

**VULNERABILITY, LIVELIHOOD DIVERSIFICATION AND  
WOMEN EMPOWERMENT AMONG THE MARINE FISHERS  
IN KERALA: EXPLORING THE ROLE OF THEERAMYTHRI**

Thesis submitted to the  
**University of Calicut**  
for the award of the Degree of  
**Doctor of Philosophy in Economics**

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November 2020

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## *Declaration*

I, Dhanya K., affirm that this thesis titled "**VULNERABILITY, LIVELIHOOD DIVERSIFICATION AND WOMEN EMPOWERMENT AMONG THE MARINE FISHERS IN KERALA: EXPLORING THE ROLE OF THEERAMYTHRI**" submitted to the University of Calicut for the award of the degree of **Doctor of Philosophy** in Economics is a bonafide record of research done by me under the guidance of Dr. K. Rajan, Retired Professor of Economics, M.D College, Pazhanji and Dr. Shyjan D., Associate Professor and Head, Department of Economics, University of Calicut. I declare that this thesis had not been submitted by me earlier for the award of any degree, diploma, fellowship or any other similar title or recognition of any University/Institution.

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## **CHAPTER 1**

# **INTRODUCTION**

### **CONTENTS**

- 1.1 Introduction
  - 1.2 Importance of fisheries sector
  - 1.3 Fisheries in Kerala
  - 1.4 Background of the Study
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## 1.1 Introduction

The last century has witnessed many changes in human civilization both culturally and technologically. The only thing that has not undergone many changes in the dependence on nature for the resources to cater to the need of humankind. However, there have been many revolutions that happened in the harvesting techniques and the introduction of high yielding varieties of crops. The vastness of the ocean has been catering to the sustenance of civilization since time immemorial. Fisheries have been considered to be the most promising resources as it was accessible to even the poorest of the world by supplementing the essential nutrients as well as being its omnipresence.

The contribution of fisheries to global food security and livelihood is difficult to quantify, it is recognized that millions of people are directly dependent upon fishing for their livelihood and sustenance (Allison and Kelling, 2009). Currently, fisheries have developed into a multifarious industry in many countries (Smith, 2000). Fishing is considered as the oldest means of livelihood and is one of the primary livelihood practice in different parts of the world (Allison and Kelling 2009). It had developed into a diverse industry generating employment, income and foreign exchange to the economy, not merely as the contributor to the food basket but being a primary contender (Smith et al., 2010). Fish provides the main source of animal protein to 20% of the world's population and is considered as a global commodity because 40 percent of the fish produced is traded internationally, which essentially infer that fish catches all around the world is traded to attain foreign earnings (FAO, 2018). However, the fisheries sector have not received much development incentives such as the agriculture and industrial sector. Proper management of resources is one of the main challenges that is faced by the sector now (Garcia and de Leiva Moreno, 2003).

## 1.2 Importance of fisheries sector

Marine fisheries turn over had been relatively static since the late 1980s with the domination of aquaculture responsible for increasing supply of fish for human consumption. Global food fish consumption (3.2 percent) exceeded population

growth (1.6 percent) and that of meat from all terrestrial animals combined (2.8 percent), between 1961 and 2016 (FAO, 2018). Food fish consumption has been growing at an average rate of about 1.5 percent per year, from nine kg in 1961 to 20.2 kg in 2015. This increase in consumption patterns is not just ascribed to increased production but also factors such as reduced wastage. The contribution of developing countries to increased fish consumption is relatively low compared with developed countries even though they have a higher share of protein in their food than those in developed countries. (FAO, 2018)

In India, fishing has been an important source of protein for the inhabitants of coastal communities for centuries and in recent years, has increasingly contributed a substantial proportion of protein nutrition for people throughout the country and abroad (Gilberthorpe and Hilson, 2016). Fisheries is an emerging sector in India with high possibilities for diversification of farming practices, rural livelihood development, domestic nutritional security, employment generation, export earnings as well as tourism. India has a coastline of over 8,118 km and an Exclusive Economic Zone (EEZ) of over 2 million sq km. Indian fisheries and aquaculture is an important sector for food production providing nutritional security, income through exports in addition to livelihood support and gainful employment to about 14 million people. With diverse resources extending deep seas to lakes within the mountains and quite more than 10% of the world biodiversity in terms of fish and shellfish species, the country has shown continuous and sustained enhancement of fish production since independence. The total fish production during 2017-18 is estimated to be 12.60 million metric tonnes, of which nearly 65% is from the inland sector and about 50% of the total production is from culture fisheries, this constitutes about 6.3% of the global fish production (National Fisheries Development Board 2019). After independence, India has experienced tremendous growth in the fisheries sector outpaced with radical technological changes which encouraged production and exports. There was an increase in the fish production of the country from 0.7 million tonnes in 1951 to 5.7 million tonnes in 2000-01, 2.7 million tonnes from marine capture fisheries. India's total fish production was 102.6 lakhs tonnes in 2014-15, which

was increased to 125.9 million tonnes in 2018-19. India is now the third-largest fish producer in the world, accounting for over 4.39 percent of the world's fish production. India's fish exports touched US\$ 1.2 billion in 2002 or about 1.21 percent of its GDP (GOI, 2003). In India, there are more than 50 types of fish and shellfish products that are being exported to 75 countries around the world. Recently fish and fish products emerged as the big share in agricultural exports from India, with 13.77 lakh tonnes in terms of quantity and ₹ 45,106.89 crores in value (NFDB, 2019). This contributes to around 10% of the total exports and nearly 20% of the agricultural exports. Around 4 million fisherfolks equipped with 2.4 lakh fishing crafts operating along the coast, seven major fishing harbours, 75 minor fishing harbours, and 1,537 landing centres function in the country (NFDB, 2019). Kerala has 10 percent of the country's coastline where the fisheries sector is considered as one of the most important productive sectors.

### **1.3 Fisheries in Kerala**

Kerala is with a coastline of over 590 km, and an Exclusive Economic Zone of 2,18,536 sq km, contributing to the occupation and livelihood for the coastal population. There are 222 fishing villages within the state and eight lakh people makes their earning from the fish capture and allied work. The major types of fisheries in the country are inland and marine, whereas Inland fisheries are "any activity conducted to extract fish and other aquatic organisms from inland waters" and marine fisheries are exclusively related to marine. There was a rise within the marine fish production, from 2.68 lakh tonnes in the 1980s to 5.63 lakh tonnes in 1990-1991. In 2014-15, Kerala's marine fish production was reported as 5.24 lakh tonnes which were hovered to 6.9 lakh tonnes in 2018-19 (Economic Review 2019). During this time the fisheries sector showed stagnant production with the annual average for the years remaining about 5.7 lakh tonnes. There was a substantial increase in the number of motorized fishing crafts and a small increase in the number of non- motorized crafts during these periods. Within the total fish landings, there was a reduction in the contribution of traditional crafts because of the increased number of motorized crafts. This has resulted in the continuous



confrontations between the traditional fishermen and the owners of the motorized crafts and trawlers (GoK, 2015), Sathiadas et al. (2006).

Kerala was the second-largest contributor to marine products in India, showed an upward trend in exports worth 29.1 thousand metric tonnes from 1996 to 1997. During the upcoming years, there had been a steady decline in the quantity exported and reached 76.6 thousand tonnes in 2003-04 (State Development Report, Kerala, 2005). In 2017 Kerala climbed to third position overtaking Karnataka with a total catch of 5.85 lakh tonnes (CMFRI, 2018). Kerala has 2,38,173 active fish workers of which about 88 percent were males. The number of allied workers in fisheries in Kerala was 78,856 of which 80 percent were women (CMFRI, 2010). Kerala fisheries and aquaculture provide around 9.2 percent of the Gross State Value Added (GSVA at constant prices) from the primary sector, which is essential to the state economy. Even though the Gross State Value Added of the state increasing over the years, the contribution of the primary sector especially the fisheries sector has been declining. The share of the fisheries sector to the GSVA has declined from 1.12 percent in 2011-12 to 0.95 percent in 2015-16. From 2011-12, except in 2014-15, the marine fish landings in Kerala have shown a declining trend and in 2015-16 it was 5.17 lakh tonnes (Economic review, 2018). It is evident that, despite being with a meagre contribution of 15 percent of the total fisherfolks population of the country, Kerala stands remarkably high in terms of the contribution made to the country.

#### **1.4 Background of the Study**

The fisheries sector has a prominent role in the gross domestic product of the state and it employs 3.4 percent of the total population of the state. Fish production in the state has always been stagnant which affects the living standards of the community (David, 2020). However, the fisheries sector plays a pivotal role in the development of the economy the fisheries sector and fisherfolks remain marginalized and neglected. Active measures are needed to overcome the backward conditions such as by regulating the number of fishing crafts, promotion of the use of proper gears, by empowering their market strategies, by uplifting

their legal, social and economic stability and thereby guard the interests of this impoverished community. Fishing is the only source of income for these communities, the reduction in the earnings thereby affects their wellbeing. The traditional fishermen are the most economically and socially backward communities in Kerala. (Kripa et al., 2018; CMFRI, 2019).

The present situation is entangled with a series of socio-economic labyrinths as the fishing community is experiencing the pressures from multifaceted dimensions. The deprived conditions of the coastal areas which have worsened with the recent climate-driven issues. The lack of consistent revenue and educational achievements have driven the community in the jeopardy. This particular situation with peril in the economy and inconsistent assurance on fishing have funnelled the community to vulnerable circumstances. This vulnerable situation is again mutilated as it has got a convergence from situations such as governance, environmental, psychological, social and economic. The need for a sustainable income is the only relief that can offer the community for their sustenance.

As the income from the fishing was not found to be sustainable, the fishers were forced to opt for a substitute. This particular scenario has led them to enquire about the alternate revenue finding methods other than fishing that has perpetually lead them to livelihood diversification. If this sort of livelihood diversification proceeds with at a finer pace, there can be a dearth of the knowledgable people in traditional fisheries. The experienced persons with their local traditional knowledge are of great importance in the fishing practice as it would fetch the maximum yield as they know the subtle changes in the sea and wind pattern. To prevent this sort of drain, it is envisaged to have an assured income that is consistent and worthy. To obtain this there has been a need for the existence of multiple earners in the family. While the fishermen carry out their fishing routine, their partners are to engage in some other income-generating activities. The Government have initiated certain well-being projects such as Kudumbasree, SHGs, micro-credit etc. for them. These efforts have been considered as promoting

women for their support. One of the pioneering projects in line with the same is the Theeramythri, which was imitated as a program to support the fisherwomen.

## **1.5 Micro Credit – An Alternative to Vulnerability Issues**

For the past two decades, the development economists have been considered Microfinance as the foremost strategies for poverty alleviation, although some of the researchers considered microfinance has not revealed its victory as a grassroots economic developer. The main reason for this interpretation is that it has not been reaching the poorest (Hulme and Mosley, 1977). Even though this program microfinance is capable of bringing the poor into the mainstream of society while comparing to their past conditions. A study conducted in Nigeria, the most populous black nation in the world shows that poverty contributes to underdevelopment and its reduction leads to economic development. Generally the poor are being denied their share of the nation's resources and other necessities that are generally available in the society for their comfort. As poverty is a worldwide problem it is necessary to convey awareness at the international level of finance and governance. The World Bank, United Nations (UN), and International Monetary Fund (IMF) have developed various programs and projects that would improve the lives of the poor, ensure health improvement and sustainable growth and development (Ssewamala et al., 2010).

### **1.5.1 Self-Help Groups and fisherwomen**

The Self-Help Groups (SHGs) organized by fisherwomen do play a vital role in the fisheries sector of maritime states of Indian coastal belts. It is a matter of great concern that, despite the economic and socio-cultural significance of fishing in Kerala state, the fisherwomen at large are outside the mainstream society and in the economically disadvantaged category without acquiring the benefits from the fishing industry. Malabar areas of Kerala always stand backwards and less progressive than the rest of Kerala and about half of the coastline of Kerala state is of Malabar (MCITRA, 2006). But fisherfolks especially women rarely gain the benefits even when there is tremendous consideration for fish production because fisheries development was most often discriminated from the development of the

fishing community. It would be pertinent to have a look into the group dynamics of the existing Self-Help Groups mobilized by the development agencies for the empowerment of women fish workers in the fisheries sector in the. The SHGs', whether it is a temporary phenomenon, or would continue on a sustainable basis needs to be investigated. The constraints have to be addressed and empowerment should be brought about by adopting suitable economically viable micro-enterprises in fisheries and allied sectors by strengthening of these SHGs.

### **1.5.2 Empowerment of fisherwomen**

Empowerment refers to the process of enhancing the capacity of individuals or groups to make choices and to transform those choices into desired actions and outcomes. The empowerment of rural women is about expanding women's assets and capabilities to participate in, negotiate with, influence, control, and hold accountable the institutions that affect their lives. The theoretical framework used in the research program conducted by the Food and Agriculture Organization of the United Nations (FAO) on rural women's financial empowerment and social safeguard is based on Golla et al.'s (2011) framework of women's financial empowerment. The framework considers that a woman is economically empowered when she has both the ability and the power to make and act on economic decisions by i) succeeding and advancing economically, and ii) having the power and agency to benefit from economic activities. Considering that social protection schemes are often targeted at female-headed households and position women as the primary receivers of transfers, the potential for enabling women's financial empowerment through social protection schemes are significant.

### **1.5.3 Description of Theeramythri**

Self Help Groups (SHGs) are becoming one of the important means for the empowerment of poor women in almost all the developing countries including India. Kerala is no exception as regards the role played by women's collectives, known by different names for emancipation and empowerment of poor women. One of the most diversified and progressing among all the SHG's in Kerala is the SAF Theeramythri activity group. Creation of suitable income-generating activities

for fisherwomen and ensuring their sustainability is the prime concern of the SAF Theeramythri project. Since 2005, the Government of Kerala devised and implemented different programs namely Tsunami Rehabilitation Program (TRP), Tsunami Emergency Assistance Program (TEAP), and Prime Ministers National Relief Fund (PMNRF) to provide relief and rehabilitation to the affected. With a total outlay of ₹ 89 crores around 2500 livelihood initiatives and micro enterprises of Tsunami affected were facilitated (Salim et al., 2018).

The Society for Assistance to Fisherwomen (SAF) appeared in June 2005 under the Department of Fisheries following the Tsunami to free the coastal population from destruction came about because of the catastrophe. They essentially focus on the financial upliftment of the fisherwomen, in this way clearing path for the nearby turn of events. Afterward, in 2010 different Tsunami relief programs were converged under another and all-encompassing occupation program named "Theeramythri". As an endeavour to gender upliftment, SAF enhanced the business competency among fisherwomen through executing microenterprises by using local resources. SAF has shaped action based gatherings of fisherwomen and broadened monetary, mechanical, and administrative assistance to set up small endeavours reasonable for the local area. SAF focuses on the impeded fisherwomen and gives them independent work openings under this program. Besides opportunities in the conventional fisheries sector, alternate livelihoods are also very much a part of Theeramythri. While Theeramythri program fundamentally centres on the monetary strengthening of fisherwomen, social and gender strengthening perspectives additionally get affected because of its exercises. SAF has embraced an interesting advancement model for underestimated networks, wherein an administration organization has effectively banded together with experts from one viewpoint, and with network establishments on the other, for making enduring cultural effect. SAF business ventures began in 2005 with a capital expense of 32 crores circulated among various gatherings, across nine locales of Kerala.

## **1.6 Problem statement**

The constraints of the present conditions have made the community search for a new livelihood option which could be detrimental to their traditional fisheries. To achieve the backdrop the vulnerabilities across the world concerning the fisheries have been reviewed. The present investigation interpolated the intrinsic relationship on how the vulnerability and livelihood diversification has affected the community in the three districts in the state of Kerala. The learning has also brought out the level of empowerment achieved in the women through Theeramythri, a project mooted with an objective of the upliftment of the fisherwomen in Kerala. The last part investigated the role of Theeramythri in reducing the vulnerability and livelihood diversification enacted through the women empowerment.

## **1.7 Organization of the Thesis**

This thesis comprises ten chapters. The first chapter presents the Introduction, background of the study, rationale of this research. The organization of the thesis is provided in this chapter.

The second Chapter portrays the relevant research conducted in the respective fields for the past few decades concerning regional, national, and global scenario. The conceptual and theoretical background of the study has given in this chapter. It includes the up to date relevant references on topics such as vulnerability, livelihood diversification, and women empowerment across the globe.

The third Chapter presents the statement of the problem, objectives, methodology, research approach and data analysis. This chapter details specific research methods including qualitative, quantitative and participatory tools used during the field research. This will also narrate aspects such as physio-geographical attributes of the study area, population, other general characteristics, and location of the study area in detail. Records from primary and secondary data that describes the fishing community are also presented.

The fourth chapter attempts to provide an outline of the vulnerability among the fishery sector and narrates the overview of the fisheries sector in the backdrop of global, national and regional scales.

The fifth Chapter addresses vulnerability among fishers in the Kerala coast and pictured the factors driving them to the vulnerability in terms of both the natural and manmade. The deliberations were made on the vulnerability in different methods of fishing, types of fishing. The region-wise differences in vulnerability have also been explained.

Chapter six also builds on data to analyze livelihood diversification from the fishers' perspective by applying the necessary academic disciplines. The chapter discusses sustainable livelihoods from this point of view. It documents livelihood activities and strategies, discusses other than fishing for sustaining the community. It describes the level of livelihood diversification and relative contribution of livelihood diversification, livelihood diversification with different methods of types fishing, and livelihood diversification in different regions.

Chapter seven evaluate how far the Theeramythri projects have been instrumental in bringing upliftment in the fisherwomen. It also portrays the level of attainment of objectives, the relative contribution of objectives. It demonstrated the effect of age group on the attainment of the objectives as well as the region-wise differences.

Chapter eight will portray the level and relative contribution of empowerment through the participation in the Theeramythri project.

Chapter nine present the model and differences in the dynamics of vulnerability among the fisherfolks in the selected villages of the coastal districts. It explains how the Theeramythri project has succeeded to reduce the factors affecting the vulnerability and livelihood diversification and the associated issues. It also records the level of empowerment gained by the fisherwomen through the various activities.

Chapter ten the concluding chapter sets out the research findings and reflects on the research approach. It gives a summary of the study and interprets relationships shown by various indicators. Five research findings are presented based on each objective. The main contribution of this dissertation is in the area of alternative approaches to fisheries management in the Kerala Coast. The references and appendices are given in the last section.

For the sake of presenting the thesis is arranged in such a way that, interpret the subject in different parts which is as follows. After the review of literature, the research gap was identified and the hypothesis was formulated. Following that, the study objectives and methodology were described in detail in the third chapter. The forthcoming chapter is provided with the related literature available on the International, National, and regional levels.



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## CHAPTER 2

# LITERATURE REVIEW

### CONTENTS

- 2.1 Introduction
  - 2.2 Theoretical background
  - 2.3 The Concept of Vulnerability
  - 2.4 Vulnerability– different perspectives
  - 2.5 Livelihood Diversification - Definition and associated dimensions
  - 2.6 Government initiatives to vulnerability reduction
  - 2.7 Women in Fisheries
  - 2.8 Women Empowerment
  - 2.9 Discussion of literature review and directives of research problem
  - 2.10 Research gap, needs and uniqueness of the study
-

## 2.1 Introduction

India being a country with high diversity, changes in the economy and livelihood was under constant modifications. It is quite unfortunate that one of the prominent sectors that remain undeveloped despite several decades of obtaining independence is the rural area economy, especially the fishermen community. The number of studies related to fishermen is in its infancy while considering the number of people who are related to the field. Many studies are primarily confined to international organizations or the regional research institutions of the respective countries.

This chapter is to provide an overview of the major studies related to the fishermen and their livelihood options across a national and international backdrop. This will enable the researcher to calibrate the methodology in action and attain the whereabouts on the problems at their right coordinates.

The high-quality research on the pioneering works is always a prerequisite of worthy scientific inquiries. The relevant research conducted by various researchers on vulnerability, livelihood diversification, and women empowerment has been summarised in this chapter.

## 2.2 Theoretical background

The vulnerability is a very subjective term across the nations, this has to be viewed in different in respective countries according to their socio-economic backdrop. There have been various theories proposed in the backwardness of the society.

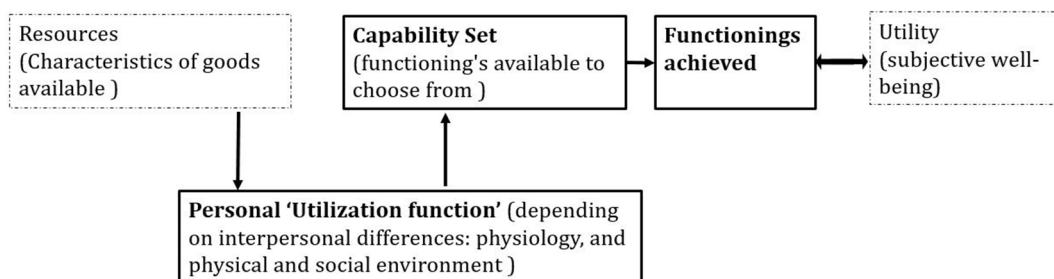
### 2.2.1 Sen's Capability theory

Sen (1981) has introduced the capability theory who had earlier contributed the notion of food entitlement, or access, emphasized that income was only valuable in so far as it increased the capabilities of individuals and thereby permitted functioning in society. To the capability element, vulnerability considered as the predisposition, weaknesses, fragilities, deficiencies, or lack of capacities that favour adverse effects on the exposed elements.

Sen's Capability Approach is defined by its choice of focus upon the moral significance of individuals' capability of achieving the kind of lives they have reason to value. A person's capability to live a good life is defined in terms of the set of valuable 'beings and doings' like being in good health or having loving relationships with others to which they have real access.

When evaluating well-being, Sen argues, the most important thing is to consider what people are actually able to be and do. The commodities or wealth people have or their mental reactions (utility) are an inappropriate focus because they provide only limited or indirect information about how well a life is going. The Capability Approach focuses directly on the quality of life that individuals are actually able to achieve. This quality of life is analyzed in terms of the core concepts of 'functionings' and 'capability'. Functionings are states of 'being and doing' such as being well-nourished, having shelter. They should be distinguished from the commodities employed to achieve them.

Capability refers to the set of valuable functionings that a person has effective access to. Thus, a person's capability represents the effective freedom of an individual to choose between different functioning combinations – between different kinds of life – that she has reason to value. Sen refers to 'capabilities' in the plural (or even 'freedoms') instead of a single capability set, and this is also common in the wider capability literature. This allows analysis to focus on sets of functionings related to particular aspects of life, for example, the capabilities of literacy, health, or political freedom.



**Figure 2.1:** Outline of the core relationships in the Capability Approach

The core relationships of the Capability Approach and how they relate to the main alternative approaches focused on resources and utility is outlined in Figure 2.1. Resources are considered as an input, but their value depends upon individuals' ability to convert them into valuable functionings, which depends, for example, on their physiology, social norms, and physical environment. An individual's capability set is the set of valuable functionings that an individual has real access to. Achieved functionings are those they actually select. The utility is considered both an output and a functioning. The utility is output because what people choose to do and to naturally have an effect on their sense of subjective well-being. However the Capability Approach also considers subjective well-being – feeling happy – as a valuable functioning in its own right and incorporates it into the capability framework.

### **2.2.2 Garrett Hardin's theory of the tragedy of the commons**

Garrett Hardin's theory of the tragedy of the commons is one of the most cited publications of recent times and is also among the most significant theories for ecologists and environmental policy researchers. Due to its vastness, the fishing industry is characterized by an open-access regime. In this regime, the individual receives all of the economic benefits accruing from the fisheries. This eventually leads to the stock depletion which is shared among all resource users and this ultimately results in the tragedy of the commons (Hardin, 1968). His theory was developed based on the findings of Gordon (1954) model on Bio-economic equilibrium which states that the consequences of open access systems are that, fishermen will continue to enter the fishery sector as long as revenues minus costs remain above zero, until ultimately the net revenue of the entire fleet is zero thus the bio-economic equilibrium (Gordon, 2010). Gordon, whose model was developed ten years before Hardin also argued that at this equilibrium the resource is depleted as far as economics will allow and fishermen will move to alternative fisheries, resulting in the sequential depletion of fish stocks,. Hardin in his theory, therefore concluded that there is a tragedy as each man is locked into a system that compels him to increase his herd without limit, thus in a world that is

limited. Drawing from these theories, it is therefore of no doubt that a situation whereby too many fishermen turn to chase too few fishes, could eventually lead to conflicts over access to these resources. With so many years after Hardin's theory, many open-access resources have indeed resulted in tragic levels of overuse and sometimes destruction.

The sustainable livelihood approach, which is prominent in a recent development, seeks for greater involvement of all stakeholders with specific sets of guiding principles and an analytical framework for fisheries management (Neiland, 2004). These set of operational principles aim at reducing poverty and vulnerability in communities engaged in small-scale fishing, their assets and access to fishing grounds, fish processing and trading (Stirrat, 2004). The main idea is to build stakeholder capacity to improve poor people's access to natural resources through the application of sustainable livelihood approaches.

### **2.3 The Concept of Vulnerability**

The vulnerability has no universal definition. Experts from various disciplines use the concept and define vulnerability, which leads to diverse measuring methods to serve their purpose and interests (Paul, 2013). The most popular 24 definitions are reviewed in Paul (2013) depending upon the word scenario.

As vulnerability is related to society and it needs more than simple understanding as people are the real victim. The International Strategy for Disaster Reduction (UN/ISDR, 2004) has defined vulnerability as "the conditions determined by physical, social, economic, and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards. Whereas in contrast to ISDR, the United National Development Programme (UNDP) defines vulnerability as "a human condition or process resulting from physical, social, economic, and environmental factors, which determine the likelihood and scale of damage from the impact of a given hazard (UNDP, 2004). The vulnerability can be explained as an internal risk factor of the subject or

system that is exposed to a hazard and corresponds to its intrinsic predisposition to be affected or to be susceptible to damage.

### **2.3.1 Vulnerabilities among the Fishing Community**

The term vulnerability designates the relationship between poverty, risk, and efforts to manage the risk. Different principles have different concepts related to vulnerability such as the probability of experiencing a loss in the future relative to some yardstick of welfare (Alwang et al., 2001). The life of fishing communities is full of uncertainty and they can be said to be vulnerable to future loss of welfare. The climate change had brought about unforeseen problems that would affect the biological health, the social and economic value of the marine fish stocks, and the supporting ecosystems. This ultimately increases uncertainty throughout the biophysical and socioeconomic process of fisheries thereby making the fishing communities vulnerable (Miller et al., 2010).

The degree of vulnerability is different and is influenced by the characteristics of the risk and the household's ability to respond to risk. The poor have limited access to assets and limited abilities to respond to risk, this makes them vulnerable in the future. Hence the capacity of the community to manage certain losses in the future would also be attributed to vulnerability studies (Alwang et al., 2001). Fisherfolks is usually considered the "poorest of the poor" or that poverty exists within the communities for generations (Adeokun et al., 2006; Jacob, 2017). However, some authors argue that fisherfolks are not essentially the "poorest of the poor" financially but may, instead, be amongst the foremost vulnerable socio-economic group, owing to their notably high exposure to natural, health-related or economic shocks and disasters (Allison et al., 2006).

The fisheries sector is one of the most vulnerable sectors which had been affected by environmental, social, economic, and cultural factors. In reality, the earnings from the fisheries sector are very high however, it is hardly reflected towards the traditional fishermen because of so many reasons. The role of intermediaries, big captures, lack of marketing strategies, etc. are the main reasons for the backwardness of the traditional fishermen. This backwardness reassembles

through their standard of living, educational level, participation level in the social activities which lead them to poverty (Purcell et al., 2017). Poverty is a severe condition of vulnerability. Underdeveloped and developing countries are facing poverty. The severity of poverty is high in the case of backward communities especially the fishing community (Tietze, 2016).

### **2.3.2 Vulnerability in Indian fisheries**

India has been substantially contributing towards marine fisheries and it has been the traditional occupation for the coastal communities of the subcontinent. It is projected that about 6.7 million people depend on fisheries for a livelihood, of which about 2 million are dependent on marine fisheries. India produced 10.8 million tonnes (mt) of fish in 2016, the third-highest in the world, after China and Indonesia. India's share of global fish production was around 6%, according to the FAO. In aquaculture, India is second only to China, with a 7% share in global production. There is a continuous increase in the fish production of India from 0.7 million tons in 1951 to 5.7 million tonnes in 2000-01, of these 2.7 million tonnes from the marine capture fisheries (FAO, 2018). Through a holistic approach, it is evident that the fisheries sector presents a picture of dynamism and growth. The report of the working group on the ninth plan (1997-2002) suggests that the fisherfolks are still in the lower strata of the society and remain as the poorest of the poor. Distinct from agriculture and other natural resources - dependent sector, the fisheries sector has its unique features. In India, it is difficult to analyze the poverty in fishing communities because of its diversified nature. As fish is a mobile resource, it is difficult to establish clear spatial boundaries, indicating the ownership over the resources like in agriculture. Unpredictability and seasonality of catches are one of the important characteristics of the fisheries sector where skill and chance play important roles. Moreover, prices obtained for the catch on any given day can be highly uncertain and will depend on the species caught, total catches and prices prevailing on that day, and several other factors (Kurien, 1995). Moreover, prices obtained for the catch on any given day can be highly uncertain and will depend on the species caught, total catches and prices prevailing on that

day, and several other factors. As fish is a perishable commodity, the dependence of the market is another feature of the fisheries sector and it's a fact, that communities cannot live on fish alone. As Firth (1966) has pointed out, this aspect has also created conditions for the emergence of middlemen, often with overtones of a patron-client relationship. In agriculture, investment is in the form of land that can be considered a more stable asset. However, in fisheries, investment takes the form of craft and gear, which have high maintenance costs, depreciate rapidly, and are often lost or damaged (Alexander, 1982). A fishing family can, overnight, lose everything it has if the boat it owns, along with the men of the family, is lost at sea during a cyclone. The relatively higher risk to life, craft, gear, and heavy dependence on men have marked attributes of this sector.

#### **2.4 Vulnerability– different perspectives**

The world development report has highlighted that there is a transition between empowerment, security, opportunity, which ultimately erodes the poverty (World Bank, 2014). Different principles have different concepts related to vulnerability such as the probability of experiencing a loss in the future relative to some yardstick of welfare vulnerability is caused by uncertain events and a household can be said to be vulnerable to future loss of welfare (Chambers, 1989). There are variations in the degree of vulnerability and it is influenced by the characteristics of the risk and the household's ability to respond to the risk (Adger, 1999). The limited access to assets and limited abilities to respond risk makes the poor and near-poor to be vulnerable in the future. The vulnerability of the household determines by the time horizon, which means the household may be vulnerable to risks over the next month, year, etc and response to risk takes place over time (Adger, 1999).

Alwang et al. (2011) have attempted to decompose vulnerability into several components of a risk chain: firstly, the risk or risk events, secondly the options for managing risk or risky responses, and thirdly the outcome in terms of welfare loss. World Bank's Social Protection Unit in 2001 has presented Social Risk Management (SRM) as a means of looking at poverty, risk, and risk management



in a new way. The main aim of the SRM is to evaluate the social management of risks- how society manages risks. SRM includes a broad range of formal and informal positive and sensitive risk management strategies by individuals, communities, nations, and groups of nations. Through an SRM perspective protection discourses how vulnerable households can be assisted to better manage risks and become less inclined to welfare losses. To understand how society can manage risk at any part of the chain, the SRM approach uses the risk/vulnerability disintegration. SRM gave more importance to the optimal vulnerability reduction through the most effective means of managing the risk and adjustments exist along the chain. Household vulnerability occurs through undesirable outcomes, and this vulnerability arises from risk exposure. Vulnerability starts with a view of risk and risk is characterized by a known or unknown probability distribution of events.

Holzmann and Jorgensen, (1999, 2000) have pointed out that, to adopt efficient risk management practices households often face so many constraints which are related to problems of asymmetric information, inefficient financial and insurance markets, perspective failures in the assessment of risks, the inability of informal mitigation efforts due to covariate risks, and exclusion from the social networks. They claimed that, as the cost of the policy exceeds its benefits, even though the policy can eliminate some constraints, the others may require alternative means of risk management.

Aysan (1993) have demonstrated that household vulnerability may be defined as the future loss of welfare below socially accepted norms caused by risky events. The depth of the vulnerability decides by the characteristics of the risk and the household's ability to respond to risk. The asset base determines the ability of the households to respond to risk.

Adger (2006) pointed out the important analytical approaches of vulnerability to the environmental change and the identification of the collaborations and consilience between research on vulnerability and the ways of resilience and adaptation through social-ecological systems. The study also illustrates the "The pressure and release model" and the relevance in current

formulations of vulnerability such as sustainable livelihood framework and vulnerability to poverty. In the field of climate change, there are three main areas of difficulties such as the challenge of measurement like exertion to incorporate social dimensions, problems regarding the perceptions of vulnerability, linking with environmental psychology. The study concludes that a theory of vulnerability must include risks, thresholds, and institutional dimensions to accommodate the multitude of scales through which vulnerability exists.

A study by FAO (2006), analyzed the livelihoods of marine fishing communities within the Indian coastal state of Orissa using the Sustainable Livelihoods Approach (SLA). It investigates the relationships between livelihoods and coastal poverty and developed simple qualitative indicators to observe the changes in these relationships over time. It had been observed that there's an overall decline in the availability of fish from the coastal waters which is additionally in the middle of declining access of the poor to the fish resources as a result of changes in fishing technology and in-market supply chains. When a shift in fishing methods from subsistence-based artisanal activities to classy modern technologies happened, it rendered redundant the standard skills, knowledge, and toil abilities of the poor, while also increasing risks and resulting in dependence upon external sources of credit. Another thing is that as fish are sold on to the traders at the purpose of landing, fishermen now not rely on the women to sell them, that the women find themselves marginalized.

An analysis conducted by FAO (2015) focused on to help countries, partner agencies and their staff, researchers and fisheries professionals in understanding how to define and measure vulnerability within complex fisheries systems, using perception-based approaches within fishing communities in the Benguela Current region (Angola, Namibia, and South Africa) as an example. This work aimed at the resilience of fisheries systems and dependent communities to multiple drivers of change including climate change and ocean acidification. According to this study climate change, one of the most life-threatening challenges facing the planet and humankind which also makes problems to marine and fisheries resources as

well as communities who ultimately depend on these systems for food and livelihoods.

FAO (2013) in, a study on "Vulnerability Assessment Methodologies" provides a comprehensive annotated bibliography of the most contemporary and seminal vulnerability methodologies from over the past decade, focusing particularly on vulnerability to climate change in the fisheries and aquaculture sector. Another notable review on the vulnerability has appeared in Philp and Rayhan (2004) which attempted to elucidate the intrinsic similarities and the subtle interchangeable meaning of the definitions of vulnerability and poverty in the different cultural contexts.

#### **2.4.1 Poverty and vulnerability**

Sen (1981) in his approach launched a new concept of 'entitlement' while redefining poverty. According to him, people's command over food does not simply depend on its production and availability in the market but is also governed by a range of social, economic, cultural, and political factors. He ascribes that poverty must be seen as deprivation of basic capacities than mere lowness of incomes. Poverty results from the inadequacy of command over resources needed to generate socially determined basic capabilities whereas capability deprivation is more general and may be caused by a host of factors (Kakwani and Son, 2006).

The abundance of the resources and subsequent income generation is determined by the proper utilization of these resources. The communities engaged in fishing and fishing-related activities for livelihood face multiple and varied pressures. Resource depletion and consequent regulatory responses impose constraints on fishing and related activities which could aggravate the economic and social pressures on these communities. Increasing coastal development and shifting demographics bring added threats to these communities (Heinz, 2000, Tuler et al., 2008).

In the economics literature, comparative consents rely on the meaning and measurement of poverty, but the concept of vulnerability is not as well developed.

In the poverty dynamics literature, the term vulnerability resides implicitly even though the mainstream of economics have less consent on it (Kanbur and Squire, 1999).

In economics, vulnerability generally theorizes as an outcome of a process of household responses to risks given a set of conditions (FAO, 2018). The economics literature has been normally regarded as poverty as a shortfall in access to services, food security, etc. In such approaches, alternative indicators of well-being are examined and usually compared in terms of their ability to identify the poor and possibly quantify poverty. The outcome of interest is most often income or consumption expenditures, and the benchmark is an absolute poverty line. A poverty profile is, in fact, a means of recognizing that poverty implies non-monetary shortfalls and informing policymakers by identifying the poor and their characteristics.

Literature exists on poverty dynamics which recognized that poverty status is not fixed but it varies in the time interval (e.g., Bane and Ellwood, 1986; Jalan and Ravillion, 1998). The outcome of the process - poverty - is assumed to be the primary policy focus, and not the process itself. The use of specific benchmarks for outcomes (e.g., a poverty line) and reliance on money metrics narrows the focus and makes the analysis more tractable. Some economists classify poverty as either chronic or transitory. Most economists distinguish between poverty-related to risk and non-risk poverty by calling the former stochastic poverty (Morduch, 1994). These studies all find transitory poverty to be significant with large portions of the sample moving into and out of poverty over the study period. They also find that over longer periods, fewer households appear to be consistently poor (Dercon, 1999).

Later on, the study conducted by Pritchett, et al. (2000) has given a picture of the poverty dynamics that demonstrates how vulnerability to poverty can be defined and then measured. They have outlined vulnerability as the risk where a household will fall into poverty at least once in the next few years. Vulnerability is thus measured as a probability, and households have greater or lesser degrees of

vulnerability. They recognized the need to mould vulnerability into risk and risk response components. Mansuri and Healy (2000) studied the poverty dynamics literature and they defined vulnerability as the ex-ante and forward-looking probabilistic measure.

FAO (2018) studied the changing patterns of poverty in fishing communities of Orissa and observed that "Social capital", which is the glue that held together with the traditional fishing communities and provided some sort of social security to the vulnerable groups (the aged, widows), has become much weakened. They pointed out that food insecurity is growing in the fishing villages and, coupled with the weakening of the welfare state policies, leading to increasing deprivation. This work examined the impact of seasonality and shocks upon the fisheries-based livelihoods and the importance and the influence of various policies, institutions, and processes in addressing the fishers' need to cope with their vulnerability context in a meaningful manner. It summarized various factors which have had an impact upon the livelihoods of the fishers and developed them into simple indicators relevant in assessing.

#### **2.4.2 Asset-based Vulnerability**

Reardon and Vosti (1995) shown that, the asset-based approach to poverty analyses poverty as caused by insufficient access to tangible and intangible assets. Poverty has been indirectly treated as a dynamic state, and the vulnerability being associated with the probability of falling below a benchmark level of current period consumption and the loss or degradation of assets. Moser (1998) has claimed that this, is a state where losses create current welfare losses and lower future expected income flows, consumption, and investment. There was a long-term effect that can be caused by transaction costs associated with the use of assets to manage risk. A major conceptual focus of this study is the ability of households to manage risk through improved responses to risk.

In asset-based analyses, it is evident that households with more income and other welfare-generating assets are considered to be less vulnerable to welfare losses associated with risky events (Reardon and Vosti, 1995). The vulnerability

can be reduced by investing in assets through two mechanisms: assets can be used to avoid welfare downswings through improved risk management, and investment over time can increase expected income. Several concepts related to vulnerability are widely used in this literature.

Reardon and Vosti, (1995) reveal that some households that are not consumption poor might be investment poor because their asset base declines over time and they are unable to generate sufficient surpluses to protect, maintain or enhance their assets.

### **2.4.3 Climate change and Vulnerability**

Salagrama (2012) has studied the impact of climate change on the livelihoods of small-scale fishers in the context of already ongoing changes in the livelihoods of fishers and fishing communities in India. The study was carried out on behalf of the International Collective in Support of Fish workers (ICSF) and had the objective such as to - assess perceptions of fishing communities of the impact of climate variability/change on their lives and livelihoods; assess knowledge, institutions, and practices of fishing livelihoods of small-scale fishing communities in the context of climate-change policies and programs at different levels. The study found that there is growing evidence that, in the perception of fishing communities, climate change has been influencing the viability of fishing operations, requiring fishers to take a wide range of adaptive and mitigation measures. The author observed that although the direct contribution of the fisheries sector to aggravating climate-change processes is considered low, there is evidence that some practices and processes within the sector could be exacerbating the impacts of climate change on the lives and livelihoods of fishers, such as growing fishing fleet size, engine power and capacity; destructive and ecologically unsound fishing practices; and poor engine and fuel efficiencies.

Mohammed et al. (2016) had assessed the vulnerability of fishery-based livelihoods due to the climate variability and changes using locally relevant indicators of exposure, sensitivity, and adaptive capacity in Gujarat. The study exposed that the fishery-based livelihoods of the Junagadh District have the

highest vulnerability among the coastal districts of Gujarat. The assessment of the different indicators has shown that the economy is the most vulnerable parameter with climate change followed by social and environmental parameters. The fishers have been affected by unusual extending of the windy days of monsoon as well as their unseasonal occurrence which reduced the total active fishing days in a year. The periods following the monsoon were considered to be crucial as it was found to be the peak fish landing period and any anomalies in weather during this season could adversely affect the income and job opportunities of fishermen. Extreme erosion events and higher storms rushes have been related to an increase in sea-level rise. As the fishers have been living very close to the seashore, any increase in the sea level will lead to the encroachment of sea and destruction of their dwelling. All these events significantly increasing the economic loss and hence increasing the vulnerability of fisherfolks. It also makes the fishery environment more worsen habitats such as mangroves, seagrass beds, and coral reefs.

Daw et al. (2009) have discussed the effects of climate change on large marine fisheries which include reparations to fishing vessels, infrastructures, along with a reduction in employment opportunity, and it adversely affects the market structure. The study pictured that Climate change has made an impact on the Shifting of the phenology, distribution and the composition of fish species where they exist in different environmental variables such as sea surface temperature and precipitation of phenology of fishing is getting affected drastically. What happened is that changes in distribution patterns and environment base the species composition of catches also changing. The study concluded that the socio-economic standard of the society determines its ability to cope with adverse events and is mainly contributed by education facility, sanitation facility, access to drinking water, and health care facility, which are also considered as the critical factor for the social development.

Muhammed et al. (2017) elaborated on the Vulnerability of Coastal Fisher Households to Climate Change from Gujarat, India. They added that the impacts of climate change are invariably seen on agriculture, aquatic ecosystem, energy,

and economics. Their study envisaged to assess the vulnerability of 1500 fisher households was assessed using PARS (parameter, attribute, resilient indicator, score) methodology, in four coastal villages. 'Economy' was found to be the most impacted parameter consequent to climate change followed by the 'social' and 'environmental' parameters. They concluded that their results obtained reflect the low adaptive capacity of fishers that could be attributed to lack of awareness, preparation, and mitigation option.

Sannadurgappa et al. (2011) have studied the Vulnerability of freshwater fisheries and the impacts of climate change in five south Indian states economies using an indicator-based approach were compared and found that the States such as Karnataka, Tamilnadu, Andhra Pradesh, Kerala and Maharashtra were identified as most vulnerable. They identified this vulnerability was due to the combined effect of predicted warming, the relative importance of fisheries to national economies and diets, and limited societal capacity to adapt to potential impacts and opportunities. It was notable that, many vulnerable states were also among the country's least developed states whose inhabitants are among the poorest and twice as reliant on fish, which provides 32% of dietary protein compared to 12% in less vulnerable states. They concluded that reducing fish mortality in the majority of fisheries, which are currently fully exploited or overexploited, is the principal feasible means of reducing the impacts of climate change.

A study was conducted to assess the climate change Awareness, Preparedness, Adaptation, and Mitigation (APAM) strategies of the costal fisher households in the Alappuzha district of Kerala by Salim et al. (2013). They analyzed that not only the increased population pressure and demand for marine protein, climate change also modified the coastal environments and increased the vulnerability of marine dependent communities around the world. Climate change has made a change in the distribution and productivity of marine and freshwater species which have an impact on the fisheries and aquaculture and ultimately on the livelihoods of the communities that depend on fisheries. They note that a



movement of fishes from one region to another as a result of the increased seawater temperature. Sea level rise is another important effect of climate change means that the coastal fishing communities are in the front line of the deleterious effect of climate change. The shifting of species from one place to another has made one place with economic vulnerability, which has an impact on the nature and commercial value of the fishes. Marginalization in terms of social and political remained in most of the traditional fishers with limited access to health care, education, and other public services. Climate change might have an impact on the capacity of the small scale and the migrant fishers to adapt to the changing environment of increased vulnerability due to the losses of natural capital. The study also mentioned about the instability of sustainable livelihoods and food security of fisherfolks. In short, climate change effects have an impact on the environment, fishery, social, economic, and development drivers. Therefore, to understand the factors which contributed to the vulnerability of coastal biological systems and human systems to develop sustainable adaptation pathways is became urgent. They concluded that the success of any mitigation and adaptation methods lies in cooperation and awareness among the victims of climate change.

#### **2.4.4 Vulnerability and Livelihood**

Indian fisheries are predominantly labour-intensive and great technical diversity has come to change the traditional nature by the superimposition of the modern, capital intensive, and specialized technology through the last fifty years. The community based, small scale fishing sector has moved to production-based industrial principles and modern strategies to boost the international markets. The fishermen sometimes have failed to cope with the technocentric model of development also the main reason for the fatigue related to the natural base. In India sustainable livelihood rely on the principle that enhancing of physical assets by exploiting natural assets (Deb, 2009). As fishing is a traditional community-based activity, fishing operations are on a subsistence level. But the high profits gained from this sector attracted bigger players to the field and have shifted the sector into profit-oriented business transactions. This ruined the abilities,

traditional knowledge, and manual labour of the poor. Open access for the common property of nature attracts a large number of poor people to find their livelihoods there and it also allows the entry of bigger players into the sector gradually they made a monopoly over the resources. As fish is directly sold to the traders at fish landing itself there is no longer a need to depend on their women to sell what is caught. This created a division of labour between men and women. Women used to do the majority of the selling activities in this sector and they became jobless. This has made an impact on the well-being of the household. The fisherfolks cannot depend on a single revenue hence both the men and women in the family are engaged in fishing and related activities. While the women were largely left out from the job, they have to meet the expenses from other sources too (Deb, 2009).

Fisherwomen who play a vital role to support the family have become jobless due to the modern changes that had happened in the fishing sector. As a result, they have to find employment in other areas like agriculture, port operations, the hotel industry, household labor and construction, and plantation work. Even though they made choices under the uncertain circumstances, the problem of poor and unsustainable livelihoods continues and growing rapidly, depicting that the fishing community deserves a satisfactory solution to their livelihood requirements. The need for alternative livelihood options is recognized and there have been many efforts from the part of the government and non-governmental organizations to address the livelihood issues of the fishing community. There were formal developmental motivations like credit systems which were a failure because of the unique conditions of the fishing sector.

Ahmed and Lipton (1988) define livelihood as a set of flows of income, should be sufficient to avoid poverty implies systems of how rural people make a living, and whether their livelihoods are secure or vulnerable over time. Vulnerability, which is commonly used in literature, denotes the - probability that livelihood stress will occur - with more stress or a higher probability implying increased vulnerability. The vulnerability related to livelihood might be denoted as

"livelihood vulnerability." This concept is regarded as forward-looking and an ongoing state. In this literature, Chambers, (1989) describes vulnerability through two sides: the first side includes an external side of risks, shocks, and stress; and second, an internal side, which is defencelessness, meaning a lack of means to mitigate or cope without incurring losses. The sustainable livelihoods literature considers both the risks and the responses. The outcome of interest is a loss of livelihood and continued "vulnerability" to subsequent shocks. It is not clear how one would specifically measure this vulnerability as there is little discussion of "a minimum level of livelihood." Other strands of this literature (e.g. Davies, 1996) distinguish between "structural vulnerability" and "proximate vulnerability." Those households that exhibit underlying characteristics that make them vulnerable (such as headship, age, households with old and infirm members—similar to concepts of structural poverty) are called structurally vulnerable. Their vulnerability is independent of the productive capacity of their entitlements in a given season or year; and they face high risks with minimal capacity to respond. The sustainable livelihood focuses on structural vulnerability addresses risk responses over time. The concept of structural vulnerability is related to notions of stochastic poverty and chronic poverty as used in the economics literature.

Meanwhile, Adger (2006) argues that the existing knowledge on analytical approaches of vulnerability to environmental change and tried to identify the synergies and consilience between research on vulnerability, resilience, and adaptation through social-ecological systems. The paper outlines the forerunner vulnerability methods, specifically on entitlements and disaster research (human ecology, hazards, and the "pressure and release model"). The author illustrates their relevance in current formulations of vulnerability, such as the sustainable livelihoods framework and vulnerability to poverty. A detailed account of the challenges facing vulnerability methodologies in the field of climate change is presented, highlighting three main areas of difficulty: the challenge of measurement such as the difficulty to encompass social dimensions, to create thresholds and the dilution of complex vulnerabilities when translating reality into information such as; perceptions of vulnerability, linking with measurement and environmental

psychology; and issues of governance addressing equitable participation of vulnerability in decision making. The author concludes that a theory of vulnerability must include risks, thresholds, and institutional dimensions to accommodate the multitude of scales through which vulnerability exists.

Islam et al. (2013) studied the vulnerability of fishery-based livelihoods to the impacts of climate variability and change in two coastal fishing communities in Bangladesh with a composite index approach to calculate livelihood vulnerability and qualitative methods to understand how exposure, sensitivity, and adaptive capacity measured by sub-indices produce vulnerability. They found that exposure to floods and cyclones, sensitivity, and lack of adaptive capacity in terms of physical, natural, and financial capital and diverse livelihood strategies interpret livelihood vulnerability in different ways depending on the context.

Blasiak et al. (2017) have demonstrated that the least developed countries top global index of vulnerability in the present context of climate change. They proposed that the future impacts of climate change on marine fisheries have the potential to negatively influence a wide range of socio-economic factors, including food security, livelihoods, and public health, and even to reshape development trajectories and spark transboundary conflict. They identified that seven out of the ten most vulnerable countries on the resulting index are Small Island Developing States, and the top quartile of the index includes countries located in Africa (17), Asia (7), North America and the Caribbean (4) and Oceania (8). More than 87% of least developed countries are found within the top half of the vulnerability index, while the bottom half includes all but one of the Organization for Economic Co-operation and Development member states. They concluded that this index provides a useful tool for prioritizing the allocation of climate finance, as well as activities aimed at capacity building and the transfer of marine technology.

## **2.5 Livelihood Diversification - Definition and associated dimensions**

Ellis (2000) defined diversification as the process by which a household increases the diversity (i.e. number) of its income-generating activities. Diversification often studied in association with adaptation and accumulation, it is a household risk management strategy used to secure income and consumption needs whilst minimizing the risks of failing to do so. The purpose of diversification is thus to develop portfolios of income-generating activities with low covariate risk among their components (Ellis 2000a, 2000b; Hazell and Norton, 1986). Most studies recognize the benefits of diversification as a means to achieve increased income and livelihood security and Reardon et al. (1992). A distinction of relevance in the literature on diversification is that between coping and adapting (Carter and May, 1999). Coping is a short-term response (or ex-post) to decreasing income or food supply Ellis (2000b), Adapting, on the other hand, is a gradual and long-term response used to buffer the household against future potential shocks and changes, usually classified as a permanent ex-ante strategy (Davies, 1993). Risk being the decision maker's "subjective perception of uncertainty" (Kostov and Lingard, 2001) and uncertainty being a large contributor to household vulnerability imply that diversification may be adopted as an ex-ante strategy, by choice (Ellis, 2000b; Valdivia, et al., 1996; Reardon et al., 1992), allowing households to better cope with unforeseen shocks, adverse events and trends, and seasonality (Alwang, et al., 2002; Dercon, 2001; Chambers, 1983).

### **2.5.1 Vulnerability and Livelihood diversification**

Internationally, the catches and prices from many fisheries exhibit high inter-annual variability, leading to variability in the income derived by fishery participants. Kasperky and Holland (2012) studied the economic risk posed by this that may be mitigated in some cases if individuals participate in several different fisheries, particularly if revenues from those fisheries are uncorrelated or very asynchronously. They have constructed indices of gross income diversification from fisheries at the level of individual vessels and find that the income of the

current fleet of vessels on the US West Coast and in Alaska is less diverse than at any point in the past 30 years. They also discover a dome-shaped relationship between the variability of individuals' income and income diversification, which implies that a small amount of diversification does not reduce income risk but that higher levels of diversification can substantially reduce the variability of income from fishing.

Anderson et al. (2017) have demonstrated the benefits and risks associated with Individuals relying on natural resource extraction for their livelihood face high-income variability driven by a mix of environmental, biological, management, and economic factors. They have reported that the key to managing these industries is identifying how regulatory actions and individual behavior affect income variability, financial risk, and, by extension, the economic stability and the sustainable use of natural resources. The study evaluated two axes by which fishers in Alaska can diversify fishing activities. They have shown that, despite increasing specialization over the last 30 years, fishing a set of permits with higher species diversity reduces individual revenue variability, and fishing an additional permit is associated with higher revenue and lower variability.

