamental or decorative fish. Fish for decoration or entertainment, which involves keeping variously coloured, attractive, curious fishes as pets in specially designed containers called 'Aquaria' has become a very popular trend. The breed and varieties of fish which are branded as ornamental fish are also found in Mizoram. The state's own plan has also envisaged the introduction of culture of ornamental fishes through the setting up of backyard hatchery of ornamental fishes. Culture of ornamental fishes in the backyards of households requires very little space, skill and time and yet very profitable. Full thrust should be given to successfully execute this project. Not only will it develop entrepreneurship for self employment in private sector but also provide job opportunities for the youths in the Aquaria manufacturing industry which will be eventually set up if the plan is implemented.

There is gender bias in many Aquaculture activities. In Mizoram, women engaged in Aquaculture are seldom found as their participation is mainly confined to selling and marketing of fishes. Women hesitate to work in the areas without the company of other women. To ensure that women utilise their full potential, it is necessary to provide capacity building support which will eventually lead to their empowerment. The culture of ornamental fish in the backyards should be taken up by the women folk. It will direct a large number of women to be engaged in Aquaculture other than selling fish and still making an important contribution to the economy. This will be an innovative approach of raising the status of women in Pisciculture.

Absence of strong Fishery Co-operative Societies in Mizoram makes it difficult for Government to render various services to fishermen. Co-operatives are the link between the government and the fish farmers. They should be an autonomous association of fish farmers united voluntarily to meet their common economic, social and cultural needs through a jointly owned and democratically controlled organisation. The existing fishery co-operatives in Mizoram lack

institutional support, both in infrastructure and finances and are short of functional authority. Strong independent fishery co-operatives should be set up with members having common interest to avoid the danger of the limited amount of fund of cooperatives being used for the benefit of the larger interest. Cooperatives should be viable as business organisations and require efficient management.

A big obstacle in the expansion of fisheries is the uncooperative behaviour of financial institutions. They play an important role because they are the means to an end. The success of every scheme introduced in Mizoram depends on the cooperation of the banks. The fishing folk have no access to banks for loans due to the absence or insufficient collateral security. The available inadequate loans are further obtained by a limited number of applicants as compared with loans with revolving fund arrangement. There is a high rate of interests and so banks are reluctant to lend money. The financial assistance or loans for developmental activities are to be implemented through these institutions and are to be shared on ratio basis with the state government. The banks alone cannot generate the loans if the government is reluctant to put in its matching share. So there is a need for the setting up of special financial institutions for fisheries (Fishery Banks) which will specifically accommodate the financial needs and problems of the fish farmers. The government should provide more collateral to be offered by the fishermen. The arrangement could be of 70% loan, 15% grants, and 15% fishermen's own contribution. Rebate for prompt repayment can also be made.

The success of all fisheries efforts depends on one single factor, that of getting the catch to the consumer in an acceptable condition. So preservation of fish is necessary to prevent spoilage, and to keep the fish fresh and fit for human consumption. Preservation should be such that there is minimum loss of flavour, taste, odour and nutritive value of the fish. The cost of preservation should be low, the fish should have a long storage life and remains safe for man, as poorly preserved fish may cause serious food poisoning when eaten. The most common method of preservation of fish in Mizoram is the chilling method and sun drying method for smaller fish. Chilling method is the most feasible as Ice plant Centres have been set up in certain places. But it is estimated that 17% of fish gets spoiled in ordinary vehicles provided with ice. So, the Mizos have yet to be introduced to the

modern preservation methods of Deep Freezing, Freeze-Drying, Salting, Brining, Smoking, Caning and the use of Chemicals and Radiation. For this, there should be creation of infrastructures as it requires mechanical equipments and skilled operatives. Seminars, demonstrations, and strong extension programmes are a prerequisite in attaining these modern methods. This will not only facilitate better preservation of fish but also furnish job opportunities for the youths of Mizoram.

Transport as the means of getting fresh fish catches across to the consumer and to the markets is an important factor of fisheries in Mizoram. The estimated 17% of fish that gets spoiled in the process of transportation can be prevented by the introduction of modern means of transportation. Road links between landing places and high ways are of considerable importance but inadequate. There should be a demand to attach fish catches to insulated or refrigerated vans, rather than the presently used passenger vehicles in view of the perishable nature of the commodity and to reduce time lost in transit. These vans are used for transporting bulk quantities to long distances. Another modern means of transportation is transportation using Crates. Crates are commonly known as 'Ice Box' in Mizoram. These ideal boxes have standard dimension, good drainage, weight and capacity for ease in operation compared to other fish transportation boxes. The use of crates will immensely reduce the rate of spoilage of fish in Mizoram. It will also provide job opportunities for the individuals in the Crate box manufacturing industry which will be eventually set up if the use of Crates is popularised for fish transportation.

It has been discussed earlier that in addition to being a great economic value for man, fish also provides several important bye-products. The different breed and varieties of fish which produce the important bye-products should be introduced and reared in Mizoram. Awareness should be made on how fishery resources can be utilised not only for food but also for producing bye-products which are of great economical value and can make an impact on the economic deficit.