However, the attempts made by Dineshababu et al. (2019) are offering us to have some space in the confronting situation, with marine spatial planning (MSP) which is an integral part of the decision-making protocol for setting up activities in the marine zone. Be it the establishment of industries, exploration, and mining for oil and minerals, deciding of surface transport, ensuring national security, exploitation of living and non-living resources, or conservation and management of resources and ecosystems with the assistance of Satellite-based technologies like remote sensing and geographic information system. This would enable the planners and policymakers to interpret the interaction between various factors and derive judicious decisions on the allocation of space and resources to different segments or activities in the marine zone and thereby reduce the vulnerability.

Kurien (2000) a pioneering researcher in the field of fisherfolks of the country, has contributed to the field with many works. The main subjects of the paper are the social and cultural aspects of marine fishing communities, as they emerge in the course of the pursuit of food and livelihood. The study mainly focused on the marine fishery of Kerala and it attempted to show how the dimensions are linked in the context of very important resources and a determinant of the ecosystem. He argued that it is difficult to transform the societies from a traditional entity into a modern entity while there existing a socio-cultural dimension, and it has been considered as a strain in the transformation. When development is given exclusively as a techno-economic orientation, it acts merely as a basis for a new search to give a meaning to previously mentioned social norms. His paper has given more importance to the degree of self-reliance and the ability to maintain and reproduce its social and cultural norms. His paper has examined the visible manifestations of deeper social and cultural attributes in the marine fishery sector, which have been fashioned over a very long history. The list included the nature of the sharing patterns in the fishery; traditional knowledge and technology; the old and new institutional arrangements in fishing communities; fish and the question of food security; and the role of women.

Cinner and Bordin (2010) have discussed the Livelihood Diversification in Tropical Coastal Communities by A Network-Based Approach to Analyzing 'Livelihood Landscapes. This was a novel modeling approach that provides for various types of livelihood portfolio analyses at different scales of social aggregation. They reminded our livelihood landscapes approach provides insights into communities' dependencies and usages of natural resources and shows how patterns of occupational interrelationships relate to socioeconomic development and population density. Cinner and Bordin (2010) raised that, a key question for future analysis is how the reduction of household occupational diversity, but the maintenance of community diversity we see with increasing socioeconomic development influences key aspects of societies' vulnerability to environmental change or disasters.

Nayak (2017) has reported that there is a transition in Fisher communities from a livelihood perspective in Chilika Lagoon, India. This paper highlights that the availability of more resources (or capitals) does not necessarily contribute to more robust livelihood strategies or outcomes. Using the case of small scale fishery-based livelihood system of Chilika Lagoon, the Bay of Bengal on the East coast of India, this paper suggests that the relationship between livelihood shocks and stresses, capitals, institutions, and livelihood strategies is circular and not linear.

Extensive household and village level survey data are used to examine the processes of social-ecological change in Chilika from a livelihood perspective. It describes how through changes in context, resources, and institutions, fishers in Chilika responded to the livelihood crisis, and how various strategies were used. It further examines the extent to which the outcomes of the strategies contributed to making fisher livelihoods sustainable. Conclusions drawn suggest that the outcomes of the livelihood crisis and responses from Chilika fishers have resulted in higher levels of their disconnection from the Lagoon and their marginalization. The multiplicity of ways through which fishers in Chilika perceive their livelihood suggest that livelihood in resource-dependent communities, such as Chilika small-scale fisheries, is multidimensional and far more complex and dynamic than often perceived. Further innovations in approaches and tools will help better understand livelihood challenges and make related outcomes sustainable.

The empirical scientific studies on diversification may be generally relevant in the socio-cultural and economic contexts, results from empirical studies differed between the various areas of the planet. It's often agreed in the empirical literature that the objective of diversification is developing portfolios of income-producing activities with lower covariate risk (Asravor, 2017; Ellis, 2000). The works likewise demonstrate that several factors impact the diversification techniques of the family in aquaculture and agriculture however in a broad context, these elements could be classified into negative or positive factors (Brugère, et al., Allison, 2008; Ellis, 2000). Based on Asravor (2017), positive factors or maybe



opportunity led and also causes diversification of livelihood methods, while negative factors are harsh or survival-led conditions that force farm households to diversify the income activities of theirs from the main income of theirs producing activity.

Wamukota et al. (2010) postulated that home livelihoods in tropical seaside communities aren't determined by an individual livelihood strategy but usually a multiplicity of occupational sectors, like agriculture, fisheries, along with informal financial activities. These non-fishing plus agricultural economic activities include small shops, transportation, along with mechanic job among others.

To comprehend the diversification of smallholder farmers' in Ghana, Asravor (2017) employed the Margalef index of diversification. The results revealed that households had diversified on the farm of theirs and in casual financial activities. Additionally, it demonstrated that social capital (dependency ratio, marital status), and human capital (extension services) drastically impacted the kind of diversification strategy practiced.

Martin et al. (2013) investigated the relationship between fishing, livelihood diversification, and poverty in the lower Mekong basin, in Laos, where fishing forms an important, part of rural livelihoods. From a household survey, they commented that participation in fishing is common and positively associated with higher occupational diversity and more agricultural activities. They interpret that this is likely due to the low opportunity costs associated with many forms of fishing and factors such as tradition, enjoyment of fishing, underutilized labor, and low capital requirements. Alternative livelihoods within the rural setting are therefore unlikely to cause fishers to leave the fishery, but instead, strengthen the livelihood portfolio as a supplementary activity. They summarised that fishing forms a greater proportion of income, employment, and food security for the poor and is important in households with poor-quality farmland.

Oladimeji (2018) has demonstrated that the earnings from non-farm activities are also increasingly becoming significant back-up revenue for most

rural households in many developing countries. The study estimated the determinants of livelihood diversification among artisanal fisherfolks in Nigeria. The factors of livelihood diversification revealed that adjusted household size, capital expenditure, and canoe owned were the important factors that influenced both the share of fishery revenue and level of diversification. They claimed that the influence was not by the same coefficients, magnitude, and structure but virtually in the same direction. Artisanal fishery households should form a formidable social organization to benefit from the economy of a bulk acquisition of fish inputs and access to modern fishing techniques. The rural labor force must also find a way to increase their incomes in rural areas such as farming by irrigation activities aquaculture and livestock rearing. They summarised that in interim, it is recommended that the non-fishery activities should also be developed among fisherfolks households to cater to rural households that are left fallow during the off-fish season.

Brugère et al. (2008) explained the question of diversification concerning fishing communities and he pointed out, like 'poverty', diversification is a multi-dimensional concept. Misapprehensions in its application to fisherfolks are linked to the complexity and variability of the concept itself, and incomplete, if not biased, anthropological knowledge of fisherfolks and their communities, in particular concerning development paradigms and efforts. These misapprehensions have translated into poor policies assuming fishers trapped into dependence on their [doomed] resource or trapping them further to it, with few escape routes and opportunities for accumulation and livelihood improvement outside the sector. His paper also raised the question related to the appropriateness of promoting diversification at any cost without taking into account social, cultural, and economic parameters, as well as pre-existing relationships with the resources.

In line with the above argument, Campbell et al. (2006) stated that promoting diversification is more than promoting choice from a menu of pre-determined activities and the promotion of specific activities should not be driven by economic considerations only. Diversification should not be promoted as a

panacea to revert the degradation of marine and freshwater fishery resources. They summarised that it should not be substitutive but complementary and build on existing knowledge and uses of local fishery and aquatic resources.

Jayaweera (2010) demonstrated that, the poverty and degradation of ecosystem services are prevalent features of the livelihood insecurity of coastal communities in Zanzibar, Tanzania. Livelihood diversification is characteristic in coastal rural areas and it is increasingly important to identify opportunities for income generation and ways to alleviate poverty. The results showed that livelihood diversification is very high in coastal households in Zanzibar. Concerning ecosystem-based livelihoods, there is more household participation in fishing and seaweed farming, but it varies from village to village. Furthermore, fisheries and tourism are the most important sectors and offer more opportunities to generate higher income for households. The findings suggest that there is space to improve the current dominant livelihood sectors sustainably in the future. They outline the possible future impact of unsustainable development and sustainable enterprises and highlight the importance of a collaborative sustainable enterprise system to ensure livelihood security.

Versleijen (2001) carried out a study in the districts Kilifi and Malindi of Kenya which focussed on the activities of artisanal fishermen and their households: the livelihood strategies they have, their attitude towards conservation, their indigenous environmental conservation practices and the effects of the Watamu Marine National Park on these. The study revealed that fishermen are aware of the degradation of marine resources but are unable to do something about it because of their poor situation. Due to their declining standard of living people start to diversify with two types of diversification that are: fishermen who diversify by starting to cultivate on a shamba and farmers who diversify by starting to fish. Because of this, people of other ethnicities and religions, than those of the traditional fishermen started fishing which ended indigenous ways of conservation. Finally, the study revealed that many fishermen are willing to stop fishing. The thesis summarised with some recommendations which might attribute to a decline

of the degradation of marine resources and the deteriorating situation of fishermen at the Kenya Coast.

Pandit et al. (2019) explained that, for the resource-poor fishers, livelihood diversification is a strategy to cope with the uncertainties and inadequateness of fisheries as a profession. They assessed the socioeconomic conditions together with livelihood diversification of fishermen households of the Ganga River. They indicated that the socio-economic circumstances of fishermen households were not promising as fishery as an only occupation that is unable to provide a decent life. The study also revealed that among other factors, the Simpson index contributes positively and significantly towards the per capita income of the fisher households. However, in the absence of suitable alternative opportunities, the resource is under pressure. The Government needs to develop appropriate tactics to enable effective livelihood diversification and they suggested that fishers may be trained in other income-generating activities like carpentry, embroidery, dressmaking, driving, etc. for better livelihood.

## **2.6 Government initiatives to vulnerability reduction**

Durrani and Malik (2010) analyzed that microfinance is an essential element for a noble poverty reduction strategy. They reported that the role of Micro Finance on poverty alleviation is dependent on both economic and social aspects. The study revealed that access and efficient provision of microcredit can allow the poor to smooth the consumption of theirs, better management of the risks of theirs, slowly build the assets of theirs, develop their micro-enterprises, enhance their income earning capacity, and enjoy an improved quality of life. Little efforts from the Government are expected to enhance the performance of microfinance institutions further it leads to poverty alleviation.

Bakhtiari (2006) has contributed to just how microcredit plus microfinance is getting great recognition as being something for economic empowerment and poverty reduction. Microfinance is a better way of combat poverty, especially in rural areas, where the majority of the world's poorest folks live. They realized that

the centre to get into small quantities of recognition at practical interest rates allows people that are poor to create the own small business of theirs and poor folks are trustable, with increased repayment rates than conventional.

Chandarsekar and Prakash (2010) exposed that, at the basic literacy of the Kerala state, ICT of poor women empowerment is feasible provided the right organizational support is given. The Poor woman through this initiative has made an entry into the lowest continuum of IT-enabled jobs and also ensures a minimum level of income adequate to meet family needs. The study also indicates that as days pass the ICT enterprises are facing difficulties to get adequate inputs/resources, facing sustainability issues, and also various challenges like the delay of payment, technological obsolesces and stiff competition from the digital market, etc. It is the high time for the agency (Kudumbasree) and Government to act and support this innovative ICT based women empowerment and poverty elevation program for Kerala's future sustainability.

In a comprehensive study by, Pitt et al. (2006), use Item Response Theory (IRT), where the element of analysis is the whole pattern of a set of binary indicators that proxy for woman's autonomy, decision-making power, and participation in household and societal decision making. They found that credit programs lead to women taking a greater role in household decision making, having greater access to financial and economic resources, having greater social networks, more bargaining power while comparing with their husbands, and having greater freedom of mobility.

FAO (2006) analyzed the livelihoods of marine fishing communities in the Indian coastal state of Orissa using the Sustainable Livelihoods Approach. They investigated the relationships between livelihoods and coastal poverty and probed to develop simple qualitative indicators to monitor the changes in these relationships over time. They found that there has been an overall decline in the availability of fish from the coastal waters also accompanied by declining access of the poor to the fish resources as a result of changes in fishing technology and in-market supply chains. The shift in fishing methods from traditional to modern has

rendered redundant the traditional skills, knowledge, and manual labor abilities of the poor, while also increasing risks and leading to dependence upon external sources of credit. They warned that, as trade has been taken place at the landing itself, fishermen no longer depend on the women to sell them, so the women find themselves marginalized. Food insecurity has been an additional indication of in availability of fishes to the traditional fishers. Weaker welfare policies of the state leading to increasing deprivation. Apart from the various trends, their paper examined the impact of seasonality and shocks upon the fisheries-based livelihoods and the importance and the influence of various policies, institutions, and processes in addressing the fishers' need to cope with their vulnerability context in a meaningful manner.

The study by Dhanuraj (2004) analyzed the new players of the sea who exploits the treasure of the sea as the new players came in to play it leads to over catching and change in the cost of living and difficult to meet both ends of life. He argues the number of entrants increased the market conditions have changed and it lowered the price of fish. In the coastal areas of Kerala, during monsoon, the sea may take away land and the houses of the fishermen and they will be in a deprived condition. The role of women in the economic activities of coastal fishing communities' supplements region's livelihood. He summarised that the degradation of coastal ecosystems and the displacement of fishing communities from their living spaces have adversely affected the workload and quality of life of women in the communities.

Mohammed et al. (2016) provided necessary inputs to understand the vulnerability and impacts on fishing communities due to climate change. From the study, it is apparent that the economic performance of the sector is going to be impacted more compared to the other parameters and this adverse impact could exaggerate and pose serious threats because of the higher sensitivity of the community due to inadequate social performance. The study reveals that there is an urgent need for awareness building among the coastal fisherfolks on climate change and related threats to the livelihood. There is also a need for devising

adaptation strategies through proper scientific interactions and pieces of training. It further concludes that the developmental and welfare activities in the coastal areas need to be planned in a climate change perspective equipping the coastal population to adapt to changes in climate scenarios. Similarly, mitigation strategies should be made by providing adequate infrastructure in the working areas and by creating opportunities for alternate vocations.

Vipinkumar and Asokan (2014) analyzed the group dynamics of Self Help with 12 dimensions and the lacunae identified in Group Dynamics Effectiveness Index give feedback for the possible improvement in SHG functioning by taking care of the dimensions contributing their effectiveness. They recognized associations between the variables can act as functional points for promoting group empowerment, which might give useful insight on the credibility of using the group dynamics network for strengthening the functioning of women's SHGs'. Ultimately, they concluded that poverty can only be eradicated by mobilizing women to solve their actual problems through Self Help Groups.

Salim et al. (2017) examined the socio-economic profile of the fisherfolks in the Poonthura fishing village of Thiruvananthapuram District, Kerala. They claim that fishers have a very high emotional attachment to the fishing activity, still, the scarcity of resources and the uncertainty of the job are making the fishermen turn away their coming generations into some other fields. The results of the study point out the reduction in the fish resource as the major reason for the uncertainty in a fisher's life. They portray that a drastic decrease in the availability of fishes and increased efforts in fishing activities have affected the livelihood of fishermen very much. This designates that there is ample scope to increase the income and thereby the living status of the fishers by providing proper knowledge about the improved fishing and fish culture practices on a scientific basis. They concluded that further works have to be done to weave suitable policy measures for the fishermen households to cope with and adapt to the changing scenario.

Later Salim et al. (2017) assessed the levels of literacy, health, income, and livelihood security of fisher households across different fisheries sectors in Kerala.

They reported that the marine capture sector has the highest annual income in comparison with other sectors but registered higher indebtedness. They described that the highest income from the non-fishery activity was from labor followed by business, other sectors, and agriculture. The study revealed that the fishers spend their major share of income on food expenditure. Despite the income from various sources, the majority of the households are swamped with debts which makes them rely on private money lenders for sustaining their living standards. The results of the study throw light on the fact that measures for improving literacy and health facilities created a positive impact on the livelihoods of the fisher community. However, due to cumulative expenditure on account of maintaining the living standard, they are still engulfed in the vicious circle of poverty due to increased debt and lack of savings, which again affect their quality of life. They have reported that appropriate measures need to be initiated to develop alternative avocations such as arranging institutional financial support like micro-credit for fisheries through SHGs/Theeramythri followed by vocational training for fisherwomen to undertake household income activities during dry/offseason, to improve fishers' quality of life through improved income and better savings.

Salim et al. (2016b) discovered that an extremely quick loss in quality is likely to happen in the situation of fish, after the catch, as it's an incredibly perishable commodity and therefore, the confirmed preservation approach to drying out that will be the most affordable technique of food preservation is continually being practiced in India. Although it's a cheap and simple technique, it's great significance in the socioeconomic system of fisher people, as the dried fish is getting a remunerative sector inside the nation and abroad.

Shyam (2016b) explained that marine fisheries have viewed as the chief contributing factors of the whole seafood and fish viewed as the key sources of micronutrients and key animal proteins that can quickly access the individuals in nearly all developing countries. Worldwide fish production has grown continuously over the five decades outpacing the entire world population growth rate (FAO, 2014). The fisheries industry has supplied approximately 16 percent



of protein to the public. About 120 million individuals depend on fisheries around the world for all along with a section of the incomes theirs. The bulk of the planet population finds a supply of livelihood and income in aquaculture and fisheries. In 2012, 58.3 million folks have been interested in the main industry of capture fisheries and aquaculture.

Central Marine Fisheries Research Institute Census (CMFRI 2010) reported that there are 3288 marine fishing villages and 1511 marine fish landing centres in 9 maritime states and 2 union territories. The total marine fisherfolks population was about 4 million comprising 8,64,550 families.

Kerala has a very rich marine wealth with a large variety of fish and a highly skilled population of fishermen has made the state a leading producer and consumer of fish (Aerthayil, 2000). Currently, in Kerala, there are 222 fishing villages in the marine and 113 fishery villages in the inland sector, where fishing and related aspects provide a livelihood to a vast majority of the population. For example, the literacy level, educational attainment of fisherfolks is much lower than that of the general population of Kerala (Department of Fisheries, 2005). There are inter-sectoral and intra-sectoral, differences in the marine fishery sector of Kerala, while existing within the most commended "Kerala Model of Development" with high human development comparable to developed countries not compromising to low per capita income (Kurien, 2000; Sathiadhas, 2006).

A study was conducted by Asian Development Bank (2003) showed other development-related indicators such as lack of income-earning opportunities, poverty, and deprivation, unsanitary and overcrowded living conditions, lack of access to basic services such as water, sanitation, electricity, poor health conditions amongst men and women, higher infant mortality rates, lower sex ratio and lack of access to health facilities, also show evidence of this neglect and marginalization of the fisherfolks in the state. The density of population is very high in the fishing villages, which have congenitally made the construction of houses and is located in the coastal fringes of the state. The annual income of the fishing community is very low which leads to a very high level of indebtedness.

The majority of them have neither land ownership nor proper housing conditions as observed by Arya (2003). As they are facing a shortage of money, they have a high rate of dependence on money lenders and traders (Dietrich and Nayak, 2002). Arya (2003) observed that the fishing community spends all its efforts to manage the burden of debts. This leads to low income, poor health, and malnutrition and ultimately into the cyclical poverty.

In Kerala, the economy fisheries sector has been registering a consistent growth of 5-6 percent during the past three decades. Two lakh active fishermen contribute to the fisheries sector to the tune of about 1.86 percent of the net domestic product (NDP) of the state (Salim, 2014).

## **2.7 Women in Fisheries**

A review of the woman's role in the fisheries has been compiled by FAO (2015). It has been noted that the multidimensional nature of work undertaken by women of fishing communities is often uncaptured. Most of the rural women especially in the fishing community are largely bound to their family and community. They are bounded with social conditioning and duties like child-rearing, education, and financing, and these women rarely spend all day periods away from home. Arenas and Lentisco (2011) reported that women play an important role in the socio-economic development of a nation. In the fisheries sector, women engage in a wide range of activities that play a vital role in the well-being of all around the world. The women's domination can be seen in the processing sector and they are mainly engaged in pre and post-harvest activities. Sorting, peeling, grading, slicing, etc are the main activities done by the women in the fishing sector. Women have an active role in the secondary sector of marine fisheries. In the fishing sector of Kerala, almost 50 percent of the post-harvest activities are undertaken by women. The participation and contribution of women in fishing activities have not got enough acknowledgement and in part, they are also facing non-remuneration for their fishing activities (Arenas and Lentisco, 2011).

Salim (2018) stated that in most official statistics women's fishing activities not being included because of the lack of economic valuation of the subsistence fisheries. Women have actively participated in small-scale economic activities these activities are also not seen as independent economic undertakings, for in most cases, their marketing participation is viewed as part of their daily household tasks of meeting family needs. Even though there exists little information about women in fisheries, their existing roles in the fisheries sector cannot be denied. As the women's participation in this sector considered as non-profitable one there is a lack of access to physical and capital resources, to decision-making and leadership positions, to training and formal education. However the role of women in the fisheries sector has reportedly found to be diminishing (Salim, 2018). If the policies favour them and give away access to these critical resources and services would improve the efficiency, profitability, and sustainability of their activities. So, necessary policies have to be so designed to increase the overall capacities of women that will improve their own and their families' nutritional and living standards (Salim, 2018).

## **2.8 Women Empowerment**

Sen's perspective on female empowerment is suggested in the discussion of his on the measurement of empowerment (Sen, 1990). Based on him, the main objective must be on specific universally valued working, which relates to the fundamental fundamentals of well-being and survival irrespective of context. These include proper nourishment, shelter, and good health. When you discover systematic gender differences in these simple functioning achievements, they can be considered as proof of inequalities in the main capabilities, instead of as variations in tastes. Empowerment is associated with the procedure of inner change (Mayoux, 1998) and also on the capacity and right making choices (Kabeer, 2001). It is composed of change, power, and choice. It's a procedure of change by which groups or individuals with very little or maybe no power gain the capability to make choices that affect the lives. The structures of power (i.e. with it, what its options are, and also just how it's exercised) directly impact the options

that females are competent in making in the lives of theirs (Mayoux, 2001, eighteen). In the feminist paradigm, empowerment goes beyond financial betterment and also well-being to strategic gender interests (Bali Swain, 2006). Empowerment can exist at a private level, where it's about developing an agency, choice, increased autonomy, self-esteem, and self-confidence. It can, besides occur at a collective level which would have the collective mobilization of females, and when possible males, for the objective of questioning and also transforming the subordination associated with gender. Collective and personal empowerment are intrinsically connected because without the latter, the former gets circumscribed (Sen, 1990). One other view of female empowerment argues it must happen in several dimensions: economic, sociocultural, familial/interpersonal, legal, psychological, and political (Malhotra et al., 2002). These dimensions cover an extensive range of factors, and therefore females might be empowered within these subdomains. For example, the sociocultural dimension covers a selection of empowerment subdomains, like marriage systems, norms regarding female's physical mobility, non-familial cultural support systems, and networks accessible to women. Social capital, social networking sites, the capability to make the highly effective community and life development choices are all associated with empowerment (Duflo, 2012).

According to Kabeer (1999), empowerment is about the ability to make strategic life choices and constitutes three dimensions: resources (defined broadly to include not only access but also future claims to material, human and social resources); agency (including processes of decision-making and less-measurable manifestations of an agency such as negotiation, deception, and manipulation); and achievements (well-being outcomes).

Ramchandani (2017) has reported that, in developing countries, the growth of microfinance institutions that precisely target low-income individuals is viewed as hypothetically useful for the upgrade of financial inclusion and addressing some issues mentioned above. Ramchandani (2017) listed the main arguments in lending to women are: (i) it improves household income (Johnson, 2005), (ii) it leads to

better health and education outcomes and (iii) it increases livelihood diversification (Hulme & Mosley, 1996; Khandker, 1998; Todd, 1996, 2001) and higher school enrolment for girls (Kabeer, 2001a).

## **2.9 Discussion of Literature review and directives of research problem**

Seventy three research publications from the national and international scenarios were collected and discussed the relevance of the particular topic. The main arguments derived are summarised below.

- 1) While analysing the literature many researchers are discussing the points such as the poverty or risk, welfare loss among the fishing community.
- 2) Few Studies are also concentrated on vulnerability related to environmental and climate change factors
- 3) Whereas the leading transnational studies conducted by scientists have concentrated mostly on the livelihood issues among the fisherfolks.
- 4) There have been a few studies which portrayed the vulnerability and asset degradation.
- 5) Studies have also demonstrated that there has been an increased ratio on livelihood diversification in the fishing community
- 6) Few reports have also supported the view that the income from fishing was not sufficient for the sustenance of their family and thereby diverted to other sources of income rather than fishing.
- 7) The increased cost of fishing has been another contributing factor for the livelihood diversification as proposed by a few researchers.
- 8) Most of the studies have reported that to heal the impoverishment in the fishing folks are to be supported by the government by policy interventions and other assistance.

- 9) The studies have also proven that poverty among the fisherfolks have reduced through the microfinance options
- 10) Few studies have demonstrated that the socio-economic conditions of fisherfolks have shown to be improved through the Theeramythri program.
- 11) Various studies have proved that sustainable livelihood programs increased the women empowerment to some extent.

From above the discussion, it has been proven that most of the studies conducted in the fishing community are either related to poverty or connected to the vulnerability caused by climate change. A theme of the present study hasn't been attempted by anyone.

## **2.10 Research gap, needs and uniqueness of the study**

It has been evident that no systematic studies about the specific research problem have been identified by the fraternity. The situation warrants an in-depth study on how the vulnerability affects the fishing community and how they can overcome from the intrigues due to the vulnerability. Hence the present study envisages addressing the following problems.

- Analyzing the level and relative contribution of vulnerability factors among the fishing community.
- Analysing the reasons for livelihood diversification
- Evaluating the performance of Theeramythri project in reducing the vulnerability and livelihood diversification and empowering the women.

There are several attempts on the factors influencing Livelihood diversification and Vulnerability among the marine fisherfolks of Kerala, which we have reviewed. However, the introduction of Theeramythri project might have varying influence especially through Women empowerment on the Vulnerability and Livelihood diversification which is yet to be investigated.

To bridge the research gap an investigation related to the above-mentioned research problem areas are truly needed. This study will expose the present polarisation happened in the traditional fishing sector to the prospective governance team. Such a study will prominently shed lights on the intrinsic inherited strains in the fishier folks. The study would also initiate discussions to develop further livelihood initiatives by including the fisherwomen which ultimately lead to the reduction of vulnerability and livelihood diversification. The increased avenues for the women entrepreneur have added the value of empowerment for marginalized society. The subsequent chapter deal with the research design, methodology, statement of the problem, research questions, research design and description of the study area.





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## CHAPTER 3

# RESEARCH DESIGN, METHODOLOGY AND STUDY AREA

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### **3.1 Introduction**

The chapter has two sections. The first section instigates with a statement of the problem, research questions, objectives, formulation of hypothesis, and provide an overview of the study constructs, concepts and terms used in the study along with. The second section deals with the methodological aspects of the study. Finally, the process adopted for the selection of the study villages representing sample, sampling technique, tools used for data collection and subsequently justifies the methodological approaches are also appraised.

### **3.2 Statement of the Problem and Research Questions**

Even after so many years of contribution to the economy from the fishery sector, the fishing community remains an undeveloped session of the society. One of the important reasons for this underdevelopment that it is controlled by the large intermediaries and the role of small fishers in fishing is being reduced day by day (Kurien, 1999). Another important reason for the backwardness of the fishing community is Climate change and global warming (Salim et al., 2018).

This is infectious as it spreads to the fields which are related to the socio-economic cultural and environment-related factors. These vulnerabilities have driven the fisherfolks to search for another income for their livelihood (Pandit et al., 2019). The rise in the atmospheric temperature results in an increase in seawater temperature which increases the sea level due to the melting of sea glaciers which lead to, invasion of the shore. These destroy houses and boats of the fisherfolks and they get deprived economically and socially. Hefty sum is needed towards the reconstruction of their houses and fishing gear and other materials. The small fishing farmers cannot compete with the large mechanized and motorized fish traders.

The fisheries sector is experiencing vulnerability as it is exposed to multiple risks from many directions. This in turn would result in livelihood diversification which would also raise as a threat to the sustainability of the traditional

employment. As the reduction of the fish and fish products would also affect both the family members if they depend on the same revenue.

The role of women in this field is highly foreshortened. As the fish is being traded at the fish landing itself, there is no need to bring it to the markets. Women of the fishing family are mainly doing transportation of fishes to the market. So, the women in the family have lost their livelihood.

This situation warrants multiple earners are necessary for the homestead to generate income. Increased vulnerability among the fisherfolks can be reduced through microcredit facilities rather than concentrating on both persons in the fishing activity.

To tackle the vulnerability, the Government has been initiating so many welfare and livelihood enhancement programs. Of this Theeramythri program is an initiative by the government to empower the fisherwomen in Kerala. So far the studies on similar lines have conducted either at a regional scale or were short term. In this context, the present study is initiated to address the problems of vulnerability, livelihood diversification, and women empowerment from a broad landscape covering three districts at North, Central, and South of Kerala.

To conclude, the general backwardness of marine fisherfolks is widely understood. Various factors are influencing the vulnerability, livelihood diversification, and women empowerment. Important among them are *inter alia* demographic factors related to the gear and crafts in fisheries, socio-religious and geographic conditions. It is felt essential to provide a social infrastructure that enables the fisherwomen to support their family, provide social security, and improve the living standard through women empowerment - hence Theeramythri Project. The present study tries to investigate the role of this project on the livelihood diversification, vulnerability and women empowerment across different regions of Kerala.

Hence the study attempts to probe into the following specific research questions

- a) What are the level and relative contribution of the determinants of vulnerability factors across different regions and demographic conditions among the fisherfolks in Kerala?
- b) What are the level and relative contribution of the determinants of livelihood diversification across different regions and demographic conditions among the fisherfolks in Kerala?
- c) How far the objectives of Theeramythri project have succeeded and what extend it differed across regions and demographic conditions?
- d) What are the level and relative contribution of the determinants of Women empowerment across different regions and demographic conditions among the fisherfolks in Kerala?
- e) How far the Theeramythri project was successful in reducing Vulnerability & Livelihood diversification of fisherfolks and enhancing the empowerment of fisherwomen across the regions?.

To answer the aforesaid questions, the study was taken up with the following objectives

### 3.3 Objectives of the Study

- a) To investigate the level and relative contribution of the determinants of **vulnerability across different regions and demographic conditions** among the fisherfolks in Kerala;
- b) To explore the level and relative contribution of the determinants of livelihood diversification **across different regions and demographic conditions** among the fisherfolks in Kerala
- c) To assess the attainment of the objectives of **Theeramythri project** among the fisherwomen in Kerala and how far it differs across regions and demographic conditions.

- d) To examine the level and relative contribution of the determinants of Women empowerment **across different regions and demographic conditions** among the fisherfolks in Kerala;
- e) To determine the effects of Theeramythri project in reducing Vulnerability & Livelihood diversification of fisherfolks and enhancing the empowerment of fisherwomen across regions.

### **3.4 Hypothesis**

The fishing community in Kerala is experiencing several vulnerabilities that have led to their livelihood diversification. Theeramythri project has an important role in, reducing the vulnerability and livelihood diversification through the empowerment of fisherwomen in Kerala.

### **3.5 Significance of the Study**

The development of nation is measured in terms of the wellbeing of the citizens in the other side. Fishing sector has been considered as the most underprivileged sector with respect to both socially and economically. The divergence of governance and policies and timely action of Government would upscale them from the deprived conditions. This present investigation would play instrumental role in bringing the inherent issues related to the vulnerability and the livelihood diversification. The study have also portrayed how the vulnerability factors have been affected the fishing community. The impacts on the traditional fishing due to the livelihood diversification have also pictured. The importance of women empowerment with the help of self-help groups have been summarised.

Although many studies have addressed poverty among the fisherfolk, not much studies are present in our region that address the vulnerability among the fisherfolk, as investigated in the present research. Most of the studies in the region have either short-term or addressed in a small regional scales. The present investigation have covered three districts spanned across a larger geographic area in the Kerala coast.

### 3.6 Scope of the Study

The study have brought out the intrinsic socio economic variations in fisherfolks in different districts set apart in the State of Kerala. It would be more appealing, if the study had extended further covering the south India, with diverse spatial settings in the backdrop of rural, suburban and urban setups. This study can be expanded further with an increased number of variables and more indepth analysis. The scope for incorporating the concepts of inland fisheries would be another promising area of further research. Livelihood diversification happened in the younger generation is another avenue for further research which was not addressed in the current study. A comparison on the similar self-help groups functioning in the State and an analysis of the empowerment generated would be another arena that can look in to.

### 3.7 Concepts and Terms used in the study

This glossary has been compiled from various sources including FishBase and the FAO Atlas. It provides an explanation of many of the technical terms relating to data collection and use which reader will be confronted with.

**Active fishing days:** Time extrapolating factor used in the estimation of total fishing effort. It is boat/gear specific and defined as the number of days in a reference period (e.g. a calendar month) during which fishing activities are "normal".

**Artisanal fisheries:** Traditional fisheries involving fishing households, using relatively small amount of capital and energy, relatively small fishing vessels, making short fishing trips, close to shore, mainly for local consumption.

**Catch:** Any activity that results in killing any fish or bringing any live fish on board.

**Data base:** A logically structured and consistent set of data that can be used for analysis.

**Data validation:** Confirmation of the reliability of data through a checking process, usually involving information from an alternative source.

**Diversification:** Diversification is the process by which a household increases the diversity (i.e. number) of its income generating activities (Ellis, 2000)

**Exclusive Economic Zone:** A zone under national jurisdiction (up to 200-nautical miles wide) declared in line with the provisions of 1982 UN Convention of the Law of the Sea, within which the coastal State has the right to explore and exploit, and the responsibility to conserve and manage, the living and non-living resources.

**Fish stock:** The living resources in the community or population from which catches are taken in a fishery.

**Fisher:** A person (male or female) participating in fishing conducted from a fishing vessel, platform (whether fixed or floating) or from the shore.

**Fishery management:** The integrated process of information gathering, analysis, planning, decision-making, allocation of resources and formulation and enforcement of fishery regulations by which the fishery management authority controls the present and future behaviour of interested parties in the fisheries, in order to ensure the continued productivity of the living resources.

**Fishery resource:** Any stock of aquatic living animals (except those specifically prohibited by law) which can be caught by fishing, and their habitat.

**Fishery:** The sum (or range) of all fishing activities on a given resource. It may also refer to the activities of a single type or style of fishing (e.g. seine or trawl fishery).

**Fishing effort:** The amount of fishing gear of a specific type used on the fishing grounds over a given unit of time e.g. hours trawled per day, number of hooks set per day or number of hauls of a beach seine per day.

**Fishing industry:** Includes both recreational, subsistence and commercial fishing, and the harvesting, processing, and marketing sectors.

**Fishing intensity:** Effective fishing effort per unit area proportional to fishing mortality

**Fishing vessel:** Any vessel, boat, ship, or other craft that is used for, equipped to be used for, or of a type that is normally used for the exploitation of living aquatic resources or in support of such activity.

**Fishing:** Any activity, other than scientific research conducted by a scientific research vessel that involves the catching, taking, or harvesting of fish,

**Fleet:** The bunch of units of any discrete type of fishing utilising a specific resource.

**Gear:** Any tools used to catch fish, such as hook and line, trawls, gill nets, traps, etc.

**Geographic Information System (GIS):** An information system that stores and manipulates data which is referenced to locations on the earth's surface, such as digital maps and sample locations.

**Governance:** The formal and informal arrangements, institutions, and mores that determine how resources or an environment are utilized; how problems and opportunities are evaluated and analysed, what behaviour is deemed acceptable or forbidden, and what rules and sanctions are applied to affect the pattern of resource and environmental use.

**Household:** A basic unit for socio-cultural and economic analysis. It includes all persons, kin and non-kin, who live in the same dwelling and share income, expenses and daily subsistence tasks.

**Landings:** Weight of the catch landed at a wharf or beach.

**Livelihood:** A means of securing the necessities of life. A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. (based on Chambers and Conway, 1992).

**Performance:** **Accomplishment; fulfilment; functioning, usually with regard to effectiveness.** Indicators of performance will be interpreted in relation to reference points and objectives.



**Policy:** The course of action for an undertaking adopted by a government, a person or another party.

**Resilience:** Resilience is the capacity of a system to absorb disturbance and reorganize while undergoing change, so as to still retain essentially the same function, structure, identity and feedbacks of regulation mechanisms (Walker et al., 2004).

**Sample design:** The sample design of a sample survey refers to the techniques for selecting a probability sample and the methods to obtain estimates of the survey variables from the selected sample.

**Self-help group:** A self-help group (SHG) is a financial intermediary committee usually composed of 10 to 20 local women or men between 18 to 40 years (GoI, 1998).

**Sustainable development:** "Development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987).

**Sustainable yield:** The number or weight of fish in a stock that can be taken by fishing while maintaining the stock's biomass at a steady level from year to year, assuming that environmental conditions remain the same.

**Theeramythri:** A project implemented by the Government of Kerala, to assist the fisher communities from their deprived socio economic conditions (CMFRI - Govt of Kerala – Fisheries Dept, 2009).

**Variable:** Anything changeable. A quantity that varies or may vary. Part of a mathematical expression that may assume any value (Compton's Encyclopaedia, 1995).

**Vulnerability :** A condition arising from the interaction of three factors, namely: (i) risk exposure, or the nature and degree to which a household (or community) is exposed to a certain risk (e.g. a natural disaster, conflicts, macro-economic changes, etc.); (ii) sensitivity to this risk, measured for instance through the

dependence of the household (or community) on fishing activity for food security or income generation; and (iii) adaptive capacity of the household (or community) to deal with risk i.e. its ability to cope with changes.

**Women empowerment:** Empowerment is an expansion in individuals' ability to act and bring about change whose achievement can't be judged in terms of her own values and objective (Sen, 1999)

**Yield:** Catch in weight. Catch and yield are often used interchangeably.

## 3.8 Explanation of constructs

### 3.8.1 Constructs related to vulnerability among fisherfolk

1. **Governance** - The need for efficient administration and good governance is at the centre of poverty reduction strategies. Fisheries development is no different – and the contributions of fisheries to poverty reduction will only be fully-realized if fisheries governance is effective. The lack of proper governance in the implementation level, are driving the fisherfolks in a miserable conditions in multiple levels (Salim et al., 2018).

In the present study under Governance the following aspects were included lack of protection, patrolling and surveillance, lack of financial assistance, lack of insurance etc have been included. The insufficient patrolling and surveillance is forcing the fishermen with reduced catches. The illegal fishing that make deterioration of the environment is also affecting them in a long term manner. The improper financial support provided by the Government is also added to the troubles which encountered by the fisherfolks (Sathiadas et al., 2003). Many of the fishermen who dwells near the sea is not having proper titles for their houses and it might be constructed in the revenue land. This will eventually affect the compensation package being offered by the Government. At the time of natural calamities and not even a single penny will be distributed as compensation.

- 2. Fishery related factors** - Under the fishery related factors items covered is, fishing with light lures, pelagic fishing, predator attack, reduction of fishing zone, migration of fishes. Overfishing emerged as the most important issue to plague the fishery indicating that fishermen have recognized the fact that overfishing of resources is taking place, even with light lures, etc. Overfishing has long been recognized by the scientific community as detrimental to the fisheries sector. Habitat destruction has been seen critically by fishermen. The problems of juvenile exploitation and pollution were also flagged by a few. Presently the marine fisheries scenario is such that any fish can be sold in the harbor, hence fishermen have no qualms about retaining under-sized fish and hence deterrents need to be put in place to avoid their capture and retention. The dedicated effort for reducing coastal industrial pollution is required as industries dump their wastes into the sea. Pelagic fishing, followed by fishing with light lures and porpoise attack on the net with captured fishes were found to be the major reason for the reduction of fish resources identified. (Salim et al., 2018). The vulnerability include the reduced fish catch and reduction in the area of fishing zone. The impact of the unsustainable fishing practices implemented by the commercial fishing agents are also a matter of concern.
- 3. Social factors** - Uneven supply of funds in their society, followed by occupational migration and religious confrontation are considered as the items in this construct. Low literacy in the fishing sector is also ranks high in the vulnerability factor. The dearth and poor location of houses in the locality are identified as a matter of concern. The increased number of individuals in a very low space and high affinity for being habitual drunkards are understood as the factors driving the vulnerability (Kurien et al., 2010).
- 4. Economic factors** - In this construct the loss in fishing days, increased cost of fishing, increased household expenditure, indebtedness, poor asset base, uncertain livelihood, erratic income, low income, seasonal unemployment, low

capacity for investment, need for multiple earners in the family are the items considered.

The increased cost of fishing coupled with the reduced number of the fishing days have also adversely affect the economy of the people. There has been many studies vouching for the same as in Salim et al. (2014). The unusual extending of the windy days of monsoon as well as their unseasonal occurrence is severely reducing the total active fishing days in a year. The months following the monsoon was considered to be crucial as it was found to be the peak fish landing period. Any abnormalities in weather such as the occurrence of high-speed winds or cyclonic weather during this season could adversely affect the income and job opportunities of fishermen. The impact of the middle man who is taking the benefit of the hard earned money by the fishermen is also accounted for the vulnerability caused due to this. The increased household expenditure and increased cost of fishing have contributed largely to the indebtedness. The seasonal unemployment is doesn't provide any assurance of income for the fishermen.

- 5. Poverty related factors** - In this construct, lack of secure housing, poor location of houses, cooking in the open space, using fire wood for cooking, lack of amenities, poor availability of drinking water, large family size, food insecurity, poor health and health care facilities, are considered.

Despite of the improvised socio-economic conditions, the fisherfolks still are under the threat of poverty, ie lack of basic facilities, such as poor availability of drinking water, poor location of houses, poor health and health care facilities. The persistence of this background for many generations are driving them to vulnerable conditions (Situmeang et al., 2019). Christophe (2004) have reviewed the Poverty in Small-scale Fisheries and reported that there has been substantial development after the interventions of IMF and FAO.

- 6. Environment related factors** - In this construct, sea level rise, extreme weather events, habitat destruction, sea water inundation, erratic monsoon are considered. Fisheries sector is not an exemption from the deleterious effects of climate change as the assessment of climate variability studies has reported changes in migration pattern of pelagic fishes in Pacific Ocean (Chavez et al., 2003), shift in recruitment regimes in many commercial fishes (Lehodey et al., 2003) (Vivekanandan et al., 2009) and expansion of inhabitant boundaries (Vivekanandan et al., 2009b) that drive the fisherfolks to the vulnerability. The environmental factors that could lead to vulnerability concerns can be summarized as land degradation, earthquake, flood, hurricane, drought, storms, Erratic / Excess Monsoon flood, El Niño, water scarcity, deforestation, and the other threats to biodiversity. The climate change is drawing a cascade of environmental catastrophes' as they impact severely on the population of fisherfolk.

Factors contributing to vulnerability are multifaceted. These factors act to challenge capacity for self- protection, blocks or diminish access to social protection, delays or complicate recovery, or expose some groups to greater or more frequent hazards than other groups (Philip and Rayhan 2004). They include rapid population growth, poverty and hunger, poor health, low levels of education, gender inequality, fragile and hazardous location, and lack of access to resources and services, including knowledge and technological means, disintegration of social patterns (social vulnerability). Other causes includes; lack of access to information and knowledge, lack of public awareness, limited access to political power and representation (political vulnerability), (Aysan,1993). When people are socially disadvantaged or lack political voice, their vulnerability is aggravated further. The economic vulnerability is related to a number of interacting elements, including its importance in the overall national economy, trade and foreign-exchange earnings, aid and investments, international prices of commodities and inputs, and production and consumption patterns

### 3.8.2 Constructs related to Livelihood diversification

- 1. Risk related diversification** - Fishing is an enterprise with high occupational risk. Many lives have impacted severely with their health status as the health risk factors are present in their occupational environment (Frantzeskou et al., 2012). Anderson et al. (2017) demonstrated that individuals in fisheries targeting a diversity of species and individuals who participate in multiple fisheries buffer income variability compared with less diverse individuals. The risk involved in the fisheries sector have been reviewed by Francis (2011). Kasperski and Holland 2013 claimed that there are two main ways fishermen can diversify their fishing revenues: by targeting different species or species groups within a region and by fishing in different regions.
- 2. Economic related diversification** - Catches and prices from various fisheries exhibit high interannual variability, leading to variability in the income derived by fishermen. The economic risk posed by this may be mitigated in some cases if individuals participate in several different fisheries, particularly if revenues from those fisheries are uncorrelated or vary asynchronously, which might not be happening in the current context (Kasperski and Holland, 2013). The considerable annual variation in income is an issue that is common to a variety of occupations dependent on natural resources, and there has been extensive study of income risk-coping mechanisms, particularly for fisherfolks in developing countries. As the cost of fishing has increased along with reduced catch, the fishing as a livelihood option is gradually faded in the community.
- 3. Psychological related diversification-** The deprived conditions in the fisher community have been acted as a barrier for the proposals and other alliances as they are considered as a marginalised community. Along with these, the tendency to conceal their identity etc have been included in this category (Kasperski and Holland, 2013).

### **3.8.3 Constructs related to Theeramythri**

- 1. Financial stability-** The financial development and improved access to banking and related services not only accelerate economic growth but also reduce income inequality and poverty. The research also observed that NGOs and Bankers actively participating in SHGs activities and encourage SHGs members to take part in income earning activities. With increased economic strength of members, the research generalized the result that there is a significant increase in repayment level of SHGs members in study area. (Uma and Rupa, 2013). The impact of microfinance on poverty is massive and displays the enormous potential in creating savings on the most unprivileged population. The increased income acquired by the Theeramythri members make them enable to live sustainably (Kumar, 2012).
- 2. Soft skill enhancement** - The opportunity while getting exposed with the people and society the participants gradually transforms themselves with more confidence to speak in public, handle situations more wisely, gain leadership qualities. This would also make them with strong interpersonal skills, improved decision making power, empathy along with self-awareness (NABARD, 2018).
- 3. Social security** - Small-scale fishers, and fish workers, generally lack access to social security as they are considered to be left out from the mainstream development. Kurien and Paul (2010) have attempted a clear picture on how the situations can be changed so as to bring the underprivileged fisherfolks to the mainstream with the support offered by the Government. In fact, they have an unmet need for social protection, both in terms of social assistance and social security and very few social protection programmes are specifically designed for the needs of fishers and fisheries-related workers.

### 3.8.4 Constructs related to women empowerment

- 1. Social factors** – Social factors include, the improved social connections, uplifted living standards and increase with cohesion with community. Scientists in the field generally agree on a few key factors that determine or influence empowerment. Another factor often considered a key element of empowerment is participation in economic activities. The control over possessions does not automatically lead to empowerment, but can be a catalyst for empowerment (Malhotra, et al., 2002). Without women's individual or collective ability to recognize and utilize resources in their own interests, resources cannot bring about empowerment (Malhotra et al., 2002). Sociological theory has highlighted the relationship between resource control and empowerment on a household level, but also observed at the socio-cultural environment for explanatory factors (Khan and Awan, 2011).
- 2. Political factors** - Need of active participation of women in government and politics is essential in order to maintain the balance of democracy, whereas global statistics clearly show that women are under-represented as leaders, elected officials, and voters due to cultural and social norms, which limit their participation in the political process (Sreeramulu and Hushenkhan 2008). The improvised confidence that they gained out of the involvement in the various political programs have made them more empowered to fight for their rights and gain leadership quality.
- 3. Economic factors** – The aim of microfinance schemes such as, Theeramythri is to enhance women's leadership through individual leadership skills development, tools for the promotion of citizens' participation and leadership in the community, as well as strategies related to women's economic empowerment (Alemu et al., 2018). Not only Theeramythri uplift the livelihood of low-income householders, they also empower their social and political lives. It is a very strong instrument of economic development, creating financial habits and unleashing entrepreneurial talents. The highly



improved financial transactions would have made them to capable of expanding their business and refined social cohesion.

4. **Legal factors** - The results point towards positive and significant impacts of microfinance participation on empowerment at the community level, which suggests that these programs offer an effective space for women to share information and raise awareness about their legal rights. This could in turn be harnessed collectively to negotiate more “room to maneuver” in the community (Alemu et al., 2018).
5. **Psychological factors**- Psychological traits like self-esteem and self-confidence are likely to improve after the involvement with the specific programs. Problem solving capacity can also be considered as a factor which determines the elevated Psychological traits (Bermio, 2020). The psychological traits that gains up on the access of the collective efforts of the fisherwomen (Rani and Radhika, 2014). While resources—economic, social, and political—are often critical in ensuring that women are empowered, they are not always sufficient.

### **3.9 Description of the study area**

Kerala has nine coastal districts with length of 590 km. The studies conducted in these areas have been summarised in the chapter two. The chapter describes the research design, methodology employed and study area selected in detail. All the nine coastal districts were considered as the first stage units. In the first stage, from all the nine, three districts were selected based on the number of landing centers, fisherfolks population, Theeramythri units and geography. There are 42 fishing villages in Thiruvananthapuram, 21 fishing villages in Ernakulam and 35 fishing villages in Calicut which means, out of the total 222 fishing villages in the state 43 percent are from these three districts. Marine fisher population is very high in Thiruvananthapuram and Calicut in the southern and northern districts. In Ernakulam the number of Theeramythri units are very high compared to other coastal districts. The selection of fishing villages as second stage units, four fishing villages from each of the three districts were selected. The study

assumed the households with a higher dependence on fisheries for income, nutrition, and employments are more sensitive to the vulnerabilities arises out of climate change, marginalization etc.

### **3.10 Data Sources and Types of data**

The study has depended largely on the primary information which was supplemented by the secondary information as and when required. The secondary information came from the data mining process by combing the published sources such as the papers released by the Government, at the Global, National and State level. Publications by the FAO and CMFRI, Economic reviews, Kerala Development reports are the sources which relayed apart from the journals periodicals and books. The primary information was collected from fishing communities through pre-structured tested schedules and by conducting focus group discussions and interviews.

### **3.11 Sampling Technique**

The multi-stage sampling method was employed in the study to collect data. The case study approaches have been used as it provides a deeper understanding of the situation in happening in the real life situations. The present study investigated the intrinsic relationships of vulnerability, livelihood diversification and women empowerment in an already impoverished community that depend solely at the environmental and social aspects. Out of the nine coastal districts in the State, three Districts separated with ample distance have been selected on the basis of marine fishermen population.

### **3.12 Methods of Data collection**

The interviewers sought verbal permission from all the respondents for interview surveys and also for the focus group discussion. The interview questions were read out to the respondent in regional language (Malayalam) and the response was written down by the interviewer. For Focus group discussions, the interviewer read out the questions and moderated the discussion. The whole discussion was audio recorded before transcribing to English.

This study is both empirical and exploratory in nature which is based on the primary and secondary data. For assessing the vulnerability and livelihood diversification 474 fishermen were selected from three spatially separated districts. The sample was represented from 12 fishing villages that lies apart (Figure 3.1). From each districts 158 fishermen were selected as the respondents. Demographic indicators of fishing families and fishing villages of districts in Kerala sharing coast of the Arabian sea where marine fishing activity is present is given (Figure 3.1).

### **3.12.1 Sample Selection**

The fishermen population of the state for 2015-16 is estimated as 10.24 lakh. Population of the state as per Census 2011 is 33.4 million. Hence the fishermen population is around 3.1 per cent of the state population. As per Central Marine Fisheries Research Institute (CMFRI) census (2010), out of total 3,288 numbers of marine fishing villages in India, 222 of them (7%) are in Kerala. Geographic location of the selected districts divides them into three zones, namely northern, central and southern zone.

Midst the sample districts, Thiruvananthapuram had the maximum number of fishing villages and Ernakulam, the least. The category 1, sample were selected on the basis of the number of active fishermen represented in the selected villages. In total, two types of samples have been selected for the study, which constituted 474 fishermen and fisherwomen totalling 948 respondents from the three districts. To analyse the enrolment of the fisherwomen in to the activities and other microenterprises, we have selected the females who have an active membership and participation in the Theeramythri project. We have selected 158 males from each three districts whereas 202 females were selected from Ernakulam, 160 from Kozhikode and 112 from Thiruvananthapuram. Data of participants from Thiruvananthapuram, Ernakulam and Kozhikode districts of Kerala were collected during the period from August 2014 to May 2019 (Table 3.1). Personal interviews with the officials of Theeramythri and SAF were also conducted to assimilate their views and to identify issues pertaining to the

objectives of the study. Secondary data has been gathered from books, journals, Government reports and documents, internet, and annual reports of Theeramythri projects etc.

**Table 3.1: The sample 1 pertaining to marine fishermen**

<b>Zone Districts</b>	<b>North Zone Kozhikode</b>	<b>Central Zone Ernakulam</b>	<b>South Zone Thiruvananthapuram</b>	<b>Total</b>
No. of fishing villages	35	21	42	98
No. of villages sampled	4	4	4	12
Active fishermen	1637	1454	2048	5139
Fishermen: Sample size	158	158	158	474

**Table 3.2: The sample 2 pertaining to Theeramythri members**

<b>Zone Districts</b>	<b>North Zone Kozhikode</b>	<b>Central Zone Ernakulam</b>	<b>South Zone Thiruvananthapuram</b>	<b>Total</b>
No. of fishing villages	35	21	42	98
No. of villages sampled	4	4	4	12
Total activity groups	113	153	94	360
Theeramythri units	40	50	29	119
Fisherwomen - Theeramythri members : each unit includes four members	160	202*	112#	<b>474</b>
Theeramythri members who were the spouse of fishermen -Sample1	73	105	66	<b>244</b>

Source: Survey data \*Two groups had five members # four groups had three members

### **3.12.2 Description on sample villages**

#### **3.12.2.1 Thiruvananthapuram District (Four villages)**

Thiruvananthapuram, the state capital of Kerala is one of the major administrative centre of the State. It attracts many national and international tourists due to its procession of properties such as museums, palaces, shrines, temples as well as the existence of natural scenic spots such as beaches and high rage picnic spots. Thiruvananthapuram has a population of 1, 42,464 fisherfolk, 42 fishing villages and 51 landing centres in its territory (Figure 3.1).

- a) **Karumkulam** - Karumkulam is a village in the situated at Thiruvananthapuram Athiyannoor Block in the Kerala State. As of 2011 India census, Karumkulam had a population of 27,331 with 13,769 males and 13,562 females. This village has reported with 375 fishermen families, of which 193 were BPL families.
- b) **Poovar** - Poovar is a tourist town in Neyyattinkara in the Thiruvananthapuram District. Pozhiyoor, the next village marks the end of Kerala as the village is the southern tip of Thiruvananthapuram. This village is reported with 963 fishermen families, of which a majority, a total of 961 were BPL families with a total population of 3721.
- c) **Valiathura** - Valiathura' is a suburb of Thiruvananthapuram, which was the once the only port along the South Kerala coast inaugurated in 1956. Valiathura is now considered as a fishing port which is famous for its pier. The 64-year-old, 214 m long pier and the warehouses behind it are noticeable, when up to 50 cargo ships used to anchor here at a time. This village has reported with 2069 fishermen families, of which 1573 were BPL families with a total population of 7830.

- d) Poonthura** village is situated in the suburbs of the district, harbours a population of about 10,000 people in about 2,000 families in an area of about 0.8 sq. km. Almost 86% of the families depend directly or indirectly on fishing for their livelihood. This village has reported with 569 fishermen families, of which 244 were BPL families which comprised of a population of 2,444 (Kerala Marine Fisheries Statistics 2015).

### **3.12.2.2 Ernakulam District (Four villages)**

Ernakulam District is considered to be an industrial capital of Kerala, due to the presence of numerous industries in the region. The district has the largest and busiest airport in the State. It also ranks top in the occurrence of Information Technology related companies along with some polluting industries. Ernakulam has a population of 42,083 fisherfolk, 21 fishing villages and 20 landing centres in its territory. The district ranks second in the marine production.

- a) Edavanakad** Edavanakad is a part of Vypin islands, which comes under the suburb of Cochin City. The Vypin - Munambam state highway passes through the village. Its western border is Arabian Sea, the eastern border is Vembanadu Lake, the northern border is Kuzhupilly village and the southern border is Nayarambalam village. This village has reported with 360 fishermen families, of which 216 were BPL families with a total population of 1987.
- b) Kuzhupilly-** Kuzhupilly is a suburb of Kochi city and a tourist destination in Vypin Island in Kerala, India. Kuzhupilly Beach is identified as a promising tourist spot in by the authorities. The beach beautification project is being implemented by the Government. This village has reported with 327 fishermen families, of which 194 were BPL families with a population of 1401 (Kerala Marine Fisheries Statistics 2015).

- c) **Nayarambalam** - This village is surrounded by Edavanakkad Grama Panchayat to the north, Narakkal Grama Panchayat to the south, the Arabian Sea to the west and Veeranpuzha to the east. Nayarambalam lies almost at the center of Vypin Island. Agriculture and fishing were conventionally the main sources of revenue for the people, but now most of the people depend on Cochin City, the nearest city on the mainland. This village has reported with 390 fishermen families, of which 245 were BPL families with a total of 1730.
- d) **Narakkal**- It is the centre of the Vypin Island and considered to be a prominent fishing village in the region. The village has a total of 440 houses and 518 households are living there. Among them, 83 households are landless or presently living as a joint family. Regarding the housing situation in the village, it is noted that 13.64 percent houses are pucca, 64.09 percent are semi-pucca and 22.27 percent houses are Kachha houses. About 80.68 percent of the existing houses in the village have sanitary toilets. Safe drinking water is available to 78.18 percent of the existing houses. Most of the houses in the village (85.23 %) are electrified. (Matsya Board 2018). This village has reported with 1005 fishermen families, of which 452 were BPL families with a total of 4394.

### **3.12.2.3 Kozhikode District (Four villages)**

Kozhikode is well known as a spot which has initiated the colonial connection after the landing of Vasco Da Gama. The District is famous for its trade links and support the state's economy with a large contribution of foreign currency from the Middle East. Kozhikode has a population of 82,129 fisherfolk, 35 fishing villages and 19 landing centres in its territory (Kerala Marine Fisheries Statistics 2015)..

- a) **Vellayil**- Vellayil is a beach on the northern side of Kozhikode city. The beach road from Chakkum Kadavu bridge runs all the way to Vellayil in the north. The facilities of the fisheries department and the Matsyafed

Corporation are situated in Vellayil. This village has reported with 251 fishermen families, of which 178 were BPL families with a total population of 1461.

- b) Puthiyappa** - Puthiyappa is an important fishing harbour of Kozhikode district within the city limits. There is a natural bay at Puthiyappa formed due to the protrusion of land into the sea. This village has reported with 608 fishermen families, of which 289 were BPL families with a total of 3645.
- c) Kappakkal**- It is the 54<sup>th</sup> ward of Kozhikode Municipality. It is a small fishing village coming under Kozhikode municipality which is south of Kozhikode beach. The beach is significantly wide bordered with coconut farms and houses of fishermen and is moderately populated. The Turtles visit this area for egg-laying and there is a report in 1972 that the largest turtle – the Leatherback had come to this place (Jayakumar and Dileepkumar 2004). This village has reported with 991 fishermen families, of which 551 were BPL families with a total of 7042.
- d) Thoppayil** – Thoppayil is another fishing village in Kozhikode districts which is listed as 67<sup>th</sup> ward of Kozhikode Municipality. This area is under threat of development and is called for stern action against the violators of the Coastal Regulation Zone Act and the people who undertook unauthorised constructions along the coastline. This village has reported with 334 fishermen families, of which 242 were BPL families with a total of 2414.



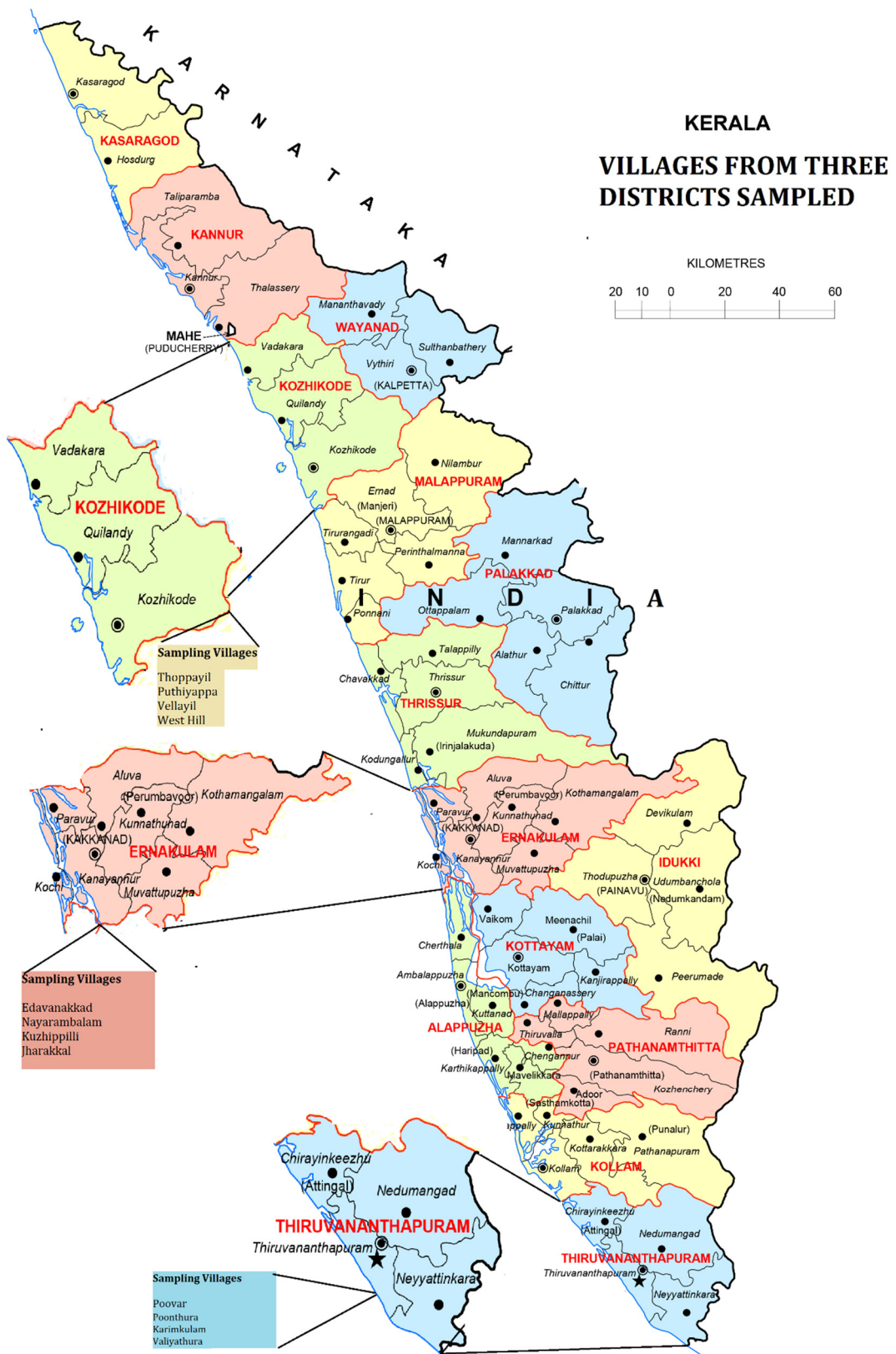


Figure 3.1: Map of Kerala showing the study sites

### 3.13 Method of Data Analysis and Interpretation

#### 3.13.1 Normality of data (distributional assumption)

The skewness and kurtosis values are examined to determine whether the variables in the data set are normally distributed or not. The values between -2 and +2 are considered normal (Civelek, 2018). In this study, all values of skewness and kurtosis were satisfied the recommended cut-off range. In addition, Kolmogorov-Smirnov test also conducted to test whether the data set is normally distributed or not (Sarstedt & Mooi, 2014).

**Table 3.3: Normality of data by Kolmogorov-Smirnov test**

SI. No	Constructs	Kolmogorov-Smirnov test		
		Statistic	df	Sig.
<b>(I) Vulnerability factors</b>				
1	Governance factors	0.018	474	0.200*
2	Fishery related factors	0.019	474	0.200*
3	Social Factors	0.021	474	0.200*
4	Economic Factors	0.011	474	0.200*
5	Poverty related factors	0.024	474	0.200*
<b>(II) Livelihood diversification factors</b>				
1	Risk related diversification	0.027	474	0.200*
2	Economic related diversification	0.028	474	0.200*
3	Psychological related diversification	0.026	474	0.200*
<b>(III) Theeramythri project factors</b>				
1	Financial Stability	0.022	474	0.200*
2	Soft skills Enhancement	0.020	474	0.200*
3	Social Security	0.029	474	0.200*
<b>(IV) Women empowerment factors</b>				
1	Economic empowerment	0.027	474	0.200*
2	Social empowerment	0.019	474	0.200*
3	Political empowerment	0.017	474	0.200*
4	Legal empowerment	0.021	474	0.200*
5	Psychological empowerment	0.025	474	0.200*

\* This is a lower bound of the true significance

It can be inferred that all P values of Kolmogorov-Smirnov test are greater than 0.05. It means that the data of each variable possess normal distribution properties (Table 3.3).

### **3.13.2 Tools and software packages used for data analysis**

To obtain the objectives one to four, such as to investigate the level of vulnerability, livelihood diversification, objectives of theeramythri and women empowerment among the fisherfolks in Kerala, Quartile deviation (Q1, Q2 & Q3), Percentage analysis and Chi-square tests are used. Quartile Deviation (by using percentile option) is used to convert data into three quarters that Q1, Q2 and Q3. Percentage analysis is used to measure the percentage of response contained in each quarter. Chi-Square test is employed for testing the significance of data distribution in each quartile. To measure the relative contribution of vulnerability, livelihood diversification, objectives of theeramythri and women empowerment among factors, mean rank and Chi-square test are employed in the form of the Friedman test. Mean rank is used to measure and compare the relative contribution of each vulnerability livelihood diversification, objectives of theeramythri and women empowerment among fisher folks Chi-Square test is adopted for testing the significance of the distribution of the mean ranks. To compare the significant difference of various demographic factors and factors of vulnerability, livelihood diversification, objectives of theeramythri and women empowerment mean scores, standard deviation, Levine's tests for homogeneity, independent t-test, Analysis of Variance (ANOVA) and Tukey's HSD tests are being used. IBM SPSS 21 Software package was employed for this purpose

The fifth objective of the study was to explore the effects of Theermythri project in reducing Vulnerability, Livelihood diversification of fisherfolks and enhancing the empowerment of fisherwomen in Kerala, Co-variance Based Confirmatory Factor Analysis (CB-CFA) and Co-variance Based Structural Equation Modelling (CB-CFA & SEM) techniques were employed. On the part CFA procedures, various validities and reliabilities of measurement instrument were established. For this purpose, Cronbach's Alpha reliability for measuring internal consistency,

measurement error adjusted correlation analysis, Average Variance Extracted (AVE), Composite Reliability (CR), CB-CFA & SEM fitness indices etc. were adopted. IBM SPSS AMOS 21 and MS excel Statistics tool packages etc. were used for this purpose.

### **3.14 Conclusion**

The first part of the chapter explained the constructs and concepts used in the study and provided an overview of the objectives. The second part portrayed the methodological aspects of the study and the process adopted for the selection of the study villages representing sample, sampling technique, tools used for data collection and subsequently justifies the methodological approaches are also evaluated. The following chapter will describe the vulnerability in the fisheries sector.

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## CHAPTER 4

# VULNERABILITY AMONG FISHERY-SECTOR – AN OVERVIEW

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- 4.1 Introduction
  - 4.2 The economic significance of the fisheries sector -World scenario
  - 4.3 Significance of Fisheries sector – Indian Scenario
  - 4.4 Coastal fishing communities in Kerala
  - 4.5 Fishery-Based Livelihood and Vulnerability
  - 4.6 Environmental factors
  - 4.7 Legal Factors
  - 4.8 Socio-Economic Conditions
  - 4.9 What drives the vulnerability?
  - 4.10 Conclusion
-

## 4.1 Introduction

The world is confronting perhaps the biggest challenge – how to take care of more than nine billion individuals by 2050 out of a set of environmental change, monetary and budgetary vulnerability, invading pandemic, and growing competition for natural resources. To curb this, the international community has committed with UN and the 2030 Agenda sets aims for the contribution and conduct of fisheries and aquaculture towards food security and nutrition in the use of natural resources to ensure sustainable development in economic, social, and environmental terms.

Since the late 1980s, the capture fishery production is relatively static and aquaculture has made an impressive growth and satisfied human consumption. However marine fish production is reduced to manifolds due to several environmental and governance factors across the globe. This chapter will bring an overview of the marine production, number of people engaged in fishing across the world, India and Kerala. Contribution of marine fisheries to the world economy have been briefly discussed. Later a discussion is placed on why fisheries in Kerala have considered as an outlier of Kerala Model of development.

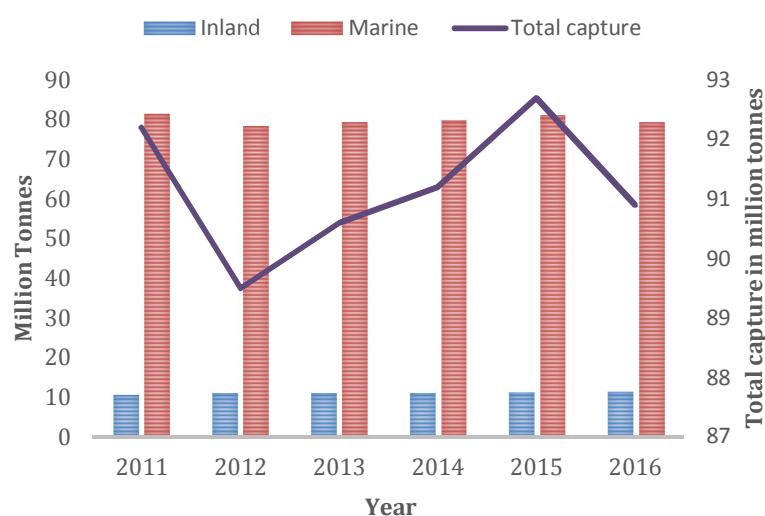
## 4.2 The Economic significance of the fisheries sector- World scenario

In 2014 Global absolute catch fishery creation was 93.4 million tons, of which 81.5 million tons originated from marine waters and 11.9 million tons from inland waters. At the point when the territory concerned, the Northwest Pacific remained the most gainful zone for catch fisheries, trailed by the Western Central Pacific, the Northeast Atlantic and the Eastern Indian Ocean (FAO, 2016).

### 4.2.1 World marine capture production

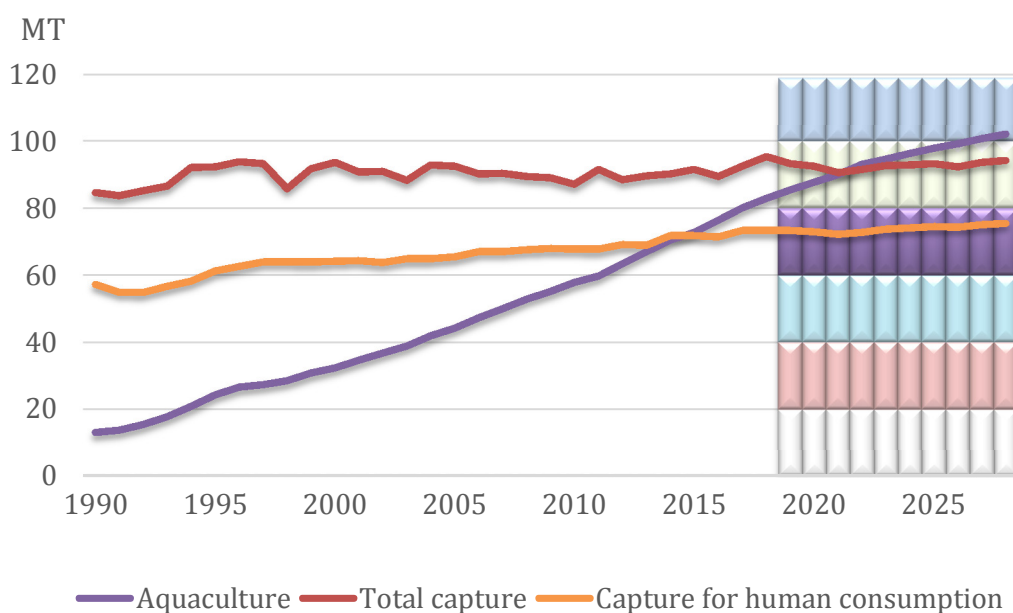
FAO in 2016 observed that total capture production in marine waters was 81.5 million tonnes in 2014, with a slight increase in the previous two years. Though, the global trend in marine fisheries is usually analyzed by removing catches of anchoveta. There has been a meagre successive growth in the catch of

inland fisheries from 2011 to 2016. It was 10.7 MT in 2011 and this has increased to 11.6 MT, in 2016 (Figure 4.1). In the case of marine fisheries captures, in 2011 and 2016 showed a decreasing trend over the years, as it has decreased from 81.5 to 79.3 MT (FAO 2018). The same pattern has reflected in the total capture production also, with a fluctuating trend, from 92.2 to 90.9 MT during the period 2011 to 2016 (Figure 4.1).



**Figure 4.1: Contribution of inland and marine to the total fish production (Million Tonnes) Source- © OECD 2019**

Globally the fish consumption has increased from an average of 9.9 kg in the 1960s to 14.4 kg in the 1990’s and in 2013 there was an increase of 19.7 kg it is touched in 20 kg in 2015. There is an increase in the growth of the global supply of fish for human consumption outpaced with the growth of population at an annual rate of 3.2 percent in the period 1961 to 2015 (Figure 4.2). The projected fish consumption has also calculated and found that, it would not be as exponential as the projected population. In the predicted model, a considerable increase in the aquaculture sector has demonstrated and it is expected to cater to the future demand for the fisheries (Source- OECD-FAO Agricultural Outlook 2019-2028 - © OECD 2019)



**Figure 4.2: World aquaculture and capture fisheries**

#### 4.2.2 Fisheries sector as an Employment Provider

Concerning as an employment provider, the statistics indicate that 59.6 million people were engaged (on a full-time, part-time or occasional basis) in the primary sector of capture fisheries and aquaculture in 2016 such as 19.3 million in aquaculture and 40.3 million in capture fisheries. It is estimated that nearly 14 percent of these workers were women. (FAO, 2018). Total employment in the primary sector showed a generally upward trend over the period 1995–2010, partly influenced by improved estimation procedures, and then levelled off. The proportion of those employed in capture fisheries decreased from 83 percent in 1990 to 68 percent in 2016, while the proportion of those employed in aquaculture correspondingly increased from 17 to 32 percent (FAO, 2018) (Table 4.1)



**Table 4.1: World employment for fishers and fish farmers by region (in thousands)**

Year	Region						Total
	Africa	Asia	Europe	Latin America & The Caribbean	North America	Oceania	
1995	2392	31296	530	1503	382	212	36315
2000	4175	39646	779	1774	346	126	46846
2005	4430	43926	705	1907	329	122	51419
2010	5027	49345	662	2185	324	124	57667
2011	5250	48926	656	2231	324	128	57515
2012	5885	49040	647	2251	323	127	58273
2013	6009	47662	240	2433	325	47	56716
2014	5674	47730	394	2444	325	46	56613
2015	5992	50606	455	2482	220	343	60098
2016	5671	<b>50468</b>	445	2466	218	342	59610

Source: FAO 2018

In 2016, 85 percent of the global population engaged in the fisheries and aquaculture sectors was in Asia, followed by Africa (10 percent) and Latin America and the Caribbean (4 percent) despite a slight decrease in the number of fishers in comparison with 2015. Employment in aquaculture was concentrated primarily in Asia (96 percent of all aquaculture engagement), followed by Latin America and the Caribbean and Africa. (FAO, 2016).

It is observed that gender-wise discrimination for employment in the marine fishery varies significantly among countries and regions (Table 4.2). It was reported that, the maximum number of women and men in employment with 15 percent and 78 percent were in Asia (Table 4.2). While comparing with men it is clear that, the participation of women in the fisheries have found to below.

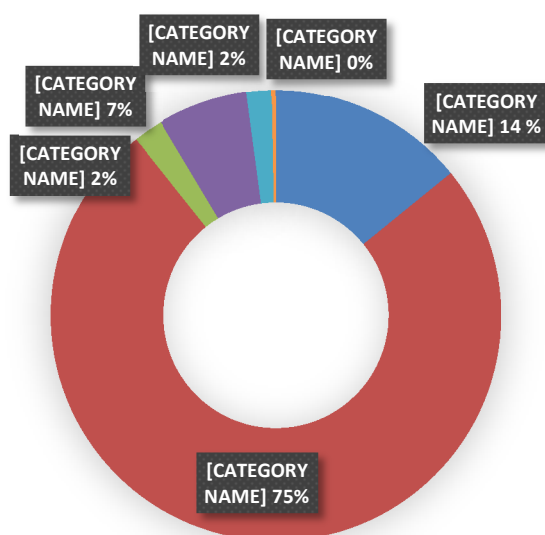
**Table 4.2: Gender wise distribution of employment 2016 (in thousands, parenthesis shows percent)**

Region	Women	Men	Unspecified
Africa	585.1 (11)	4249.3 (79)	532.6 (10)
Latin America & The Caribbean	394.4 (19)	1383.6 (66)	306.7 (15)
North America	0.1 (0)	37.9(18)	171.1 (82)
Asia	4843.9 (15)	25020.5(78)	2125.2 (7)
Europe	6.4 (2)	115.3(33)	232 (66)
Oceania	49.1 (15)	150(45)	134.7 (40)

Source: FAO, 2018

### 4.2.3 An estimate of the global fleet and its regional distribution

About 4.6 million fishing vessels are scanning the sea with their equipment to grab the fish wealth as per the estimate of FAO (2018). Asia ranked first with a share of 75 percent of the global fleet, with a whopping figure of 3.5 million vessels which was followed by Africa (15 percent), Latin America and the Caribbean (6 percent), North America (2 percent) and Europe (2 percent) (Figure 4.3).

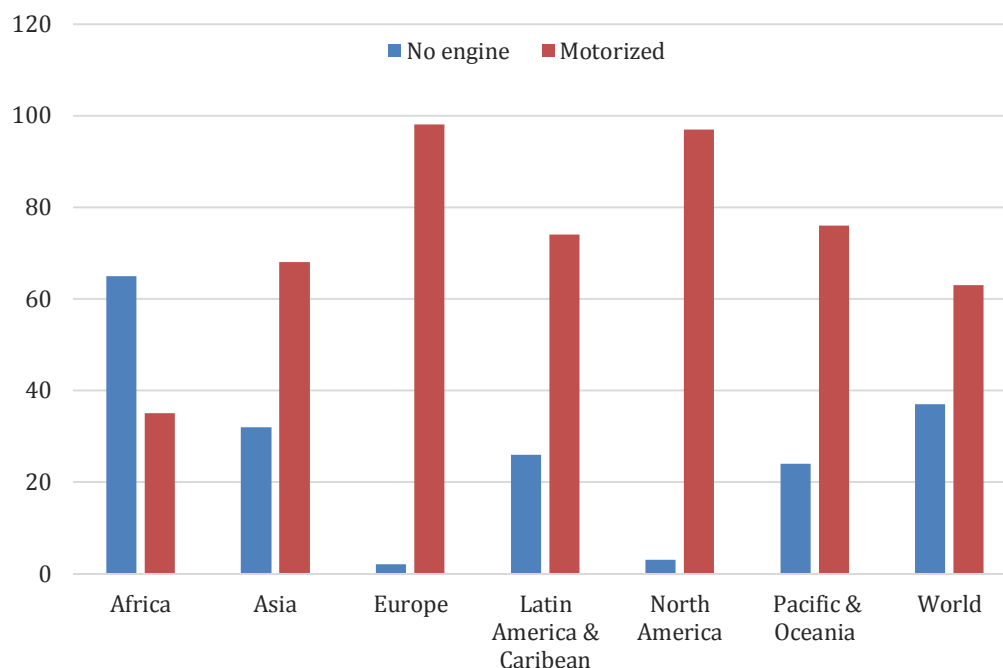


Source: FAO, 2018

**Figure 4.3: Global fleet and its regional distribution**

#### 4.2.4 The proportion of fishing vessels with and without engine

As per the data in 2014, globally, 64 percent of reported fishing vessels were engine-powered in 2014, of which 80 percent were in Asia, with the remaining regions all under 10 percent each (Figure 4.4.)



Source: FAO 2018

**Figure 4.4: Regional distribution and proportion of motorized and non-motorized vessels**

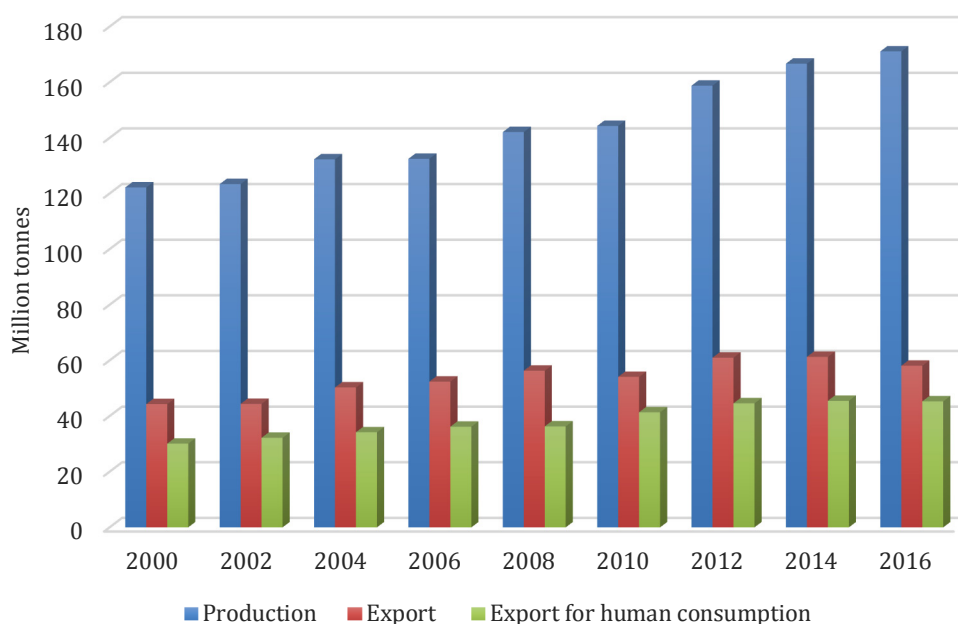
The motorized fishing fleet showed a clear correlation towards the development of the nation and region as the developed regions such as Europe (98 percent) and North America (97 percent) had the highest number of motorized fishing vessels. In the case of the number of fishing vessels, the top tanked region Asia had 32 percent non-motorized fishing vessels. The motorized fleet is dispersed unequally around the world; Asia has 68 percent of the reported motorized fleet, while the remaining all other regions share the rest as per the

evaluation conducted in 2016. In the world 37 percent were non-motorized fishing vessels and 63 percent motorized fishing vessels.

Although there has been a drastic increase in the number of vessels and technologies involved in the fishing and related activities, the state of the world's marine fish stocks has not enhanced overall, except a few notable progress in some areas. Based on FAO's (2018) analysis of assessed commercial fish stocks, the share of fish stocks within biologically sustainable levels has decreased from 90 percent in 1974 to 68.6 percent in 2013. Thus, 31.4 percent of fish stocks were estimated as fished at a biologically unsustainable level and therefore overfished which is a concern worldwide. Steadily, the percent of stocks fished at biologically unsustainable levels increased, especially in the late 1970s and 1980s, from 10 percent in 1974 to 26 percent in 1989. After 1990, the number of stocks fished at unsustainable levels continued to increase, although more slowly. The ten most-productive species accounted for about 27 percent of the world's marine capture fisheries production in 2013. However, most of their stocks are fully exploited with no potential for upsurges in production; the remainder is overfished with increases in their production only possible after successful stock restoration.

#### **4.2.5 International Trade and Fisheries**

International trade is accountable as a major player in the fisheries and aquaculture sector as an employment creator, food supplier, income generator, and contributor to economic growth and development, as well as to food and nutrition security. The seafood and related value-added products are one of the most significant universally traded items which contribute largely as a foreign exchange earner of the world food sector, with about 78 percent of seafood products. This would fuel the economy of many developing nations too.



**Figure 4.5: World Fisheries Production and Quantities Destined for Export**

While analysing the data from 2000 to 2016, it is evident that the production of fish has shown an increase at a diminishing rate (Figure 4.5). In 2000 it was 122.2 which was increased to 171.1 million tons. In the case of export, there has been a report of ups and downs in the export. In 2012 the export was 61 million tons which were decreased to 58.1 in 2016. The export for human consumption has also shown a similar pattern, increasing at a constant rate.

#### 4.2.6 Top ten exporters and importers of fish and fish products

While scrutinising the data on the top ten exporters of the fish and fish products of the world, it can be inferred that, China grabs the share of 10.4 percent of the global share in 2006 which was raised to 14.1 in 2016. Norway ranks second with 6.4 percent which was increased to 7.6 percent in 2016. Whereas India ranked only as sixth by holding a share of 2 percent in 2006 which was doubled in another ten years with 3.9 percent in 2016 (Table 4.3). China is the chief fish producer and since 2002 has also been the leading

exporter of fish and fish products, although they represent only one percent of its total merchandise trade.

**Table 4.3: Top ten exporters of fish and fish products** (FAO Fisheries and aquaculture, 2018)

Country	2006		2016	
	Value (million USD)	Share %	Value (million USD)	Share %
China	8968	10.4	20131	14.1
Norway	5503	6.4	10770	7.6
Vietnam	3372	3.9	7320	5.1
Thailand	5267	6.1	5893	4.1
Unites States	4143	4.8	5812	4.1
<b>India</b>	<b>1763</b>	<b>2</b>	<b>5546</b>	<b>3.9</b>
Chile	3557	4.1	5143	3.6
Canada	3660	4.2	5004	3.5
Denmark	3987	4.6	4696	3.3
Sweden	1551	1.8	4418	3.1
Subtotal	41771	48.4	74734	52.4
Rest of World	44523	51.6	67796	47.6
World total	86293	100	142530	100

As a consumerist country the USA ranks top with a share of 15.5 percent in the import of Fish and Fish Products, followed by Japan with 15.4 percent in 2006. In 2016 also they kept the same ranking, but the share percent for Japan has decreased as one third. Interestingly despite China is one of the chief fish producers and exporter they also import fish and fish products to cater to their massive demand of the bulk population (Table 4.4).

**Table 4.4: Top Ten importers of Fish and Fish Products**

Country	2006		2016	
	Value (USD)	Share %	Value (USD)	Share %
USA	14058	15.5	20547	15.1
Japan	13971	15.4	13878	10.2
Spain	6359	7	7108	5.2
China	4126	4.5	8783	6.5
France	5069	5.6	6177	4.6
Germany	4717	5.2	6153	4.5
Italy	3739	4.1	5601	4.1
Sweden	2028	2.2	5187	3.8
Republic of Korea	2753	3	4604	3.4
United Kingdom	3714	4.1	4210	3.1
Subtotal	60533	66.6	82250	60.7
Rest of the World	30338	33.4	52787	39.3
World Total	90871	100	135037	100

Source: FAO 2018

The root causes of the backwardness of the fishing sector, are associated with some factors such as the risk in the harvesting nature of the production process; the high perishability of the product; the relatively higher capital investment needed for harvesting, and the associated higher risks; the relative isolation of workspace from mainstream society; and the dangerous nature of the business and the uncertainties associated with the state of resources, which create fears and vulnerability. All these factors contribute significantly to fishery's dependence on intermediaries. These intermediaries are in a position to take advantage of fishers throughout the whole food chain. This dependence can easily trap fishing communities in a web of exploitative relationships. The issue then is how fishers can improve and sustain their livelihoods by working together more effectively to conserve the resources, better manage their fishing and post-harvest operations, and optimize their long-term gains.

It was noted that, the world total marine catch was 81.2 million tonnes in 2015 which has dropped to 79.3 million tonnes in 2016, representing a decrease of almost 2 million tonnes. Decreasing catches affected 64 percent of the 25 top producer countries, but only 37 percent of the remaining 170 countries.

To summarise the data presented above, it can be observed that the overall in the world inland and aquaculture fisheries are emerging with a productive trend. Asia had the highest proportion of the fishing fleet with a high dependence on the fisheries for employment. It is observed that only 68 percent of the people are only having the facility of the motorized fishing facility. The worldwide export of fish and fish products is observed as diminishing over the last decade.

### **4.3 Significance of Fisheries sector – Indian Scenario**

India is identified as the second-largest fish producing country in the world accounting for 6.56 percent of global production. With over 5.37 percent to the agricultural Gross Value Added (GVA), fisheries, and aquaculture it remains to be a primary source of food, nutrition, income, and livelihood to millions of people and is contributing to 1 percent to the nation's GVA. About 160 lakh people have been provided with a livelihood in this sector. Rural populations in the developing world have been supported by the Fisheries and aquaculture that was found to be an important source of food, nutrition, employment, and income for millions. It is to be noted that, the sector not only provides livelihood to about 16 million people at the primary level but also almost twice the number along the value chain. As a rich source of animal, protein fish is an affordable and healthiest options to alleviate hunger and nutrient deficiency, sustained and focused attention must be given to the fisheries sector through policy and financial support to accelerate its development in a sustainable, responsible, comprehensive and equitable manner.



The country has a long coastline of 8118 km and equally large area under estuaries, backwater, lagoons, etc., conducive for developing capture as well as culture fisheries with the declaration of the Exclusive Economic Zone (EEZ) in 1977, an area of 20.02 million sq km, (comprising of 0.86 million sq. km on the west coast, 0.56 million sq. km on the east coast and 0.60 sq.km around the Andaman & Nicobar Island) has come under our jurisdiction with the absolute right of exploring, exploiting and natural utilization of living resources falling within it.

India positioned in the seventh position for marine fish production in the world. The sector supports nearly 3.79 million fisher population, that provide export earnings to the tune of 30,000 crore rupees and offer employment to about one million fishers. The coastline of the mainland is composed of nine maritime states and two union territories. Sustained marine fish production from the sea can be ensured only if the harvest is made judiciously through management and control. The Central Marine Fisheries Research Institute (CMFRI) is mandated to monitor the marine fishery resources by estimating the quantity of marine fish harvested and derive management measures to keep the harvest at a sustainable level for each of the commercially important marine fishery resources.

#### **4.3.1 Population of fisherfolk**

There were 3,288 marine fishing villages distributed among the nine maritime states and the union territories out of which 456 were in Maharashtra, 573 were in Tamil Nadu and 555 were in Andhra Pradesh (Marine fisheries census 2015). In the country Gujarat has the longest coastal length followed by Tamil Nadu, Andhra Pradesh, Maharashtra, and Kerala holding the fifth rank. An observation is that Andhra Pradesh has got 1, 63,427 families and Kerala has got 1, 18,937. But their fisherfolks population is more or less similar with numbers as 605428 and 610165 respectively (Table 4.5).

**Table 4.5: Profile of the State and UT's in India**

State/UT	Coastal length (km)	Landing Centres	Fishing Villages	Fishermen Families	Traditional fishermen families	BPL Families	Fisherfolks population
West Bengal	158	59	188	76981	53532	48870	380138
Odisha	480	73	813	114238	87541	56279	605514
Andhra Pradesh	974	353	555	163427	161039	159101	605428
Tamil Nadu	1076	407	573	192697	185465	127245	802912
Puducherry	45	25	40	14271	14248	10998	54627
Kerala	590	187	222	118937	116321	65459	610165
Karnataka	300	96	144	30713	28533	23624	167429
Goa	104	33	39	2189	2147	489	10545
Maharashtra	720	152	456	81492	74203	15509	386259
Gujarat	1600	121	247	62231	59469	15784	336181
Daman &Diu	21	5	11	7374	7181	333	40016

Source: Marine fisheries census 2015

Among the marine fishermen population 33.6 percent were adult males, 31.9 percent adult females, 5.6 percent male children up to 5 years of age, 5.2 percent female children up to 5 years of age, 12.7 percent male children above 5 years of age and 11.0 percent were female children above 5 years of age (Table 4.6). The overall sex ratio was 928 females per 1000 males and this was below thousand for all the maritime states. The sex ratio was maximum in Puducherry (982) and minimum in West Bengal (865).

**Table 4.6: Population distribution structure in India**

State/UT	Male			Female			Total	Sex ratio
	Adult	Children		Adult	Children			
		Up to 5yrs	above 5yrs		Up to 5yrs	Above 5yrs		
West Bengal	123511	28302	51961	108894	25252	42218	380138	865
Odisha	187546	48581	83824	167851	43378	74334	605514	893
Andra Pradesh	191136	30105	90284	190888	29846	73169	605428	943
Tamil Nadu	286158	34879	93130	271774	33908	83063	802912	939
Puducherry	17695	2983	6877	18290	2792	5990	54627	982
Kerala	220602	27649	62139	215820	27676	56279	610165	966
Karnataka	63301	8147	15928	58254	7311	14488	167429	916
Goa	4292	435	751	3987	378	702	10545	925
Maharashtra	134403	15756	47601	132013	15327	41159	386259	953
Gujarat	102281	22152	50994	96097	20937	43720	336181	916
Daman &Diu	12381	2550	5598	12354	2292	4841	40016	949
Total	1343306	221539	509087	1276222	209097	439963	3999214	928

Source: Marine fisheries census 2015

\*females per thousand males

### 4.3.2 Educational Status

In India about 57.8 percent of the fisherfolks were educated with different levels as approximately 15.0 percent of the males and 13.9 percent of the females had primary level of education. Around 13.2 percent of the males and 10.9 percent of the females completed higher secondary level. Closely 2.7 percent of the males and 2.0 percent of the females had above the higher secondary level of education. Among the fisherfolks about 42.2 percent were uneducated of which 21.0 percent were males and 21.2 percent females (Table 4.7). The percent of uneducated among marine fishermen was as high as 65.7 percent in Andhra Pradesh. The percent of educated fisherfolks was maximum for Goa (86.0 percent) followed by Kerala (72.5 percent).

**Table 4.7: Educational Status of the fishermen in India**

State/UT	Primary		Higher Secondary		Above Higher Secondary		Unschoolled	
	Male	Female	Male	Female	Male	Female	Male	Female
West Bengal	70102	63924	37269	26470	3082	885	65019	59833
Odisha	88860	79386	49467	36223	12550	5829	120493	120747
Andhra Pradesh	52880	47117	39571	30016	12101	5370	176868	181554
Tamil Nadu	109608	98238	107131	98204	25474	23606	137075	134789
Puducherry	5992	5933	8277	7269	2291	1537	8012	9541
Kerala	93580	88601	95764	90482	16171	17662	77226	75354
Karnataka	21984	20828	22492	18274	8217	6205	26536	27435
Goa	1429	1452	2445	1945	621	473	548	819
Maharashtra	51006	53391	68723	51535	12235	8808	50040	59438
Gujarat	35427	30906	32174	23266	4157	2045	81517	83600
Daman & Diu	5662	5025	6470	5459	1086	522	4761	6189
<b>Total</b>	<b>5,36,530</b>	<b>4,94,801</b>	<b>4,69,783</b>	<b>3,89,143</b>	<b>97,985</b>	<b>72,942</b>	<b>7,48,095</b>	<b>7,59,299</b>

Source: Marine fisheries census 2015

### 4.3.3 Occupation profile

It was reported that 37.8 percent of the marine fisherfolks were engaged in active fishing with 83.4 percent of them having full-time engagement. About 2.4 percent of the fisherfolks were engaged in fish seed collection of which 54.4 percent were fulltime and 45.6 percent part-time. Tamil Nadu accounted for the maximum number of dynamic fishermen (21.6 percent) followed by Odisha (16.4 percent) and Andhra Pradesh (15.2 percent). Among the maritime states, Goa had the bare minimum contribution towards active fishermen (0.2 percent).

Nearly 57.4 percent of the fisherfolks engaged in fish seed collection were females and 42.6 percent males (Table 4.8). Among the fisherfolks engaged in fishing and allied activities, 36.5 percent were engaged in the marketing of fish, 32.6 percent were working as labourers and 14.2 percent were engaged in making and repairing the net. Nearly 81.8 percent of the fisherfolks engaged in the marketing of fish were women. Fisherfolks engaged in marketing of fish was

maximum in Maharashtra (20.6 percent) followed by Andhra Pradesh (17.6 percent), Tamil Nadu (16.8 percent) and Odisha (14.6 percent). Fisherfolks engaged in making and repairing of the net was maximum in West Bengal (21.2 percent) followed by Odisha (20.6 percent) and Maharashtra (16.7 percent). Among the fisherfolks engaged in curing and processing maximum was in Andhra Pradesh (16,848; 31.5 percent) followed by Maharashtra (17.9 percent) and Odisha (15.9 percent). Among the fisherfolks engaged in peeling maximum was in Kerala (31.0 percent) followed by Maharashtra (20.5 percent) and Gujarat (14.4 percent); Fisherfolks engaged as labourer was maximum in Andhra Pradesh (32.2 percent) followed by Maharashtra (14.5 percent) and Odisha (13.9 percent) (Marine fisheries census 2015).

**Table 4.8: Active fisherfolks in India**

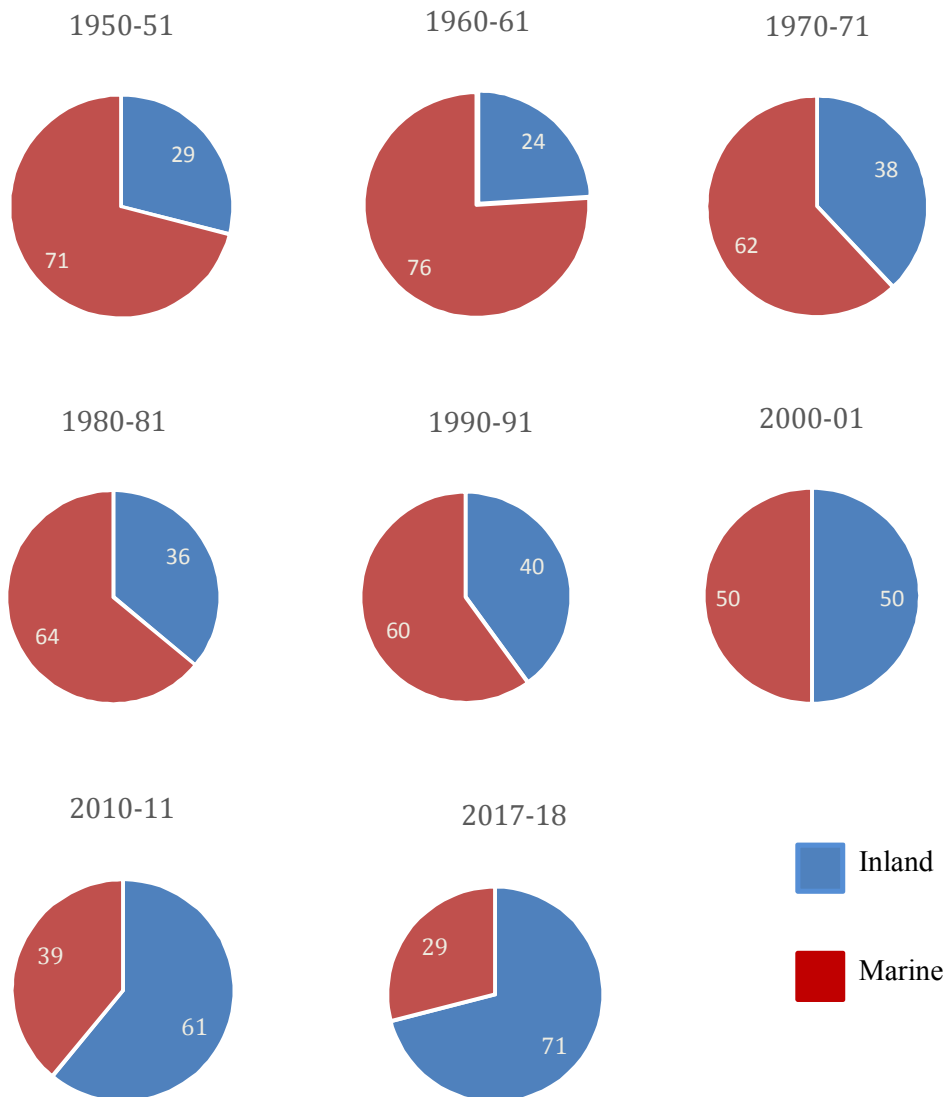
State/UT	Actual Fishing		Fish Seed Collection				Total
	Full time	Part time	Full time		Part time		
			Male	Female	Male	Female	
West Bengal	55511	24744	3211	2792	2111	6914	95283
Odisha	99972	35609	5162	10173	3252	8243	162411
Andhra Pradesh	127837	19373	1145	463	1317	733	150868
Tamil Nadu	198856	13078	1563	140	124	303	214064
Puducherry	11510	668	4	17	1	9	12209
Kerala	130922	10582	2090	901	328	573	145396
Karnataka	32037	6657	948	560	128	426	40756
Goa	1505	865	0	0	0	0	2370
Maharashtra	62614	11414	433	286	660	938	76345
Gujarat	65002	10983	3532	775	762	1847	82901
Daman & Diu	6042	1339	28	21	27	23	7480
<b>Total</b>	<b>7,91,808</b>	<b>1,35,312</b>	<b>18,116</b>	<b>16,128</b>	<b>8,710</b>	<b>20,009</b>	<b>9,90,083</b>

Source: Marine fisheries census 2015

#### 4.3.4 Contribution of Inland and marine fisheries

While comparing the inland fisheries and the marine fisheries, it was with only a small portion (29 percent) was occupied for inland fisheries and after 2017 the situation was reversed as the marine fisheries share was converted to 29

percent. As observed elsewhere in the World a gradual shift in the dependence of Mainland fisheries leaving behind the marine fisheries has been observed (Figure 4.6). This may be attributed to the effects of climate change and other anthropogenic activities.

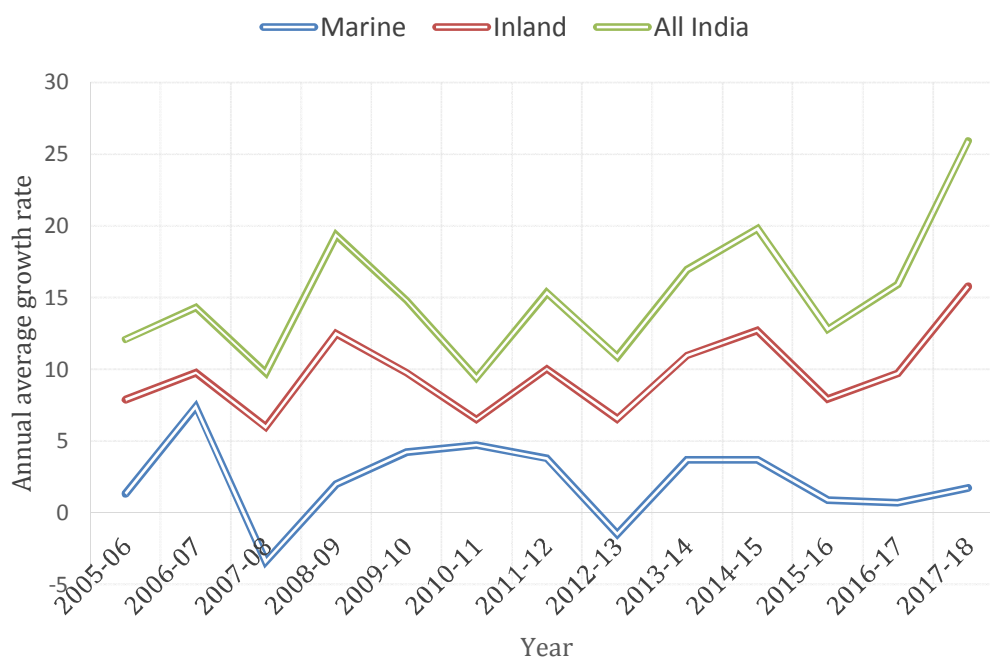


Source: Handbook on fisheries statistics 2018

**Figure 4.6: Contribution of inland and marine fisheries over the different Time Span**

### 4.3.5 Fish Production during recent years

It is observed that the annual average growth rate of total fish production in 2017-18 was 10.14 percent with a contribution of 14.05 percent from the inland sector and 1.73 percent from the marine sector. From 2005 to 2018 we could record several erratic patterns that were observed in the fish production over the past two decades, with four notable decreases in the inland fisheries and two notable decreases in the case of marine fisheries (Figure 4.7).



Source: State Governments/Union Territory Administration

**Figure 4.7: Fish Production during 2005-2018**

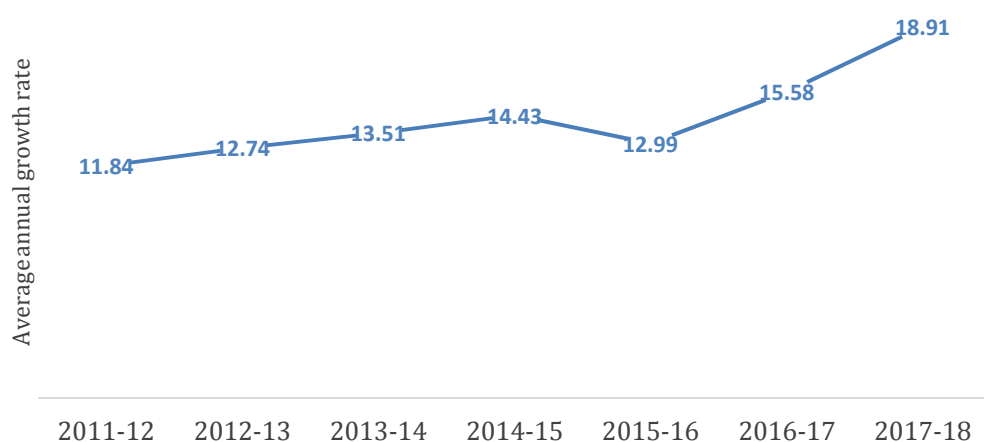
In India, Inland fish production constitutes more than 68 percent of the total fish production and the annual growth rate of production has also reported being high as the growth rate was 8.99 percent in 2016-17. However, marine fish production has increased during recent years, the growth rate is marginal during the past few years.