To obtain multiple benefits of fish farming, the trend of Integrated Fish Farming should be popularised. Fish Culture is combined with agriculture or livestock for full and maximum utilisation of resources. It provides a higher source of income especially to the farmer having a small holding and has a lasting effect for raising the socio-economic status of the rural people. It includes Paddy-cum-Fish

Culture, Duck-cum-Fish Culture, Fish-cum-Pig Farming, Fish Culture-cum-Poultry Farming and Chick-Pig-Fish Culture. Many fish farmers of Mizoram have also started to make use of this practice. It is expected that Integrated Fish Farming practices will increase in future as they are dependent on eco-friendly measures and ensure high returns as well as sustained production levels of fish and other animals.

Paddy-cum-Fish Culture can provide an additional supply of fish crop. As paddy fields remain flooded with water for several months, fish can be grown there at low cost along with the rice. In addition, insect pests of rice, algae and unwanted weeds are eliminated by fish.

The raising of ducks with composite fish culture has been found to be compatible with the cultivated fish. The ducks feed on insects, tadpoles, duck weeds etc. The duck droppings contribute to the fertilization and no additional manure is needed for supplementary feed required for the fish.

In Fish-cum-Pig Farming, cattle fodder required for pigs is grown on the terraced embankments. Pig dung which is very rich in nutrients acts as substitute for pond fertilizers and supplementary fish feeds. It ensures high profit through less investment.

In Fish Culture-cum-Poultry Farming, poultry houses are constructed above the water level using bamboo poles, and the droppings may fertilise the pond directly. It also provides fish meal, a natural proteinous fish food.

In Chick-Pig-Fish Culture, all the three animals can be integrated for better production. The pig chamber is constructed just above the water and the poultry house is constructed on top of the pig chamber. Chick droppings are used as food by pigs, and the pig dung in turn provides as fish meal.

The Government also needs to do away with politicisation of beneficiaries. Incidence of mishandling of funds by non-beneficiaries is very common in Mizoram especially in the rural districts. Non-beneficiaries avail the assistance of certain schemes and financial incentives while the rightful beneficiaries are left out of it. Favouritism and patronage system are also a common occurrence in the granting of projects and distribution of grants. There is no appropriate positive outcome in the sector keeping in view the financial outlay of schemes implemented in Mizoram.

Mishandling of funds by the higher officials could be the reason for the hinder of projects and development schemes. The Fisheries sector will perform better and more efficiently if there is absence of political interference especially at the top level. All the persons involved in fisheries should work together and strive towards the accomplishment of their common goal.

The entire need of food for human kind cannot be met from land only, and the water bodies (rivers, lakes, ponds) and the vast ocean have to be exploited to meet the requirement. Worldwide production of fish for aquaculture is increasing in developing countries. Besides being a rich source of food, fishery provides new job opportunities also, reducing the pressure of unemployment. In general, attention has to be paid to specific human concerns, such as reduction in the level of poverty, promotion of employment and satisfaction of the basic needs of all the people, especially the poor people in the rural areas.

To conclude, even though the study has concluded that there is shortage of production of fish in the state, and that there is a wide gap between the rates of production and the demand, yet it has also mentioned about the operations of central sponsored schemes and plans and the funding agencies of the fisheries sector of Mizoram. The discrepancies can be avoided with the use of a planned and coordinated effort of the Directorate, the State Government, the beneficiaries and all the outside agencies involved in it. The Directorate has to take up the role of a catalytic agent of change.

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APPENDIX

QUESTIONNAIRE FOR FISH VENDORS

1. Male / Female ____
2. Age ____
3. Locality ____
4. Year of starting Business ____
5. Number of family members ____
6. Number of workers in the family (government or non-government) ____
7. Which is sold more in the market.

   a) Local fish ____ b) Fish imported from the plains ____
8. State the reason

   a) Better quality in taste ____ b) Cheaper ____ c) Fresher _____
9. Production of local fish is sufficient.

   a) Yes ____ b) No ____ c) Can't say ____
10. Number of fish sold in kgs per week.

    a) Local fish____

       i) 20-30Kgs____ ii) 30-40kgs ____ iii) 40-50kgs ____ iv) Above 50kgs ____

    b) Fish from the plains ____

       i) 20-30Kgs____ ii) 30-40kgs ____ iii) 40-50kgs ____ iv) Above 50kgs ____
11. Amount of income incurred in a week:

    a) Rs. 1,000____ b) Rs. 1,000-2,000____ c)Above Rs. 2,000____
12. Frequency of spoilage.

    a) Most of the time ____ b) Sometimes ____ c) Hardly ____
13. State the reason.

    a) Inadequate preservation ____ b) Transportation problems ____ c) Others ____
14. Increase in consumers.

    a) Yes ____ b) No ____ c) Can't say ____
15. Reliable source of income.

    a) Yes ____ b) No ____ c) Can't say ____