### 4.3.6 Contribution of Fisheries sector to GDP

Fisheries sector ranks high concerning the contribution towards the national economy as they provide a livelihood to approximately 8.14 lakh fishermen families in the country. The fisheries sector contributes to the GDP of India by around one percent. Whereas the share of fisheries in the GDP from Agriculture, Forestry, and Fishing is 5.5 percent. The sector not only fuels the economy but also promotes employments in various allied industries and thereby growth. It also brings a lot of foreign exchange and very nourishing. Contribution to the GDP from the Fisheries is found to be decreasing from 2005 to 2012. There is a slight increase from 2012 to 2014. In 2016-17 it was 0.92 and again it was decreased to 0.91 during the period 2017-18.

### 4.3.7 Export Performance of Fish and Fish products

India contributed 37,871 crores in the financial year 2016-17, as the exports from the fisheries sector, which is about 0.92 percent of all-India Gross Value Added (GVA) and 5.23 percent of the agriculture GVA (2015-16). India is the third major fish producing nation in the world, with a stake of 5.4 percent of global fish production. In aquaculture India ranks second in the world after China (Figure 4.8).



**Figure 4.8: Average annual growth rate of export of fish and fish products**



The annual growth rate of the export of fish and fish products was found to be increased from 2011 to 2018, except in the year 2015. It was only 12.99 whereas in the year 2018 it was reported as 18.91.

Even if India, is the third-largest producer of fish and the second-largest producer of Inland fisheries, the contribution from fisheries to total GDP and the agricultural GPD is not substantial. Within a period of seven decades the inland fisheries and marine fisheries contributions have swapped. As the majority of the people have been depending on the marine fisheries, whatever happens in the sustainability of marine fisheries will also affect the livelihood of the poor fishers.

#### **4.4 Coastal fishing communities - Kerala scenario**

The coast of Kerala constitutes approximately 10 percent of India's entire coastline. Kerala ranks quite high in terms of the overall development index in the world, with the only exception of the fisher and tribal community. With a vast coverage of 590 km of coastal area in nine coastal districts, 222 fishing villages, and 187 landing centres in the region along with an exclusive economic zone (EEZ) of 2,18,536 Sq Km contribute quite largely to the nation's development. It is estimated that about eight lakh people make their livelihood from capture and allied works in marine fisheries in the fishing villages situated along the coastline of the state. The marine districts of Kerala are Thiruvananthapuram, Kollam, Alappuzha, Ernakulam, Trissur, Malappuram, Kozhikode, Kannur, Kasaragod. In addition to this, the state is adorned with 44 rivers, 49 reservoirs, nine freshwater lakes, more than 65,000 hectares of brackish water, more than 46,000 hectares of backwaters, and several ponds, irrigation tanks, streams, etc, which contribute a rich resource of inland production. The maximum coastline being shared by Alleppey and Kannur (82 Kms).

##### **4.4.1 District Profile**

Out of the 222, marine fishing villages wherein fishermen reside, the maximum number was in Thiruvananthapuram district (42) and the minimum was in Kannur district (11). The number of fishing villages in the remaining districts

varied between 16 and 35. Of the 187, the total number of marine fish landing centres, 51 belonged to Thiruvananthapuram district. Malappuram district the minimum number of landing centres (11). Thiruvananthapuram was reported with the highest marine population followed by Malappuram and Alappuzha while Thrissur was with the lowest fishermen population. In Kerala 1,18,937 fishermen families, 98 percent belonged to traditional fishermen of which 65,459 (55 percent) families were below the poverty line (Table 4.9).

**Table 4.9: District wise distribution of fisherfolks population of Kerala**

District	Marine				Inland				Marine & Inland
	Male	Female	Children	Total	Male	Female	Children	Total	Total
Thiruvananthapuram	64212	56673	50350	171235	453	528	453	1434	172669
Kollam	40500	33648	20271	94419	13716	12917	8262	34895	129314
Pathanamthitta	0	0	0	0	946	822	383	2151	2151
Alappuzha	53335	48721	28370	130426	25381	24302	13177	62860	193286
Kottayam	0	0	0	0	9993	9470	5848	25311	25311
Idukki	0	0	0	0	272	272	173	717	717
Ernamkulam	29123	27267	17226	73616	24060	23556	17156	64772	138388
Thrissur	21023	21589	14200	56812	8041	7367	4669	20077	76889
Palakkad	0	0	0	0	876	867	885	2628	2628
Malappuram	36244	28889	26086	91219	1836	1602	864	4302	95521
Kozhikode	39571	34282	26168	1000211	4242	4462	3461	12165	112186
Wayanad	0	0	0	0	78	84	76	238	238
Kannur	19551	10129	8727	38407	2461	2602	1390	6453	44860
Kasaragod	17800	16393	9817	44010	418	392	188	998	45008
Total	321359	277591	201215	800165	92773	89249	56985	239007	1039172

Source: Economic review 2019 Volume 2

While considering the average number of families in a village it was with 536, with 2,748 persons per village. The average family size was 5.1 with a maximum of 6.6 in Kasaragod and Malappuram districts. Whereas adult males constituted 36 percent, adult females 35 percent and children 29 percent of the marine fisherfolks population in Kerala and women formed 49 percent of the

population, and the female to male ratio was 966 for 1000 males. This ratio was maximum in Kasaragod district (1007) and minimum in Kollam (935) district.

#### 4.4.2 Active marine fishermen population in Kerala

It is evident from the data that the number of active fishermen who are in the fishing field is diminishing at an alarming rate in six districts. Thiruvananthapuram ranks first in terms of the number of active fishermen, but only 30 percent of them are coming to active fishing. In Malappuram out of 89365 population 35 percent have actively participated in the fishing. While comparing across the years, out of nine coastal districts Kannur only has shown a nominal increase in the number of active fishermen (Table 4.10). Of the 1, 45,396 active fishermen 1, 30,922 were employed as fulltime fishermen, 10,582 were part-time and the rest engaged in fish seed collection. About 46 percent of fisherfolks excluding children, were occupied with active fishing (33 percent) and fishing allied activities (13 percent). The majority of the women were engaged in the fish seed collection.

**Table 4.10: Percent distribution of active marine fishermen to the marine population in Kerala**

Year	2012-13				2013-14				2014-15			
	District	Population Estimated	No of active fishermen	%	Population Estimated	No of active fishermen	%	Population Estimated	No of active fishermen	%		
Thiruvananthapuram	164327	51988	32	166954	51274	31	167754	50899	30			
Kollam	89915	18675	21	92058	18654	20	92500	18561	20			
Alappuzha	107743	38795	36	127165	39237	31	127776	25900	20			
Ernakulam	71312	15195	21	71774	13397	19	72119	13230	18			
Thrissur	71313	6097	09	55391	6101	11	55657	5803	10			
Malappuram	78288	30178	39	88938	30948	35	89365	31479	35			
Kozhikode	95341	21370	22	97520	21707	22	97987	21769	22			
Kannur	54259	5738	11	37447	5172	14	37627	5186	14			
Kasaragod	42632	9885	23	42909	9903	23	43115	9983	23			
Total	775130	197921	26	780156	196393	25	783900	182810	23			

Source: Kerala Marine Fisheries Statistics 2015

### 4.4.3 Educational Status

In Kerala, in contrast to the national scenario 73 percent of fisherfolks (excluding children below 5 years) were educated with different levels of education. Almost 33 percent of the fisherfolks had a primary level of education, 34 percent had a secondary level, 6 percent had above secondary level and the rest 27 percent of the population was unschooled. Closely 91 percent of the marine fisherfolks in Ernakulam and Alappuzha districts had at least a primary level of education. Other prominent districts were Kannur (88 percent), Kozhikode (83 percent), and Thrissur (81 percent). The proportion of unschooled fisherfolks was highest in Malappuram district (Table 4.11).

**Table 4.11: The educational status of fisherfolks in Kerala**

District	Primary		Higher Secondary		Above Higher Secondary		Unschooled		Total
	Male	Female	Male	Female	Male	Female	Male	Female	
	Thiruvananthapuram	19098	18331	18191	16674	4560	4156	27123	
Kollam	6573	5668	11961	11500	2702	2420	7938	7497	56259
Alappuzha	17509	16940	19542	17885	2828	3201	3422	3940	85267
Ernakulam	8682	8450	8045	7250	1559	1836	1682	1833	39337
Thrissur	4458	4303	5753	4886	585	983	2165	2665	25798
Malappuram	12474	12265	8057	8155	772	637	22965	21345	86670
Kozhikode	13509	12034	15872	15916	1784	2704	6143	6598	74560
Kannur	6178	5506	4372	4405	800	1052	1477	1579	25369
Kasaragod	5099	5104	3971	3811	581	673	4311	4471	28021

Source: Marine Fisheries Census of CMFRI, 2010

### 4.4.4 Occupation Profile

There were about 54,407 fisherfolks engaged in fishing-related activities, such as marketing (38 percent), labourers (27 percent), peeling (18 percent), curing/processing (10 percent), and making/repairing net (6 percent). The largest number of fisherfolks engaged in fishing allied activities belonged to Thiruvananthapuram district (39 percent) whereas this was only three percent

both in Thrissur and Kannur districts. This was obvious because of the larger population size of the fisherfolks present in Thiruvananthapuram. This is true in the case of the largest number of people involved in other than fishing category too.

**Table 4.12: The occupational profile of the fisherfolks of Kerala**

District	Active fishermen	No. of members involved in fishing allied activities							Total occupied
		marketing of fish	making/repairing Net	Curing/Processing	Peeling	Labourer	Others	Other Than Fishing	
Thiruvananthapuram	35314	11922	1137	2280	126	5422	153	2130	58484
Kollam	16677	1991	891	1095	328	1651	72	636	23341
Alappuzha	23256	686	457	614	6269	827	78	3608	35795
Ernakulam	8934	438	86	438	2486	553	47	404	13386
Thrissur	5704	391	141	396	239	238	15	322	7446
Malappuram	22238	501	129	63	38	4220	44	1059	28292
Kozhikode	20200	590	68	628	257	540	145	1122	23550
Kannur	5404	631	142	158	19	458	144	1335	8291
Kasaragod	7669	3268	317	5	55	482	38	77	11911
Total	145396	20418	3368	5677	9817	14391	736	10693	210496

Source: Marine Fisheries Census of CMFRI, 2010

#### 4.4.5 Gender-wise Fishing Allied Activities

Concerning gender, women outweighed men in fishing allied activities accounting for about 67 percent. Among the major fishing allied activities, women's contributions were dominated in peeling (96 percent), curing/processing (84 percent), and marketing (79 percent). Chief share (84 percent) of those engaged in the marketing of fish went to the three districts Thiruvananthapuram (58 percent), Kasaragod (16 percent), and Kollam (10 percent). Thiruvananthapuram (34 percent), Kollam (26 percent), and Alappuzha (14 percent) districts were accounted for 74 percent of those engaged in the creation/repairing net. About 59 percent of the fisherfolks engaged in curing/processing belonged to Thiruvananthapuram and Kollam district (Table 4.13).

Table 4.13: Gender wise fishing and allied activities

District	marketing of fish		making/ Repairing Net		Curing/Processing		Peeling		Labourer		Others	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Thiruvananthapuram	1560	10362	478	659	233	2047	83	43	3282	2140	105	48
Kollam	282	1709	522	369	207	888	38	290	1079	572	54	18
Alappuzha	384	302	421	36	141	473	54	6215	296	531	53	25
Ernakulam	308	130	65	21	149	289	55	2431	400	153	30	17
Thrissur	340	51	135	6	25	371	3	236	87	151	15	0
Malappuram	374	127	114	15	24	39	37	1	3766	454	27	17
Kozhikode	497	93	29	39	22	606	77	180	324	216	129	16
Kannur	415	216	127	15	106	52	1	18	326	132	132	12
Kasaragod	82	3186	294	23	1	4	12	43	156	326	16	22
<b>Total</b>	<b>4242</b>	<b>16176</b>	<b>2185</b>	<b>1183</b>	<b>908</b>	<b>4769</b>	<b>360</b>	<b>9457</b>	<b>9716</b>	<b>4675</b>	<b>561</b>	<b>175</b>

Source: Marine Fisheries Census of CMFRI, 2010

In a study on the socio-economic condition of marine fisherfolks in Kerala, a State which has achieved considerable progress in improving the overall quality of life of its peoples, Kurien (1995) remarked that the fishing communities in Kerala have not benefited from the increased value of output in the sector or the State's overall efforts at improving the quality of life. Kurien (1995) found that, while the overall literacy rate in the State (using 1981 data) was 85 percent, whereas in fishing villages it was only 66, with a female literacy rate with only 44. He also pointed out a lower sex ratio in fishing villages (972 as compared to the State figure of 1032) and a higher population growth rate (2.3 percent as compared to the 1.9 for the State). Likewise, he observed that 84 percent of fishing households lived in thatched and semi-thatched huts, while the figure for the rest of the State was only 28 percent.

A rural assessment of coastal fishing villages by Matsyafed in 1997 (GOK, 1997) revealed that in these villages, 4 to 20 percent of houses belonging to fishing families are prone to sea erosion; that between 5 to 42 percent of families live in huts with both thatched roofs and walls; and that anywhere between 3 and 22 percent of families have no title deeds to the plots on which they live.

#### **4.4.6 Fish production in India and Kerala**

In Kerala the total fish production in 2017-18 was 6.73 lakh tonnes, of which Marine fish landings were 4.84 lakh tonnes and Inland fish production was 1.89 lakh tonnes. Year-wise details of fish production in Kerala from 2013-14 to 2018 are provided in Table 4.14. The total fish production in the State has been deteriorating during the past two years. Marine fish production is decreasing since the 2014-15. Between 2013 and 18, there has been a gradual decrease in the marine production from 5.22 lakhs tons in 2013-2014, which was slightly upgraded to 5.24 in the subsequent year but experienced a downfall to 4.84 in the year of 2017-18. But in the case of Inland fisheries they had a slight fluctuation from 1.86 lakhs tons during 2013-14, and it was 2.02 in the preceding year, but lowered to 1.89 in 2017-18. In the case of the total production there has been an

incremental increase in the first three years, but from 2015-16 the trend of decrease was visible (Table 4.14).

In India the marine fish production has shown as a stagnation but the inland fish production was showing an increasing trend which was compensated the total production.

**Table 4.14: Fish production by the state of Kerala from 2013 to 2018**

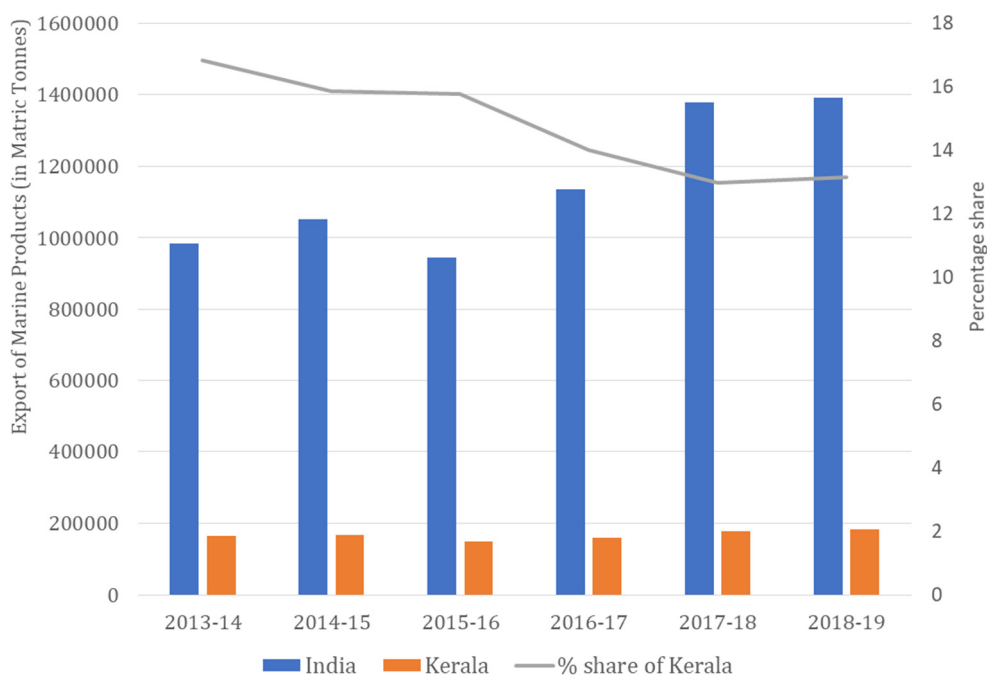
Year	Kerala			India		
	Marine	Inland	Total	Marine	Inland	Total
2013-14	5.22	1.86	7.08	34.6	65.3	99.3
2014-15	5.24	2.02	7.26	35.69	66.91	102.6
2015-16	5.17	2.1	7.27	36	71.62	107.62
2016-17	4.88	1.88	6.76	36.25	78.06	114.31
2017-18	4.84	1.89	6.73	36.88	89.02	125.9

Source: *Economic Review 2019 Volume 2*

#### 4.4.7 Marine Export performance of Kerala

Export of marine products from Kerala documented the growth of 0.64 percent in quantity during 2014-15 than that in 2013-14. The fish production in Kerala during 2012-13 was 6.8 lakh tonnes. Kerala's share in the national marine fish production is about 18.22 percent in value terms. There was a steady increase in the marine export of the country from 6,78,436 MT to 1051/243 MT during the period of 2009-2016. But the state of Kerala, being a consumer state has not improved much as it was started with a 107293 MT but has reached only 166784 MT with a meagre increment (Figure 4.9). The data shows that in the export of fisheries produce, Kochi port in Kerala plays a major role as the second-largest exporter at 1,55,989 MT, after Vizag port, Andhra Pradesh, with 1,59,973 MT of marine cargo exported during 2016-17 (Economic Review 2019). While analyzing the share of Kerala to the marine products export of India has revealed that it was decreasing from 16.84 to 12.91 during the period 2013 to 2019 (Table 4.15).





**Figure 4.9: Comparison of export of Marine Products from India & Kerala**

#### 4.4.8 Contribution of the fisheries sector to GSDP of Kerala

The interventions in the policy and innovative attempts of the state in mechanization and motorization led to significant achievements in the fisheries sector. The share of the fishery sector in the Agricultural State Domestic Product of Kerala maintained a stable position between 10.5 percent and 13.5 percent establishing the significance of this sunrise sector. The contribution of the fisheries sector to GSDP of the State showed increasing at a diminishing rate. Although the absolute value of fish products has almost doubled over the years, its share in GSDP is declining due to the increased contribution of other sectors especially the service sector.

**Table 4.15: Contribution of the fisheries sector to GSDP of Kerala**

Year	(A) GSDP	(B) Agriculture	(C) Fishing	B as % of /A	C as % of B	C as % A
2011-12	33629310	5110077	377363	15.20	7.38	1.12
2012-13	38128287	5304091	515183	13.91	9.71	1.35
2013-14	42910029	5903097	622834	13.76	10.55	1.45
2014-15	47180920	6739502	704319	14.28	10.45	1.49
2015-16	50913738	6606683	834359	12.98	12.63	1.64
2016-17	57024819	7222368	973424	12.67	13.48	1.71
2017-18	63365119	7823137	1119044	12.35	14.30	1.77

Source: *Economic Review 2019*

#### 4.4.9 Fisheries sector – An outlier in the Kerala model

Unlike the other urban and rural areas of Kerala, fishing villages all along the Indian coast remains comparatively backward and embraced with underdevelopment. In Kerala Marine fishery sector displays discrepancies, both inter-sectoral and intra-sectoral, against the most acclaimed “Kerala Model of Development” with high human development analogous to developed countries not negotiating to low per capita income (Kurien, 2000 and Sathiadhas, 2006).

Despite the high efforts taken to upgrade the society the tangible outcomes in terms of the overall development index remain lower in the case of the fishers. Despite the State literacy rate is with 93.70 percent the literacy rate in marine fishing villages in Kerala is just with 73 percent. Notably, a paradoxical picture of the low level of human development in the fisheries sector is underscored by the lower sex ratio of coastal fishing villages (979) compared to the State average of 1058 (Salim et al., 2017).

## **4.5 Fishery-Based Livelihood and Vulnerability**

Fishery related vulnerability is a different ball game when it relates to dimensions of any discipline that is distinct from agriculture and other natural-resource-dependent sectors and efforts to measure it must have to consider the unique features of the sector. This is a challenge in a country like India, where an 'agrarian, land-based perspective' inclines to dominate. Considering these special artefacts it would be essential to examine these specificities briefly, as they are closely linked to issues of poverty and vulnerability, and need of policy interventions that are specifically tailor-made for the deprived community (Kurien, 1998).

### **4.5.1 Fisheries as a Common Property**

Fisheries concerning the vastness of the areas, the nature of the resource make it difficult to establish clear spatial boundaries indicating ownership over resources which is different from agriculture. The sea is thus often deliberated as a resource that can be freely accessed, even though, in certain areas, communities have evolved systems to regulate access to, and use of coastal fisheries resources (Keen 1983). It is evident that, these systems, in general, have not established much recognition, leading to open access conditions, with implications for the social and economic well-being of these communities. The sector is characterized by a sheer unpredictability and seasonality of catch where both fortune and skilfulness articulate important roles (Kurien, 1995). Furthermore, values obtained for the catch on any given day can be highly uncertain and will depend on the species caught, total catches and prices prevailing on that day, and several other factors.

### **4.5.2 Problems related to marketing**

The extreme reliance on the market is another feature that curtails the fisheries sector, in comparison with agriculture, due to the perishable nature of the commodity, and the fact that communities cannot live on fish alone. This has invited an apprehensive middle man in the scene that drains often with overtones

of a patron-client relationship (Firth, 1966). Instable price mechanisms are often prevailing in every fishing village. The middlemen decide the price of the fish once the fishermen land up after a heavy toll in the sea. The discrepancy in the market price of fish to the increase in fuel price is another concern. The development in the communication sector has brought both advantages and disadvantages to the sector alike. As the price of the fish is of fluctuating one, the communication divide helps the merchants and major players in the fishery sector to exploit the traditional fishermen. The value is dictated by the price of the fish in the global market of that time or at least in the nearby markets. Fish harvests are always fluctuating and sale prices are unpredictable. This in turn makes the fishermen forced to sell their catch to traders at prices far below market rates. This is also discouraging fishermen from pursuing their present occupation. Furthermore fishermen have odd hours of fishing and also make unplanned trips based on other fisher's landed catches, which is possible only if they live on or near the shore (Kuriakose, 2006).

In the field of agriculture, investment is in the form of land that can be considered a more stable asset. On the other hand, in fisheries, investment takes the form of craft and gear, which have high maintenance costs, denigrate rapidly, and are often lost or damaged (Alexander, 1982). In an overnight a fishing family can, lose everything it has if the boat it owns, along with the men of the family, is lost at sea during a cyclone. The reasonably higher risk to life, craft, and gear are marked attributes of the sector.

#### **4.5.3 Glitches related to storage**

Local marine fish market chains are largely characterized by unsanitary conditions, pitiable handling of fish, and loss of quality (from the catch to the final market). Innovative expansions in marketing channels such as mega-grocery stores are emerging in some towns, with modern fish handling practices and facilities. Smaller-scale fishers are often unable to gain access to these marketing channels due to the poor quality of their product. (Salim et al., 2008). The easily accessible and low-cost credit, and the affordability of basic infrastructures such as ice, cold

storage, and cold transport that would enable fishers to maintain better quality and obtain higher prices.

#### **4.5.4 Complications related to mechanized trawling**

The mechanization of fishing vessels and the use of synthetic gear materials have made tremendous changes in the coastal zone. The effects of trawling on the traditional fishermen in the fishing villages were disastrous. The mechanization through trawling and per seining has made the drastic depletion of fish and dearth of fish production. The traditional fishermen's fishing area would be decreased by the operation of a per seine boat (Stephen, 2015). Similarly the catastrophic trawling technology also leads to environmental depletion as the trawling net scraps the bottom of the sea which in turn will destroy the sea bed, plants, foliage, and coral reef. This region is the chief breeding ground of many species including fishes that make the deprived marine ecology.

#### **4.5.5 Less catch and reduction of fish resources**

The economic and ecological destruction and decrease in fish production will lead the deterioration in the revenue of traditional fishermen. The unanticipated decline of the fish population is leading to a sharp fall in the income of the fishermen. Increased fishing intensity by the trawlers affected the fish stocks in the inshore waters which ultimately led to an overall decline in fish landings (Steven, 2007). The decline in the landing was caused by the operation of trawl net, purse seine, and ring seine. Unmanaged marine fisheries face chronic economic overexploitation and overfishing principally because of open access characteristics. Notably, the marine catch levels in inshore waters are stagnating and fish stock health is showing some alarming symptoms of diminution. The expansion of coastal development activities, including land reclamation, construction of ports, bridges, roads, and buildings for industrial and residential purposes, oil and natural gas exploration, pollution from agricultural run-off containing chemicals, fertilizers and pesticides, and industrial effluents and urban sewage are considered to be the causative agents for the marine ecology depletion (Barnage et al., 2018).

#### **4.5.6 Lack of availability of operational requirement**

The increased price in the boat fuel such as kerosene and diesel over the years has fuelled the problems of the fishermen. As the fuel price increases the income from the fish is reducing due to the lack of resources are another matter of concern (Barnage et al., 2018).

#### **4.5.7 Occupational risk and lack of safety guards**

The impact of the high end sophisticated imported fishing vessels could fetch the high yield from the areas which are designated for the traditional fishermen is another dreadful condition prevailing in the scene. The lack of safety equipment and modern communications ails the traditional fishermen to the verge of distress (Fry et al., 2019).

#### **4.5.8 Unsustainable fishing practices**

The Kerala coast is suffering from several threats that directly affecting the socio-economic characters of the State. The term "unsustainable fishing" is a situation (in contradiction with the Law of the Sea Convention) characterized by overfishing or inadequate fishing pattern; fishing activities that lead to long-term losses in the biological and economic productivity, biological diversity, or impacting ecosystem structure in a way that impairs the functioning of the exploited system across several generations (FAO, 2009).

Unsustainable fishing can be divided into three types (i) Overfishing; (ii) Destructive fishing; and (iii) IUU fishing.

Overfishing covers three interconnected phenomena: biological overfishing, economic overfishing, and ecosystem overfishing. Economic overfishing occurs when a fishery is generating a rent lower than the maximum rent obtainable, primarily because an excessive level of fishing effort was applied (Plamoottil et al., 2017). Ecosystem overfishing is defined as the situation in which the long-term historical species balance has been significantly modified by fishing.

Destructive fishing practices refer to the use of fishing gears in ways or in places such that one or more key components of an ecosystem are obliterated, devastated, or ceases to be able to provide essential ecosystem functions.

Illegal, unreported, and unregulated (IUU) fishing is defined in the International Plan of Action to Prevent, Deter, and Eliminate Illegal Unreported Unregulated Fishing. The global vessels which are scanning the fishing grounds that are delineated for the mechanized fishers of our state are another concern.

#### **4.5.9 Tourism and other development activities**

As Kerala being advertised best with the serene beaches and waterfronts, the increased inflow from the tourists has made a significant impact on the seas and coasts. This has intervened in the conflict over the coastal space which is mostly between fishing communities and other stakeholders from the tourism industry (Emilda, 2016). There have been emerging conflicts with several communities that are being displaced from coastal areas or being threatened with displacement in the name of development activities particularly tourism and seaports. The access and visibility of the sea are very essential for fishermen as part of their daily decision-making, traditional ecological knowledge, and basic life activities such as the launch of boats, lying of shore seines, drying of fish, mending of nets, berthing of boats and many other social functions (Bharathi, 1991; Salagrama, 2006; Praxis, 2005). Tourism hampers most of the said facilities and this drags to the tension zones for both. The splintering of cultural dogma is another issue related to tourism. However the inflow of the tourists will make the fishermen try alternative income options by installing small shops and businesses.

#### **4.6 Environmental factors**

In the past two decades, the State of Kerala has been witnessing its harsh period, in terms of both natural hazards and Pandemics. The Indian Ocean tsunami of 26<sup>th</sup> December 2004 was a series of giant sea waves unleashed by the massive earthquake beneath the sea with its epicentre located in Indonesia. The tsunami caused significant demolition and casualties in the coastal regions as in Kerala,

187 villages were affected, registering a death toll of 180 persons and huge damage to assets and livelihood (Sathiadhas et al., 2005).

Cyclone Ockhi, which caused the deaths or disappearance of over 350 people and injury to over 200—almost all of them fishermen— between 30 November and 3 December 2017, left behind a scene of devastation and tragedy in southern Kerala and Tamil Nadu. The recent disasters demonstrated the link between environment and disaster risk. While the floods cannot be exclusively attributed to climate change impact, climate change predictions do indeed forecast increases in rainfall intensity in Kerala in the years to come. Furthermore, coastal cities in Kerala are prone to waterlogging and flooding due to increased water inflow as well as sea-level rise (Sathiadhas et al., 2005).

Regardless of whether the present event is linked to climate change, the floods of 2018 and the tropical cyclone Okhi before that serve as warnings about the extreme events which Kerala may expect more frequently in a world with changing climate. The floods and landslides have highlighted the particular vulnerabilities that especially the poor, fisherfolks in different stages of the disaster cycle across sectors such as health and nutrition, water and sanitation, housing, livelihoods, and so on (PDNA, 2018, Govt of Kerala).

The fishing community of the state rendered phenomenal voluntary assistance towards search and rescue in the flood-affected areas. Nearly 669 boats that went out with 4,537 fishermen are estimated to have saved at least 65,000 lives. The impacts of unsustainable and polluting practices on land and sea finally concentrate in the coastal zone. The CRZ Notification has been poorly implemented, and violations have been blatant. As the fishers live next to the sea also increases vulnerability to natural calamities, such as cyclones and tidal waves, as well as to coastal erosion along with several parts of the coast.

The coastal pollution is another major threat to the micro-biota and thereby the species compositions of the region.



#### **4.7 Legal factors**

Apart from this, many communities, until today, lack clear titles to the land they live and work on or well-defined access rights to the waters they have customarily fished. There is no explicit recognition of traditional and customary rights of fishing communities in the coastal. Fishing communities are not part of decision-making processes related to coastal area management planning and development (Sachin, 2014).

#### **4.8 Socio-Economic Conditions**

The proximity of the sea, which is drastically engulfing the shores in a context where pressure on coastal resources is increasing rapidly, often leads to overcrowding and conditions of poor hygiene and sanitation. Along with this fishing communities, particularly, tend to live in remote settlements close to the sea, with little access to adequate education and health services, and distant from urban centres and centres of political power, increasing their vulnerability to processes of social and political exclusion (Shyam, 2017; Shyam, 2017 b).

#### **4.9 What drives the vulnerability?**

It is clear that, an enormous number of fishers were involved in artisanal, small-scale fishing operations in open water bodies including the sea, rivers, and creeks, as well as in fish trading, processing, and related activities. The nature of their livelihoods and their living conditions make them one of the poorest and most marginalized groups in the country. Livelihood can be considered as sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets, both now and in the future, without undermining the natural resource base. Succeeding this definition, there is significant evidence to establish that the livelihoods of the coastal fishers are becoming increasingly unsustainable. Over the past 25 years, changes in the fishing sector have increased at a faster pace than fishers' ability to cope up with them.

The livelihoods of the fishers have been affected by a wide range of factors, including (i) deteriorating access to and availability of fish resources; (ii) cumulative competition for fishing grounds and in the marketplace; (iii) overcapitalization of fishing and post-harvest activities; and (iv) macro-economic factors that challenge the traditional structures and mechanisms that used to protect fishers' livelihoods.

There is a need to understand many of these changes as manifestations of particular policy frameworks within which the development and management programs have worked. These include the process of policy-making, how policies were translated into programs, their implementation, and their monitoring and evaluation. As a result, the livelihoods of coastal fishers are becoming gradually inefficient, unmaintainable, and feeble. Fishers find their security of existence under threat and their ability to meet the basic needs of life eroding. In other words, poverty is increasing. The problem is aggravated by the growing vulnerability of fishers to natural disasters, which are increasing both in frequency and intensity (Figure 4.10).

Therefore, as demonstrated, the vulnerability of current livelihood systems in the coastal fishing sector, then, is both the cause as well as the outcome of the poverty and food insecurity that characterize their livelihoods. The perseverance of this cycle is due to the poor asset base of fishers as well as to the failure or inadequacy of policy responses.

Altogether these issues contribute significantly to small-scale fishers' dependence on intermediaries. In turn these intermediaries are in a position to take advantage of fishers throughout the whole food chain – buying their fish; providing them with credit; offering them land on which to build their homes; and extending consumption loans. This dependence can easily trap fishing communities in a web of exploitative relationships. The problem then is how small-scale fishing communities can recover and sustain their livelihoods by working together more effectively to conserve the resources, better manage their fishing and post-harvest operations, and enhance their long-term gains.

There are multiple obstacles to materialize these action still exist, whereas the action to overcome difficulties in building organizational development is key to changing the path of rural development in small scale fisheries. The difficulties include: (i) fishing as an independent and competitive activity and the hunting mind-set of being a fisher are in themselves major challenges to undertaking collective action and forming organizations; (ii) the weak political-economic influence of small-scale fisheries as a social class can be an impediment owing to their dispersed distribution and limited opportunities to discuss issues; (iii) small-scale fish workers have a low literacy rate; and (iv) the average age of fish workers is rising. The drivers of vulnerability have been summarised in figure 4.10.

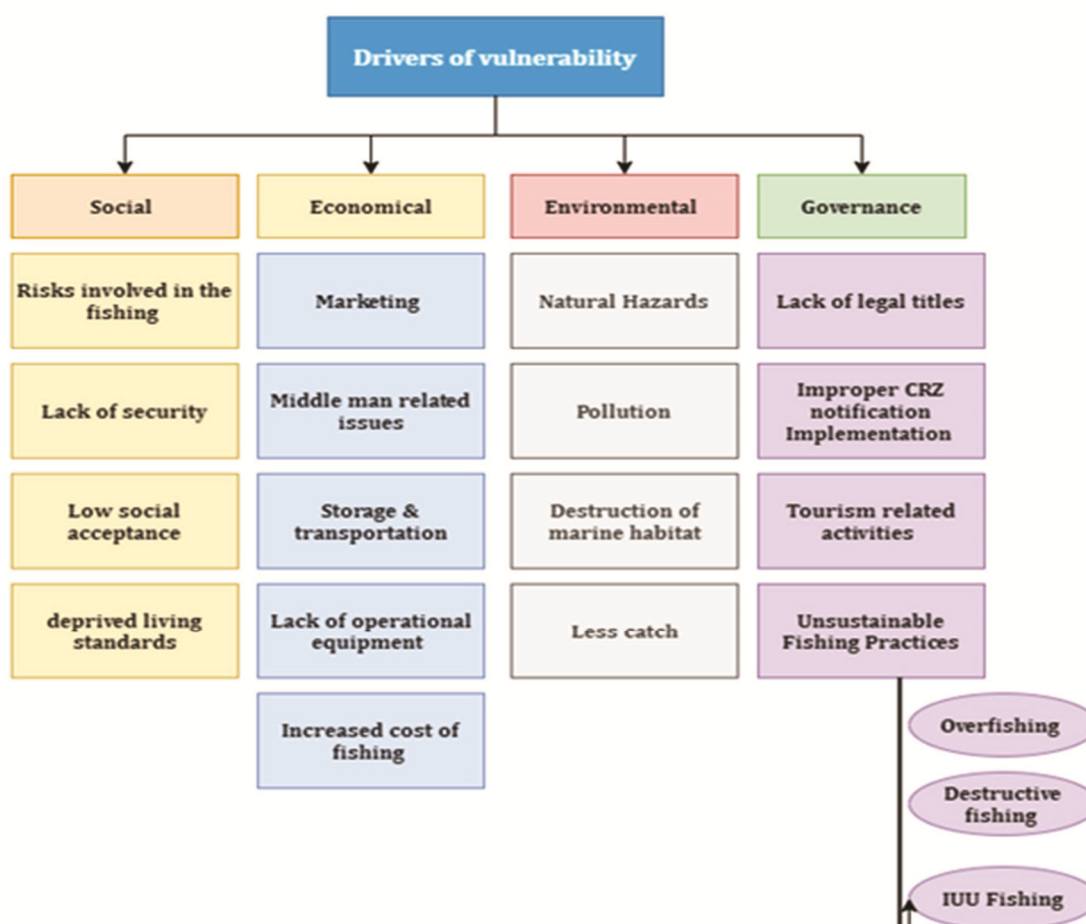


Figure 4.10: The flowchart describing the problems related to vulnerability

## **4.10 Conclusion**

The situation warrants attention, and there is a need to move away from a one-dimensional income-based understanding of poverty in the fisheries sector, to a multidimensional and dynamic understanding based on the unique characteristics of the sector. It would appear reasonable to conclude that, from all available evidence, (reviewed in chapter 2) fishing communities have not benefited to the same extent from the overall scenario of progress within the State.

The subsequent chapter will shed light on what are the way by which these most underprivileged community can sustain their impediments both socially and economically. Owing to the miseries up scaled in the society, alternative search for the livelihood during the lean periods have noticed and described in the following chapter.

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## CHAPTER 5

# VULNERABILITY AMONG THE FISHERFOLKS IN KERALA

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- 5.1 Introduction
  - 5.2 Profile of fishermen- socio-economic conditions
  - 5.3 Vulnerability among the fisherfolks in Kerala
  - 5.4 Level of vulnerability among the fisherfolks in Kerala
  - 5.5 Relative Contribution of Vulnerability Factors among Fisherfolks in Kerala
  - 5.6 The differences in the factors of vulnerability regarding the types of fishing, methods employed for fishing and region of the fisher folks in Kerala
  - 5.7 Conclusion
-

## 5.1 Introduction

It can be seen that many millions of people around the world find a source of income and livelihood in the fisheries and aquaculture sector. The study conducted by FAO 2015, indicate that 56.6 million people in the world were engaged in the primary sector of capture fisheries and aquaculture in 2014. Of this total, 36 percent were engaged full time, 23 percent part-time, and the remainder were either occasional fishers or of unspecified status.

Globally for the first time since the period 2005–2010, the total engagement in fisheries and aquaculture did not increase. Overall employment in the sector decreased, almost entirely due to a decrease of about 1.5 million fishers, while engagement in aquaculture remained more stable. Consequently, the proportion of those employed in capture fisheries within the fisheries and aquaculture sector decreased from 83 percent in 1990 to 67 percent in 2014, while that of those employed in fish farming correspondingly increased from 17 to 33 percent. The slight reduction in employment appears to signal stabilization in engagement in the sector (FAO, 2015).

Small-scale operations continue to play a critical role in supporting livelihoods, particularly rural livelihoods, contributing to food security and alleviating poverty (Kurien, 1998). The similar pattern is replicating in India too. Even though India occupies the third rank in global marine production and second in inland production, the livelihood and living conditions of the fishermen in India is not found to be promising. Despite Kerala's share for global fish production is increasing, the fishing community is in depriving condition. But in Kerala the marine fisheries production is high as 72 percent and inland fisheries production is low as 28 percent (Department of Fisheries, GoK, 2018).

The premise warrants a situation with a thorough understanding of the representative samples of the select districts to evaluate the profile of the fishermen who are directly involved in the fishing activities. This included the degree of attainment of educational status, age, and occupational profile along with

their economic whereabouts. This chapter elaborates the socio-economic profile of fisherfolks, level and relative contribution of factors of vulnerability and differences along with demographic factors.

## **5.2 Profile of fishermen- socio-economic conditions**

The study carried out in three districts of Kerala. Primary data collected from a total of 474 respondents i.e., 158 respondents each from three districts, have been considered for the analysis.

### **5.2.1 Age group classification**

The respondents were analysed looking at the overall age group, the age groups of 40 to 50 were ranked as high with 41 percent. It was interesting to note that, the younger generation who is coming to the fisheries field was comparatively low as only 17 percent, with a similar figure of those who have above the age of 50 and above.

The highest percent of youngsters with 18.9 were reported from the Kozhikode region, whereas the lowest was reported from Thiruvananthapuram with 15.2 percent (Table 5.1). In the case of the age group of 30 to 40, the highest was in Kozhikode with 28.5 while the lowest was reported from Thiruvananthapuram with 21.5 percent. While analysing the age group of 40-50, it was observed as with 43 percent of contribution was from Ernakulam which ranked first whereas Kozhikode was with least 38.6 percent. The most aged group, with above 50 years was more in Thiruvananthapuram with 22.2 percent while Kozhikode was low with 13.9 percent.

**Table 5.1: Age wise classification of fishermen in percent**

<b>Districts/ Age</b>	<b>20-30</b>	<b>30-40</b>	<b>40 -50</b>	<b>50 &amp; above</b>	<b>Total sample</b>
TVM	15.2	21.5	41.1	22.2	158
EKM	17.7	24.1	43.0	15.2	158
KZE	18.9	28.5	38.6	13.9	158
Total	17.3	24.7	40.9	17.1	474

The low number of the recruitment of younger generation to the fishing field can be attributed to the reasons such as, their parents are not interested to spare their children to the field of fisheries owing to the risks and low income that can be produced. The younger generation are also reluctant to come forward due to the low prestige of the profession and other social taboos (Rajan, 2002).

### 5.2.2 Distribution on the basis of education

While taking the educational status of fishermen in overall from the three districts, more than the half, with 53.2 percent had only primary education, followed by secondary (23.4 percent). In the case of illiterates it was 13.7 and 7.6 percent of fishermen had higher secondary education followed by above higher secondary education with 3.2 percent (Table 5.2).

In all the districts the ranking pattern followed the same. The persons with only primary education in Thiruvananthapuram was with 47.5 percent whereas 3.2, who have completed above higher secondary education (Table 5.2). In Ernakulam 55.1 percent have scored their primary education, however they had the highest percent of fisherfolks with above higher secondary level with 4.4. The person who have completed their primary education in Kozhikode was with 55.1 percent but only 1.9 percent had their educational level more than higher secondary. Kozhikode had the highest percent of fisherfolks who was illiterate with 15.8 percent.

**Table 5.2: Educational status of fishermen in percent**

Districts	Illiterate	Primary	Secondary	Higher secondary	Above Higher Secondary
TVM	14.6	47.5	28.5	6.3	3.2
EKM	10.8	55.1	20.9	8.9	4.4
KZE	15.8	57.0	17.7	7.6	1.9
Total	13.7	53.2	23.4	7.6	3.2



An examination of the educational level of the fishermen reveals that bulk of them have only primary education and it is due to the fact that they enter fishing at an early age neglecting education to help the family to increase the earnings to reduce poverty.

### **5.2.3 Distribution of fishermen on the basis of types of fishing**

While analyzing the types of fishing, data shows that distribution of fishermen, among the three districts a total of 474 fishermen were employed in marine sector, whereas about 125 persons (26.3 percent) have carried out the inland fishing, along with marine fishing. Among the districts, Ernakulam had the highest contribution with 14 percent followed by Kozhikode, 6.9 percent and Thiruvananthapuram with 5.2 percent.

**Table 5.3: Distribution of fishermen with respect to types of fishing in parentage**

<b>Districts</b>	<b>Marine</b>	<b>Marine and inland in percent</b>
TVM	100	5.2
EKM	100	14
KZE	100	6.9
Total sample	474	125

### **5.2.4 Distribution of fishermen on the basis of types of gears used in fishing**

When it comes to the types of gears used in fishing, half of them opted for motorized fishing with 57.1 percent which was followed by Non-motorised fishing with 34 percent (Table 5.4). Only a fraction of people were depending on Mechanized Fishing with 8.9 percent. In the case of Thiruvananthapuram Motorized Fishing had the highest with 46.8 percent while the lowest was reported from mechanised fishing with 6.9 percent. While analysing the data from Ernakulam, it was observed that 56.6 percent of contribution was from motorized fishing which ranked first whereas it was with least 10.7 percent in mechanised fishing. Kozhikode was reported with the highest percent in the usage of motorized Fishing and lowest was in mechanised fishing with 8.8 percent.

**Table 5.4: Distribution of fishermen with gears used in percent**

Districts	Mechanized Fishing	Motorized Fishing	Non- motorized fishing
TVM	6.9	46.3	46.8
EKM	10.7	56.6	32.9
KZE	8.8	68.9	22.1
Total	8.9	57.1	34

The mechanised fishing is being conducted by large boat owners whereas the fishermen will only be a worker in the boats. The motorised fishing in the study areas are found to be more, because of the high physical investment in the non-motorised fishing and very less yield. Even though the second to motorised fishing, non-motorised fishing are reported to be higher.

### 5.2.5 Income pattern during season

The income of the fishermen are recorded with an uneven supply during the harvesting season and off season. During harvesting the season, the maximum earnings of the fishermen went above ₹ 20,000 for 3.8 percent in the Ernakulam and 1.9 percent in the Kozhikode district. In the Ernakulam 70.9 percent respondents received an income between ₹ 5,000 and ₹ 10,000 (Table 5.5).

**Table 5.5: Income pattern of fisherfolks during season**

Amount in ₹/ Districts	TVM	EKM	KZE
Below 5,000	22.2	8.9	32.3
5,000-10,000	62.7	70.9	56.3
10,000-15,000	8.9	11.4	7.0
15,000-20,000	3.2	5.1	2.5
Above 20,000	3.2	3.8	1.9
Total sample	158	158	158

### 5.2.6 Income pattern during off season

During the off-season 22.2 percent of the respondents did not have any source of income. Lack of alternative mechanisms for catching fish and the trawling ban during the seasons can be the reasons for these low earnings (Table 5.6).

**Table 5.6: Expenditure pattern of fisherfolks during off season**

Amount in ₹/ Districts	TVM	EKM	KZE
No earnings	22.2	9.5	5.1
Below 1000	20.3	14.6	12.0
1000-2000	25.3	38.0	35.4
2000-3000	22.2	23.4	1.3
3000-4000	3.2	4.4	23.4
Above 4000	7.0	10.1	22.8
Total	158	158	158

### 5.2.7 Expenditure pattern of the fishermen

In Thiruvananthapuram 48.7 percent of the respondents claimed as they needed ₹ 8,000-12,000 to meet the regular expenses (Table 5.7). In Kozhikode 5.1 percent of the respondents were of the opinion that they needed below ₹ 4,000. The medical bills and other unavoidable emergencies could be the reason behind the excessive expenditure as vouched by few of the respondents. In Ernakulam 56.3 percent of the fisherfolks have mentioned that, their monthly expenditure will hover anywhere between ₹ 4,000-8,000.

**Table 5.7: Expenditure pattern of the fishermen**

Amount in ₹/ Districts	TVM	EKM	KZE
Below 4,000	1.9	0.6	5.1
4,000-8,000	39.9	56.3	51.3
8,000-12,000	48.7	36.7	39.9
12,000-16,000	7.0	5.1	3.2
16,000-20,000	2.5	1.3	0.6
Total sample	158	158	158

It was evident that the high variability in the income and expenditure pattern are much more prominent in the case of fisherfolks. Their economic situation is getting worsen during the off season in the coast, which is leading them to the vulnerable situation. This would make them to borrow money from the money lenders which would make their situation more problematic. In case of any medical emergencies, marriages and educational expenses etc. are to be met with the same moneylenders who charge a hefty amount as the interest rate from the fisherfolks and they would end up in the very severe financial trauma.

### 5.3 Vulnerability among the fisherfolks in Kerala

The characteristics of the fishermen regarding their vulnerability on the basis of primary data is described in this chapter. From the review, it was identified that, there are several factors such as governance, fishery related, social, economic, poverty related, and environment factors are also driving them to the vulnerable conditions (Figure 5.1). In this chapter, demographic factors intends to explain factors related to the gear and crafts in fisheries, types of fishing, and regional differences.

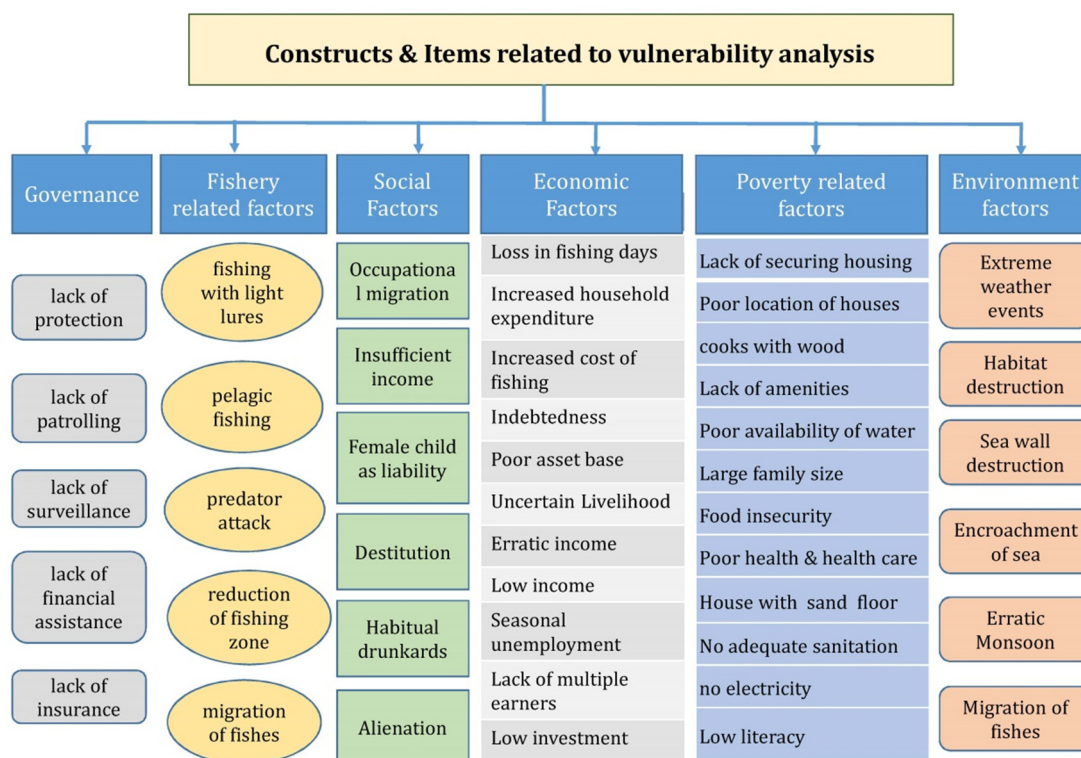


Figure 5.1: Constructs and items used for analysing vulnerability

The following part is discussing about the vulnerability among the fisherfolks in Kerala.

#### 5.4 Level of vulnerability among the fisherfolks in Kerala

To investigate level, relative contribution and demographic differences of vulnerability factors among the fisherfolks in Kerala, Quartile Deviation, Percent Analysis, and Chi-Square tests are used. Quartile Deviation is used to convert data into three quarters that Q1, Q2 and Q3. Percent analysis is used to measure the percent of response contained in each quarter. Chi-Square test is employed for testing the significance of data distribution in each quartile. The following six factors are considered as vulnerability factors that

- 1) Governance factors
- 2) Fishery related factors
- 3) Social Factors
- 4) Economic Factors
- 5) Poverty related factors
- 6) Environment factors

#### Hypothesis 5.1 Proportions of the level of vulnerability factors among the fisherfolks in Kerala is equally distributed

Out of the six factors, the forthcoming part is synthesising the level of **Governance factors** of vulnerability among the fisherfolks (Table 5.8).

**Table 5.8: The level of Governance factors of vulnerability among fisherfolks**

Attribute	Low level (Q1)	Moderate level (Q2)	High level (Q3)	Total	Chi-Square value	P-value
Level of Governance factors of vulnerability	124 (26.16%)	277 (58.43%)	73 (15.40%)	474 (100%)	75.77	<0.001 **

\*\* denotes significant at 1% level

Since the P-value is  $<0.01$ , the proportions of the level of Governance factors of vulnerability among fisherfolks in Kerala is not equally distributed. It indicates that there is a significant difference regarding the level of Governance factors of vulnerability among fisherfolks in Kerala.

It can be observed that 26.16 percent of fisherfolks getting low-level government support (Table 5.8). About 58.43 percent of them getting moderate level support from the Government. Only 15.40 percent getting a high level of government support. So, it can be inferred that most of the fisherfolks are getting a moderate level of Government support.

The government offers a moderate level of subsidies for the fisherfolks, which is observed as very low in comparison with their living standards. Contingent living expenses are also been provided by the Government as low as the ₹ 4,500 during the off-season. Of this amount, they have to pay a sum of ₹ 500 per month for three months and they receive a sum of three-fold for every family. Considering the household expenses in the region the provided amount is very meagre as they can sustain only with basic needs. There were some allegations also in place that these amounts were also not distributed on time for the needy people.

Patrolling and surveillance in the coastal areas are also undertaken by the respective line departments. However, considering the fleet and manpower to serve along the 590 kilometres of the coastal line which was found not sufficient. This had driven conflicts in the traditional fisherfolks with mechanised boatmen, as they used to harvest the fish from near to the shoreline which is demarcated for the fishermen with non-motorised and motorised craft which employs small vessels for the fishing.

Despite the risk level exposed to the fisherfolks, the contribution from the Government in offering insurance is also in moderate level. While looking into the governance, the Government is responsible for the acts related to the sea. Most of the commission recruited by the Government have made only superficial patch-up,

meanwhile, most of the fishermen, by and large, the fishing sector also regulated and controlled by the Government. The situation is the same whether they are in the sea or on the land. Decades back itself, Food and Agricultural Organization (FAO) stipulated fourteen life-saving tools containing kit on the board of vessel to save the life of a fisherman. While fishing, it is learned that more than 98 percent of fishing boats in Kerala lack these facilities on their board.

Considering the **fishery-related factors**, Since the P-value is <0.01, the proportions of fishery-related vulnerability among fisherfolks in Kerala is not equally distributed. It indicates that there is a significant difference regarding the level of Fishery Related Factors of vulnerability among fisherfolks in Kerala. It can be observed that 17.29 percent fisherfolks are facing vulnerability by low-level fishery-related factors (Table 5.9). Whereas 22.78 percent of them are affecting vulnerability by moderate level fishery-related factors and 59.9 percent of the fisherfolks are facing vulnerability due to high-level fishery-related factors. So, it can be inferred that most of the fisherfolks are facing vulnerability due to higher level of fishery-related factors.

**Table 5.9: The level of Fishery Related Factors of vulnerability among fisherfolks**

Attribute	Low level (Q1)	Moderate level (Q2)	High level (Q3)	Total	Chi-Square value	P-value
Level of Fishery Related Factors of vulnerability	82 (17.29%)	108 (22.78%)	284 (59.9%)	474 (100%)	87.24	<0.001**

\*\* denotes significant at 1% level

It can be observed that the fishing with light lures, was found to be affecting the small traditional fishers in most of the regions of the sample districts. Pelagic fishing is another type of fishing that affects, especially non -motorized and motorized fishers which take all the yields that leave nothing for the traditional fishers.

Overfishing emerged as the most important issue to plague the fishery indicating that fishermen have recognized the fact that overfishing of resources is

taking place, even with light lures, etc. Overfishing has long been recognized by the scientific community as detrimental to the fisheries sector. Validation of this by the fishermen gives hope that they can be educated regarding the management of resources which are overfished. Habitat destruction has been seen critically by fishermen. The problems of juvenile exploitation and pollution were also flagged by a few. Presently the marine fisheries scenario is such that any fish can be sold in the harbour, hence fishermen have no qualms about retaining under-sized fish and hence deterrents need to be put in place to avoid their capture and retention. According to some, the dedicated effort for reducing coastal industrial pollution is required as industries dump their wastes into the sea. Pelagic fishing, followed by fishing with light lures and porpoise attack on the net with captured fishes were found to be the major reason for the reduction of fish resources identified by the respondents.

Coming to the **social factors** which are leading to vulnerability, since the P-value is  $<0.01$ , the proportions of the level of the social factor of vulnerability among fisherfolks in Kerala is not equally distributed. It indicates that there is a significant difference regarding the level of social factors of vulnerability among the fisherfolks of Kerala. It can be observed that 23.8 percent fisherfolks get influenced by the low level of social-related factors. About 56.3 percent of them are facing vulnerability due to a moderate level of social factors. Only 19.9 percent of fisherfolks getting vulnerability due to a high level of social factors (Table 5.10). So, it can be inferred that most of fisherfolks distressing with vulnerability due to a moderate level of social factors.

**Table 5.10: The level of Social factor of vulnerability among fisherfolks**

Attribute	Low level (Q1)	Moderate level (Q2)	High-level Social (Q3)	Total	Chi- Square value	P-value
Level of Social factor of vulnerability	113 (23.8%)	267 (56.3%)	94 (19.9%)	474 (100%)	94.21	$<0.001^{**}$

*\*\* denotes significant at 1% level*



The occupational migration is attributed mainly because of a few reasons. Engagement in the fishing activity as a livelihood was not considered to be a dignified profession by the younger generation. The inconsistent revenue despite the high investment is another notion of concern. This could be the one reason that is driving the young generation away from the fishing activity to find a way out in search of better revenue. Uneven supply and inconsistency of funds from the Government is another limiting factor. Low literacy in the fishing sector has exposed them to have the least acquaintance with the new technologies that are coming up in the field. Religious confrontations have also contributed in the segregation of the fisherfolks. There has been remarkable assistance from the religious associations with cash or in-kind for several families. Destitution which is inherent in the fisherfolks has driven them to be a more complicated situation in the due course of time, which was coupled with the extreme weather events in the past decade. Large family size has fuelled with a meagre amount of profits are observed as another social factor for the vulnerability.

While considering the level of **economic factors**, since the P-value is <0.01, the proportions of the level of Economic factor of vulnerability among fisherfolks in Kerala is not equally distributed. It indicates that there is a significant difference regarding the level of Economic factor of vulnerability among fisherfolks in Kerala. It can be observed that 6.75 percent fisherfolks are affecting vulnerability due to low-level economic factors (Table 5.11). 36.7 percent of them facing vulnerability due to moderate level Economic factors, 56.54 percent of the fishers are facing vulnerability due to the high level of economic factors. So, it can be inferred that most of the fisherfolks are facing vulnerability due to the higher level of economic factors.

**Table 5.11: The level of Economic factor of vulnerability among fisherfolks**

Attribute	Low level (Q1)	Moderate level (Q2)	High level (Q3)	Total	Chi-Square value	P-value
Level of Economic factor of vulnerability	32 (6.75%)	174 (36.7%)	268 (56.54%)	474 (100%)	104.67	<0.001**

\*\* denotes significant at 1% level

Regionally it is observed that there is a loss in the number of days that was used for fishing. The main reason attributed to this was the erratic monsoon and regional weather changes. This has contributed largely to the vulnerability among the fisherfolks. The increased cost of fuel, supplies, with the labour charge, has also dragged them with more debt and they borrow money from the local vendors with high-interest rates and it leads them to be with more indebtedness. As they have poor asset base, the repayment of the loan is considered to be far from reality. Increased household expenditure is also found to be the major reason for their low profile of living standard. Uncertainty in the livelihood which is controlled by many factors is the matter of concern.

While evaluating, the **poverty-related factors of vulnerability**, Since the P-value is  $<0.01$ , the proportions of the level of the poverty-related factor of vulnerability among fisherfolks in Kerala is not equally distributed. It indicates that there is a significant difference regarding the level of the poverty-related factor of vulnerability among fisherfolks in Kerala. From the above table, it can be observed that 50.8 percent fisherfolks are affected with poverty-related factor at a low level (Table 5.12). Among them, 26.7 percent are exposed to vulnerability due to the moderate level of poverty-related factors. Whereas only 22.5 percent are faced with a high level of poverty-related factors. So, it can be inferred that most of fisherfolks affected with a low level of poverty-related factors.

**Table 5.12: The level of Poverty related factor of vulnerability among fisherfolks**

Attribute	Low level (Q1)	Moderate level (Q2)	High level (Q3)	Total	Chi-Square value	P-value
Level of Poverty related factor of vulnerability	241 (50.8 %)	127 (26.7 %)	106 (22.5%)	474 (100%)	94.21	$<0.001^{**}$

*\*\* denotes significant at 1% level*

Most of the fisherfolks have housing facilities however the location and surroundings of their houses are only a matter of concern. Amenities for the living are also found to be moderate. Availability of safe drinking water was the only factor that was not sufficient for the community.

Considering the level of **Environmental factors**, since the P-value is less than 0.01, the proportions of the level of Environmental factors of vulnerability among fisherfolks in Kerala is not equally distributed. It indicates that there is a significant difference regarding the level of environmental factors of vulnerability among fisherfolks in Kerala. It can be observed that 12.7 percent of fisherfolks were affected with low level concerning environmental factors. About 26.8 percent of them was affected with moderate level concerning environmental factors (Table 5.13). A large proportion ie. 60.5 percent was affected with high level concerning environmental factors. So, it can be inferred that most of the fisherfolks were affected with high level concerning environmental factors of vulnerability.

**Table 5.13: The level of Environmental factors of vulnerability among fisherfolks**

Attribute	Low level (Q1)	Moderate level (Q2)	High level (Q3)	Total	Chi-Square value	P value
Level of Environmental factor of vulnerability	60 (12.7%)	127 (26.8%)	287 (60.5 %)	474 (100%)	108.34	<0.001**

\*\* denotes significant at 1% level

Global sea-level rise has contributed significantly to the vulnerability of the fisherfolks as it has impacted many fields. Extreme weather events during the past decade were another contributing factor of vulnerability. The destruction of habitat in the coastal region and erratic monsoon is also found to be a contributing factor. The local migration of fishes across regions which is an outcome of seawater temperature rise is also reported as a valid reason.

## 5.5 Relative contribution of vulnerability factors among the fisherfolks in Kerala

To obtain the objective that the relative contribution of vulnerability factors among the fisherfolks in Kerala, mean rank and Chi-square test are employed by the way of Friedman test. Post hoc test of mean rank is used to measure and compare the relative contribution of each vulnerability factor and Chi-Square test is adopted for testing the significance of the distribution of the mean ranks.

**Hypothesis 5.2** *There is no significant difference among the mean ranks towards the factors of vulnerability among fisherfolks in Kerala*

Since P-value is less than 0.01, the null hypothesis is rejected at 1 percent level of significance. Hence it can be concluded that there is a significant difference among mean ranks towards Factors of vulnerability among fisherfolks in Kerala. Based on mean rank Economic factors (9.38) is a most important reason for vulnerability among fisherfolks in Kerala, is followed by Fishery related factors (8.99), Environmental factors (8.37), Social factors (8.02), Governance factors (7.82) and Poverty related factors (6.37) (Table 5.14).

**Table 5.14: Friedman test for significant difference among mean ranks towards factors of vulnerability among fisherfolks in Kerala**

SI No	Factors of vulnerability	Mean ranks	Ranks based on mean rank
1.	Governance factors	7.82	V
2.	Fishery related factors	8.99	II
3	Social factors	8.02	IV
4.	Economic factors	9.38	I
5	Poverty related factors	6.37	VI
6	Environmental factors	8.37	III

**Chi-square value 121.25**

**P value - <0.001\*\***

*Note: \*\* Denotes significant at 1% level*

Economic factors are the most important factor which affected the fisherfolks and they will be exposed to vulnerability. Fishing can be considered as a sustainable occupation only when they can avail sufficient fishing days, which is not true as in the present case as they get only 8 to 12 fishing days per month. They get only a meagre amount, which allows them to purchase basic amenities only. The increased cost involved in fishing is also a limiting factor. This will drag them to increased debts and associated miseries. With centralized landings and greater competition for the catch, smaller players, with access to meagre capital including men and women vendors and head loaders, processors, cycle vendors etc. usually get access to only low-value fish for local consumption, with correspondingly lower profit margins. Signs of overfishing are evident, particularly in coastal waters, highlighting the need for better management, particularly of non-selective gear groups, such as bottom trawlers. International Collective in Support of Fish workers (ICSF 2011) has done an analysis with emphasis on expanding production and better resource exploitation, there is now a recognition of the need for conservation and management, because of the overfishing, particularly of coastal resources.

Small-scale vendors and processors continue to be constrained by, among other things, a lack of adequate credit, lack of ice and storage infrastructure, lack of transport, and by poor facilities at markets and landing centres. Migration is increasingly being adopted as a survival strategy (Sathiadas and Prathap 2009). Faced with declining resources in their waters, several fishing units migrate along the coast to richer fishing grounds. There is also a regional migration as a crew to work on mechanized fishing vessels.

The fisheries sector is increasingly being affected by pollution and the impact of another land- and sea-based activities on coastal resources and their productivity. Impacts are most acutely felt by those fishing in coastal and inshore waters, particularly those engaged in cleaning and collection activities. Along the east coast, fish production tends to be dominated by the motorized and non-

mechanized fleet, while on the west coast it is dominated by the mechanized fleet, except in Kerala where the motorized fleet dominates.

## **5.6 The differences in the factors of vulnerability regarding the types of fishing, methods employed for fishing and region of the fisherfolks in Kerala**

To compare the significant difference between types of fishing used (inland plus marine fishers and marine fishers) mean scores, standard deviation and independent t-test are used. To measure the significant difference between methods of fishing used (Motorised, non-motorised and mechanised) and region of fisherfolks (Thiruvananthapuram, Kozhikode and Ernakulam) regarding the factors of vulnerability, mean scores, standard deviation, Analysis of Variance (ANOVA) and ‘Tukey’ HSD post hoc Test’ are used.

### **5.6.1 Vulnerability among the fishermen those who are engaged in different types of fishing**

#### **Hypothesis 5.3 *There is no significant difference between Inland plus marine fishers and marine fishers concerning factors of vulnerability***

Since P-value is less than 0.01, the null hypothesis is rejected at 1% level concerning factors of vulnerability that Governance factors, Fishery related factors, Social factors, Economic factors and Poverty related factors. Hence, there is a significant difference between inland plus marine fishers and marine fishers with regard to the factors of vulnerability that Governance factors, Fishery related factors, Social factors, Economic factors and Poverty related factors. Based on the mean score, it can be said that the vulnerability among marine fishers has more severe than the inland plus marine fishers in all the above-mentioned factors of vulnerability (Table 5.15).

**Table 5.15: t-test for significant difference between Inland plus marine fishers and Marine fishers with respect to factors of vulnerability**

SI No	Factors of vulnerability	Types of fishing used				t value	P-value
		Marine fishers		Inland plus Marine fishers			
		Mean	SD	Mean	SD		
1	Governance factors	4.32	0.697	3.98	0.681	3.572	<0.001**
2	Fishery related factors	4.02	0.269	3.76	0.327	3.922	<0.001**
3	Social Factors	4.34	0.234	4.02	0.284	3.132	<0.001**
4	Economic Factors	4.29	0.372	3.98	0.228	3.002	<0.001**
5	Poverty related factors	4.21	0.480	3.92	0.331	3.244	<0.001**
6	Environmental Factors	3.12	0.614	3.19	0.773	0.114	0.902

\*\* denotes significant at 1% level

It has been proven by many studies; the marine fishery was impacted mostly bycatch (Salim et al. 2014, FAO 2018). The impact was evident as the fish catch decreased drastically over the years despite the increased number of attempts with a variety of fleets and equipment. Second to this aspect the seasonality play a significant role in the deprived condition of the fisherfolks. The fishers claim that there has been a movement of coastal fishes to open sea, pelagic fishes to deeper waters. A shift in spawning season of major fishes has taken place along the coast due to environmental factors which made the situation worse. The marine fisherfolks in contrast with those who are doing both inland and marine fishing have got tremendous differences in multiple factors. In terms of the number of fishing days, those who are doing inland fishing and marine fishing gets advantages as the regulatory warnings released by the Government to stay away from the seas would not have affected to the fishers those who are doing both. From the perspective of cost of the fishing and time taken to get a profitable yield would also found to be different in both cases, favouring those who are engaged in both type of fishing. The manoeuvrability in the timing would be another reason to point out the superiority over the other in

the case of inland fishing. The joint efforts in the aquaculture by the inland fisherfolks have also made them have a reasonable revenue which made them have a better life.

There is no significant difference between inland plus marine fishers and marine fishers with regard to the environmental factors of vulnerability since P-value is greater than 0.05. Hence the null hypothesis accepted with regard to the environmental factor of vulnerability.

The recent climatic events such as Okhi and flood have impacted the ecosystem dynamics of the estuarine and neritic zones. Just after the flood, the fishers have pointed out that there was less demand for fishes as the taste of fishes have reportedly come down. The sediments which bring in to the sea through the rivers have decreased which in turn would have affected the food chain of the estuarine system. This could be a limiting factor that driven the localised movements of the target fishes.

### **5.6.2 Vulnerability among the fisherfolks those who are using different methods for fishing (Motorised, Non-motorised, Mechanised)**

While analysing the vulnerability among the fisherfolks those who are using different methods for fishing, since P-value is less than 0.01, the null hypothesis is rejected at 1% level with regard to the dimension of vulnerability factors that Governance factors, Fishery related factors, Social factors, Economic factors and Poverty related factors. Hence there is the significant difference among the different methods of fishing with regard to the dimensions of vulnerability factors such as Governance factors, Fishery related factors, Social factors, Economic factors and Poverty related factors (Table 5.14).



**Table 5.16: ANOVA test for significant difference between motorised, non-motorised and mechanised methods used among the fisherfolks with respect to factors of vulnerability**

SI No	Factors of vulnerability	Methods used for fishing			F value	P value
		Motorised Fishing	Non-motorised fishing	Mechanised Fishing		
		Mean & SD	Mean & SD	Mean & SD		
1.	Governance factors	4.16 (0.56)	4.46 (0.78)	3.33 (0.81)	3.480	<0.001**
2.	Fishery related factors	4.14 (0.72)	4.54 (0.56)	3.60 (0.90)	2.950	<0.001**
3.	Social Factors	4.24 (0.93)	4.73 (0.69)	3.70 (0.88)	3.197	<0.001**
4.	Economic Factors	3.90 (0.97)	4.65 (0.72)	3.44 (0.93)	2.986	<0.001**
5.	Poverty related factors	4.07 (0.66)	4.46 (0.85)	3.78 (0.93)	3.554	<0.001**
6.	Environmental Factors	3.92 (0.72)	3.94 (0.88)	3.99 (0.81)	3.490	0.163

Note : 1. \*\* denotes significant at 1% level  
 2. The value within bracket refers to SD

There is a significant difference in the economic conditions of the workers involved in the three different types of vessels. Non-motorised boats are the one with manual operation and only a few people will be engaged in the boat. Motorised boats are with an engine on board and number of people using these boats will be less than ten. Whereas, in the case of the mechanised boat it is loaded with high-end sensors and high-tech equipment to track the fish availability etc. The number of people on board will also be about 50.

The cost of a mechanised boat is very high and they would also get the privilege of hefty loans from the banks. Whereas in the case of the motorised and non-motorised boats they would get that much support in terms of money as they will be deprived of the collateral deposit.

Although the patrolling and surveillance are in place in the coasts, the motorised fishers will be invading the fishing zones of the traditional fishermen

which in turn would result in the lesser yield for them. The financial support extended to the mechanised fishing will be far from those of the non-motorised fishing. The fishing with light lures by the motorised fishing would also be a concern as it would take a toll on the yield of non-motorised fishermen. The disparity with high-end technology used by the mechanised fishing in contrast with the traditional know-how could also attract friction by enhancing the yield for the mechanised fishing. The mechanised boat owners won't have any real connection with the shores of the people on the coast as they would belong to the corporates or the businessmen in some other cities. For the past two decades, it has been observed with a rapid expansion in fishing capacity, including the small-scale sector. The most affected in this process are the fishermen on non-mechanized craft, the majority, who face declining catches and increasingly vulnerable livelihoods as a result of fishing practices adopted by the motorized and mechanized fleet. There has been a significant escalation in investment and operating costs, for both mechanized and motorized vessels. This correspondingly related to the trend towards greater concentration of ownership of craft by the fisher community. Elevated costs and investments have led to greater indebtedness, and credit continues to be accessed mainly from informal sources at higher rates of interest. The manoeuvres of non-mechanized craft, especially in certain regions, are becoming unviable, as resources and returns decline.

There is no significant difference between Motorised, Non-motorised, Mechanised fishing methods with regard to the environmental factor of vulnerability since P-value is greater than 0.05. Hence the null hypothesis accepted with regard to the environmental factor of vulnerability.

However, the extreme weather events, habitat destruction, fish migration, erratic monsoon have affected more or less uniformly to all three types of fishing methods. The global change in the climate and sea-level rise have contributed significantly to the reduction in the marine captures. Another important issue that was raised by the fishermen across the three study sites was the formation of the belt at seafloor that has appeared quite recently after the natural catastrophes. This

has trampled the spawning ground for the fishes and has contributed enormously to the deterioration of the catches from the region. In most of the areas, the sea encroachment has made a wall-like appearance of the sand in the shore, which make reduced accessibility for the non-motorised and motorised vessels to the sea.

### 5.6.3 Post-hoc test of ANOVA

Even though the test shows that there is a significant difference, in the vulnerability factors among the fisherfolks those who are using different methods for fishing it doesn't imply that each group is significantly different from all other groups. To know which groups are significantly different, a 'Post Hoc' test is carried out using 'Tukey's HSD Test' (Table 5.17).

**Table 5.17: Post Hoc Test for significant difference among motorised, non-motorised and mechanised method used by fisherfolks with respect to factors of vulnerability**

Factors of Vulnerability	Methods used for fishing (I)	Methods used for fishing(J)	Mean Difference (I-J)	P value
Governance factors	Motorised Fishing	Non-motorised fishing	-0.3	<0.001**
	Fishing	Mechanised fishing	0.83	<0.001**
	Non-motorised fishing	Mechanised fishing	1.13	<0.001**
Fishery related factors	Motorised Fishing	Non-motorised fishing	-0.4	<0.001**
	Fishing	Mechanised fishing	0.54	<0.001**
	Non-motorised fishing	Mechanised fishing	0.94	<0.001**
Social factors	Motorised Fishing	Non-motorised fishing	-0.49	<0.001**
	Fishing	Mechanised fishing	0.54	<0.001**
	Non-motorised fishing	Mechanised fishing	1.03	<0.001**
Economic factors	Motorised Fishing	Non-motorised fishing	-0.75	<0.001**
	Fishing	Mechanised fishing	0.46	<0.001**
	Non-motorised fishing	Mechanised fishing	1.21	<0.001**
Poverty related factors	Motorised Fishing	Non-motorised fishing	-0.39	<0.001**
	Fishing	Mechanised fishing	0.29	<0.001**
	Non-motorised fishing	Mechanised fishing	0.68	<0.001**

\*\* denotes significant at 1% level

From the result of Post Hoc test in Table 5.17, it is revealed that there is a significant difference between the all methods used for fishing in the Governance factors under vulnerability factors among fisherfolks in Kerala. Based on ‘Tukey’s HSD Test’, the motorised fishing method has significantly differed from the non-motorised fishing method at 1% level and mechanised fishing method at 1% level in respect of Governance factors of vulnerability and non-motorised fishing method is also significantly differed from the mechanised fishing method at 1% level in respect of Governance factors of vulnerability

In the case of Governance factors, the motorised and non-motorised are found to be significantly different. However, while comparing with motorised fishing non-motorised fishing is reported as more vulnerable. The lack of Governance factors that lead to vulnerability is related as they failed to ensure the protection. As the non-mortised fishing has assigned with a boundary in the neritic zone, they would not in a position to attain sufficient yields from this zone. This is attributed to the fact that the motorised fishing would use the light lures to trap the fish. Whereas in the case of motorised and mechanised fishing the mechanised boats have got sophisticated technology in fishing such as scanning of sea bottom to track hold on the shoals of fishes. They would be in a position to demarcate the catches that are with more costly. There are some places as the mechanised fishing would affect both motorised and non-motorised fishing. The mechanised fishing is targeting high priced fish varieties for exporting. All the other varieties of catches would be sent back to the sea, which would result in a wastage of resource. This in turn would result in the resource shortage for both motorised and non-motorised fishing. It is envisaged that the Government should enact upon the premises mentioned above to prevent the consequences faced by the fishers.

From the result of Post Hoc test, it is revealed that there is the significant difference among all the methods used for fishing in the Fishery related factors under vulnerability factors among fisherfolks in Kerala (Table 5.17). Based on ‘Tukey’s HSD Test’, the motorised fishing method has significantly differed from the non-motorised fishing method at 1% level and mechanised fishing method at

1% level in respect of Fishery related factors of vulnerability and non-motorised fishing method is also significantly differed from the mechanised fishing method at 1% level in respect of Fishery related factors of vulnerability,

While comparing the non-motorised and motorised fishing the reduction of the fishing zone is a matter of serious concern for the non-motorised fishing. The nets laid by the non-motorised fishers are prone to be attacked by the porpoise. Along with its yield, they damage the nets severely that would result in a reduction of at least two days in the fishing as they have to repair the net before the next use. While comparing with mechanised fishing motorised fishing is more vulnerable. Motorised fishing lacks the mechanism that could attain good yield.

From the result of Post Hoc test, it is revealed that there is a significant difference between the all methods used for fishing in the Social factors under vulnerability factors among fisherfolks in Kerala (Table 5.17). Based on 'Tukey's HSD Test', the motorised fishing method has significantly differed from the non-motorised fishing method at 1% level and mechanised fishing method at 1% level in respect of Social factors of vulnerability and non-motorised fishing method is also significantly differed from the mechanised fishing method at 1% level in respect of Social factors of vulnerability.

While comparing the motorised and non-motorised fishing, there has been a notable occupational migration among non-motorised fishing personals. This is sole because of the low income derived from their fishing activities. This would drive them to move across the disciplines such as street marketing, coolie, etc. The low literacy among the non-motorised and motorised fishers would play as a criterion to demarcate the mechanised fishers, as they are well versed with the handling of sophisticated mechanisms. The permeability in the access of fishing grounds is the limiting factors for the non-motorised fishing, whereas the motorised and mechanised fishing can invade multiple zones for their exploration as they are not limited with boundaries with in the permissible zones.

From the result of Post Hoc test, it is revealed that there is the significant difference among all the methods used for fishing in the case of Economic factors under vulnerability factors among the fisherfolks in Kerala (Table 5.17). Based on 'Tukey's HSD Test', the motorised fishing method is significantly differed from the non-motorised fishing method at 1% level and with the mechanised fishing method at 1% level in respect of Economic factors of vulnerability and non-motorised fishing method is also significantly differed from the mechanised fishing method at 1% level in respect of Economic factors of vulnerability. The mechanised fishing will be limited with the number of ports they could anchor, but they are not compromised with the area of fishing. Seasonal unemployment both in the motorised and non-motorised fishing in comparison with mechanised fishing would attract more benefits irrespective of the curtails of the seasonality. As the fishers are of low capacity for investment in the non-motorised and motorised in comparison with the mechanised fishing is another reason that funnels to the vulnerability. The cost of fishing in the case of mechanized, motorised and non-motorised fishing is found to be different. Even though the mechanised fishing would be in a position to cover up the expenditure as they could collect the yield. The indebtedness in the fishermen was reported as more in in the case of motorised fishing, followed by non-motorised and mechanised fishing. The reason for this could be attributed to the fact that low asset base in the motorised and non- motorised fishing community.

From the result of Post Hoc test, it is revealed that there is a significant variance between the all methods used for fishing in the Poverty related factors under vulnerability factors among fisherfolks in Kerala (Table 5.17). Based on 'Tukey's HSD Test', the motorised fishing method has significantly differed from the non-motorised fishing method at 1% level and mechanised fishing method at 1% level in respect of Poverty related factors of vulnerability and non-motorised fishing method is also significantly differed from the mechanised fishing method at 1% level in respect Poverty related factors of vulnerability.

Due to the low income generated by the non-motorised fishing community they would be in a position to weave their nets to save the money. This warrants

immense attention, as the task is laborious and need to spend consecutive hours that has made many people sick by sitting on the sand for a long time. The lack of proper drinking water is a limiting factor for the entire community. The large size of the family is another criterion for the deprived condition in the non-motorised fishing community.

#### 5.6.4 Vulnerability among the fishermen in different regions of Kerala (Thiruvananthapuram, Kozhikode and Ernakulam)

**Hypothesis 5.4.** *There is no significant difference among different regions of fisherfolks with respect to factors of vulnerability*

Since P-value is less than 0.01, the null hypothesis is rejected at 1% level with regard to the dimension of vulnerability factors that fishery-related factors and social factors. Hence there is a significant difference between different regions of the fisherfolks in Kerala regarding the two vulnerability factors that fishery-related factors and social factors (Table 5.18).

**Table 5.18: ANOVA for significant difference among the region of fisherfolks with respect to factors of vulnerability**

SI No	Factors of vulnerability	Region wise differences			F value	P value
		Thiruvananthapuram	Kozhikode	Ernakulam		
1.	Governance factors	4.12 (0.847)	4.18 (0.942)	4.09 (0.782)	1.078	0.456
2.	Fishery related factors	3.98 (0.745)	4.09 (0.812)	4.43 (0.758)	3.765	<0.001**
3	Social Factors	4.02 (0.786)	4.45 (0.562)	3.87 (0.723)	3.349	<0.001**
4.	Economic Factors	3.98 (0.887)	3.99 (0.981)	4.01 (0.732)	1.178	0.292
5	Poverty related factors	4.12 (0.847)	4.18 (0.942)	4.14 (0.782)	1.266	0.366
6	Environmental factors	4.22 (0.843)	4.18 (0.940)	4.19 (0.588)	1.234	0.351

Note: 1. The value within bracket refers to SD  
2. \*\* denotes significant at 1% level.

Fishery related factors have affected drastically to the community at Ernakulam followed by Kozhikode and Thiruvananthapuram. Predator attack by the Porpoise was much more pronounced at the Ernakulam, which has contributed largely to the reduction of yield. Due to the proximity of the international exporting hub, the number of fleets deployed at the coasts of Ernakulam is on the higher side and this has made the area vulnerable in terms of fishery-related factors. About social factors, Kozhikode ranked first followed by Thiruvananthapuram and Ernakulam. This has got a positive relationship with the literacy rate in the fishermen operating in the region.

There is no significant difference between different regions of the fisherfolks in Kerala regarding the four vulnerability factors that governance, economic factors, poverty-related and environmental factors since the P-value is greater than 0.05. Hence the null hypothesis is accepted with regard to the factors of vulnerability such as governance, economic factors, poverty-related and environmental factors.

The state policies are to be followed uniformly, which has made the uniform pattern in all study sites on Governance factors. All other factors such as economic factors, poverty-related factors, environmental factors are also found to be similar in all regions. In the case of all study areas, loss in fishing days increased cost of fishing, increased house-hold expenditure, indebtedness, uncertain livelihood, seasonal unemployment, low capacity for investment, low income and erratic income has contributed to the economic factors which appear to be same in all regions. In the case of poverty-related factors all cases have mentioned poor availability of drinking water facilities. Poor location of the houses is another matter of concern which are exposed to sea encroachment and other calamities. Environmental factors which cause vulnerability is almost unique in all spheres of study sites. Environmental impacts followed by fishery and economic parameters which attributed by monsoonal fluctuations consider as the most significant, followed by the sea-level rise and seawater inundation. With respect to monsoonal fluctuations, the respondents perceived that there is a substantial decrease in rainy days over the years and erratic monsoon was noticed. There was a perception that



a substantial increase in sea level and coastal erosion has taken place in the fishing villages.

### 5.6.5 Post-hoc test of ANOVA

Even though the test shows that there is a significant difference among fisherfolks of different regions, with respect to factors of vulnerability it doesn't imply that each group is significantly different from all other groups. To know which groups are significantly different, a 'Post Hoc' test is carried out using 'Tukey's HSD Test' (Table 5.19).

**Table 5.19: Post Hoc Test for significant difference among different regions, with respect to factors of vulnerability**

Factors of Vulnerability	(I) Study area	(J) Study area	Mean Difference (I-J)	P value
Fishery related factors	Thiruvananthapuram	Kozhikode	-0.11	<0.001**
		Ernakulam	-0.45	<0.001**
	Kozhikode	Ernakulam	-0.34	<0.001**
Social factors	Thiruvananthapuram	Kozhikode	-0.43	<0.001**
		Ernakulam	0.15	<0.001**
	Kozhikode	Ernakulam	0.58	<0.001**

\*\* denotes significant at 1% level

From the result of Post Hoc test, it is revealed that there is a significant difference between all the study areas in the Fishery related factors under vulnerability factors among fisherfolks in Kerala (Table 5.19). Based on 'Tukey's HSD Test', corresponding study areas such as Thiruvananthapuram - Kozhikode, Thiruvananthapuram-Ernakulam, Kozhikode – Ernakulam was significantly different at the 1% level. The fishery-related factors are much affected in the case of Ernakulam whereas in the case of Kozhikode and Thiruvananthapuram. Fishery related factors have affected drastically to the community at Ernakulam followed by Kozhikode and Thiruvananthapuram. Predator attack by the Porpoise was much

more pronounced at the Ernakulam, which has contributed largely to the reduction of yield. Due to the proximity of the international exporting hub, the number of fleets deployed at the coasts of Ernakulam is on the higher side and this has made the area vulnerable in terms of fishery-related factors. This could have attributed to the positive relationship with the literacy rate in the fishermen operating in these regions.

From the result of Post Hoc test, it is revealed that in the case of social factors there is a significant difference between all the study sites across the region, under vulnerability factors among fisherfolks in Kerala (Table 5.19). Based on 'Tukey's HSD Test', in the case of social factors to there has been a notable difference in the study areas such as Thiruvananthapuram - Kozhikode, Thiruvananthapuram-Ernakulam, Kozhikode – Ernakulam at 1% level. With regards to social factors, Kozhikode ranked first followed by Thiruvananthapuram and Ernakulam. This has got a positive relationship with the literacy rate in the fishermen, operating in these regions. The support from the various religious centres has contributed to the well-being of the fisherfolks in the region. The number of habitual drunkards was also found to be higher, in the Thiruvananthapuram, which was instrumental in the backwardness of the society.

## **5.7 Conclusion**

To summarise, it is evident that the vulnerability among the fisherfolks, the economic factor reported being with high rank, followed by fishery-related and environment factors. Next to this, the people, who are experiencing vulnerably are the fishers who operate non- motorised vessels. While comparing marine plus inland and marine fishers, vulnerability is higher in the case of marine fishers. It is observed that economic factor, environment factor is not appeared to be different with respect to the geographical areas. The preceding chapter enumerates the repercussion of the vulnerabilities.

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## CHAPTER 6

# LIVELIHOOD DIVERSIFICATION AMONG THE FISHERFOLKS OF KERALA

### CONTENTS

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  - 6.6 Conclusion
-

## 6.1 Introduction

The recent climatic events and catastrophes coupled with a global reduction of fish resources have made the already deprived fishermen into poverty. This situation permitted them to think on the alternative livelihood options to get relief from the murky socio-economic condition. There is not much literature available from India on the livelihood diversification except the studies by Khatun and Roy (1998) Shiyani and Pandya (2016) and Arjun et al. (2019). Fishing is a risky enterprise. Owing to the risk and the high variation in the annual income, there could be a possibility for seeking alternative way-out by the fishermen. Diversification is a process by which households engage in multiple income-generating activities (Brugerie et al., 2008). The relationship between fishing and livelihood diversification is important because fishing is an important component of rural livelihoods of households in the coastal areas. High annual variation in income is a problem that is common to a variety of occupations dependent on natural resources, and there has been extensive study of income risk-coping mechanisms, particularly for farmers in developing countries.

In the context of fisheries, diversification is promoted as a means for reducing dependence on the resource, making restrictive management easier and less controversial for those affected by such measures. This often interprets diversification as a change of occupation (to discontinue fishing, do something different for living) rather than adding other activities to a revenue-portfolio. With the inclination for increasing pressure on fishery resources, it becomes ever more necessary to address in a coherent way diversification and its links with both poverty reduction and responsible fisheries. Individuals who rely on natural resources for their livelihoods, such as fishers, farmers, and forestry workers, face high levels of income variability. For fishers, catching multiple species has been shown to reduce revenue variability at large scales (vessels and communities), but the individual-level consequences of maintaining catch diversity are unknown. The present chapter deals with the livelihood diversification reported from the different coastal districts of Kerala.

## 6.2 Livelihood diversification

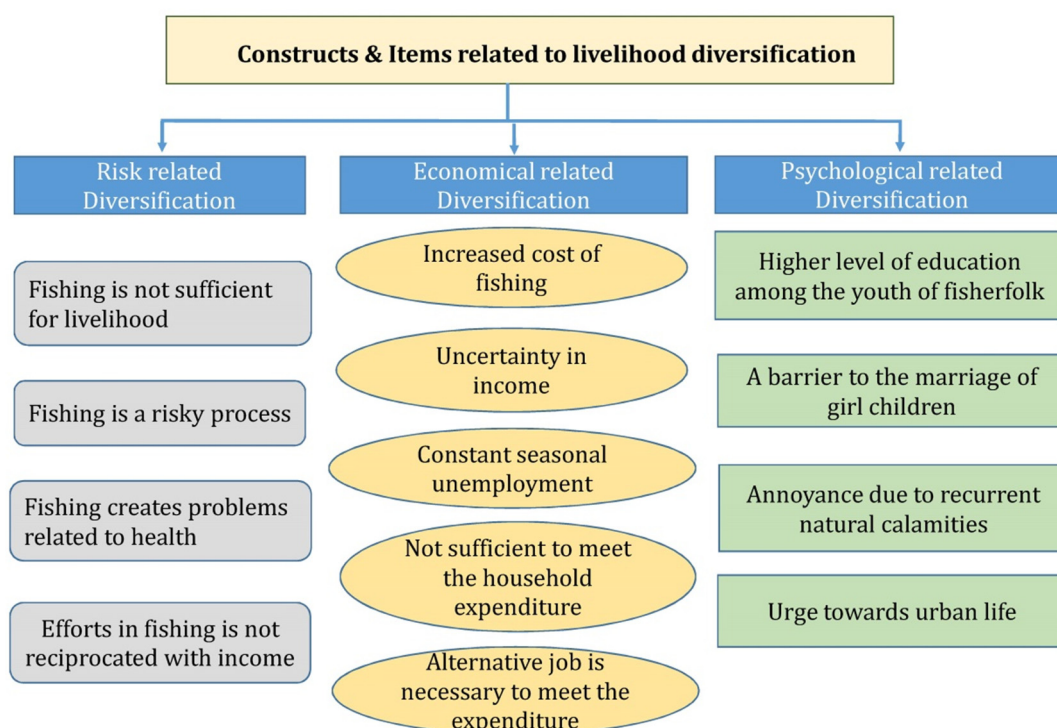
Livelihood diversification is the diversification of income sources for livelihood. In the previous chapter, it has been discussed that the vulnerabilities that the fishermen have faced. There are different factors such as social, economic, governance, fishery-related, poverty-related factors and environmental factors which can cause vulnerability among the fishing community. The multidimensional nature of the vulnerabilities among the fishing community ultimately forced them to diversify their livelihood to non-fishing activities. As a result, they are diversifying into other non-fishing activities such as self-employed, driver, service, tourist guide, small scale business, coolie and others.

There have been reports of the livelihood diversification in all the three districts. However, the numbers of the proportion of the diversified individuals were observed in the fields of daily wage workers. The second dominant fields were contributed by drivers including those who have managed to lease or buy a vehicle such as an auto. Self-employed and others had shared the third rank with 17.6 percent of contribution. The least contribution was offered to the tourist guide with 2.3 percent (Table 6.1).

**Table 6.1: Percentage of fishermen who are doing non-fishing activities**

Category	TVM	EKM	KZE	Total
Self-employment	19.3	19.8	13.0	17.6
Tourist guide	2.4	3.8	0.0	2.3
Small scale business	4.8	10.7	6.5	7.8
Driver	21.7	17.6	20.7	19.6
Daily wage workers	32.5	24.4	25.0	26.8
Service	4.8	9.2	9.8	8.2
Others	14.5	14.5	25.0	17.6

Multiple reasons can be attributed to livelihood diversification. The following constructs would shed more insights about the same (Figure 6.1).



**Figure 6.1: Constructs and items used for demonstrating livelihood diversification**

### 6.3 Level of livelihood diversification among the fisherfolks in Kerala

To achieve the objective that the level of livelihood diversification among the fisherfolks in Kerala, Quartile Deviation, Percentage analysis, and Chi-Square tests are used. The following are the three factors of livelihood diversification

- 1) Risk related diversification
- 2) Economic related diversification
- 3) Psychological related diversification

**Hypothesis 6.1: Proportions of the level of livelihood diversification among the fisherfolks in Kerala is equally distributed.**

While considering the level of Risk related diversification, since the P-value is  $<0.01$ , the proportions of the level of **risk related diversification** among

fisherfolks in Kerala is not equally distributed. It indicates that there is a significant difference regarding the level of risk related diversification among fisherfolks in Kerala. It can be noticed that 15.82 percent of fisherfolks facing low-level risk-related diversification, 21.3 percent of the fisherfolks are facing the moderate level risk-related diversification and 62.86 percent of them facing high-level risk related diversification. This is the major reason as they are diversifying from the fishing field to another. So, it can be inferred that most of the fisherfolks in Kerala are diversifying from their fishing field to another due to the high risk of the fishing job and low income which they are presently getting (Table 6.2).

**Table 6.2: The level of risk related Factors of diversification among fisherfolks**

Attribute	Low level (Q1)	Moderate level (Q2)	High level (Q3)	Total	Chi-Square value	P-value
Level of risk related factors of diversification	75 (15.82%)	101 (21.30%)	298 (62.86%)	474 (100%)	97.79	<0.001**

\*\* indicates 1% level of significance

It is reiterated that fishing is defensibly considered a high-risk profession. This is supported by available data on deaths of fisherfolks in natural calamities and at sea, indicating the need to undertake steps to reduce the vulnerability of fishermen and fishing communities (Kurien, 1998). The fishing was not sufficient for livelihood as they could not support them with a sustainable income. The risk involved in the sailing and unpredicted torrential rainfall and high tides always set the fishermen into anguish.

While analysing the **economic-related diversification**, since the P-value is <0.01, the proportions of the level of economic-related diversification among fisherfolks in Kerala is not equally distributed. It indicates that there is a significant difference regarding the level of economic-related diversification among fisherfolks in Kerala (Table 6.3).

**Table 6.3: The level of economic-related diversification among the fisherfolks**

Attribute	Low level (Q1)	Moderate Level (Q2)	High level (Q3)	Total	Chi-Square value	P-value
Level of economic related diversification	95 (20.04%)	112 (23.62%)	267 (56.32%)	474 (100%)	96.75	<0.001**

\*\* indicates 1% level of significance

It can be noticed that 20.04 percent fisherfolks facing low-level economic-related diversification, 23.62 percent of them were facing the moderate level of economic-related diversification and 56.32 percent of them facing a high level of economic-related diversification (Table 6.3). This is the major reason as they were diversifying from the fishing field to another. So, it can be inferred that most of the fisherfolks in Kerala are diversifying from their fishing field to another due to the high economic related in which they are presently getting.

The income from fishing alone would not be sufficient for their escalating needs in the present situation. The reduction in the potential fishing days as an outcome of the global changes sandwiched with the meagre amount of money, they receive from the fishing have driven them to search for the substitute for the livelihood option. The secondary profession is found to provide an ample supply of employment days apart from the stable income. Fishing is highly sensitive to the weather changes and the inconsistency in the working days and profits made by them more vulnerable.

While reckoning the level of **psychological related diversification** since the p-value is higher than 0.05 the proportion of psychological related diversification among the fisherfolks in Kerala is equally distributed (Table 6.4).

**Table 6.4: The level of psychological related livelihood diversification among fisherfolks.**

Attribute	Low level (Q1)	Moderate level (Q2)	High level (Q3)	Total	Chi-Square value	P-value
Level of psychological related diversification	148 (31.22%)	157 (33.12%)	169 (35.65%)	474 (100%)	1.087	0.127**

\*\* indicates 1% level of significance



Educated youth in the fisherfolks are not interested to follow their parent's profession as they consider it as a low-profile job. Moreover the increased level of education among youth diverted them to follow alternative paths in their profession. The low profile of the fishermen has always persisted an obstacle to the marriage of their children's, which forced them to settle down in places away from the coastal area.

#### **6.4 Relative contribution of livelihood diversification factors among fisherfolks of Kerala**

To analyse the relative contribution of livelihood diversification pattern among the fisherfolks in Kerala mean rank and Chi-square test is employed by the way of Friedman test.

**Hypothesis 6.2** *There is no significant difference among the mean ranks towards the factors of livelihood diversification among the fisherfolks in Kerala.*

Since P-value is less than 0.01, the null hypothesis is rejected at a 1 percent level of significance. Hence it can be concluded that there is a significant difference among mean ranks towards factors of livelihood diversification among fisherfolks in Kerala. Based on post hoc test among the mean rank, Economic related diversification (7.81) is the most important reason for livelihood diversification among the fisherfolks in Kerala, is followed by Risk related diversification (6.29) and Psychological related diversification (5.17) (Table 6.5).

**Table 6.5: Friedman test for significant difference among mean ranks towards factors of livelihood diversification among fisherfolks in Kerala**

SI No	Factors of diversification among fisherfolks in Kerala	Mean rank	Ranks based on mean rank
1.	Risk related diversification	6.29	II
2.	Economic related diversification	7.81	I
3	Psychological related diversification	5.17	III
<b>Chi-square value 137.37</b>			
<b>P value - &lt;0.001**</b>			

\*\* Denotes significant at 1% level

## **6.5 The differences in the factors of livelihood diversification with regard to the types of fishing, methods used for fishing and regions of fisherfolks**

To compare the significant difference between types of fishing used (inland plus marine fishers and marine fishers) mean scores, standard deviation and independent t test are used. To measure the significant difference between methods of fishing used (Motorised, non-motorised and mechanised) and region of fisherfolks (Thiruvananthapuram, Kozhikode and Ernakulam) regarding the factors of diversification, mean scores, standard deviation, Analysis of Variance (ANOVA) and 'Tukey's HSD post hoc Test' are used.

### **6.5.1 Livelihood diversification among the fisherfolks those who are engaging in different types of fishing**

**Hypothesis 6.3.** *There is no significant difference between Inland plus marine fishers and marine fishers with respect to factors of livelihood diversification*

Since P-value is less than 0.01, the null hypothesis is rejected at 1% level with regard to factors of livelihood diversification that risk related diversification, economic-related diversification and psychological related diversification. Hence, there is a significant difference between inland plus marine fishers and marine fishers with regard to the factors of livelihood diversification that risk related diversification, economic-related diversification and psychological related diversification (Table 6.6). Based on mean score, it can be observed that risk related, economic-related and psychological related factors of diversification are higher among the fishers those who are engaged in marine fishing only than those who engaged in both marine and inland fishing types.

**Table 6.6: t test for significant difference between Inland plus marine fishers and marine fishers with respect to factors of livelihood diversification**

SI No	Factors of diversification	Types of fishing used				t value	P value
		Inland plus marine fishers		Marine fishers			
		Mean	SD	Mean	SD		
1.	Risk related diversification	3.97	0.745	4.37	0.648	3.971	<0.001**
2.	Economic related diversification	3.88	0.947	4.33	0.727	3.178	<0.001**
3	Psychological related diversification	3.64	0.715	4.01	0.644	3.487	<0.001**

*\*\* denotes significant at 1% level*

Those who are engaged in marine fishing are exposed to more livelihood diversification. In the case of inland fisheries, the fish catches are not profoundly affected with seasonality and other climatic driven factors. The livelihood diversification was not common in the case of marine plus inland fishers.

### **6.5.2 Livelihood diversification among the fisherfolks those who are using different methods for fishing (Motorised, Non-motorised fishing, Mechanised)**

**Hypothesis 6.4. *There is no significant difference among the fisherfolks those who are using different methods for fishing with respect to factors of livelihood diversification.***

Since P-value is less than 0.01, the null hypothesis is rejected at 1% level with regard to the dimension of diversification factors that risk related diversification and economic related diversification among fisherfolks in Kerala. Hence there is a significant difference among Motorised, Non-motorised and Mechanised fishing methods with regard to the dimension of diversification that risk related diversification and economic related diversification (Table 6.7).

**Table 6.7: ANOVA test for significant difference among motorised, non-motorised and mechanised methods used by the fisherfolks with respect to factors of livelihood diversification.**

SI No	Factors of livelihood diversification	Methods used for fishing			F value	P value
		Motorised Fishing	Non-motorised fishing	Mechanised Fishing		
		Mean & SD	Mean & SD	Mean & SD		
1.	Risk related diversification	4.38 (0.49)	4.01 (0.97)	3.75 (0.74)	3.480	<0.001**
2.	Economic related diversification	4.61 (0.67)	4.27 (0.74)	3.97 (0.84)	2.950	<0.001**
3	Psychological related diversification	3.97 (0.90)	4.01 (0.69)	4.04 (0.88)	1.197	0.112

Note : 1. \*\* denotes significant at 1% level  
2. The value within bracket refers to SD

It was observed that the livelihood diversification is very high in the case of motorised fishing, as it consumes hefty amounts of money as the cost of fuel and labour charge etc. This amount would not be reimbursed through the catches. Hence they would move for the secondary options. The livelihood diversification is constantly performed during the lean periods experienced by the fishers especially when they are losing their fishing days due to monsoon and other weather events.

There is no significant difference between Motorised, Non-motorised and Mechanised fishing methods with regard to the psychological related factors of diversification since P-value is greater than 0.05. Hence the null hypothesis accepted with regard to the psychological related factors of diversification. Educated youth in the fisherfolks are not interested to follow their parent's profession as they consider it is with a low profile job. Moreover, the increased level of education among youth diverted them to follow alternative paths in their profession.

### 6.5.3 Post-hoc test of ANOVA

Even though the test shows that there is a significant difference, it doesn't imply that each group is significantly different from all other groups. To know which groups are significantly different, a 'Post Hoc' test is carried out using 'Tukey's HSD method' (Table 6.8).

**Table 6.8: Post Hoc Test for significant difference between motorised, non-motorised and mechanised methods used by fisherfolks with respect to factors of livelihood diversification**

Factors of diversification	Methods used for fishing	Methods used for fishing	Mean Difference	P value
Risk related diversification	Motorised	Non-motorised fishing	0.37	<0.001**
	Fishing	Mechanised fishing	0.63	<0.001**
	Non-motorised fishing	Mechanised fishing	0.26	<0.001**
Economic related diversification	Motorised	Non-motorised fishing	0.34	<0.001**
	Fishing	Mechanised fishing	0.64	<0.001**
	Non-motorised fishing	Mechanised fishing	0.30	<0.001**

\*\* denotes significant at 1% level

From the result of Post Hoc test, it is revealed that there is a significant difference between risks related diversification and economic related diversification among fishers those who are using different methods for fishing (Table 6.6). Based on 'Tukey's HSD Test' motorised fishing method has significantly differed from the non-motorised fishing method and mechanised fishing method at 1% level in respect of risk related diversification and economic related diversification, and non-motorised fishing method is also significantly differed from the mechanised fishing method at 1% level in respect of risk related diversification and economic related diversification.

While considering the motorised and non-motorised fishing methods the livelihood diversification is very high in the case of those who are engaged in motorised fishing. This is because the risk related to motorised fishing is very high. The fishing is not sufficient for livelihood as they could not support them with a sustainable income. The risk involved in the sailing and unpredicted

torrential rainfall and high tides always set the fishermen into suffering. Whereas non-motorised fishing also facing similar problems. While analysing the motorised and mechanised fishing, it is observed that livelihood diversification is very high in the motorised fishing. In the mechanised fishing, the risk factor is meagre or they can diversify their risks by availing high insurance. This kind of facilities is not available with motorised fishing. The early warning systems such as weather forecasting and other technologies are available with mechanised fishing. While, the non-motorised and mechanised fishing, the risk related diversification is very high among those who are engaged in non-motorised fishing.

#### 6.5.4 Livelihood diversification among the fishermen in different regions in Kerala (Thiruvananthapuram, Kozhikode and Ernakulam)

**Hypothesis 6.5.** *There is no significant difference among different regions of fisherfolks with respect to factors of livelihood diversification.*

Since P-value is less than 0.01, the null hypothesis is rejected at 1% level with regard to dimensions of livelihood diversification that economic-related diversification and psychological related diversification among fisherfolks in Kerala (Table 6.9). Hence there is a significant difference among different regions of fisherfolks with respect to economic-related diversification and psychological related diversification among the fisherfolks in Kerala.

**Table 6.9. ANOVA for significant difference among different regions of fisherfolks with respect to factors of livelihood diversification**

SI No	Factors of diversification	Region			F value	P value
		Thiruvananthapuram	Kozhikode	Ernakulam		
1.	Risk related diversification	4.12 (0.74)	4.17 (0.84)	4.05 (0.68)	1.007	0.891
2.	Economic related diversification	4.45 (0.58)	4.11 (0.61)	4.48 (0.47)	2.875	<0.001**
3	Psychological related diversification	3.91 (0.61)	4.12 (0.61)	3.94 (0.78)	2.321	<0.001**

*Note:* 1. The value within bracket refers to SD  
2. \*\* denotes significant at 1% level.

It was observed that among the regions studied Ernakulam is reported with high rate economic-related diversification. In Ernakulam they had potentials to change their livelihood options as the region is very near to the urban area with immense possibilities of jobs. While in the case of psychological related diversification, it is reported that Kozhikode had a higher rate of livelihood diversification. It was supplemented with local migration of the people from the coast to obtain fair alliance for the other parts of the society.

In the case of risk-related livelihood diversification among different regions, since the p-value is higher than 0.05, the null hypothesis is accepted with regard to the factor that risk related diversification among the fisherfolks in Kerala. Hence there is no significant difference among the different regions of the fisherfolks with respect to the related risk factors of livelihood diversification. The risk factors on fishing are almost the same in all regions.

#### **6.5.5 Post-hoc test of ANOVA**

Even though the test shows that there is a significant difference, among different regions of fisherfolks, with respect to factors of diversification it doesn't imply that each group is significantly different from all other groups. To know which groups are significantly different, a 'Post Hoc' test is carried out using 'Tukey's HSD Test' (Table 6.10).

**Table 6.10: Post Hoc Test for significant difference between regions of fisherfolks with respect to factors of livelihood diversification**

<b>Factors of Livelihood diversification</b>	<b>Region used for fishing (I)</b>	<b>Region used for fishing(J)</b>	<b>Mean Difference (I-J)</b>	<b>P-value</b>
Economic related diversification	Thiruvananthapuram	Kozhikode	0.34	<0.001**
		Ernakulam	-0.03	0.757
	Kozhikode	Ernakulam	-0.37	<0.001**
Psychological related diversification	Thiruvananthapuram	Kozhikode	0.21	0.05*
		Ernakulam	0.18	0.05*
	Kozhikode	Ernakulam	-0.03	0.794

Note: 1. \*\* denotes significant at 1% level

2. \* denotes significant at 5% level

From the result of Post Hoc test (Table 6.10), it is revealed that there is a significant difference between the regions for fishing regarding the economic related factor of diversification among fisherfolks in Kerala. Based on 'Tukey's HSD Test' Thiruvananthapuram has significantly differed from Kozhikode at 1% level, but Thiruvananthapuram is not significantly different from Ernakulam in respect of economic-related factor of diversification and in the same way, Kozhikode is significantly different from Ernakulam at 1% level with respect of economic-related factor of livelihood diversification. From the respondents, it was evident that Kozhikode has more livelihood diversification as the region is well exposed to the Middle East. They are more skewed for engaging the same fishing profession in countries such as Yemen, UAE etc. While comparing the Thiruvananthapuram and Ernakulam, the more urbanised niche provides equal chances for the livelihood diversification and thereby no significant changes have been observed. Whereas while comparing Ernakulam and Kozhikode, Ernakulam was with more diversification, as they have more possibilities of exposure employing more openings for jobs.

From the result of Post Hoc test, it is revealed that there is a significant difference between the regions used for fishing regarding the psychological related factor of diversification among fisherfolks in Kerala. Based on 'Tukey's HSD Test' Thiruvananthapuram is significantly differed from Kozhikode and Ernakulam, at 5% level, but the same way Kozhikode is not significantly differed from Ernakulam in respect of psychological related factor of diversification.

In Thiruvananthapuram, they are more inclined towards traditional style fishermen, and they believe that the sea won't fail them to give away. Whereas in the case of Ernakulam and Kozhikode they are looking for the prestige and don't want to continue their parent's profession in long run. For Kozhikode and Ernakulam not much difference was observed.



## **6.6 Conclusion**

The present study showed enough shreds of evidence for the livelihood diversification. Due to the risk related factor, the fishers who opt for the secondary livelihood appears to be more. The lack of sufficient income to meet their expenses can be the sole reason for the livelihood diversification. The livelihood diversification was observed more in those who are employed in marine fisheries. Another observation made is that the livelihood diversification was high in the fishers those who are engaged in motorised fishing. The lack of interest in the younger generation to take up the fishing field as a profession is another reason for the occurrence of livelihood diversification. The increased level of attainment of education in the youngsters also provides them with multiple opening in the professional avenue. This context is making the elder professionals in the fishing field keep their next generation away from the fishing field.



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## CHAPTER 7

# THEERAMYTHRI PROJECT AND LIVELIHOOD ENHANCEMENT AMONG FISHERWOMEN IN KERALA

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- 7.1 Introduction
  - 7.2 Universe of activity groups
  - 7.3 Sample of Theeramythri Units
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  - 7.6 Theeramythri project and fisherwomen in Kerala
  - 7.7 The differences in the factors of Theeramythri project regarding the age group, region of the business unit, and category of units of fisherwomen engaged in Kerala
  - 7.8 Conclusion
-

## 7.1 Introduction

In the process of poverty eradication and reducing gender discrimination, the Governments have been implementing various schemes and programmes providing ways and means towards women development and empowerment. SHG movement, one among such programmes which have been proved successful in fulfilling its objectives. However, it is felt that the other schemes and programmes do have their prominent part in the process of women development and empowerment and which are being successfully implemented. The schemes and programmes intended for women development are reviewed by Shantilin (2011).

From the previous chapters, it was observed that vulnerability among the fisherfolks ultimately led them to abandon their traditional jobs and move to other areas other than fishing. In these circumstances, it is essential to have multiple earners in the family. To keep the fishermen in traditional jobs and to provide income-generating activities to their spouses is one of the important solutions for the upliftment of the fishing community. There are various programmes such as Self-Help groups, Kudumbasree for providing financial support for starting up different livelihood programmes among the fisherwomen.

In the State of Kerala, Theeramythri programme is the flagship programme of Society for Assistance to Fisherwomen (SAF) an organization mooted by the Fisheries Department of Government of Kerala, that encourages, facilitates and handholds fisherwomen to engage in gainful alternate self-employment for their economic and social emancipation.

The primary objectives of the Theeramythri programme are,

- 1) To promote integrated sustainable development of the fisherfolks of Kerala
- 2) To promote alternative livelihoods among fisherfolks for enhancing their incomes and improving their quality of life
- 3) To encourage new livelihood avenues through capacity and skill building of fisherfolks

- 4) To enhance the modernization of technologies for improving efficiency and quality in livelihood ventures
- 5) To build awareness among fisherfolks on quality improvement in production processes
- 6) To develop leadership and management acumen among fisherfolks through capacity building and training
- 7) To promote common production and service centres
- 8) To support the communities in production processes as well as in the marketing of their products and services

Any project can be evaluated in terms of valuing the success of its objectives. There have been multiple levels of objectives are present, which could be tangible while exercising the project. However, the present study focused on the three major outcomes derived from the objectives such as financial stability, soft skill enhancement, and social security.

Hence a detailed study on the outputs achieved by the Theeramythiri project in the three districts is carried out. From these areas, 28 units were selected from Thiruvananthapuram, 50 units were selected from Ernakulam 40 units were taken from Kozhikode, according to the percent of the population of units present in the area. To achieve this, a thorough study on the population of those who are attached to Theeramythri project is conducted. The demographic details of the Theeramythri members, the universe of activity Groups, etc., are provided as follows.

## **7.2 Universe of activity groups**

It was found that the largest proportion of the activity groups are composed of Garments and textiles with a total of 315 units. The units with manufacture and sales of food ranked second with 258 units followed by others with 199 units. Others include firms such as rental shops, hire services, ice plants, flour mills, etc. The least contribution was made by the supermarkets with only 10 in numbers across the entire nine coastal districts.

The number of garments & tailoring units was highest in the Ernakulam district with 61 units and the least was in the districts of Thiruvananthapuram and Kasaragod with 16 units. In the case of food-related units, Kozhikode ranked high with 48 units and Thiruvananthapuram was with least having eight units. The coir manufacturing units had a monopoly in Alappuzha districts with 29 units and a single unit was reported from Trissur. While considering the fish processing units Kollam had the highest number with 26 and the least were from Thrissur with five units. The highest number of provisional stores was recorded from Kasaragod with 12 units followed by Malappuram and Ernakulam with 11 units, whereas the least number with one was from Kannur. Two supermarkets were recorded from Kasaragod and Ernakulam. All other districts had supermarkets one each except in Kollam. Considering the category others, Thiruvananthapuram had the highest numbers with 43, and the least was reported from Kannur with four units (Table 7.1).

**Table 7.1: The universe of activity groups and their distribution across various districts in numbers.**

Districts	Garments & Tailoring	Food	Coir	Fish	Provisions	Super Market	Others	Total
Thiruvananthapuram	16	8	0	23	3	1	43	94
Kollam	41	38	0	26	6	0	23	134
Alappuzha	30	34	29	20	0	1	10	124
Ernakulam	61	28	0	13	11	2	38	153
Thrissur	51	37	1	5	9	1	22	126
Malappuram	34	17	0	14	11	1	18	95
Kozhikode	45	48	0	6	4	1	9	113
Kannur	21	26	0	10	1	1	4	63
Kasaragod	16	22	0	18	12	2	32	102
<b>Total</b>	<b>315</b>	<b>258</b>	<b>30</b>	<b>135</b>	<b>57</b>	<b>10</b>	<b>199</b>	<b>1004</b>

Source: CMFRI, 2018

### **7.3 Sample of Theeramythri Units**

It was found that the largest proportion of the activity groups are composed of Garments and textiles with a total of 38 units. The units with manufacture and sales of food ranked second with 24 units followed by others such as rental shops, hire services, ice plants, flour mills, etc with 23 units. Fish processing units and provision stores were ranked next with 18 and 11 units. The least contribution was made by the supermarkets with only four in numbers across the three sample districts (Table 7.2).

**Table 7.2: Sample of Theeramythri Units selected from the target Districts**

<b>Districts</b>	<b>Garments &amp; Tailoring</b>	<b>Food</b>	<b>Fish</b>	<b>Provisions</b>	<b>Super Market</b>	<b>Others</b>	<b>Total</b>
Thiruvananthapuram	06	4	7	2	1	8	28
Ernakulam	17	10	7	5	2	9	50
Kozhikode	15	10	4	4	1	6	40
Total	38	24	18	11	4	23	118

### **7.4 Sample of Theeramythri Members- fisherwomen**

A total of 474 Theeramythri members from the fishing family were selected as the sample. They were selected based on the number of Theeramythri units. The number of Theeramythri units was very high in Ernakulam followed by Kozhikode and Thiruvananthapuram. Each unit was consisted of four members except in the supermarket, where five members were present. In Ernakulam, 50 units were selected and are comprised of 202 members. Among the sample districts, the number of units was low in Thiruvananthapuram with 28 units along with a total of 112 members (Table 7.3).

Another important peculiarity of the sample is that about 51.5% of the Theeramythri members are the spouses of the fishermen that have been selected for the study. To understand the impact of Theeramythri project in reducing

vulnerability and livelihood diversification it is expected to be more systematic while including such a sample (Table 7.3).

**Table 7.3. The sample selected from the Theeramythri members - fisherwomen**

Districts	Sample Units	Sample of Theeramythri members	Number of fisherwomen those who are the spouses of fishermen
Thiruvananthapuram	28	112	66
Ernakulam	50	202	105
Kozhikode	40	160	73
Total	118	474	244 (51.5%)

## 7.5 Profile of fisherwomen- socio-economic conditions

### 7.5.1 Age group classification

The respondents were analyzed considering the overall age group, as the age groups of 31 to 40 were ranked as high with 39.2 percent . It was interesting to note that, the younger generation who is approaching Theeramythri was comparatively low as with only 25.7 percent . Whereas those who have the age of 41 and above were 35.2 percent . The highest percent of youngsters with 26.7 was reported from the Ernakulam region, whereas the lowest was reported from Thiruvananthapuram with 23.2 percent (Table 7.4). In the case of the age group of 31 to 40, the highest was in Ernakulam with 39.6 while the lowest was recorded from Thiruvananthapuram with 33.9 percent. While analyzing the age group of 41-50, it was observed as 46.4 percent of contribution was from Thiruvananthapuram which ranked first whereas Kozhikode was least with 30 percent .

**Table 7.4: Age-wise classification of Theeramythri Members (in percent ).**

Districts/Age group	21-30	31-40	41 and above
Thiruvananthapuram	23.2	33.9	46.4
Ernakulam	26.7	39.2	32.7
Kozhikode	26.3	42.5	30.0
Total	25.7	39.2	35.2



### **7.5.2 Marital status**

The marital status has shown that 69.8 percent of the respondents were married and among the majority of the respondents were the spouses of the fishermen who have been taken as the sample of the study. About 16.7 percent of them were unmarried and 8.4 percent of them were widows. Divorcees were also present in the sample with 5.1 percent. Divorcees and widows were reported as high in Kozhikode with 6.9 and 10 percent followed by Thiruvananthapuram (4.5 and 9.8 percent ) and least was reported from Ernakulam (3.9 and 6.5 percent) (Table 7.5). The unmarried persons were recorded as high in Thiruvananthapuram with 24.1 followed by Ernakulam with 16.3 percent and Kozhikode with 11.8 percent. Widows and divorced persons were the head of their families.

**Table 7.5: Marital Status of Theeramythri Members (in percent)**

<b>Marital Status/Districts</b>	<b>Thiruvananthapuram</b>	<b>Ernakulam</b>	<b>Kozhikode</b>	<b>Total</b>
Married	61.6	73.3	71.3	69.8
Divorcee	4.5	3.9	6.9	5.1
Widow	9.8	6.5	10.0	8.4
Unmarried	24.1	16.3	11.8	16.7

### **7.5.3 Educational status**

While considering the educational status of Theeramythri members overall from the three districts, more than one-third of the sample, with 35.4 percent had only secondary education, followed by primary education with 34.1 percent. Whereas 17.5 percent of Theeramythri members had higher secondary education followed by illiterate with 6.5 percent and above higher secondary education with 6.3 percent (Table 7.6). The persons with secondary education ranked first in Thiruvananthapuram with 40.2 percent, whereas 29.5 percent have completed primary education. About 12.5 percent of Theeramythri members were illiterate, which was the highest among all districts (Table 7.6). In Ernakulam 39.1 percent have recorded with secondary education, however, they had the highest percent of Theeramythri members with higher secondary level with 20.8 percent above

higher secondary level with 7.9 percent. The least number of illiterate members was reported from Ernakulam with about four percent. The person who has completed their primary education in Kozhikode was high with 45 percent, but only 3.7 percent had their educational level more than above the higher secondary level. Kozhikode had the illiterate members with 5.8 percent.

**Table 7.6: Educational status of Theeramythri members (in percent).**

Districts	Illiterate	Primary	Secondary	Higher secondary	Above HSE
Thiruvananthapuram	12.5	29.5	40.2	10.7	7.1
Ernakulam	4.0	28.2	39.1	20.8	7.9
Kozhikode	5.6	45.0	27.5	18.1	3.7
Total	6.5	34.1	35.4	17.5	6.3

*Source: Primary Data*

#### 7.5.4 Occupation wise distribution

While analyzing the overall occupation wise distribution of Theeramythri members, one-third of them were working on behalf of garments & tailoring with 32 percent which was followed by the food sector with 20.3 percent (Table 7.7). Others ranked next with 19.4 percent followed by persons associated with fish processing units with 15.2 percent and finally provisional stores with 9.3 percent. Only a fraction of people were employed at supermarkets with 3.8 percent.

While examining the district-wise occupation distribution in Thiruvananthapuram the category others had the highest with 28.6 percent while the lowest was reported with 3.6 percent for supermarkets. While scrutinizing the data from Ernakulam, it was observed that 33.7 percent of contribution was from garments and tailoring units which ranked first whereas the supermarket was with least represented with 4.9 percent. In Kozhikode, Theeramythri members were found to be highest in those who are working in garments and tailoring units with 37.5 percent whereas the supermarket was least with 2.5 percent.

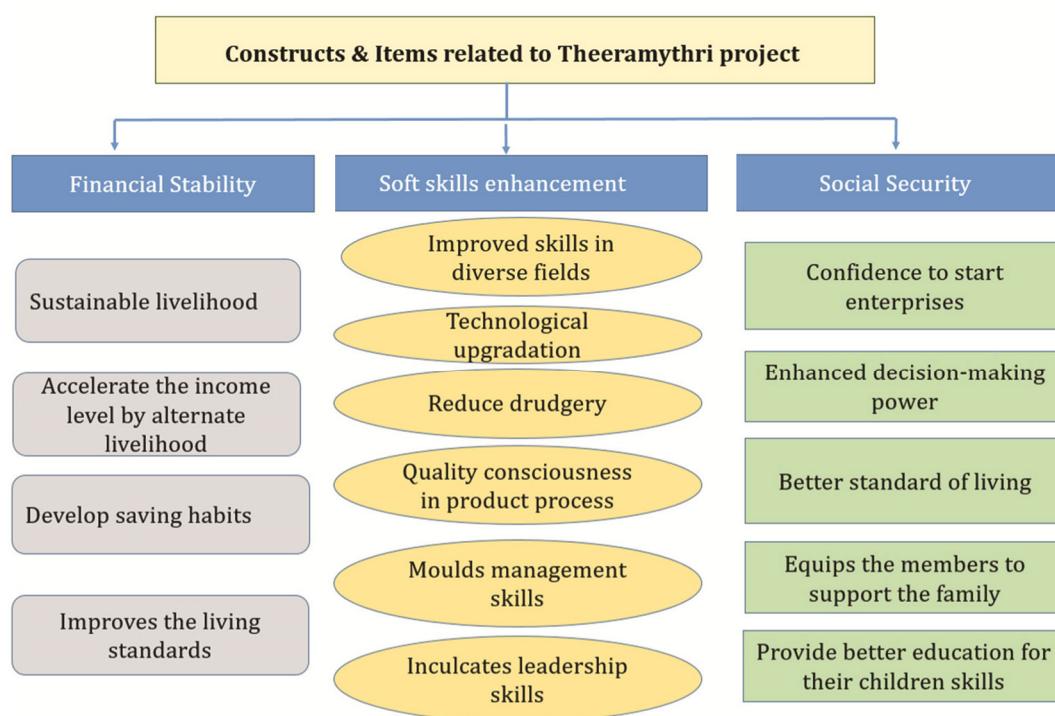
**Table 7.7: Occupation wise distribution of Theeramythri members**

Districts	Garments & Tailoring	Food	Fish	Provisions	Supermarket	Others	Total
Thiruvananthapuram	21.4	14.3	25.0	7.1	3.6	28.6	23.6
Ernakulam	33.7	19.8	13.8	9.9	4.9	17.8	42.6
Kozhikode	37.5	25	10	10	2.5	15	33.8
Total	32.06	20.3	15.2	9.3	3.8	19.4	100

From the interactions with the Theeramythri members, it can be deduced that the income generated from the enterprises are fetching them fairly good financial stability. This stability would make them capable of handling diverse situations and cater to them with increased self-confidence. The soft skills gained through the training programs given by SAF would make them more effective in running different types of enterprises. The following portions would shed light on the effectiveness of the Theeramythri project in ensuring financial stability, soft skill enhancement, and social security among the members.

## **7.6 Theeramythri project and fisherwomen in Kerala**

This part analyses through Theeramythri, how far the women's empowerment has been made, by examining indicators categorized in three dimensions: Financial Stability, Soft skills Enhancement, and Social Security. Each dimension is again divided into subcategories of pertinent indicators. Due to substantial differences across dimensions, the analysis varies by dimension based on the scope and types of indicators. The constructs and items related to the Theeramythri project are provided in Figure 7.1. In the first part, provide an overview of the attainment level of the objectives of the Theeramythri Project for fisherwomen in Kerala. The second part evaluates indicators based on the differences in the factors of Theeramythri project regarding the age group, region of the business unit, and the category of units of fisherwomen are provided. Finally, in the next chapter, the effects of the Theeramythri project on the empowerment of fisherwomen in Kerala are discussed.



**Figure 7.1: The constructs and items related to the objectives of the Theeramythri project**

### 7.6.1 Level of attainment of the objectives of the Theeramythri Project with respect to fisherwomen in Kerala

To achieve the objective that the level of attainment of the objectives of the Theermythri project, quartile deviation, percentage analysis, and Chi-Square tests are used. Quartile deviation is used to convert data into three quarters that Q1, Q2, and Q3. Percentage analysis is used to measure the percent of responses contained in each quarter. Chi-Square test is employed for testing the significance of data distribution in each quartile.

The following three factors are considered as objective factors of the Theeramythri project

- 1) Financial Stability
- 2) Soft skills Enhancement
- 3) Social Security

**Hypothesis 7.1: Proportions of the level of the objective factors of the Theeramythri Project for fisherwomen in Kerala is equally distributed**

While analysing the **financial stability** it indicates that there is a significant difference regarding the level of financial stability factor of Theeramythri Project for fisherwomen in Kerala. Since the P-value is <0.01, the proportions of the level of financial stability factor of Theeramythri project for fisherwomen in Kerala is not equally distributed. It can be observed that 23.2 percent of members of the Theeramythri project have a low-level financial stability factor of Theeramythri Project for fisherwomen in Kerala (Table 7.8). About 24.6 percent of them have a moderate level financial stability factor of Theeramythri Project for fisherwomen in Kerala. Whereas, 52.1 percent of them have a high-level financial stability factor of Theeramythri Project for fisherwomen in Kerala.

**Table 7.8: The level of financial stability factors of Theeramythri project for fisherwomen**

Attribute	Low level (Q1)	Moderate level (Q2)	High level (Q3)	Total	Chi-Square value	P-value
Level of Financial stability factors	110 (23.2%)	117 (24.6%)	247 (52.1%)	474 (100%)	94.21	<0.001**

\*\* indicates significant at 1% level

One of the important objectives of Theeramythri is to provide alternative livelihoods to the fisherwomen and ensure financial stability among them. For this, the Government has provided financial assistance to start-up micro-enterprises. There are different categories of units such as Garments and Tailoring, Food, Fish, etc. They earned a reasonable income which equips them to struggle against their deprivations and support their partner.

While looking into the **soft skill enhancement**, it indicates that there is a significant difference regarding the level of soft skill enhancement of a factor of

Theeramythri Project for fisherwomen in Kerala. Since the P-value is  $<0.01$ , the proportions of the level of soft skill enhancement factor of Theeramythri project for fisherwomen in Kerala are not equally distributed. It can be observed that 16.2 percent of members of the Theeramythri project have a low-level soft skill enhancement factor of Theeramythri Project for fisherwomen in Kerala (Table. 7.9). About 60.5 percent of them have a moderate level soft skill enhancement factor of Theeramythri Project for fisherwomen in Kerala. Whereas, 23.2 percent of them have a high-level soft skill enhancement factor of Theeramythri Project for fisherwomen in Kerala.

**Table 7.9: The level of soft skill enhancement factor of Theeramythri project for fisherwomen in Kerala**

Attribute	Low level (Q1)	Moderate level (Q2)	High level (Q3)	Total	Chi-Square value	P-value
Level of soft skills enhancement factor	77 (16.2%)	287 (60.5%)	110 (23.2%)	474 (100%)	87.48	$<0.001^{**}$

*\*\* indicates significant at 1% level*

Theeramythri project provides various training programmes to the members regarding different micro-enterprises. The project has provided training programmes to develop their skills like technological, leadership, and management skills which always helped them to improve their business. However, due to their inferior developments in the literacy state and other deprived conditions, the upliftment of the community without external assistance was found to be difficult. The present program has succeeded in achieving the results as it was intended. In many parts of the world, it has been proven that soft skill improvement in the aspirants has increased the probability of an increased amount of returns. However, there are studies such as conducted by Groh (2016), who demonstrated that the impact of soft skills training on female youth employment in Jordan was insignificant. This could be largely attributed to the sociological factors prevailing in the particular community.

In the case of the **social security** factor of Theeramythri, it indicates that there is a significant difference regarding the level of social security factor of Theeramythri Project for fisherwomen in Kerala. Since the P-value is <0.01, the proportions of the level of social security factor of Theeramythri project for fisherwomen in Kerala are not equally distributed. It can be observed that 18.7 percent of members of the Theeramythri project have a low-level social security factor of Theeramythri Project for fisherwomen in Kerala (Table 7.10). Around 24.8 percent of them have a moderate level social security factor of Theeramythri Project for fisherwomen in Kerala. Whereas, 56.3 percent of them have a high-level social security factor of Theeramythri Project for fisherwomen in Kerala.

**Table 7.10: Shows the level of social security factor of Theeramythri project for fisherwomen in Kerala**

<b>Attribute</b>	<b>Low level (Q1)</b>	<b>Moderate level (Q2)</b>	<b>High level (Q3)</b>	<b>Total</b>	<b>Chi-Square value</b>	<b>P-value</b>
Level of social security factor	89 (18.7%)	118 (24.8%)	267 (56.3%)	474 (100%)	101.98	<0.001**

\*\* indicates significant at 1% level

Valid and inclusive measures of gender equality and women’s empowerment are essential to monitoring progress toward achieving Sustainable Development Goal (SDG5). Women’s empowerment and gender equality are important in their own right to women and girls and are linked with other SDGs, such as eliminating poverty (SDG 1), achieving zero hunger and malnutrition (SDG 2), and good health and well-being for women and children (SDG 3) (Cunningham et al., 2015; Heckert et al., 201; Malapit et al., 2015; Ruel et al., 2018; Sraboni et al., 2014).

Theeramythri project has provided sustainable income-generating activities through micro-enterprises, which levered them with more financial independence. Most of the Theeramythri members had an opinion that their social status and self-esteem increased to some extent. They have the decision-making powers in the family with their partner.

### 7.6.2 Relative contribution of attainment of the objectives of Theermythri project among fisherwomen in Kerala

To obtain this objective the extent of attainment of the objectives of Theermythri project, mean rank, and Chi-square test is employed by the way of Friedman test. Post hoc analysis of mean rank is used to measure and compare the extent of each factor of the Theeramythri project and the Chi-Square test is adopted for testing the significance of the mean rank distribution.

#### **Hypothesis 7.2** *There is no significant difference among mean ranks towards factors of Theeramythri project among fisherwomen in Kerala*

Since P-value is less than 0.01, the null hypothesis is rejected at a 1 percent level of significance. Hence it can be concluded that there is a significant difference among mean ranks towards Factors of Theeramythri project among the fisherwomen in Kerala. Based on post hoc test mean rank, financial stability (9.52) is the most important reason for joining in the Theeramythri project among the fisherwomen in Kerala, is followed by soft skill enhancement factors (8.47) and Social security factor (7.27) (Table 7.11).

**Table 7.11: Friedman test for significant difference among mean ranks towards factors of Theeramythri project among fisherwomen in Kerala**

Sl No	Factors of Threemythri project	Mean ranks	Ranks based on mean rank
1.	Financial Stability	9.52	I
2.	Soft skills Enhancement	8.47	II
3	Social Security	7.27	III

**Chi-square value: 148.78**  
**P value: <0.001\*\***

*\*\* Denotes significant at 1% level*

Although there are various objectives for the Theeramythri project, among them to provide financial stability by providing financial assistance for starting micro-enterprises is the major and dominant one. Members of the Theeramythri is also trained by the mission coordinators to develop the soft skills among them.



Most of the Theeramythri units are running very well, and it creates confidence among the members and they can able to live with a high standard of living. However, a woman's role in decision making has declined (Shet, 1994) probably because she is not having any stake in the earnings of her husband. Though the financial dependence makes her less assertive, uncharacteristic of an empowered woman who ought to have an equal say in the affairs of the household, she can lead a less stressful life. In a traditional fisher's society, a women's social status is often referred to with respect to that of her husband. When a fisherwoman goes for some job, it will be mostly counted as the inability of her husband to support the family. Because of the same reason the women usually do not enjoy the freedom to go for some work or interact with change agents, especially when the agents are males. Nevertheless, few exceptions are there who overcome the barriers of society in the struggle for existence and they, in due course develop behavioural modification, characteristic of androgyny (Viswanathan, 1996). This argument is not valid across our region because of the high literacy rate that enabled the woman to have a secure and independent living situation.

### **7.7 The differences in the factors of Theeramythri project regarding the age group, region of the business unit, and category of units of fisherwomen engaged in Kerala**

To compare the significant difference between age groups, the region of business units and category of units of fisherwomen engaged in Kerala, mean scores, standard deviation Analysis of Variance (ANOVA), and 'Tukey's HSD test' are used.

#### **7.7.1 Factors of Theeramythri among different age groups of fisherwomen**

**Hypothesis 7.3. *There is no significant difference between different age groups of fisherwomen and the factors of the Theeramythri project***

Since P-value is less than 0.01, the null hypothesis is rejected at a 1% level with regard to dimensions of the Theeramythri project that financial stability and soft skill enhancement and different age groups of fisherwomen. Hence there is a

significant difference among different age groups of fisherwomen with regard to the factors of the Theeramythri project that financial stability and soft skill enhancement (Table 7.12).

**Table 7.12: ANOVA test for significant difference between different age groups of fisherwomen and factors of Theeramythri project**

SI No	Factors of Theeramythri project	Different age groups of fisherwomen			F value	P-value
		21 to 30	31 to 40	41& above		
		Mean & SD	Mean & SD	Mean & SD		
1.	Financial Stability	3.81 (0.67)	4.31 (0.84)	4.07 (0.74)	3.547	<0.001* *
2.	Soft skills Enhancement	4.55 (0.84)	4.18 (0.82)	4.02 (0.67)	3.287	<0.001* *
3	Social security	3.98 (0.54)	3.92 (0.78)	4.01 (0.91)	1.207	0.097

Note: 1. \*\* denotes significant at 1% level  
2. The value within the bracket refers to SD

Financial stability and soft skill enhancement are closely related to the age group of respondents. Members coming under the middle age group have better efficiency in financial matters. Whereas in the case of soft skill enhancement the lower age group performed very well. The lower age group can catch the training programmes very effectively. Technological skills, Management skills, and leadership skills are better performed by the lower age group.

There is no significant difference between different age groups of fisherwomen with regard to the factors of the Theeramythri project in the case of social security since the P-value is greater than 0.05. Hence the null hypothesis is accepted with regard to the Social Security factor of Theeramythri Project. In the case of the Theeramythri project, it is mainly aimed to develop economic empowerment among the fisherwomen in Kerala. Through enhancing the alternative livelihood and the high economic benefit gained from the project; members can gain a self-sustainable alternative livelihood. By joining the project all the members of all age groups have mentioned as they had a feeling of their improved Social security.

### 7.7.2 Post-hoc test of ANOVA

Even though the test shows that there is a significant difference between different age groups of fisherwomen and factors of the Theeramythri project, it doesn't imply that each group is significantly different from all other groups. To know which groups are significantly different, a 'Post Hoc' test is carried out using 'Tukey's HSD Test' (Table 7.13).

**Table 7.13: Post Hoc Test for significant difference among age groups of fisherwomen with respect to factors of Theeramythri project**

Factors of Theeramythri project	Age groups (I)	Age groups (J)	Mean Difference (I-J)	P-value
Financial Stability	21 to 30	31 to 40	-0.50	<0.001**
		41 and above	-0.26	<0.001**
	31 to 40	41 and above	0.24	<0.001**
Soft skills Enhancement	21 to 30	31 to 40	0.37	<0.001**
		41 and above	0.53	<0.001**
	31 to 40	41 and above	0.16	<0.001**

\*\* denotes significant at 1% level

From the result of the Post Hoc test, it is revealed that there is a significant difference between financial Stability and Soft skill enhancement in the different age groups of the members of the Theeramythri project (Table 7.13). Based on 'Tukey's HSD test', the age group 21-30 is significantly different from the age group 31-40 and 41 and above at 1% level in respect of financial stability and soft skill enhancement of the factors of Theeramythri project. While the age group 31-40 is also significantly different from the age group 41 and above at a 1% level in respect of financial stability and soft skill enhancement of the factors of the Theeramythri project.

The attainment of the objectives of Theeramythri is closely related to the age group of the members. Financial stability can be achieved by the age group of 31 to 40 than the age group of 21 to 30 because the later age group is not having the maturity to handle the financial matters of the family as they have lesser

experience in life. Another reason pointed out is that the lower age group having higher educational qualifications compared to other age groups, and they are not completely dedicated to doing these jobs. When we compare the lower age groups to the higher age groups 41 and above the observation is the same. The higher age groups are observed to have higher financial stability than the lower age groups.

This present study also reveals that the age of women was associated with levels (low to high) of empowerment. These findings are in favor of observations made in a study from Bangladesh which discloses that women's age had a positive effect on empowerment, increasing with women's age (Haque et al 2011). Likewise, the study from the Philippines reports that the percent of women who contribute in specific decisions (about their health care, purchases for daily household needs, major household purchases, about visits to their family or relatives) escalates with age (Castro 2014).

Another objective of the Theeramythri project is to develop soft skills among the members. For this, they are providing various training programmes to develop management skills, leadership skills, processing skills, etc. These training programmes are more helpful to the lower age group compared with other age groups. Because they have the potential to imbibe the accurate opportunities of the venture. Their increased educational level has also played an important role in their easy adaptation. The age group 21-30 have more soft skill enhancement than the age groups 31-40 and 40 and above. It is observed that as the age is increasing their imbibing ability is decreasing. In the case of the age group 31- 40, they are more benefitted with the skills than the age group 40 and above. The higher age groups are principally focused on the units where the requirement of soft skills are not essential. This age group is mainly confined to the engagements with hire services, ice plants, etc. where their prerequisite is a mere presence of them to deliver the products or materials.

### 7.7.3 Factors of Theeramythri project among the fisherwomen those who are running different categories of units

**Hypothesis 7.4.** *There is no significant difference in the factors of the Theeramythri project among the fisherwomen those who are running different categories of units*

Since P-value is less than 0.01, the null hypothesis is rejected at a 1% level with regard to the financial stability factor of the Theeramythri project and the fisherwomen who are running different categories of units. Hence there is a significant difference between the financial stability factor of Theeramythri and different categories of units that the members are working (Table 7.14).

**Table 7.14: t-test for significant difference between factors of Theeramythri project among the fisherwomen those who are running different categories of units**

Sl No	Factors of Theeramythri project	Category of units					
		Garments & textiles	Food	Fish	Supermarket	Provision stores	Others
		Mean & SD	Mean & SD	Mean & SD	Mean & SD	Mean & SD	Mean & SD
1.	Financial Stability	4.44 (0.62)	4.57 (0.87)	3.88 (0.64)	4.01 (0.82)	4.17 (0.71)	3.22 (0.89)
2.	Soft skills Enhancement	3.97 (0.67)	4.04 (0.58)	3.99 (0.89)	4.01 (0.93)	4.02 (0.97)	3.96 (0.86)
3	Social security	3.85 (0.68)	3.88 (0.74)	3.91 (0.72)	3.79 (0.67)	3.89 (0.95)	3.87 (0.89)

Financial Stability: F. Value = 3.98, P Value = <0.001\*\*

Soft skills Enhancement: F. Value = 0.947, P Value = 0.428

Social Security: F. Value = 0.874, P Value = 0.517

Note: 1. \*\* denotes significant at 1% level  
2. The value within the bracket refers to SD

Food activity groups include those groups which are running hotels, restaurants, catering services, bakery, homemade sweets, etc. Their sales turnover over the past three years was increasing. The food sector was observed to be the

most effectively progressing sector among the SAF groups. The financial stability of the group members under this food category was very high compared to other categories. Following to the food sector, garments and textiles have been maintained with appropriate financial stability. Even though it has a slow growth rate, it has shown consistency and remained in the market without cessations. The majority of the Theeramythri groups were in the garments sector. They include tailoring units, trade of garments which they procure from apex federations and other wholesale shops, tailoring outsourcing units, and those groups running textiles shops. Consequently, the number of women who work in this sector is on the higher side.

Provision stores are also playing a significant role in preserving a financial equilibrium among the members. Even though the initial expenditure of this group is very high it provides a consistent income to the beneficiaries. The supermarket is the prospective project which Theeramythri undertakes. During the time of its inception, more than 20 women were included per unit in this sector. The change in the attitude of purchasing behaviour, which is upscaling of the purchase from the local vendors – has made a substantial increase in the number of supermarkets across the region. This market competition coupled, with the decreasing profitability has driven these units to lessen the labours in the venture, which was notably high in this sector. A decrease in the profits would ignite the disproportion in the financial benefits of the members which were evident from the site inspections.

Fish-based activity groups have been initiated since the inception of the SAF. The major activities they undertake were diversified over the years and currently, it includes the sale of fresh fish, sale of fish value-added products, clam processing, mussel farming, peeling sheds, etc. It was observed that the climate-driven deteriorations that were occurring in the field of fisheries have retained to emulate in this category too. It is affected by the availability of fish, types of fish, etc. Even if these units have high demand both in the transnational scenario and

national setting, the problems related to the fishing was also distressing the category.

There are other categories such as hiring services, ice plants, dairy farms, etc which have low-level financial stability as compared to other categories. These groups were largely affected as they are closely related to the enterprise.

There is no significant difference between the categories of the units of the fisherwomen coming under the Theeramythri project with regard to the soft skill enhancement and social security factors of the Theeramythri project since P-value is greater than 0.05. Hence the null hypothesis was accepted with regard to the soft skill enhancement and social security factors of the Theeramythri project.

It was reported that soft skill enhancement and social security are the same for all categories of members. As SAF delivers various training programs specifically for each category, all the members are well equipped with that precise skill. There was only one difference that as the category changes skill also changes. Every unit generates profits to some extent and it enables the members to increase their volume of purchasing power and outstanding income can be routed to the savings. The increased income of the members will be positively correlated to their feeling of security, decision-making power, and self-confidence. Even though they are under the stress related to the business they can overcome the condition efficiently with the support of the income.

#### **7.7.4 Post-hoc test of ANOVA**

Even though the test shows that there is a significant difference, between factors of the Theeramythri project among the fisherwomen those who are running different categories of units, it doesn't imply that each group is significantly different from all other groups. To know which groups are significantly different, a 'Post Hoc' test is carried out using 'Tukey's HSD Test' (Table 7.15).

**Table 7.15: Post Hoc Test for significant difference between different categories of units with respect to factors of Theeramythri project**

Factors of Theeramythri project	Category of units	Category of units	Mean Difference	P-value
Financial Stability	Garments and textiles	Food	-0.13	<0.001**
		Fish	0.56	<0.001**
		Super market	0.43	<0.001**
		Provision store	0.27	<0.001**
		Others	1.22	<0.001**
	Food	Fish	0.69	<0.001**
		Super market	0.56	<0.001**
		Provision store	0.40	<0.001**
		Others	1.35	<0.001**
	Fish	Super market	-0.13	<0.001**
		Provision store	-0.29	<0.001**
		Others	0.66	<0.001**
	Supermarket	Provision store	-0.16	<0.001**
		Others	0.79	<0.001**
	Provision stores	Others	0.95	<0.001**

\*\* denotes significant at 1% level

From the result of the Post Hoc test in it is revealed that there is a significant difference between the financial stability factor of Theeramythri and different categories of Theeramythri units (Table 7.15). Based on ‘Tukey’s HSD test’, Garments and Textile units are significantly different from Food, Fish, Supermarket, Provision store, and others at a 1% level in respect of the financial stability factor of Theeramythri project. Food units are also significantly different from fish, supermarkets, provision stores, and others at a 1% level in respect of the financial stability factor of the Theeramythri project. Likewise, Fish units are significantly



different from the supermarket, provision store, and others at a 1% level in respect financial stability factor of the Theeramythri project. Super Market is also significantly different from the Provision store and others at a 1% level in respect financial stability factor of Theeramythri project. The provision store is also different from others at a 1% level with respect to the financial stability factor of the Theeramythri project.

Appropriate financial stability has been maintained by the Garments and textiles throughout. Even though it has a slow growth rate, it has consistently continued in the market. But when we compared to the food sector, the progression of Garments and textile sector is diminutive. Garments and textile units are more profitable than fish, supermarkets, provision stores, and others in terms of financial stability. Food units were identified as one of the major progressing units in the case of sales and turnover in comparison with the other units such as fish, supermarket, provision store, and others. In the case of fish units, it displayed a decreasing profit which has offered an unstable financial ailment to the members. In meantime, the financial stability obtained from fish units was reported as higher only in the case of other units that include hiring services ice plants, etc. Interestingly the provision store and supermarket have higher financial stability than the fish units. Despite the supermarket has higher financial stability than the other units it has lower financial stability compared to the provision store. Even though the super market's sales were high, their initial investment and expenditure might not be able to direct it progressively. The provision store has higher financial stability than the other units. Unlike the other initiatives, this particular firm has got importance in many ways, as the constant visit of multiple stakeholders could be one of the reasons attributed to this. The receipt of correct payments and financial record keeping with computerised device would ease the functioning of the firm and staff. They would also be in a position to know the stock and facilitate correct maintenance.

### 7.7.5 Factors of Theeramythri project among the fisherwomen those who run their business in different regions in Kerala (Thiruvananthapuram, Kozhikode, and Ernakulam)

**Hypothesis 7.5:** *There is no significant difference among different regions of fisherwomen running their enterprises with respect to factors of the Theeramythri project*

Since P-value is less than 0.01, the null hypothesis is rejected at a 1% level with the different regions of the units and the financial stability factor of the Theeramythri project. Hence there is a significant difference between different regions of the units and the financial stability factor of the Theeramythri project (Table 7.16).

**Table 7.16: ANOVA for significant different regions of fisherwomen running their units with respect to factors of Theeramythri project**

SI No	Factors of Theeramythri project	Region-wise differences			F value	P-value
		Thiruvananthapuram	Kozhikode	Ernakulam		
1.	Financial Stability	3.97 (0.87)	4.12 (0.56)	4.47 (0.97)	3.257	<0.001**
2.	Soft skills Enhancement	3.98 (0.68)	4.04 (0.82)	4.01 (0.78)	0.857	0.524
3	Social Security	3.87 (0.61)	3.81 (0.84)	3.85 (0.64)	0.914	0.647

Note: 1. The value within the bracket refers to SD

2. \*\* denotes significant at 1% level.

While taking the regions of the Theeramythri units it was found that there is a regional difference in the case of the financial stability factor. The number of Theeramythri units is very high in Ernakulam compared to Kozhikode and Thiruvananthapuram. There are 153 units in Ernakulam, 113 units in Kozhikode, and 94 units in Thiruvananthapuram. The educational status of the members influenced the well-functioning of the project. In Ernakulam, almost all units are running very well especially the food, textiles, and garments units. Most of the units have good sales records and turnover which ultimately leads to the financial

stability of the respondents. The increased level of urbanization and the acquaintance of the members with the urban community would have also played a reason for this change. Knowledge acquired by women through their new roles also allowed participating in collective actions and decision-making on the same level as fishermen do. The various case studies suggest that the empowerment of women in remote small coastal communities could be achieved by acquiring new skills, knowledge of the environments where they live, and thereby getting financial support. The result was that women were then able to influence decisions about their future, form and manage a cooperative, apply to obtain grants, permits and subsidies, or to participate in various ventures.

There is no significant difference between different regions of the units and soft skill enhancement and social security factors of the Theeramythri project since the P-value is greater than 0.05. Hence the null hypothesis was accepted with regard to the factors of the Theeramythri project such as soft skill development and social security factors and among the different regions of the fisherwomen running their enterprises.

Soft skill enhancement and social security are found to be the same in all the regions as the project provides training programmes which make confidence to all the members irrespective of the region. The advancement of media literacy and educational standards provided by the State Government could be attributed to this.

#### **7.7.6 Post-hoc test of ANOVA**

Even though the test shows that there is a significant difference, among different regions of fisherwomen running their units with respect to factors of the Theeramythri project, it doesn't imply that each group is significantly different from all other groups. To know which groups are significantly different, a 'Post Hoc' test is carried out using 'Tukey's HSD Test' (Table 7.17).

**Table 7.17: Post Hoc Test for significant difference among different regions of units with respect to factors of Theeramythri project**

Factors of Theeramythri project	Regions of units	Regions of units	Mean Difference	P-value
Financial stability factor	Thiruvananthapuram	Kozhikode	-0.15	<0.001**
		Ernakulam	-0.50	<0.001**
	Calicut	Ernakulam	-0.35	<0.001**

\*\* denotes significant at 1% level

From the result of the Post Hoc test, it is revealed that there is a significant difference between the different regions and the financial stability factor of the Theeramythri project (Table 7.17). Based ‘Tukey’s HSD test’, the financial stability factor of the Theeramythri project in Thiruvananthapuram is different from Ernakulam and Kozhikode at 1% level. The regions Kozhikode is different from Ernakulam in respect of the financial stability factor at a 1% level.

Thiruvananthapuram is very much related to traditional fishing and all the problems related to fishing is also affected the living conditions of the community too. Concerning age, the members from Thiruvananthapuram were more aged and they have been more traditional in their outlook. They were also insisted to uphold their traditional values and were reluctant to follow the modern practices offered by the Theeramythri project.

## 7.8 Conclusion

Women's effort on diversifying income in both the existing and emerging income activities explain their zeal for economic independence rather than being dependent on their spouse. The evidence here buttresses the fact that fisherfolks no longer depend on fisheries as sole income but rather engage in agricultural and non- agricultural income-generating activities to make both ends meet. The forthcoming chapter would portray the women empowerment achieved through the Theeramythri project.

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## CHAPTER 8

# FACTORS OF WOMEN EMPOWERMENT AMONG THE FISHERFOLKS OF KERALA

### CONTENTS

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  - 8.2 The constructs and items related to the analysis of women empowerment
  - 8.3 The level of empowerment among fisherwomen in Kerala
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  - 8.5 The differences in the factors of empowerment regarding the age group, category of units and region of operation among fisherwomen in Kerala
  - 8.6 Conclusion
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## 8.1 Introduction

The concept of empowerment traces its history in the mid-17th century with the legalistic meaning; ‘to invest with authority’. Thereafter it began to be used with an infinitive in a more general way meaning "to enable or permit." Its modern use originated in the civil rights movement, which sought political empowerment for its followers. This idea of empowerment is an offshoot of the discourse on human development and it came into prominence after the 1980s. Its linkage with feminist discourse went a long way in shaping the idea of women’s empowerment. However, these concepts are still not clearly defined and demarcated from closely related concepts. Empowerment has been defined as to infuse people with power (Narayana, 2002; World Development Report, 2002, 2000) i.e. access to resources, as expansion in individual’s agency (Kishore, 2002), as power of decision making i.e. autonomy (Jojeebboy, 1995).

The principle of gender equivalence is preserved in the Indian constitution in its preamble, fundamental rights, fundamental duties and directive principles. The constitution not only grants equality to women but also empowers the State to adopt measures of positive discrimination in favour of women. In the process of poverty eradication and reducing gender discrimination, the governments have been implementing various schemes and programmes providing ways and means towards women development and empowerment. SHG movement, one among such programmes which have been proved successful in fulfilling its objectives. However, it is felt that the other schemes and programmes do have their prominent part in the process of women development and empowerment and which are being successfully implemented.

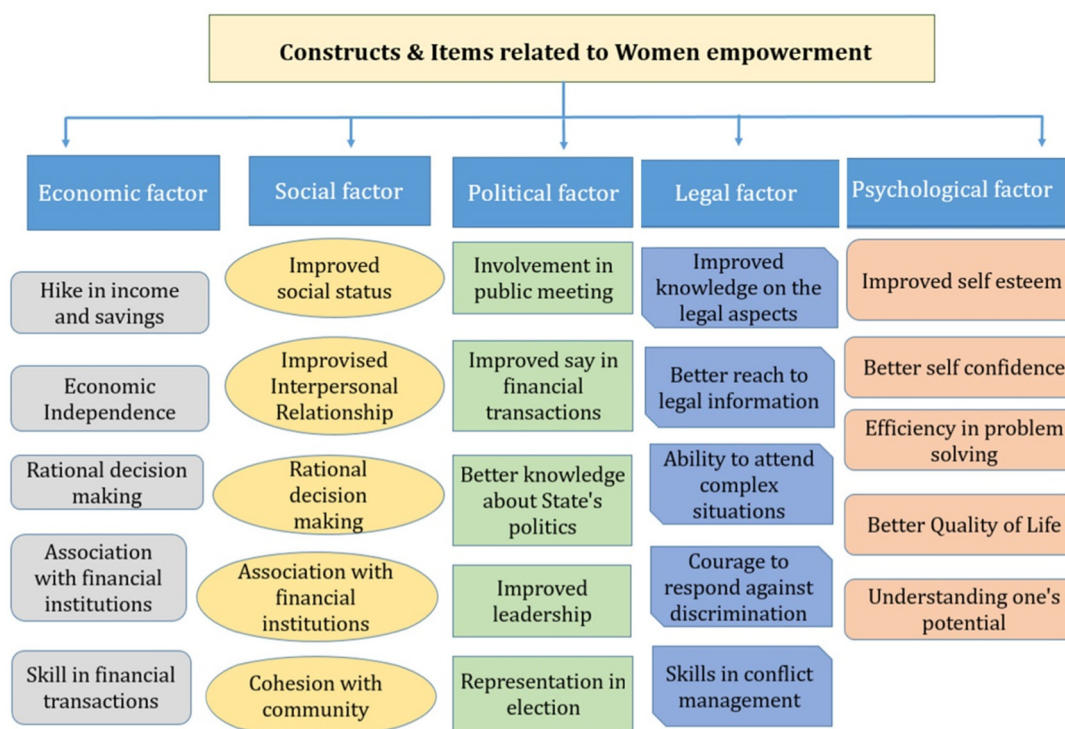
For Sen (1993), empowerment is reflected in a person’s capability set. The ‘capability’ of a person depends on a variety of factors, including personal characteristics and social arrangements. Empowerment is the capacity to fulfil this capability and not just the choice to do so. Sen’s view on women’s empowerment is indicated in his discussion on the measurement of empowerment (Sen, 1990). According to him, the focus should be on certain universally valued functionings,

which relate to the fundamentals of survival and well-being regardless of context. These include proper nourishment, good health and shelter. If there are systematic gender differences in these very basic functioning achievements, they can be taken as evidence of inequalities in the underlying capabilities, rather than as differences in preferences. Empowerment is also related to the process of internal change (Mayoux, 1998) and to the capacity and right to make decisions (Kabeer, 2001). It consists of change, choice and power. It is a process of change by which individuals or groups with little or no power gain the ability to make choices that affect their lives. The structures of power (i.e. who has it, what its sources are, and how it is exercised) directly affect the choices that women can make in their lives (Mayoux, 2001, 2018). In the feminist paradigm, empowerment goes beyond economic betterment and well-being to strategic gender interests (Bali-Swain, 2006). Empowerment can exist at an individual level, where it is about having an agency, increased autonomy, choice, self-confidence and self-esteem. It can also exist at a collective level that would include collective mobilization of women, and when possible men, for the purpose of questioning and changing the subordination connected with gender. Personal and collective empowerment are intrinsically linked because without the latter, the former becomes restricted (Sen, 1990). Another view of women's empowerment argues that it needs to occur in multiple dimensions: economic, sociocultural, familial/interpersonal, legal, political and psychological (Malhotra et al., 2002). These dimensions cover a broad range of factors, and thus women may be empowered within one of these subdomains. For instance, the sociocultural dimension covers a range of empowerment subdomains, such as marriage systems, norms regarding women's physical mobility, non-familial social support systems and networks available to women. This chapter elaborates the level and extent of the relative contribution of factors of women empowerment and its demographic differences across the study area.

## **8.2 The constructs and items related to the analysis of women empowerment**

The women empowerment was measured in various ways. It was measured by analysing the various factors such as social factor, economic factor, political

factor, legal factor and psychological factor. The various constructs and items related to the women empowerment are provided in figure 8.1.



**Figure 8.1: The constructs and items related to the women empowerment**

### 8.3 The level of empowerment among fisherwomen in Kerala

To achieve the level of women empowerment among fisherwomen in Kerala, quartile deviation, percentage analysis, and Chi-Square tests are used. The following factors are considered as the factors of women empowerment in this study.

- 1) Economic empowerment
- 2) Social empowerment
- 3) Political empowerment
- 4) Legal empowerment
- 5) Psychological empowerment



**Hypothesis 8.1: Proportions of the level of factors of women empowerment among fisherwomen in Kerala is equally distributed.**

The level of economic empowerment among fisherwomen in Kerala is not equally distributed since the P-value is less than 0.01. It indicates that there is a significant difference regarding the level of Economic empowerment factor of women empowerment among fisherwomen in Kerala. It can be observed that 22.5 percent of fisherwomen getting a low level of economic empowerment (Table 8.1). Around 23.6 percent of them getting a moderate level of economic empowerment. Whereas, 53.8 percent of them secured a high level of economic empowerment after joining in Theeramythri Project. So, it can be inferred that most of the fisherwomen have high-level economic empowerment.

**Table 8.1: The level of economic empowerment among fisherwomen in Kerala**

Attribute	Low level (Q1)	Moderate level (Q2)	High level (Q3)	Total	Chi-Square value	P-value
Level of Economic empowerment	107 (22.5%)	112 (23.6%)	255 (53.8%)	474 (100%)	93.17	<0.001**

\*\* indicates significance @1% level

The results authorise that the economic factor partakes the most significant impact on empowering the fisherwomen of SAF activity groups. There was a high level of economic empowerment through Theeramythri programmes. Association with financial institutions and adept in the financial transaction are the two main reasons for their increase in the empowerment level. Economic independence and their ability in decision making are steadily increasing through their efficient performance in working in the activity groups. The revolving funds and interest-free loans provided by the SAF have enabled the members to create additional economic opportunities and generate income which has increased their bargaining skills and decision-making power within the households.

The outputs reinforce the assertions of Davis et al. (2008), Haggblade et al. (2007) and FAO (1998) that rural households are involved in a range of economic activities and that agriculture while remaining important, is not the sole or in some cases, even the principal activity of the poor. The role of crop and livestock in household food security explains their prominence in income and food security of poor fisherfolks in fishing communities. Women engaged in competitive advantage in trading on value-added goods related to fisheries should be strengthened and encouraged.

With respect to level of **social empowerment** Since the P-value is less than 0.01, the proportions are not equally distributed. It indicates that there is a significant difference regarding the level of social empowerment factor of women empowerment among fisherwomen in Kerala. It can be observed that 15.6 percent fisherwomen getting low-level social empowerment (Table 8.2). About 21.5 percent of them were getting a moderate level of social empowerment. Whereas, 62.8 percent getting high-level social empowerment after joining in the Theeramythri Project. So, it can be inferred that most of the fisherwomen had high-level social empowerment after joining in the Theeramythri activities.

**Table 8.2: The level of Social empowerment among fisherwomen in Kerala**

Attribute	Low level (Q1)	Moderate level (Q2)	High level (Q3)	Total	Chi-Square value	P-value
Level of social empowerment	74 (15.6%)	102 (21.5%)	298 (62.8%)	474 (100%)	99.14	<0.001**

\*\* indicates significance @1% level

Provision of managerial training and awareness generating activities by the activity groups leads to greater exposure and changes in social attitudes. Better social status and good interpersonal relationship leads to their improved self-confidence and also improved self – worth/esteem. This was evident in their attitude and have proven with their capabilities to achieve the upliftment in their social empowerment.

In the case of proportions of the level of **political empowerment**, since the P-value is less than 0.01, it is not equally distributed. It indicates that there is a significant difference regarding the level political empowerment factor of women empowerment among fisherwomen in Kerala. It can be observed that 25.1 percent fisherwomen getting low-level political empowerment (Table 8.3). About 59.9 percent of them getting are getting a moderate level of political empowerment. Whereas, 14.9 percent getting high-level political empowerment after joining in Theeramythri Project. So, it can be inferred that most of the fisherwomen have a moderate-level of political empowerment after joining in the Theeramythri activities.

**Table 8.3: The level of political empowerment among fisherwomen in Kerala**

Attribute	Low level (Q1)	Moderate level (Q2)	High level (Q3)	Total	Chi-Square value	P-value
Level of political empowerment	119 (25.1%)	284 (59.9%)	71 (14.9%)	474 (100%)	88.17	<0.001**

\*\* indicates significance @1% level

More acceptance as a leader in the society and invitation to participate in elections are the major factors that lead to the political empowerment of fisherwomen to the total empowerment level. Since the 1990s, coastal resource and fisheries governance has been subject to social experiments that can provide learning opportunities, including those for political empowerment. In practice, recently the Government attempted to increase the involvement and leadership of women in fisheries. Through these actions, women are also empowered in different ways. They have acquired resources (e.g., knowledge, opportunities) and decision-making power, facilitating project developments (e.g., the formation of cooperatives) that promote political and economic sustainability. These study highlight elements that contribute to empowering women in fisheries in these contexts.

In the case of the level of **legal empowerment** of fisherwomen in Kerala is not equally distributed since the P-value is less than 0.01. It indicates that there is a

significant difference regarding the level legal empowerment factor of women empowerment among fisherwomen in Kerala. It can be observed that 62.6 percent fisherwomen getting low-level legal empowerment (Table 8.4). About 27 percent of them getting moderate level legal empowerment. Whereas, 10.3 percent getting high-level legal empowerment after joining in Theeramythri Project. So, it can be inferred that most of the fisherwomen have low-level legal empowerment after joining in the Theeramythri activities.

**Table 8.4: The level of legal empowerment among fisherwomen in Kerala**

Attribute	Low level (Q1)	Moderate level (Q2)	High level (Q3)	Total	Chi-Square value	P-value
Level of legal empowerment	297 (62.6%)	128 (27%)	49 (10.3%)	474 (100%)	102.17	<0.001**

\*\* indicates significance @1% level

The ability to seek the assistance of concerned people to find concrete solutions to their daily justice problems shows the major increase in the legal empowerment. It enables them to perfectly plan, manage, execute and to solve the conflicts among them. All these enable them to excel in their present positions. The representations of these SHG members in elections, their improved awareness on legal provisions related to women, their unanimous courage to respond against the discrimination and better access to legal information are the significant outcomes of the legal empowerment. This is again related to the increased literacy rates of the State which have enabled them to get an upscaled version of legal empowerment. In the present study, 62.6 percent of fisherwomen have opined that they had a low level of legal empowerment.

In the case of level of **psychological empowerment** of fisherwomen in Kerala it is not equally distributed since the P-value is less than 0.01. It indicates that there is a significant difference regarding the level of psychological empowerment factor of women empowerment among fisherwomen in Kerala. It can be observed that 15.1 percent fisherwomen getting low-level psychological

empowerment (Table 8.5). About 26.7 percent of them getting a moderate level of psychological empowerment. Whereas, 58.01 percent is getting high-level psychological empowerment after joining in Theeramythri Project. So, it can be inferred that most of the fisherwomen have high-level psychological empowerment after joining in the Theeramythri activities.

**Table 8.5: The level of psychological empowerment among fisherwomen in Kerala**

Attribute	Low level (Q1)	Moderate level (Q2)	High level (Q3)	Total	Chi-Square value	P-value
Level of psychological empowerment	72 (15.1%)	127 (26.7%)	275 (58.01%)	474 (100%)	92.17	<0.001**

\*\* indicates significance @1% level

There could be various psychological barriers that are generating hindrances in women empowerment. The locus of control of such barriers is both internal as well as external. For example, psychological hindrances are fear, insecurity, risk, lack of self-esteem, self-confidence, fear of failure etc. The psychological empowerment is a blend of self-esteem, self-efficacy, self-determination, self-confidence, self-awareness, and positive thinking and it ultimately leads to welfare and happiness of women. A women who is psychologically empowered has a capacity to increase self-image and conquer stigma. Empowering women means enabling women to access skill and knowledge and cope with the stress and trauma of present as well as future.

From all these remarkable changes in economic, legal, political, social and psychological levels of empowerment level after joining the activity groups of SAF. It is evident that all the above factors are the major driving forces of women empowerment. It's something beyond what that SAF had expected. All the facts reveal the truth that SAF has done a major role in the upliftment of the fisherwomen community and thereby boosting the development of our nation. The study concludes that a change has to be brought about not only in the status of women but in the attitude of the society towards them.

## 8.4 Relative Contribution of Empowerment Factors among the Fisherwomen in Kerala

To analyse the relative contribution of women empowerment factors among the fisherwomen in Kerala mean rank with post hoc analysis and Chi-square test is employed by the way of Friedman test.

**Hypothesis 8.2.** *There is no significant difference among the mean ranks towards factors of women empowerment among the fisherwomen in Kerala*

Since P-value is less than 0.01, the null hypothesis is rejected at a 1 percent level of significance. Hence it can be concluded that there is a significant difference among mean ranks towards factors of women empowerment among fisherwomen in Kerala (Table 8.6). Based on post hoc test of the mean rank, Economic Empowerment (10.87) is the most important empowerment factor that happened to the members of Theeramythri, is followed by social Empowerment factors (9.87), Psychological Empowerment (8.74), Political Empowerment (8.01) and Legal Empowerment (7.84)

**Table 8.6: Friedman test for significant difference among mean ranks towards factors of women empowerment among fisherwomen in Kerala**

SI No.	Factors of women empowerment	Mean ranks	Chi-Square value	P-value	Ranks based on mean rank
1.	Economic empowerment	10.87			I
2.	Social empowerment	9.87			II
3.	Political empowerment	8.01	112.17	<0.001**	IV
4.	Legal empowerment	7.84			V
5.	Psychological empowerment	8.74			III

\*\* Denotes significant at 1% level

Of these five significant factors of empowerment, economic empowerment factor is the highest. This is the crucial part of the empowerment as all the other factors are to be considered as the outcomes of the economic empowerment. In other words, the success achieved by the successful implementation of the project

would be measured by means of recording the scales of upliftment in economy incurred in the due course of the time.

The social empowerment is also crucial that plays an important role, as it brings in the elevated social status and cohesion with the community. Their improved interpersonal relationship also was evident from the community. Psychological empowerment also observed to have significance in the women empowerment in the estimated model to bring in self-esteem, efficiency in problem-solving, a better quality of life, and create self-confidence. From all these remarkable changes in economic, legal, political, social and psychological levels of empowerment after joining the activity groups of SAF, it is evident that all the above factors are the major driving forces of women empowerment. The main reason for joining Theeramythri is not merely to get just credit. It is an empowerment process whereby the women become economically and socially empowered, thus enabling them to take control over their lives. As cited by Karl, (1995) empowerment is a process of awareness and capacity building leading to greater participation, to greater decision- making power and control, and to transformative action. Within communities in which co-operative chains are embedded, women are sometimes targeted as the subjects for development assistance under their perceived income and empowerment needs.

## **8.5 The differences in the factors of empowerment regarding the age group, category of units and region of operation among fisherwomen in Kerala**

To compare the significant difference between age group, category of units and region of operation among fisherwomen in Kerala, mean scores, standard deviation, analysis of Variance (ANOVA) and Tukey's HSD post hoc test are used.

### **8.5.1 Factors of empowerment among different age groups of fisherwomen**

**Hypothesis 8.3:** *There is no significant difference between different age groups of fisherwomen and factors of women empowerment*

Since P-value is less than 0.01, the null hypothesis is rejected at 1% level with regard to different age groups of fisherwomen and psychological factors of

women empowerment among the members of Theeramythri in Kerala. Hence there is a significant difference between the different age group of fisherwomen and psychological factors of women empowerment among the members of Theeramythri in Kerala (Table 8.7).

**Table 8.7: ANOVA test for significant difference between different age groups of fisherwomen and factors of women empowerment**

SI No	Factors of women empowerment	Different age groups of fisherwomen			F value	P-value
		21 to 30	31 to 40	41 and above		
		Mean & SD	Mean & SD	Mean & SD		
1.	Economic empowerment	4.41 (0.87)	4.47 (0.62)	4.40 (0.74)	0.997	0.567
2.	Social empowerment	3.98 (0.79)	3.91 (0.66)	3.95 (0.70)	1.144	0.217
3	Political empowerment	3.37 (0.58)	3.39 (0.78)	3.31 (0.51)	1.247	0.197
4	Legal empowerment	3.17 (0.55)	3.12 (0.51)	3.15 (0.81)	1.007	0.458
5	Psychological empowerment	3.78 (0.58)	4.12 (0.87)	4.01 (0.81)	3.978	<0.001**

Note: 1. \*\* denotes significant at 1% level

2. The value within bracket refers to SD

Psychological empowerment also shows some significance in the women empowerment among the fisherwomen. The middle-aged fisherwomen showed more psychological empowerment amongst the other age groups. This could be because of their adaptability to the changing scenarios as they are mostly entrusted with high responsibility in their homestead.

There is no significant difference between different age groups of fisherwomen and economic, social, political and legal factors of women empowerment among the members of Theeramythri in Kerala since P-value is



greater than 0.05. Hence the null hypothesis is accepted with regard to different age groups of fisherwomen and economic, social, political and legal factors of women empowerment among the members of Theeramythri in Kerala.

### 8.5.2 Post-hoc test of ANOVA

From the result of Post Hoc test, it is revealed that there is a significant difference between Psychological factor of women empowerment and different age groups of Theeramythri members among the fisherwomen in Kerala (Table 8.8). Based on ‘Tukey’s HSD’ post hoc test, Psychological factor of women empowerment is significantly different from the age group 21-30, with 31-40 and 41 & above at 1% level (Table. 8.8). At the same time, psychological empowerment of the age group 31-40 is also significantly different from the age group of 41 & above at 1% significant level among the members of Theeramythri in Kerala.

**Table 8.8: Post Hoc Test for significant difference between age groups of fisherwomen with respect to factors of women empowerment**

Factors of women empowerment	Age groups	Age groups	Mean Difference	P-value
Psychological empowerment	21 to 30	31 to 40	-0.34	<0.001**
		41 and above	-0.23	<0.001**
	31 to 40	41 and above	0.11	<0.001**

*\*\* denotes significant at 1% level*

Society for Assistance to Fisherwomen encourages its members by providing financial assistance to start small micro-enterprises. It also provided better social status and good interpersonal relationship which leads to their improved self-confidence and also improved self-esteem. Age is identified as a factor which influences the psychological empowerment of the members. As age is increasing the psychological empowerment is also found to be increasing. As the age increases the financial maturity attained by them will be accelerated and thereby enable them to have a better saving in the future and ensure the sustainability of the fisherwomen. This also makes them initiate further revenue-generating programs at the regional level. This will gradually funnel them to have increased self-esteem, self-motivation and empowerment.

### 8.5.3 Factors of empowerment among the fisherwomen those who are running different category of units

**Hypothesis 8.4.** *There is no significant difference between factors of women empowerment among the fisherwomen those who are running different category of units.*

Since P-value is less than 0.01, the null hypothesis is rejected at 1% level with regard to Economic empowerment factor of women empowerment among the fisherwomen those who are running different category of units. Hence there is a significant difference between economic empowerment factor and Theeramythri members who are running different category of units (Table 8.9).

**Table 8.9: ANOVA test for significant difference between factors of women empowerment among the fisherwomen those who are running different category of units**

SI No	Factors of women empowerment	Category of units					
		Garments & textiles	Food	Fish	Super market	Provision stores	Others
		Mean & SD	Mean & SD	Mean & SD	Mean & SD	Mean & SD	Mean & SD
1.	Economic empowerment	4.12 (0.67)	4.67 (0.87)	3.71 (0.64)	4.51 (0.47)	4.40 (0.51)	3.99 (0.44)
2.	Social empowerment	3.98 (0.74)	4.01 (0.64)	3.98 (0.62)	3.96 (0.72)	4.02 (0.84)	4.03 (0.91)
3	Political empowerment	3.75 (0.57)	3.71 (0.74)	3.73 (0.84)	4.69 (0.44)	3.70 (0.94)	3.72 (0.88)
4	Legal empowerment	3.41 (0.54)	3.44 (0.96)	3.47 (0.84)	4.40 (0.56)	3.46 (0.78)	3.45 (0.81)
5	Psychological empowerment	4.01 (0.93)	4.04 (0.69)	3.99 (0.88)	4.03 (0.76)	3.97 (0.48)	3.98 (0.61)

Economic empowerment: F. Value = 3.107, P-Value = <0.001\*\*

Social empowerment: F. Value = 1.071, P -Value = 0.127

Political empowerment: F. Value = 0.987, P -Value = 0.197

Legal empowerment: F. Value = 0.841, P -Value = 0.167

Psychological empowerment: F. Value = 0.845, P -Value = 0.107

Note: 1. \*\* denotes significant at 1% level

2. The value within bracket refers to SD

The outcomes approve that the economic factor had the most significant impact on empowering the fisherwomen of Theeramythri activity groups. Associations with financial institutions and proficiency in the financial transaction are the two main reasons for their increase in the empowerment level. The evolved economic independence and their ability in decision making are steadily increasing through their competent performance in working in the activity groups. The economic empowerment of the different sectors of the activity group members indicates that the food sector is the most empowered sector since the origin of these Theeramythri groups. Throughout the years, supermarket, provision store and the Garment sector still demonstrate a substantial increase in the number of activity groups with a high level of empowerment. The pieces of training, skill up-gradation programmes, motivation activities, efficient support, time management etc., are identified as the tangible factors contributing to the significant increase in revenue. Whereas the garment and textile sector occupies almost one-third of all the activity groups.

There is no significant difference between Social, Political, Legal, Psychological empowerment factors with regard to the different units of Theeramythri running by the fisherwomen in Kerala since P-value is greater than 0.05. Hence the null hypothesis accepted with regard to Social, Political, Legal, Psychological empowerment factors with regard to the different units of Theeramythri running by the fisherwomen in Kerala.

Ever since SAF has instigated to provide financial assistance to the fisherwomen there have some signals of empowerment also. Almost all the unemployed fisherwomen are brought under this programme and several capacity buildings programmes, skill training, etc., are given to increase and encourage the empowerment status of the fisherwomen. Kerala, being 100% literate state, it is vital to ensure literacy in all the sectors. The political, social, legal and psychological empowerment are the same in all categories. The members have increased their social status, social esteem, and had increased leadership skills, management skills, and good interactions with society.

### 8.5.4 Post-hoc test of ANOVA

From the result of Post Hoc test, it is revealed that there is a significant difference between Economic empowerment of members those who are running different categories of units (Table 8.10). Based on Tukey's HSD' post hoc test, Garments and textiles are significantly different from food, fish, supermarket, provision store and others at 1% level of economic empowerment factor. Food units are also significantly different from fish, supermarket, provision store and others at 1% level of economic empowerment factor. At the same time Fish units is also significantly different from, supermarket, provision store and others at 1% level of economic empowerment factor, the supermarket is also significantly different from provision store and others at a 1% level of economic empowerment factor. Provision store also significantly different from others at 1% level of economic empowerment factor (Table 8.10).

**Table 8.10: Post Hoc Test for significant difference between different category of units with respect to factors of women empowerment**

Factors of women empowerment	Category of units	Category of units	Mean Difference	P-value
Economic empowerment	Garments and textiles	Food	-0.55	<0.001**
		Fish	0.41	<0.001**
		Super market	-0.39	<0.001**
		Provision store	-0.28	<0.001**
		Others	0.13	<0.001**
	Food	Fish	0.96	<0.001**
		Super market	0.16	<0.001**
		Provision store	0.27	<0.001**
		Others	0.68	<0.001**
	Fish	Super market	-0.80	<0.001**
		Provision store	-0.69	<0.001**
		Others	-0.28	<0.001**
	Super market	Provision store	0.11	<0.001**
		Others	0.52	<0.001**
	Provision stores	Others	0.41	<0.001**

\*\* denotes significant at 1% level

The economic empowerment of the different sectors of the activity group members indicates that the food sector is the most empowered sector since the origin of these Theeramythri groups. Throughout the years, supermarket, provision store and the garment sector demonstrated with a significant increase in the number of activity groups with a high level of empowerment. The training, skill up-gradation programmes, motivation activities, efficient support, time management etc., are identified as the tangible factors contributing to the success of these units. It is noteworthy that the garments and textile sector occupy almost one-third of all the activity groups.

### **8.5.5 Empowerment among the fisherwomen those who running their units in different regions in Kerala (Thiruvananthapuram, Kozhikode and Ernakulam)**

**Hypothesis 8.5.** *There is no significant difference among the factors of empowerment among the fisherwomen those who running their units in different regions in Kerala.*

**Table 8.11: ANOVA for significant difference among the factors of empowerment among the fisherwomen those who running their units in different regions in Kerala**

Sl No	Factors of women empowerment	Different Region of the units			F value	P-value
		Thiruvananthapuram	Kozhikode	Ernakulam		
1.	Economic empowerment	4.01 (0.847)	4.21 (0.942)	4.55 (0.782)	3.952	<0.001**
2.	Social empowerment	3.88 (0.745)	4.14 (0.812)	4.43 (0.758)	3.724	<0.001**
3	Political empowerment	3.74 (0.786)	3.77 (0.562)	3.81 (0.723)	1.217	0.324
4	Legal empowerment	3.21 (0.786)	3.25 (0.562)	3.19 (0.723)	1.074	0.217
5	Psychological empowerment	4.07 (0.786)	4.12 (0.562)	4.08 (0.723)	0.751	0.984

*Note:* 1. The value within bracket refers to SD  
2. \*\* denotes significant at 1% level.

Since P-value is less than 0.01, the null hypothesis is rejected at 1% level with regard to the Economic and Social factors of empowerment among the fisherwomen those who are running their units in different regions in Kerala. Hence, there is a significant difference between the Economic and Social factors of empowerment among the members of Theeramythri in different regions of Kerala (Table 8.11).

While looking into the regions of the Theeramythri units it is evident that there is a regional difference in the case of economic and social empowerment. The number of Theeramythri units are very high in Ernakulam (153) compared to Kozhikode (113) and Thiruvananthapuram (94). The Educational status of the members influenced the well-functioning of the project. In Ernakulam, almost all units are running very well especially the food, textiles and garments units. Most of the units have good sales records and turn over which ultimately leads to the economic empowerment of the respondents. The increased level of economic empowerment will make them access the other levels of empowerment, especially social empowerment.

There is no significant difference between the factors of empowerment among the fisherwomen those who running their units in different regions in Kerala regarding the Political, Legal and Psychological factors of Women empowerment since the P-value is greater than 0.05. Hence the null hypothesis is accepted with regard to the factors of Women empowerment such as Legal, Political and Psychological factors among different regions of sample districts.

Legal, psychological and political factors of empowerment are found to be the same in all the regions as the project provides training programmes which make confidence to all the members irrespective of the region. The advancement of the extension of media literacy and improved educational standards provided by the State Government could be recognised to this.

### 8.5.6 Post-hoc test of ANOVA

From the result of Post Hoc test, it is revealed that there is a significant difference between Economic factor of Women empowerment among the fisherwomen those who running their units in different regions in Kerala in (Table 8.12). Based on Tukey's HSD test, the region Thiruvananthapuram is different from Ernakulam and Kozhikode at 1% level and Kozhikode is different from Ernakulam at 1% level in respect of economic empowerment factor of women empowerment (Table 8.12).

**Table 8.12: Post Hoc Test for significant difference between different regions of units located with respect to factors of women empowerment**

Factors of women empowerment	Region of business units located	Region of business units located	Mean Difference	P-value
Economic empowerment	Thiruvananthapuram	Kozhikode	-0.20	<0.001**
		Ernakulam	-0.54	<0.001**
	Kozhikode	Ernakulam	-0.34	<0.001**
Social empowerment	Thiruvananthapuram	Kozhikode	-0.26	<0.001**
		Ernakulam	-0.55	<0.001**
	Kozhikode	Ernakulam	-0.29	<0.001**

\*\* denotes significant at 1% level

While comparing the economic and social empowerment it is found to be higher in Ernakulam followed by Kozhikode and Thiruvanthapuram. The presence of active Theeramytri group and members are identified as the reason behind the skewness. The urbanisation factor can also be attributed to this growth along with the provisions of more access to the market by the members. With respect to the people from the Kozhikode, they were also insisted to uphold their traditional values due to the sociological reasons. Thiruvananthapuram is very much related to traditional fishing and all the problems related to fishing is also affected the living conditions of the community too.

From the result of Post Hoc test, it is revealed that there is a significant difference between Social factor of Women empowerment among the fisherwomen those who running their units in different regions in Kerala (Table 8.12). Based on Tukey's HSD test, the region Thiruvananthapuram is different from Ernakulam and Kozhikode at 1% level and Kozhikode is different from Ernakulam at 1% level in respect of the social factor of women empowerment.

The chain reaction ignited after the increased economic empowerment would lead to the cascade of the empowerment as observed by the present study. As it is followed by social empowerment, but there can be a regional difference in these. It is clear that where ever the economic empowerment has happened, the social empowerment also would be reflected.

## **8.6 Conclusion**

Creation of suitable income-generating activities for fisherwomen and ensuring their sustainability is the prime concern of the SAF Theeramythri project. SAF targets the disadvantaged fisherwomen and provides them with self-employment opportunities under this programme. Besides opportunities in the traditional fisheries sector, alternate livelihoods are also very much a part of Theeramythri. While Theeramythri programme primarily emphasises on economic empowerment of fisherwomen, social and gender empowerment aspects also gets impacted due to its activities. The forthcoming chapter will portray the effects of Theeramythri project on reducing Vulnerability and Livelihood diversification of fisherfolks and enhancing the empowerment of fisherwomen in Kerala. The next chapter will elucidate the impact of Theeramythri project on the upliftment of the fisherfolks in Kerala



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## CHAPTER 9

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# THE EFFECTS OF THEERAMYTHRI PROJECT ON REDUCING VULNERABILITY AND LIVELIHOOD DIVERSIFICATION OF FISHERFOLKS AND ENHANCING THE EMPOWERMENT OF FISHERWOMEN IN KERALA

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## **9.1 Introduction**

This chapter deals with testing of various hypotheses formulated and development of Co-variance Based Structural Equation Modelling which measures effects of Theermythri project on reducing vulnerability and livelihood diversification of fisherfolks and enhancing the empowerment of fisherwomen in Kerala. It contains an overview of CB-CFA and SEM method and developing Theeramythri model for Kerala. The result summary of hypotheses testing is also explained at the end of this chapter.

To explore the effects of Theermythri project on reducing Vulnerability and Livelihood diversification of fisherfolks and enhancing the empowerment of fisherwomen in Kerala, Co-variance Based Confirmatory Factor Analysis (CB-CFA) and Co-variance Based Structural Equation Modeling (CB-CFA & SEM) techniques were employed.

## **9.2 Co-variance Based Confirmatory Factor analysis for the reliability and validity for research model building**

### **9.2.1 Assessment criteria of the CB-CFA models for final reliability and validity**

It is necessary to establish construct validity (convergent and discriminant validity) as well as reliability (Composite reliability) which is performing confirmatory factor analysis. Confirmatory factor analysis (CFA) is a statistical technique used to verify the factor structure of a set of observed variables. CFA allows testing the hypothesis that a relationship between observed variables and their underlying latent constructs exists (Suhr, 2009). The factors have to demonstrate adequate validity and reliability. The following tools were employed for the assessment of the measurement model:

- 1) Composite Reliability (CR)
- 2) Construct validity
  - a) Convergent Validity
  - b) Discriminant Validity.

1. **Composite Reliability:** is a measure of the overall reliability of a construct. The value varies between 0 and 1. Values of composite reliability of  $>0.7$  and above are considered to be good (Hair et al., 2010). Values less than 0.6 indicate lack of internal consistency.
2. **Construct validity:** Construct validity can be measured by two methods that convergent validity and discriminant validity
  - (a) **Convergent Validity** – the items that are indicators or the observed variables in a specific construct should converge or share a high proportion of variance with each other. According to Hair et al. (2010), if there are convergent validity issues in the validity examination, then it indicates that the latent factor is not well explained by the observed variables. Malhotra et al. (2001) observe that AVE is a strict measure of convergent validity even more conservative than CR. In the present study average variance extracted (AVE) for measuring convergent validity has been used. The value of AVE is calculated by using standardized factor loadings. The threshold value of AVE is  $>0.5$  (Hair et al., 2010). Item factor loadings are also a measure to identify convergent validity (Hair et al., 2010). The threshold value of standardized factor loading for establishing item validity is  $>0.5$  for this study (Hair et al., 2010). If the standardized factor loadings and AVE values are more than 0.5, it indicates adequate convergence.
  - (b) **Discriminant validity** is the extent to which a construct is truly distinct from other constructs. High discriminant validity indicates that a construct is unique and captures phenomena that are not represented by other constructs. If the discriminant validity examination does not yield the required results, it indicates that the variables correlate with variables of the other constructs to a large extent i.e. the latent variable is better explained by some other variables than by its own observed variables. Fornell and Larcker (1981) criterion which is a conservative method of assessing discriminant validity

was used in the present study. It compares the square root of AVE with the latent variable correlations. The square root of AVE of each construct should be greater than its latent variable correlation with any other constructs. By this, discriminant validity can be established.

### 9.3 Confirmatory Factor Analysis Models for factors of Theeramythri Project

CFA model fit indices to assess the overall model fit which is represented in Table 9.1. The value of Chi-Square to the degrees of freedom ratio for an acceptable model should be less than 5. In this case, the value is 2.149 which is very well within the suggested maximum value. The RMSEA score is 0.053, well below the accepted threshold score of 0.08. Moreover, the GFI and AGFI values are above 0.9 and CFI is above 0.9 for which 1.0 indicates exact fit. Thus, the model is a good fit and can be considered for further analysis (Figure 9.1).

**Table 9.1: Model fit indices for Theeramythri research instrument**

Attributes	CMIN/DF	P-value	GFI	AGFI	CFI	RMSEA
Study model	2.149	0.000	0.937	0.919	0.931	0.053
Recommended value	Acceptable fit[1-5]	Greater than 0.05	Greater than 0.9	Greater than 0.9	Greater than 0.9	Less than 0.08
Literature support	Hair et al., (1998)	Barrett (2007)	Hair et al. (2006)	Hair et al. (2006)	Hu and Bentler (1999)	Hair et al. (2006)

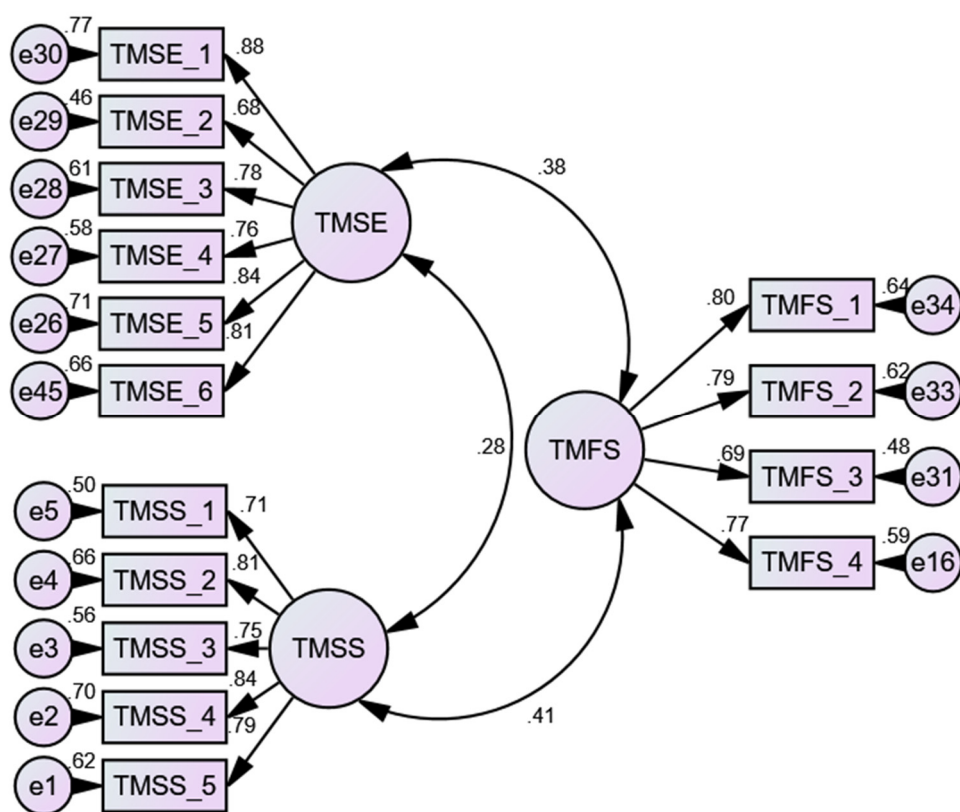


Figure 9.1: Confirmatory Factor Analysis for Factors of Theeramythri Project

Table 9.2: Final reliability and validity for Theeramythri project research instrument

Constructs	Item code	Factor loading	Cronbach's Alpha Final	AVE	Composite Reliability
Theeramythri - Financial Stability	TMFS 1	0.80	0.845	0.582	0.848
	TMFS 2	0.79			
	TMFS 3	0.69			
	TMFS 4	0.77			
Theeramythri – Soft skills enhancement	TMSE 1	0.88	0.910	0.631	0.911
	TMSE 2	0.68			
	TMSE 3	0.78			
	TMSE 4	0.76			
	TMSE 5	0.84			
	TMSE 6	0.81			
Theeramythri – Social Security	TMSS 1	0.71	0.885	0.608	0.886
	TMSS 2	0.81			
	TMSS 3	0.75			
	TMSS 4	0.84			
	TMSS 5	0.79			

It can be inferred that all the factor loadings are above the threshold level of 0.5 which establishes the item validity of the constructs (Table 9.2). After the collection of final data, Cronbach's Alpha reliability test has performed in the present study. The final values of Cronbach's Alpha are found to be greater than 0.8 which confirms the reliability of the variables which are used to measure the construct. The composite reliability values are found to be higher than 0.7 which indicates that all the constructs have a high level of internal consistency reliability. The Average Variance Extracted (AVE) values are also found to be above the threshold value of  $>0.5$ . Thus, it can be inferred that the constructs have high levels of convergence. As all the parameters meet the prescribed value, the data is appropriate for further analysis and model building. The discriminant validity for Theeramythri research instrument is displayed in Table 9.3.

**Table 9.3: Discriminant Validity for Theeramythri project research instrument**

<b>Constructs</b>	<b>Financial Stability</b>	<b>Soft skill enhancement</b>	<b>Social Security</b>
Financial Stability	<b>(0.763)</b>		
Soft skills enhancement	0.384	<b>(0.794)</b>	
Social Security	0.415	0.281	<b>(0.780)</b>

The square root of AVE values and inter construct latent variable correlations are provided in Table 9.3. Values in brackets are the square root of AVE scores which should be greater than the inter construct latent variable correlation values to establish the non-existence of any relationship. From the above table, it can be inferred that no relationship exists among the constructs and discriminant validity for the Theeramythri research instrument is established.

**Table 9.4: Path values of Confirmatory Factor Analysis for contributing factor to Theeramythri Project – Financial Stability**

Path relationships		Standardized coefficient (Beta values)	P-value	Ranks based on Beta Values
Sustainable livelihood (TMFS 1)	← Financial Stability	0.80	<0.001**	I
Accelerate the income level by alternate livelihood (TMFS 2)	← Financial Stability	0.79	<0.001**	II
Develop saving habits (TMFS 3)	← Financial Stability	0.69	<0.001**	IV
Improves the living standards (TMFS 4)	← Financial Stability	0.77	<0.001**	III

Based on the standardised beta coefficient, Sustainable livelihood (0.80) is the most influencing factor to Theeramythri Project – Financial Stability factor among fisherfolks in Kerala followed by accelerating the income level by alternate livelihood (0.79), improves the living standards (0.77) and develop saving habits (0.69). It indicates that by providing financial stability under the scheme of Theeramythri project, fisherfolks are getting better sustainable livelihood and accelerate their income level by alternate livelihood (Table 9.4.). These two factors are the most influencing factors of financial stability construct. Compared to other factors, develop a saving habit is the least influencing factor for financial stability construct among fisherfolks in Kerala

**Table 9.5: Path values of Confirmatory Factor Analysis for contributing factor to Theeramythri Project – soft skill enhancement**

Path relationships		Standardized coefficient (Beta values)	P-value	Ranks based on Beta Values
Improved skills in diverse fields (TMSE 1)	← Soft Skill Enhancement	0.88	<0.001**	<b>I</b>
Technological up-gradation (TMSE 2)	← Soft Skill Enhancement	0.68	<0.001**	<b>VI</b>
Reduce drudgery (TMSE 3)	← Soft Skill Enhancement	0.78	<0.001**	<b>IV</b>
Quality consciousness in product process (TMSE 4)	← Soft Skill Enhancement	0.76	<0.001**	<b>V</b>
Moulds management skills (TMSE 5)	← Soft Skill Enhancement	0.84	<0.001**	<b>II</b>
Inculcates leadership skills (TMSE 6)	← Soft Skill Enhancement	0.81	<0.001**	<b>III</b>

Based on standardized beta coefficient, improved skills in diverse fields (0.88) is the most influencing factor of Theeramythri project – soft skill enhancement factor among fisherfolks in Kerala followed by accelerating the income level by moulds management skills (0.84), inculcates leadership skills (0.81), reduce drudgery (0.78), quality consciousness in product process (0.76), technological up-gradation(0.68). It indicates that by providing training for soft-skill development under the scheme of Theeramythri project, the members are getting improvement in their soft skill (Table 9.5.). Improved skills and better management skills are the most influencing factors of soft skill enhancement construct. While comparing with other factors, technological up-gradation is the



least influencing factor of soft skill enhancement construct among the members of Theeramythri in Kerala.

**Table 9.6: Path values of Confirmatory Factor Analysis for contributing factor to Theeramythri Project – Social Security**

Path relationships		Standardized coefficient (Beta values)	P-value	Ranks based on Beta Values
Confidence to start enterprises (TMSS 1)	← Social Security	0.71	<0.001**	V
Enhanced decision-making power (TMSS 2)	← Social Security	0.81	<0.001**	II
Better standard of living (TMSS 3)	← Social Security	0.75	<0.001**	IV
Equips the members to support the family (TMSS 4)	← Social Security	0.84	<0.001**	I
Provide better education for their children (TMSS 5)	← Social Security	0.79	<0.001**	III

Based on standardized beta coefficient, equips the members to support their family(0.84) is the most influencing factor of Theeramythri Project which provide social security to the members of Theeramythri project in Kerala followed by Enhanced decision-making power (0.81), provide better education for their children (0.79), better standard of living (0.75) and confidence to start enterprises (0.71). It indicates that the participation in Theeramythri project has improved the social security of the members. Equips the members to support their family and enhanced decision-making power are the most influencing factors of social security construct. While comparing with other factors, confidence to start enterprises is the least influencing item of social security construct among the members of Theeramythri in Kerala (Table 9.6).

### 9.4 Confirmatory Factor Analysis for Livelihood Diversification measuring instrument

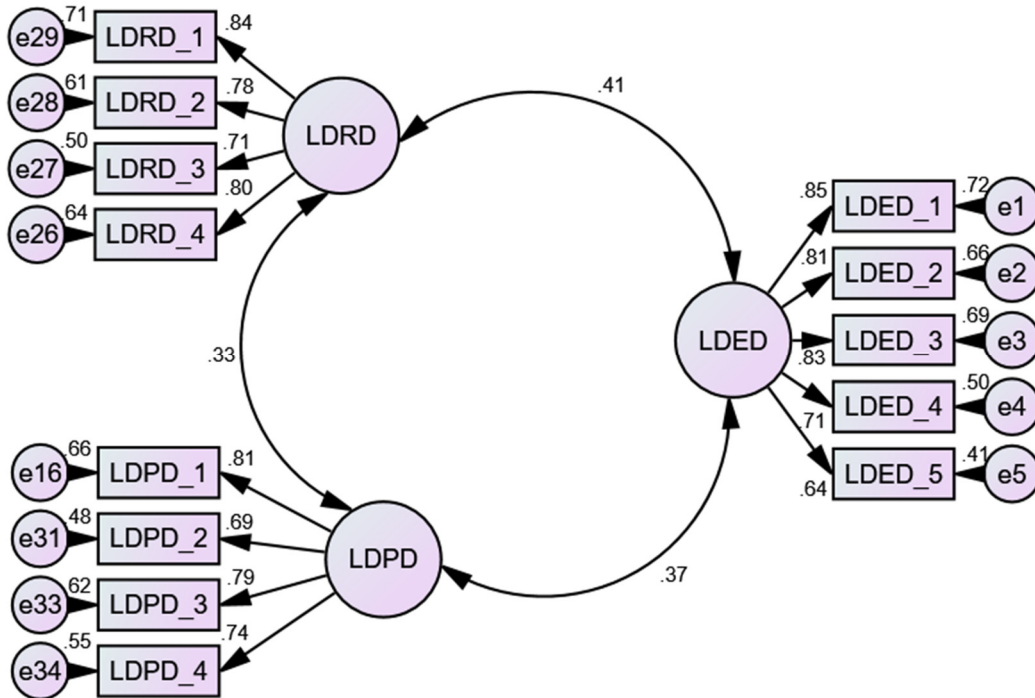


Figure 9.2: Confirmatory Factor Analysis for Livelihood Diversification measuring instrument

Table 9.7: Model fit indices of CFA for Livelihood Diversification measuring instrument

Attributes	CMIN/DF	P-Value	GFI	AGFI	CFI	RMSEA
Study model	2.247	0.000	0.914	0.919	0.937	0.070
Recommended value	Acceptable fit [1-5]	Greater than 0.05	Greater than 0.9	Greater than 0.9	Greater than 0.9	Less than 0.08

The value of Chi-Square to the degrees of freedom ratio for an acceptable model should be less than 5. In this case, the value is 2.247 which is very well within the suggested maximum value. The RMSEA score is 0.070, well below the accepted threshold score of 0.08. Moreover, the GFI and AGFI values are above 0.9 and CFI is above 0.9 for which 1.0 indicates exact fit. Thus, the model is a good fit and can be considered for further analysis (Figure 9.2.).

**Table 9.8: Final Reliability and Validity for Livelihood Diversification measuring instrument**

Constructs	Item code	Factor loading	Cronbach's Alpha Final	AVE	Composite Reliability
Livelihood Diversification – Risk related diversification	LDAD 1	0.84	0.862	0.615	0.864
	LDAD 2	0.78			
	LDAD 3	0.71			
	LDAD 4	0.80			
Livelihood Diversification – Economic related diversification	LDED 1	0.85	0.843	0.596	0.844
	LDED 2	0.81			
	LDED 3	0.83			
	LDED 4	0.71			
	LDED 5	0.64			
Livelihood Diversification – Psychological related diversification	LDPD 1	0.81	0.880	0.577	0.880
	LDPD 2	0.69			
	LDPD 3	0.79			
	LDPD 4	0.74			

It can be inferred that all the factor loadings are above the cut-off value of 0.5 which establishes the item validity of the constructs (Table 9.8). After the final data collection, Cronbach's Alpha reliability test was performed in the present study. The final values of Cronbach's Alpha are found to be greater than 0.8 which confirms the reliability of the variables used to measure the construct. The composite reliability values are found to be higher than 0.7 which indicates that all the constructs have a high level of internal consistency reliability. The Average Variance Extracted (AVE) values are also found to be above the threshold value of >0.5. Thus, it can be inferred that the constructs have high levels of convergence. As all the parameters meet the prescribed value, the data is appropriate for further analysis and model building. The discriminant validity for Livelihood diversification research instrument displayed in Table 9.8

**Table 9.9: Discriminant Validity for livelihood diversification research instrument**

Constructs	Risk related diversification	Economic related diversification	Psychological related diversification
Risk related diversification	<b>(0.874)</b>		
Economic related diversification	0.412	<b>(0.772)</b>	
Psychological related diversification	0.331	0.374	<b>(0.760)</b>

The square root of AVE values and inter construct latent variable correlations are displayed in Table 9.9. Values in brackets are the square root of AVE scores which should be greater than the inter construct latent variable correlation values to establish the non-existence of any relationship. It can be inferred that no relationship exists among the constructs and discriminant validity for the livelihood diversification research instrument is established (Table 9.9).

**Table 9.10: Path values of Confirmatory Factor Analysis Livelihood Diversification – Risk related Diversification**

Path relationships		Standardized co-efficient (Beta values)	P-value	Ranks based on Beta Values
Fishing is not sufficient for livelihood (LDRD 1)	← Risk related Diversification	0.84	<0.001**	<b>I</b>
Fishing is a risky process (LDRD 2)	← Risk related Diversification	0.78	<0.001**	<b>III</b>
Fishing creates problems related to health (LDRD 3)	← – Risk related Diversification	0.71	<0.001**	<b>IV</b>
The efforts invested for fishing is not reciprocated with income (LDRD 4)	← Risk related Diversification	0.80	<0.001**	<b>II</b>

Based on standardized beta coefficient, Fishing is not sufficient for livelihood (0.84) is the most influencing item of risk related diversification of

livelihood diversification factor among fisherfolks in Kerala followed by the efforts invested for fishing is not reciprocated with income (0.80), Fishing is a risky process (0.78). It indicates that livelihood diversification is mainly due to the mismatch between the income and expenditure of fishing more overfishing is a risky process it also leads to livelihood diversification (Table 9.10). These two factors are the most influencing factors of risk related diversification construct. Compared to other factors, fishing makes health problems is the least influencing factor for risk-related livelihood diversification construct among fisherfolks in Kerala.

**Table 9.11: Path values of Confirmatory Factor Analysis Livelihood Diversification – Economic related Diversification**

Path relationships		Standardized coefficient (Beta values)	P-value	Ranks based on Beta Values
Increased cost of fishing (LDED 1)	← Economic related diversification	0.85	<0.001**	<b>I</b>
Uncertainty in income (LDED 2)	← Economic related diversification	0.81	<0.001**	<b>III</b>
Constant seasonal unemployment (LDED 3)	← Economic related diversification	0.83	<0.001**	<b>II</b>
Not sufficient to meet the household expenditure (LDED 4)	← Economic related diversification	0.71	<0.001**	<b>IV</b>
Alternative job is necessary to meet the expenditure (LDED 5)	← Economic related diversification	0.64	<0.001**	<b>V</b>

Based on standardized beta coefficient, increased cost of fishing (0.85) is the most influencing item of economic-related diversification of livelihood diversification factor among fisherfolks in Kerala followed by constant seasonal unemployment (0.83), uncertainty in income (0.81). It indicates that livelihood

diversification is mainly because the cost of fishing is increasing day by day and the fishers are facing constant seasonal unemployment which leads to uncertainty in the income of the fishers (Table 9.11). These three factors are the most influencing factors of economic-related diversification construct. Compared to other factors, the necessity of an alternative job is the least influencing factor for economic-related livelihood diversification construct among fisherfolks in Kerala.

**Table 9.12: Path values of Confirmatory Factor Analysis livelihood diversification – psychological related diversification**

Path relationships		Standardized coefficient (Beta values)	P-value	Ranks based on Beta Values
Higher level of education among the youth of fisherfolks (LDPD 1)	← psychological related Diversification	0.81	<0.001**	I
A barrier to the marriage of girl children (LDPD 2)	← psychological related Diversification	0.69	<0.001**	IV
Annoyance due to recurrent natural calamities (LDPD 3)	← psychological related Diversification	0.79	<0.001**	II
Urge towards urban life (LDPD 4)	← psychological related Diversification	0.74	<0.001**	III

Based on standardized beta coefficient, a higher level of education among the youth of fisherfolks (0.81) is the most influencing item of psychological related diversification of livelihood diversification factor among fisherfolks in Kerala followed by annoyance due to recurrent natural calamities (0.79), urge towards urban life (0.74). It indicates that livelihood diversification is mainly because the upliftment with a higher level of education among the members of the family would lead to the psychological related diversification of livelihood diversification (Table 9.12). These two factors are the most influencing factors of psychological related diversification construct. Compared to other factors, the marriage of girl children is the least influencing factor for psychological related livelihood diversification construct among fisherfolks in Kerala.

### 9.5 Confirmatory Factor Analysis for Vulnerability research instrument

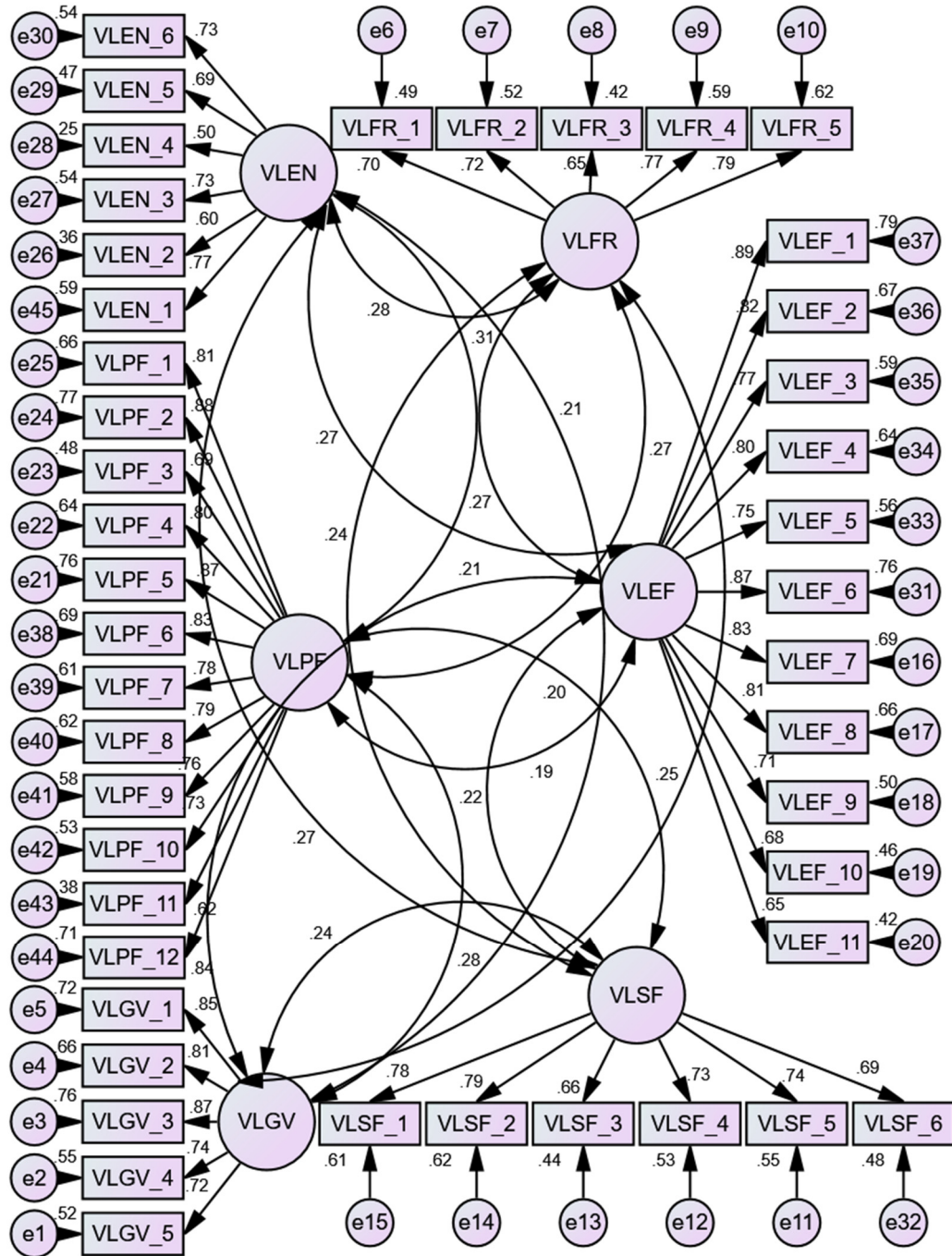


Figure 9.3: Confirmatory Factor Analysis for Vulnerability research instrument

**Table 9.13: Model fit indices for vulnerability measuring research instrument**

Attributes	CMIN/DF	P-Value	GFI	AGFI	CFI	RMSEA
Study model	2.874	0.000	0.937	0.922	0.940	0.050
Recommended value	Acceptable fit [1-5]	Greater than 0.05	Greater than 0.9	Greater than 0.9	Greater than 0.9	Less than 0.08

The CFA model fit indices to assess the overall model fit is provided in Table 9.13. The value of Chi-Square to the degrees of freedom ratio for an acceptable model should be less than 5. In this case, the value is 2.874 which is very well within the suggested maximum value. The RMSEA score is 0.50, well below the accepted threshold score of 0.08. Moreover, the GFI and AGFI values are above 0.9 and CFI is above 0.9 for which 1.0 indicates exact fit. Thus, the model is a good fit and can be considered for further analysis.



**Table 9.14: Final Reliability and Validity for Vulnerability research instrument**

Constructs	Item code	Factor loading	Cronbach's Alpha Final	AVE	Composite Reliability
Vulnerability – Governance	VLGV 1	0.85	0.897	0.798	0.898
	VLGV 2	0.81			
	VLGV 3	0.87			
	VLGV 4	0.74			
	VLGV 5	0.72			
Vulnerability – Fishery related factors	VLFR 1	0.70	0.847	0.726	0.849
	VLFR 2	0.72			
	VLFR 3	0.65			
	VLFR 4	0.77			
	VLFR 5	0.79			
Vulnerability – Social factors	VLSF 1	0.78	0.874	0.731	0.874
	VLSF 2	0.79			
	VLSF 3	0.66			
	VLSF 4	0.73			
	VLSF 5	0.74			
	VLSF 6	0.69			
Vulnerability – Economic factors	VLEF 1	0.89	0.945	0.780	0.945
	VLEF 2	0.82			
	VLEF 3	0.77			
	VLEF 4	0.80			
	VLEF 5	0.75			
	VLEF 6	0.87			
	VLEF 7	0.83			
	VLEF 8	0.81			
	VLEF 9	0.71			
	VLEF 10	0.68			
	VLEF 11	0.65			
Vulnerability – Poverty related factors	VLPF 1	0.81	0.851	0.848	0.951
	VLPF 2	0.88			
	VLPF 3	0.69			
	VLPF 4	0.80			
	VLPF 5	0.87			
	VLPF 6	0.83			
	VLPF 7	0.78			
	VLPF 8	0.79			
	VLPF 9	0.76			
	VLPF 10	0.73			
	VLPF 11	0.62			
	VLPF 12	0.84			
Vulnerability – Environmental factors	VLEN 1	0.77	0.826	0.798	0.827
	VLEN 2	0.60			
	VLEN 3	0.73			
	VLEN 4	0.50			
	VLEN 5	0.69			
	VLEN 6	0.73			

It can be inferred that all the factor loadings are above the recommended threshold level that 0.5, which establishes the item validity of the constructs (Table 9.14). After the final data collection, the reliability test was performed in the study. The final values of Cronbach's Alpha are found to be greater than 0.8 which confirms the reliability of the variables used to measure the construct. The Composite Reliability values are found to be higher than 0.7 which indicates that all the constructs have a high level of internal consistency reliability. The AVE values are also found to be above the threshold value of >0.5. Thus, it can be inferred that the three constructs have high levels of convergence. As all the parameters meet the prescribed value, the data is appropriate for further analysis and model building. The discriminant validity for vulnerability research instrument is displayed in Table 9.15.

**Table 9.15: Discriminant Validity for vulnerability research instrument**

Factors	VLGV	VLFR	VLSF	VLEF	VLPF	VLEN
VLGV	<b>(0.893)</b>					
VLFR	0.251	<b>(0.852)</b>				
VLSF	0.244	0.240	<b>(0.854)</b>			
VLEF	0.214	0.312	0.221	<b>(0.883)</b>		
VLPF	0.285	0.274	0.251	0.194	<b>(0.920)</b>	
VLEN	0.211	0.284	0.274	0.275	0.313	<b>(0.893)</b>

The square roots of AVE values and inter construct latent variable correlations are provided in Table 9.15. Values in brackets are the square root of AVE scores which should be greater than the inter construct latent variable correlation values to establish the non-existence of any relationship. It can be inferred that no relationship exists among the constructs and discriminant validity for the vulnerability measuring research instrument is established (Table 9.15).

**Table 9.16: Path values of Confirmatory Factor Analysis for vulnerability among fisherfolk-Governance factors.**

Path relationships		Standardized co-efficient (Beta values)	P value	Ranks based of Beta Values
Lack of Protection from invasion of fishing grounds (VLGV 1)	← Governance	0.85	<0.001**	II
Low Patrolling and Surveillance (VLGV 2)	← Governance	0.81	<0.001**	III
Deficiency of financial assistance from the Government (VLGV 3)	← Governance	0.87	<0.001**	I
Lack of effective Protection method from Government (VLGV 4)	← Governance	0.74	<0.001**	IV
Lack of safeguard measures (VLGV 5)	Governance	0.72	<0.001**	V

Based on standardized beta coefficient, Deficiency of financial assistance from the Government (0.87) is the most influencing factor of vulnerability-governance factor among fisherfolks in Kerala followed by Lack of protection from invasion of fishing grounds (0.85), low patrolling and surveillance (0.81) and Lack of effective Protection method from Government (0.74) (Table 9.16). It indicates that the lack of financial assistance from the Government is the major driving force for the vulnerability among the fisherfolks along with lack of protection from invasion of fishing grounds. These two factors are the most influencing factors of Vulnerability factor in governance construct. Compared to other factors, Lack of safeguard measures is the least influencing factor for Vulnerability factor in governance construct among fisherfolks in Kerala.

**Table 9.17: Path values of Confirmatory Factor Analysis of Vulnerability - Fishery related factors.**

Path relationships		Standardized coefficient (Beta values)	P-value	Ranks based on Beta Values
Fishing with light lures affects the small fishermen (VLFR 1)	← Fishery related factor	0.70	<0.001**	IV
Pelagic fishing (VLFR 2)	← Fishery related factor	0.72	<0.001**	III
Predator attack (VLFR 3)	← Fishery related factor	0.65	<0.001**	V
Reduction of fishing zone (VLFR 4)	← Fishery related factor	0.77	<0.001**	II
Migration of fishes (VLFR 5)	← Fishery related factor	0.79	<0.001**	I

Based on standardized beta coefficient, migration of fishes (0.79) is the most influencing vulnerability factor- fishery-related factor among fisherfolks in Kerala followed by reduction of fishing zone (0.77), pelagic fishing (0.72) and fishing with light lures affects the small fishermen (0.70). It indicates that the two factors such as the migration of fishes and Reduction of the fishing zone are the main attributing items of the fishery-related construct. Compared to other factors, predator attack (0.65) is the least influencing factor for the fishery-related construct of vulnerability among fisherfolks in Kerala (Table 9.17).

**Table 9.18: Path values of Confirmatory Factor Analysis of Vulnerability - Social factors**

Path relationships		Standardized co-efficient (Beta values)	P value	Ranks based of Beta Values
Occupational migration (VLSF 1)	← Social factor	0.78	<0.001**	II
Income from fishing is not sufficient (VLSF 2)	← Social factor	0.79	<0.001**	I
Female children considered as a liability (VLSF 3)	← Social factor	0.66	<0.001**	VI
Destitution (VLSF 4)	← Social factor	0.73	<0.001**	IV
Habitual drunkards (VLSF 5)	← Social factor	0.74	<0.001**	III
Alienation (VLSF 6)	← Social factor	0.69	<0.001**	v

Based on standardized beta coefficient, Income from fishing is not sufficient (0.79) is the most influencing Vulnerability Factor- social factor among fisherfolks in Kerala followed by occupational migration (0.78), and habitual drunkards (0.74). It indicates that the two factors such as the Income from fishing is not sufficient and Occupational migration are the main attributing items of the social factor construct. Compared to other factors, female children considered as a liability (0.66) is the least influencing item of Social factor construct of vulnerability among fisherfolks in Kerala (Table 9.18).

**Table 9.19: Path values of Confirmatory Factor Analysis of Vulnerability - Economic factors**

Path relationships		Standardized coefficient (Beta values)	P-value	Ranks based on Beta Values
Loss in fishing days (VLEF 1)	← Economic factor	0.89	<0.001**	<b>I</b>
Increased cost of fishing (VLEF 2)	← Economic factor	0.82	<0.001**	<b>IV</b>
Increased household expenditure (VLEF 3)	← Economic factor	0.77	<0.001**	<b>VII</b>
Indebtedness (VLEF 4)	← Economic factor	0.80	<0.001**	<b>VI</b>
Poor asset base (VLEF 5)	← Economic factor	0.75	<0.001**	<b>VIII</b>
Uncertain Livelihood (VLEF 6)	← Economic factor	0.87	<0.001**	<b>II</b>
Erratic Income (VLEF 7)	← Economic factor	0.83	<0.001**	<b>III</b>
Low Income (VLEF 8)	← Economic factor	0.81	<0.001**	<b>V</b>
Seasonal Unemployment (VLEF 9)	← Economic factor	0.71	<0.001**	<b>IX</b>
Need for multiple earners in the family (VLEF 10)	← Economic factor	0.68	<0.001**	<b>X</b>
Low capacity for Investment (VLEF 11)	← Economic factor	0.65	<0.001**	<b>XI</b>

Based on standardized beta coefficient, Loss in fishing days (0.89) is the most influencing item of economic factor among fisherfolks in Kerala followed by uncertain livelihood (0.87), and erratic income (0.83). It indicates that the two factors such as the loss in fishing days and uncertain livelihood are the main attributing items of the economic-related construct. Compared to other factors, low capacity for investment (0.65) is the least influencing item of economic factor construct of vulnerability among fisherfolks in Kerala (Table 9.19).

**Table 9.20: Path values of Confirmatory Factor Analysis of Vulnerability – Poverty related factor**

Path relationships			Standardized coefficient (Beta values)	P-value	Ranks based on Beta Values
Lack of securing housing (VLPF 1)	←	Poverty related factor	0.81	<0.001**	V
Poor location of houses (VLPF 2)	←	Poverty related factor	0.88	<0.001**	I
The household cooks with wood, charcoal or dung (VLPF 3)	←	Poverty related factor	0.69	<0.001**	XI
Lack of amenities (VLPF 4)	←	Poverty related factor	0.80	<0.001**	VI
Poor availability of water (VLPF 5)	←	Poverty related factor	0.87	<0.001**	II
Large family size (VLPF 6)	←	Poverty related factor	0.83	<0.001**	IV
Food insecurity (VLPF 7)	←	Poverty related factor	0.78	<0.001**	VIII
Poor health & health care (VLPF 8)	←	Poverty related factor	0.79	<0.001**	VII
The household has a dirt, sand or dung floor (VLPF 9)	←	Poverty related factor	0.76	<0.001**	IX
do not have adequate sanitation (VLPF 10)	←	Poverty related factor	0.73	<0.001**	X
The household has no electricity (VLPF 11)	←	Poverty related factor	0.62	<0.001**	XII
Low literacy leads fishermen incapable to cope up with the changes (VLPF 12)	←	Poverty related factor	0.84	<0.001**	III

Based on standardized beta coefficient, Poor location of houses (0.88) is the most influencing item of Poverty related factor among fisherfolks in Kerala followed by Poor availability of water (0.87), and Low literacy leads fishermen

incapable to cope up with the changes (0.84). It indicates that the three factors such as the Poor location of houses, Poor availability of water and Low literacy lead fishermen incapable to cope up with the changes are the main attributing items of the poverty-related construct. Compared to other factors, the household has no electricity (0.62) is the least influencing item of poverty-related factor construct of vulnerability among fisherfolks in Kerala (Table 9.20).

**Table 9.21: Path values of Confirmatory Factor Analysis of Vulnerability – Environment-related factors**

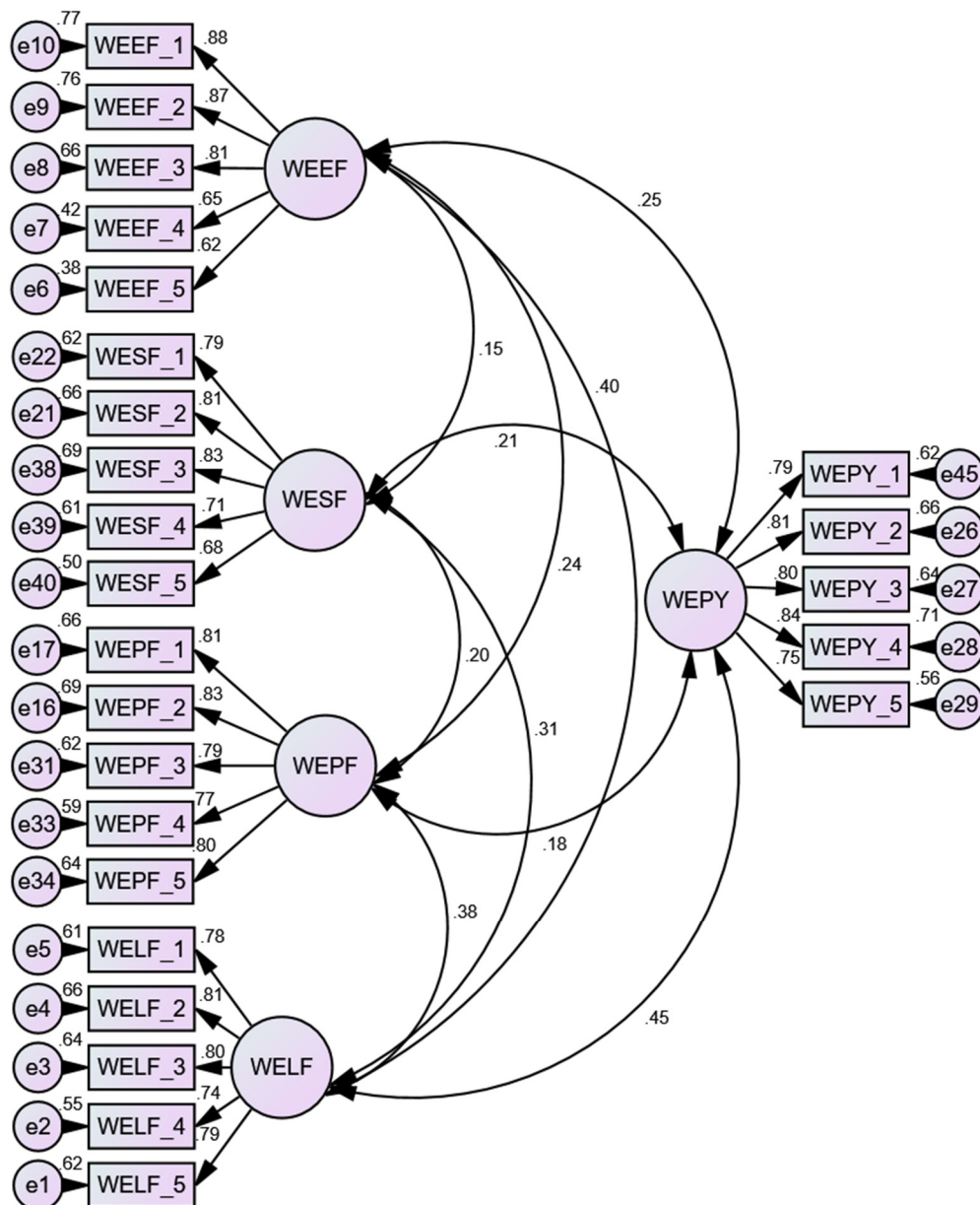
Path relationships		Standardized coefficient (Beta values)	P-value	Ranks based on Beta Values
Extreme weather events (VLEN 1)	← Environment related factors	0.77	<0.001**	<b>I</b>
Climate change leads to the habitat destruction (VLEN 2)	← Environment related factors	0.60	<0.001**	<b>IV</b>
Sea wall destruction (VLEN 3)	← Environment related factors	0.73	<0.001**	<b>II</b>
Encroachment of sea (VLEN 4)	← Environment related factors	0.50	<0.001**	<b>V</b>
Erratic Monsoon - reduces the fishing days (VLEN 5)	← Environment related factors	0.69	<0.001**	<b>III</b>
Increase in the seawater temperature would lead to the migration of fishes (VLEN 6)	← Environment related factors	0.73	<0.001**	<b>II</b>

Based on standardized beta coefficient, extreme weather events (0.77) is the most influencing item- Environment-related factors among the fisherfolks in Kerala. The second rank is shared by two factors such as Sea wall destruction (0.73), and Increase in the seawater temperature would lead to the migration of fishes (0.73). Items with the third rank are erratic monsoon - reduces the fishing days (0.69). It



indicates that the three factors such as the Sea wall destruction and Increase in the seawater temperature would lead to the migration of fishes are the main attributing items of the Environment related factors construct. Compared to other factors, Encroachment of sea (0.50) is the least influencing item among the Environment related factor construct of vulnerability in fisherfolks in Kerala (Table 9.21).

### 9.6 Confirmatory Factor Analysis for women empowerment measuring instrument



**Figure 9.4: Confirmatory Factor Analysis for women empowerment measuring instrument**

**Table 9.22: Model fit indices of CFA for women empowerment measuring instrument**

Attributes	CMIN/DF	P-Value	GFI	AGFI	CFI	RMSEA
Study model	2.187	0.000	0.912	0.911	0.935	0.069
Recommended value	Acceptable fit [1-5]	Greater than 0.05	Greater than 0.9	Greater than 0.9	Greater than 0.9	Less than 0.08

The CFA model fit indices to assess the overall model fit for women empowerment measuring instrument is provided in Table 9.22. The value of Chi-Square to the degrees of freedom ratio for an acceptable model should be less than 5. In this case, the value is 2.187 which is very well within the suggested maximum value. The RMSEA score is 0.069, well below the accepted threshold score of 0.08. Moreover, the GFI and AGFI values are above 0.9 and CFI is above 0.9 for which 1.0 indicates exact fit. Thus, the model is a good fit and can be considered for further analysis.

**Table 9.23: Final Reliability and Validity for women empowerment measuring instrument**

Constructs	Item code	Factor loading	Cronbach's Alpha Final	AVE	Composite Reliability
Women empowerment - Economic factor	WEEF 1	0.88	0.880	0.598	0.880
	WEEF 2	0.87			
	WEEF 3	0.81			
	WEEF 4	0.65			
	WEEF 5	0.62			
Women empowerment - Social factor	WESF 1	0.79	0.875	0.616	0.876
	WESF 2	0.81			
	WESF 3	0.83			
	WESF 4	0.71			
	WESF 5	0.68			
Women empowerment – Political factor	WEPF 1	0.81	0.899	0.640	0.899
	WEPF 2	0.83			
	WEPF 3	0.79			
	WEPF 4	0.77			
	WEPF 5	0.80			
Women empowerment – Legal factor	WELE 1	0.78	0.888	0.616	0.889
	WELE 2	0.81			
	WELE 3	0.80			
	WELE 4	0.74			
	WELE 5	0.79			
Women empowerment – Psychological factor	WEPY 1	0.79	0.897	0.638	0.898
	WEPY 2	0.81			
	WEPY 3	0.80			
	WEPY 4	0.84			
	WEPY 5	0.75			

It can be inferred that all the factor loadings are above the cut-off value of 0.5 which establishes the item validity of the constructs (Table 9.23). After the final data collection, The Cronbach's Alpha reliability test was performed. The final values of Cronbach's Alpha are found to be greater than 0.8 which confirms the reliability of the variables used to measure the construct. The Composite Reliability values are found to be higher than 0.7 which indicates that all the constructs have a high level of internal consistency reliability. The Average Variance Extracted (AVE) values are also found to be above the threshold value of >0.5. Thus, it can be inferred that the constructs have high levels of convergence. As all the parameters meet the prescribed value, the data is appropriate for further analysis and model building. The discriminant validity for women empowerment research instrument is displayed in Table 9.24

**Table 9.24: Discriminant Validity for women empowerment research instrument**

<b>Factors</b>	<b>WEEF</b>	<b>WESF</b>	<b>WEPF</b>	<b>WELF</b>	<b>WEPY</b>
WEEF	<b>(0.773)</b>				
WESF	0.157	<b>(0.784)</b>			
WEPF	0.243	0.204	<b>(0.800)</b>		
WELF	0.404	0.314	0.385	<b>(0.784)</b>	
WEPY	0.254	0.215	0.185	0.452	<b>(0.799)</b>

The square root of AVE values and inter construct latent variable correlations displayed in Table 9.24. Values in brackets are the square root of AVE scores which should be greater than the inter construct latent variable correlation values to establish the non-existence of any relationship. From the above table, it can be inferred that no relationship exists among the constructs and discriminant validity for the women empowerment measuring research instrument is established.

**Table 9.25: Path values of Confirmatory Factor Analysis for contributing factor to women empowerment – Economic factor**

Path relationships		Standardized coefficient (Beta values)	P-value	Ranks based on Beta Values
Hike in income and savings (WEEF 1)	← Economic factor	0.88	<0.001**	<b>I</b>
Economic Independence (WEEF 2)	← Economic factor	0.87	<0.001**	<b>II</b>
Rational decision making (WEEF 3)	← Economic factor	0.81	<0.001**	<b>III</b>
Association with financial institutions (WEEF 4)	← Economic factor	0.65	<0.001**	<b>IV</b>
Skill in financial transactions (WEEF 5)	← Economic factor	0.62	<0.001**	<b>V</b>

Based on standardized beta coefficient, hike in income and savings (0.88) is the most influencing item to Economic factor of women empowerment. Other Economic factors followed are economic Independence (0.87), rational decision making (0.81) and association with financial institutions (0.65). It indicates that through the participation in Theeramythri project the fisherwomen experienced an increase in the income and savings and which leads them to have economic independence. Compared to other factors, skill in financial transactions is the least influencing item (0.62) for Economic factor of women empowerment construct among the fisherfolks in Kerala (Table 9.25).

**Table 9.26: Path values of Confirmatory Factor Analysis for contributing factor to women empowerment – Social factor**

Path relationships		Standardized coefficient (Beta values)	P-value	Ranks based on Beta Values
Improved social status (WESF 1)	← Social factor	0.79	<0.001**	III
Improvised Interpersonal Relationship (WESF 2)	← Social factor	0.81	<0.001**	II
Rational decision making (WESF 3)	← Social factor	0.83	<0.001**	I
Association with financial institutions (WESF 4)	← Social factor	0.71	<0.001**	IV
Cohesion with community (WESF 5)	← Social factor	0.68	<0.001**	V

Based on standardized beta coefficient, rational decision making (0.83) is the most influencing item of the social factor of women empowerment. Other social factors followed are improvised interpersonal relationship (0.81), improved social status (0.79) and association with financial institutions (0.71). It indicates that through the participation in Theeramythri project the fisherwomen experienced an increase in the income and savings which leads them to have economic independence. Compared to other factors, Cohesion with the community is the least influencing item of (0.68) social factor of women empowerment construct among fisherfolks in Kerala (Table 9.26).

**Table 9.27: Path values of Confirmatory Factor Analysis for contributing factor to women empowerment – Political factor**

Path relationships		Standardized coefficient (Beta values)	P-value	Ranks based on Beta Values	
Involvement in public meeting (WEPF 1)	←	Political factor	0.81	<0.001**	II
Improved say in financial transactions(WEPF 2)	←	Political factor	0.83	<0.001**	I
Better knowledge about State's politics (WEPF 3)	←	Political factor	0.79	<0.001**	IV
Improved leadership (WEPF 4)	←	Political factor	0.77	<0.001**	V
Representation in election (WEPF 5)	←	Political factor	0.80	<0.001**	III

Based on standardized beta coefficient, improved say in financial transactions (0.83) is the most influencing item to the political factor of women empowerment. Other Political factors followed are Involvement in a public meeting (0.81), Representation in the election (0.80) and Better knowledge about State's politics (0.79). It indicates that through the participation in Theeramythri project the fisherwomen experienced an increased level of political awareness which have made them with self-awareness and political consciousness. Compared to other factors, improved leadership is the least influencing item of (0.77) Political factor of women empowerment construct among fisherfolks in Kerala (Table 9.27).

**Table 9.28: Path values of Confirmatory Factor Analysis for contributing factor to women empowerment – Legal factors**

Path relationships			Standardize d coefficient (Beta values)	P-value	Ranks based on Beta Values
Improved knowledge on the legal aspects (WELE 1)	←	Legal factor	0.78	<0.001**	IV
Better reach to legal information (WELE 2)	←	Legal factor	0.81	<0.001**	I
Ability to attend complex situations (WELE 3)	←	Legal factor	0.80	<0.001**	II
Courage to respond against discrimination (WELE 4)	←	Legal factor	0.74	<0.001**	V
Skills in conflict management (WELE 5)	←	Legal factor	0.79	<0.001**	III

Based on standardized beta coefficient, Better reach to legal information (0.81) is the most influencing item of the legal factor of women empowerment followed by the ability to attend complex situations (0.80), and skills in conflict management (0.79). It indicates that through the participation in Theeramythri project the fisherwomen experienced an increased level of legal awareness which have made them with problem-solving skills and legal consciousness. Compared to other factors, Courage to respond against discrimination is the least influencing item of (0.74) legal factor of women empowerment construct among fisherfolks in Kerala (Table 9.28).

**Table 9.29: Path values of Confirmatory Factor Analysis for contributing factor to women empowerment – Psychological factor**

Path relationships		Standardize d coefficient (Beta values)	P-value	Ranks based on Beta Values
Improved self-esteem (WEPY1)	← Psychological factor	0.79	<0.001**	<b>IV</b>
Better self-confidence (WEPY 2)	← Psychological factor	0.81	<0.001**	<b>II</b>
Efficiency in problem-solving (WEPY 3)	← Psychological factor	0.80	<0.001**	<b>III</b>
Better quality of life (WEPY 4)	← Psychological factor	0.84	<0.001**	<b>I</b>
Understanding one's potential (WEPY 5)	← Psychological factor	0.75	<0.001**	<b>V</b>

Based on standardized beta coefficient, the better quality of life (0.84) is the most influencing item to Psychological factor of women empowerment followed by better self-confidence (0.81), and efficiency in problem-solving (0.80). It indicates that through the participation in Theeramythri project the fisherwomen experienced an increased level of psychological upliftment which have made them with better self-confidence and improved self-esteem. Compared to other factors, understanding one's potential is the least influencing item (0.75) for Psychological factor of women empowerment construct among fisherfolks in Kerala (Table 9.29).

The all measurement models described above found that the data is appropriate for further analysis and building Structural Equation Models (SEM) by using the research hypotheses.



## **9.7 Co-variance Based Structural Equation Modeling for measuring the effects of Theermythri Project in Reducing the Vulnerability and Livelihood diversification of fisherfolks and enhancing the empowerment of fisherwomen in Kerala**

### **9.7.1 Co-variance Based Structural Equation Modeling techniques**

Structural equation modelling (SEM) is a multivariate statistical analysis technique that is used to analyze structural relationships. It is the combination of factor analysis and multiple regression analysis. This method is preferred because it estimates the multiple and interrelated dependence in a single analysis. In this analysis, mainly two types of variables are used, that is, endogenous variables (dependent variable) and exogenous variables (independent variable). Structural Equation Modelling is a confirmatory approach and is mainly used for hypotheses testing and for the analysis of a structural theory bearing on some phenomenon. SEM has three major advantages over traditional multivariate techniques: (1) explicit assessment of measurement error; (2) estimation of latent (unobserved) variables via observed variables; and (3) model testing where a structure can be imposed and assessed as to fit of the data. SEM is used to show the causal relationships between variables. The relationships shown in SEM represent the hypotheses of the researchers. SEM in particular is well suited to investigating complex relationships among multiple constructs. The two most prevalent SEM-based analytical methods are covariance-based SEM (CB-SEM) and variance-based SEM (PLS-SEM). PLS-SEM used for theory building and CB-SEM is mainly used for theory testing. In this study, CB-SEM is adopted as it is a theory-testing method of research. In this study, IBM SPSS AMOS 21 software package was used to run the CB-CFA and SEM models.

This section deals with the effects of Theeramythri project on reducing Vulnerability and Livelihood diversification of fisherfolks and enhancing

empowerment of fisherwomen in Kerala. For this, the following hypotheses are to be tested (Table 9.30).

## **9.8 Formulation of hypotheses and developing a research model**

### **1. Theeramythri Project Vs Women empowerment**

The women empowerment is one of the aims of the Theeramythri programme. The programme is the flagship programme of SAF that encourages, facilitates and handholds fisherwomen to engage in gainful alternate self-employment for their economic and social emancipation. Society for Assistance to Fisherwomen (SAF) was registered under Travancore- Cochin Literary and Charitable Societies Act on 1st June 2005 with the mandate to work for the empowerment of fisherwomen across Kerala state. Therefore, it can be hypothesised that;

*SM.H1: Theeramythri project has positive effect on enhancing empowerment of fisherwomen in Kerala*

### **2. Theeramythri Project Vs Vulnerability**

The vulnerability of fishing community towards the climate change, being a subject of great concern all over the world, takes the form of social, economic and even geographical and biological issues. Theeramythri project in Kerala considered as a safeguard for fisherfolks in Kerala against various hazards faced by them including vulnerability issues. The above discussion directly leads to the following hypothesis that;

*SM.H2: Theeramythri project has positive effect on reducing the vulnerability among fisherfolks in Kerala*

### **3. Theeramythri Vs Livelihood diversification**

The primary objectives of the Theeramythri programme is (1) To promote alternative livelihoods among fisherwomen for enhancing their incomes and improving their quality of life, (2) To encourage new livelihood avenues through capacity and skill building of fisherwomen (3) to enhance the modernisation of technologies for improving efficiency and quality in livelihood venture (4) To develop leadership and management acumen among fisherwomen through capacity building and training. The project Theeramythri envisaged the upliftment of the living standards of the fisherfolks by providing support to income-generating activities. Another important vision of the project is to help the fishermen to continue their traditional job by ensuring an additional income to their spouses thereby reduce the livelihood diversification among the fishermen. It leads to the following hypothesis

*SM.H3: Theeramythri project has a positive effect on reducing the livelihood diversification among fisherfolks in Kerala*

### **4. Women Empowerment Vs Livelihood diversification**

Throughout the world women dominate the seafood processing sector. The manual dexterity required in processing seafood involves activities like sorting, grading, peeling, gutting, slicing etc., is the primary reason for this dominance. The Theeramythri programme encourages, facilitates and handholds fisherwomen to engage in gainful alternate self-employment for their economic and social empowerment. Galab and Rao (2003) have reported that women empowerment through alternative livelihoods have improved their control over their family. While fisherwomen in the family is empowered, their spouses will resume to their traditional fishing that could result in the betterment of the entire family. In harmony with the above findings it can be hypothesed that

*SM.H4: Women empowerment has positive effects on reducing the livelihood diversification among fisherfolks in Kerala*

## 5. Vulnerability Vs Livelihood diversification

Diversification may, thus, be considered as a deliberate household strategy to smooth incomes or to manage risks, or it may be an involuntary response to the crisis to cope with shocks (Bryceson 1996, 1999; Delgado and Siamwalla 1999; Toulmin et al., 2000; Barrett et al., 2001). Hence, diversification provides a safety-net for the rural poor. Diversification, as a risk-management and shock-coping strategy, may yield lower average welfare outcomes, but should lead to more income security when an extreme event does occur (Barrett et al., 2001; Bandyopadhyay and Skoufias, 2013). In this sense, climate and other risks push households into diversification (Barrett et al., 2001; Ellis, 2004; Reardon et al., 2006). For instance, working off the farm could potentially reduce household food production due to the competition for family labour between farm and off-farm work (e.g., Huang et al., 2009; Pfeiffer, LópezFeldman and Taylor, 2009). Climate variability, associated with farm-income variability, is recognized as one of the main drivers of livelihood diversification strategies in developing countries (Rural Malawi, 2015). According to the above discussion, one can say that one of the major reasons for livelihood diversification among fisherfolks in Kerala may be due to their vulnerability issues. Therefore, these findings suggest the following hypothesis that:

SM.H5: *Vulnerability has negative effect on livelihood diversification among fisherfolks in Kerala*

The hypotheses formulated by the study developed the following hypothesized research model.

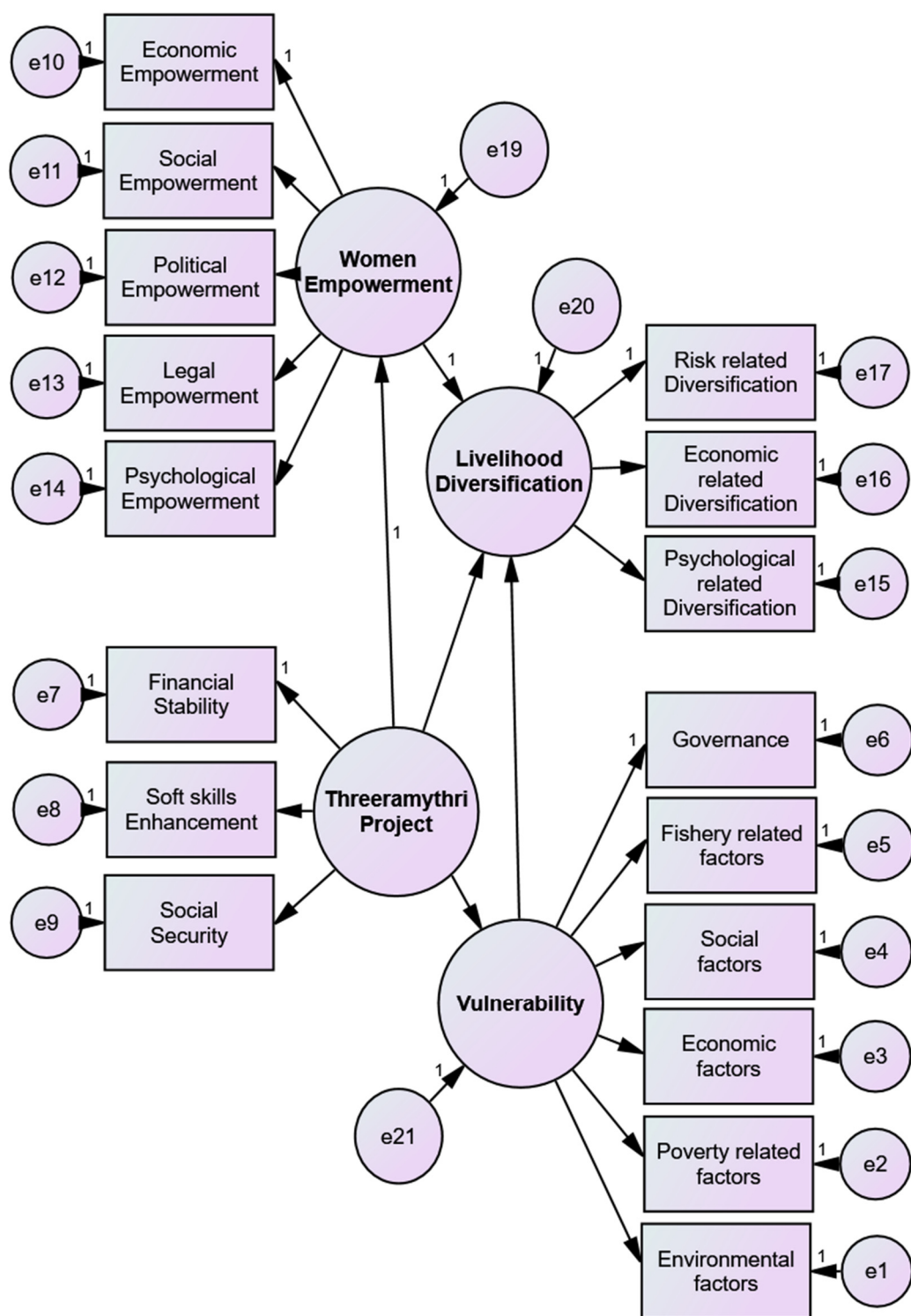
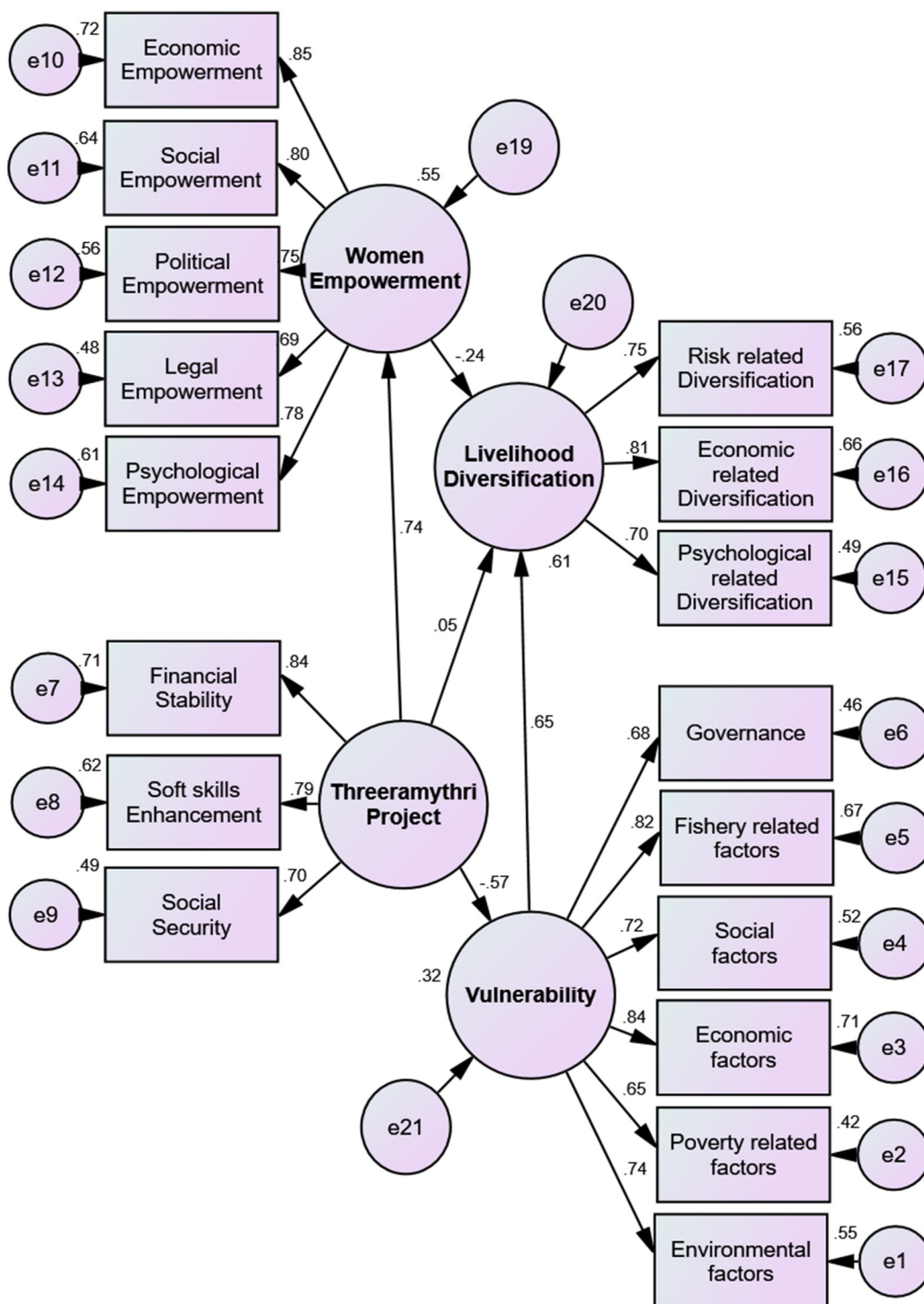


Figure 9.5: Hypothesized research model.

**Table 9.30: Summary of hypotheses for model building**

<b>Hypotheses No.</b>	<b>Hypotheses of model building</b>
SM.H1	Theeramythri project has positive effect on enhancing empowerment of fisherwomen in Kerala
SM.H2	Theeramythri project has positive effect on reducing the vulnerability among fisherfolks in Kerala
SM.H3	Theeramythri project has positive effect on reducing the livelihood diversification among fisherfolks in Kerala
SM.H4	Women empowerment has positive effect on reducing the livelihood diversification among fisherfolks in Kerala
SM.H5	Vulnerability has negative effect on livelihood diversification among fisherfolks in Kerala

*SM.H1 to SM.H5 indicates Structural Model Hypotheses*



**Figure 9.6: CB-SEM model for the effects of Theeramythri project in reducing Vulnerability and Livelihood diversification of fisherfolks and enhancing empowerment of fisherwomen in Kerala**

**Table 9.31: Model fit indices for effects of Theeramythri project on Vulnerability and Livelihood diversification of fisherfolks and enhancing empowerment of fisherwomen in Kerala**

Model	CMIN/DF	P-Value	GFI	AGFI	CFI	RMSEA
Study model	4.223	0.000	0.917	0.903	0.933	0.047
Recommended value	Acceptable fit [1-5]	Greater than 0.05	Greater than 0.9	Greater than 0.9	Greater than 0.9	Less than 0.08

The SEM model fit indices to assess the overall model fit is represented in Table 9.31. The value of Chi-Square to the degrees of freedom ratio for an acceptable model should be less than 5. In this case, the value is 4.223 which is very well within the suggested maximum value. The RMSEA score is 0.047, below the accepted threshold score of 0.08. Moreover, the GFI and AGFI values are above 0.9 and CFI is above 0.9 for which 1.0 indicates exact fit. Thus, the SEM model is a good fit.

**Table 9.32: Path values and R<sup>2</sup> values of the effects of Theeramythri project on reducing Vulnerability and Livelihood diversification of fisherfolks and enhancing empowerment of fisherwomen in Kerala**

Constructs path index	Standardized coefficient (Beta)	R <sup>2</sup> Value	Critical Ratio	P-value
Vulnerability ← Theeramythri Project	-0.57	0.32	9.524	<0.001**
Women Empowerment ← Theeramythri Project	0.74	0.55	14.27	<0.001**
Livelihood Diversification ← Theeramythri Project	0.05		1.114	0.214 <sup>NS</sup>
Livelihood Diversification ← Women Empowerment	-0.24	0.61	4.574	<0.001**
Livelihood Diversification ← Vulnerability	0.65		12.34	<0.001**

\*\* indicates significant at 1% level, NS indicates non-significant.



Standardized beta coefficient of Theeramythri project on reducing vulnerability is -0.57 represents the partial effect of Theeramythri project on vulnerability, holding the other path variables as constant. The estimated negative sign implies that such effect is negative that Vulnerability would decrease by 0.65 for every unit of standard deviation increase in Theeramythri project and this coefficient value is significant at 1% level. Therefore, it can be concluded that the hypothesis one is accepted that Theeramythri project has positive effects on reducing vulnerability among fisherfolks in Kerala (Table 9.32).

The standardized beta coefficient of Theeramythri project on enhancing women empowerment is 0.74 represents the partial effect of Theeramythri project on women empowerment, holding the other path variables as constant. The estimated positive sign implies that such effect is positive that women empowerment would increase by 0.74 for every unit of standard deviation increase in Theeramythri project and this coefficient value is significant at 1% level. Therefore, it can be concluded that hypothesis two is accepted that Theeramythri project has positive effects on enhancing women empowerment among fisherwomen in Kerala.

The standardized beta coefficient of Theeramythri project on livelihood diversification is 0.05 represents the partial effect of Theeramythri project on livelihood diversification, holding the other path variables as constant. But the P-value of this beta coefficient is not significant. Therefore, it can be concluded that Theeramythri project does not have any positive effects on reducing livelihood diversification among fisherfolks in Kerala.

The standardized beta coefficient of women empowerment on livelihood diversification is -0.24 represents the partial effect of women empowerment on livelihood diversification, holding the other path variables as constant. The estimated negative sign implies that such effect is negative that livelihood diversification would decrease by 0.24 for every unit of standard deviation increase in women empowerment and this coefficient value is significant at 1% level. Therefore, it can be concluded that the hypothesis four is supported that

woman empowerment has a positive effect on reducing livelihood diversification among fisherfolks in Kerala.

The standardized beta coefficient of vulnerability on livelihood diversification is 0.65 represents the partial effect of vulnerability on livelihood diversification, holding the other path variables as constant. The estimated positive sign implies that such effect is positive that livelihood diversification would increase by 0.65 for every unit of standard deviation increase in vulnerability and this coefficient value is significant at 1% level. Therefore, it can be concluded that hypothesis five is supported that Vulnerability has negative effects on livelihood diversification among fisherfolks in Kerala.

The explanatory power of the structural equation model is assessed by examining the  $R^2$  value of the dependent variables. The R squared coefficient measures the percentage of variation that is explained by the model (See Model figure 9.6). The coefficient of determination for vulnerability,  $R^2$  is 0.32. This value implies that about 32% of the variation in vulnerability is explained by Theeramythri project. This value leads to the conclusion that other independent variables are necessary for predicting vulnerability besides this independent construct that Theeramythri project, to account for the remaining 68% of the variation in vulnerability is not explained by this independent construct, Theeramythri project. In simple words, the study reveals that Theeramythri project has succeeded 32% for reducing vulnerability among fisherfolks in Kerala. There are some other factors which might be implemented to reduce the balance to 68% vulnerability. Those factors are not measured by this study.

The coefficient of determination for women empowerment,  $R^2$  is 0.55. This value implies that about 55% of the variation in women empowerment is explained by Theeramythri project. This value leads to the conclusion that other independent variables are necessary for predicting women empowerment besides this independent construct that Theeramythri project, to account for the remaining 45% of the variation in women empowerment is not explained by this independent construct, Theeramythri project. In other words, the study shows that Theeramythri project has succeeded 55%

for enhancing women empowerment among fisherwomen in Kerala. There are some other factors which must be identified for enhancing the balance to 45% women empowerment. Those factors are not measured in this study.

The coefficient of determination for livelihood diversification,  $R^2$  is 0.61. This value implies that about 61% of the variation in livelihood diversification is explained by Theeramythri project, women empowerment and vulnerability. This value leads to the conclusion that other independent variables are necessary for predicting livelihood diversification besides these independent constructs that Theeramythri project, women empowerment and vulnerability, to account for the remaining 29% of the variation in livelihood diversification is not explained by these independent constructs that Theeramythri project, women empowerment and vulnerability. In other words, the study shows that Theeramythri project, women empowerment and vulnerability have succeeded 61% for explaining the factor that livelihood diversification among fisherfolks in Kerala. There are some other factors which must be identified for predicting the balance of 29% of livelihood diversification. Those factors were not measured in the study (Table 9.33).

**Table 9.33: Result summary of hypothesis testing**

Hypotheses No.	Hypotheses for model building	Result of Hypotheses testing
SM.H1	Theeramythri project has a positive effect on enhancing empowerment of fisherwomen in Kerala	<i>Supported</i>
SM.H2	Theeramythri project has a positive effect on reducing the vulnerability among fisherfolks in Kerala	<i>Supported</i>
SM.H3	Theeramythri project has a positive effect on reducing the livelihood diversification among fisherfolks in Kerala	<i>Not Supported</i>
SM.H4	Women empowerment has a positive effect on reducing the livelihood diversification among fisherfolks in Kerala	<i>Supported</i>
SM.H5	The vulnerability has a negative effect on livelihood diversification among fisherfolks in Kerala	<i>Supported</i>

*SM.H1 SM.H5 indicates Structural Model Hypotheses*

## **9.8 Conclusion**

In this chapter, various hypotheses were tested and a Theeramythri model for Kerala was developed based on the results of these hypotheses testing. All hypotheses are supported except the hypothesis that effects of Theeramythri project on livelihood diversification. Fit indices of this model show that both all CFA models and SEM model are with a good fit. The final chapter Summarises the recommendations and future perspectives

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## CHAPTER 10

### SUMMARY OF FINDINGS AND CONCLUSION

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- 10.1 Introduction
  - 10.2 Vulnerability among the fisher folks in Kerala
  - 10.3 Livelihood diversification among the fisher folks in Kerala
  - 10.4 Theeramythri project and its contribution to the empowerment of fisherwomen
  - 10.5 Result summary of hypothesis testing
  - 10.6 Limitations of the study and directions for future research
  - 10.7 Suggestions and Policy Implications
  - 10.8 Conclusion
-

## 10.1 Introduction

The fisherfolks across three marine districts in Kerala have been studied in detail to demonstrate the vulnerability, livelihood diversification and women empowerment and the influence of Theeramythri project among them. This chapter summarises the aspects discussed in the core chapters and incorporated the policy interventions to be adopted. Then the chapter discusses the limitations of the study and concludes with the way forward. Inferences and recommendations are also provided in the last part.

## 10.2 Vulnerability among the fisherfolks in Kerala

The study investigated the reason for the backwardness in the marginalised fisherfolks in a multidimensional way. Various factors have been incorporated for the investigation such as economic, fishery-related factors, environmental-related factors, poverty-related factors, and social factors.

Even though the Government offers a moderate level of subsidies for the fisherfolk, it is observed as not sufficient in comparison with their living standards. The level of Governance factor of vulnerability among fisherfolks in Kerala shows that the fishers are getting only a moderate level of governance. Contingent living expenses are also been provided by the Government for the lean season which used to reach the needy after a quite long time or very few people have received it on time.

Among the vulnerability factors, fishery-related factors miserably affects fishers. The fisherfolks in Kerala are in the frontline of vulnerability due to high-level fishery-related factors. It was observed that fishing with light lures are affecting the small traditional fishers. Pelagic fishing affects, as the non-motorized and motorized fishers which take all the yields that leave nothing for the traditional fishers. Overfishing is an important issue to plague the fishery as overfishing of resources is taking place, even with light lures, etc. Habitat destruction has been seen critically by fishermen. A dedicated effort for reducing coastal industrial pollution is required as industries dump their wastes into the sea. Pelagic fishing,

followed by fishing with light lures and porpoise attack on the net with captured fishes were found to be the supplementary reason for the reduction of fish resources identified by the respondents.

Compared to other vulnerability factors, the social factor of vulnerability with economic and fishery-related factors, social factors which leads to vulnerability had a moderate level impact. Occupational migration is another social factor which makes the fisheries to more vulnerable. According to the opinion of the respondents, their younger generation stays away from fishing as they consider fishing as a job that is not a dignified one. Uneven supply and inconsistency of funds from the Government is another limiting factor coupled with Low literacy and religious confrontations.

In the case of the economic factor of vulnerability among fisherfolks in Kerala shows that half of them are facing vulnerability due to a higher level of Economic factor vulnerability. Regionally it is observed that loss in the number of fishing days could be attributed due to the erratic monsoon and regional weather changes. The increased cost of fuel, supplies, with the labour charge, has also dragged them with more debt and as a result, they borrow money from the local vendors with high-interest rates which again led them to be more with indebtedness. As they have a poor asset base, the repayment of the loan is considered to be far from reality.

The level of Poverty related factor of vulnerability among fisherfolks in Kerala shows that half of the fishers are facing vulnerability due to the low level of poverty-related vulnerability factor. Most of the fisherfolks have housing facilities however the location and surroundings of their houses are only a matter of concern. Amenities for the living are also found to be moderate. The availability of safe drinking water was the only factor that was not sufficient for the community.

Concerning the environmental factors of vulnerability among fisherfolks in Kerala, it was found that the fishers are more vulnerable due to global sea-level rise and extreme weather events during the past decade. The destruction of habitat in the coastal region and erratic monsoon is also found to be a contributing factor. The local migration of fishes across regions which is an outcome of seawater temperature rise is also reported as a valid reason.

There is a significant difference in the relative contribution factors of vulnerability among fisherfolks in Kerala. It is found that economic factors are the most important reason for vulnerability among fisherfolks in Kerala, is followed by Fishery related factors, Environmental factors, Social factors, Governance, and Poverty related factors. Economic factors are the most important factor which affected the fisherfolks and they will be exposed to vulnerability.

Economic factors are the most important factor which affected the fisherfolks and they will be exposed to vulnerability. Fishing can be considered as a sustainable occupation only when they can avail sufficient fishing days, which is not true as in the present case they get only 8 to 12 fishing days in a month. They get only a meager amount, which permits them to purchase basic amenities only. The increased cost involved in fishing is also a limiting factor that will drag them to increased debts and miseries.

In fishery-related factors, the occurrence of pelagic fishing along with the reduction of the fishing zone permitted the traditional fishermen is another issue that the fishermen have to tackle. The migration of fishes would also lead them to low yield and increase vulnerability. Evidence of overfishing is evident, particularly in coastal waters, highlighting the need for better management.

In Environmental factors, the sea-level rise that causes the sea bed erosion along with extreme weather events that cause the unpredictable changes in the sea and low yield are the driving force for the vulnerability in the fisherfolks of the State. From an emphasis on expanding production and better resource exploitation, there is now a recognition of the need for conservation and management, because



of the overfishing, particularly of coastal resources. In the case of social factors, occupational migration ranks high along with religious confrontation. The impedance in the Governance is also found to be a contributing factor as the financial assistance and the delay in the implementation of various schemes are in place.

The fisheries sector is increasingly being affected by pollution and the impact of other lands- and sea-based activities on coastal resources and their productivity. Impacts are most acutely felt by those fishing in coastal and inshore waters, particularly those engaged in gleaning and collection activities. Despite the notable difference in the reduction of poverty, available evidence suggests that coastal fishing communities, in general, have lower levels of literacy, and poorer conditions of housing, lack of drinking water, lack of amenities, poor health, and health care facilities. Evidence also suggests that communities are faced with a deteriorating quality of life as a result of pollution, sea erosion, increased pressure on coastal lands, degradation of the coastal environment, and displacement. It is evident that the cascading effect of the interrelated factors is bringing the vulnerability of the fishers to a closer extent. The high dependency on each factor, that primarily drives the conditions of the fishermen to a worsening scenario.

There is a notable difference observed between inland plus marine fishers and marine fisherfolks with regard to the factors of vulnerability that Governance, Fishery related factors, Social factors, Economic factors, and Poverty related factors. The marine fishers are confronted with many issues in terms of economic benefits, as the fishery-related vulnerability profoundly affects them with immediate factors such as erratic monsoon, and other climatic events that are in action. Whereas the inland plus marine fishers have always extended with a choice in their hand to be in action. They can opt for inland fishing as and when they are confronted with the threat of weather mediated emergency.

The noteworthy difference was reported between Motorised, Non-motorised, Mechanised fishing methods with regard to the dimension of vulnerability factors

that Governance, Fishery related factors, Social factors, Economic factors, and Poverty related factors. The traditional fisherfolks with their vessels are to compete with the high-end technology-driven fishing boats and would end up in the meager yield. The cost incurred during the fishing for labour and fuel has also hiked in the past one decade that would ultimately affect the revenue of the fishermen in mechanised and motorised vessels who have been taking a hazardous and challenging profession. In the mechanised fishing boats, the majority of the workers are the migrant workers and they would also occupy the niche of the native workers that drive them to vulnerability. The encroachment of the mechanised fishing boats to the areas designated for the traditional fishermen and motorised fishers is another matter of concern and problem. Although the patrolling and surveillance are in place on the coasts, the motorised fishers will be invading the fishing zones of the traditional fishermen which in turn would result in a lesser yield for them. In the case of the motorised fishermen, a large proportion of them is leasing their craft from the local vendors which in turn results in the less profit share of the yield as their major share would reach the craft lenders.

There is a notable difference in the economic conditions of the workers involved in the three different types of vessels. In the case Governance factor, the motorised and non-motorised are found to be significantly different. However, while comparing with motorised fishing, non-motorised fishing is reported as more vulnerable. The lack of Governance that leads to vulnerability is related as they failed to ensure the protection. Those who are finding their daily wages by using the traditional fishing crafts are without any support from the Government as some of them are devoid of any safeguard measures and lack insurance etc. The cost of a mechanised boats are very high and they would also get the privilege of hefty loans from the banks. Whereas in the case of the motorised and non-motorised boats they would not be that much support in terms of money as they are derived from the collateral deposit.

The financial support extended to the mechanised fishing will be far from those of non-motorised fishing. The fishing with light lures by the motorised fishing would also be a concern as it would take a toll on the yield of non-motorised fishermen. The disparity with high-end technology used by mechanised fishing in contrast with the traditional know-how could also attract friction by enhancing the yield for the mechanised fishing. The mechanised boat owners won't have any real connection with the shores of the people on the coast as they would belong to the corporates or the businessmen in some other cities. The most affected in this process are the fishermen on non-mechanized craft, the majority, who face declining catches and increasingly vulnerable livelihoods as a result of fishing practices adopted by the motorized and mechanized fleet. There has been a significant escalation in investment and operating costs, for both mechanized and motorized vessels. This correspondingly related to the trend towards greater concentration of ownership of craft by the fisher community. Elevated costs and investments have led to greater indebtedness, and credit continues to be accessed mainly from informal sources at higher rates of interest. The maneuvers of non-mechanized craft, especially in certain regions, are becoming unviable, as resources and returns decline.

The present study recorded that there is a significant difference between different regions of the fisherfolks in Kerala regarding the two vulnerability factors that fishery-related factors and social factors. The fishery-related factors have affected drastically to the community at Ernakulam followed by Kozhikode and Thiruvananthapuram. The reports on the predator attack by the Porpoise was much more pronounced at the Ernakulam, which has contributed largely to the reduction of yield. Due to the proximity of the international exporting hub, the number of fleets deployed at the coasts of Ernakulam was on the higher side and this has made the area vulnerable in terms of fishery-related factors. With respect to the social factors, Calicut ranked first followed by Thiruvananthapuram and Ernakulam. This has got a positive relationship with the literacy rate in the fisherman, which is operating over the region. While comparing the regional wise differences Ernakulam was found to be more vulnerable in the case of fishery-

related factors than the other two districts. In the case of social factors, Calicut is found more vulnerable than the other two districts.

The state policies are to be followed uniformly, which has made the uniform pattern in all study sites on governance factors. All other factors such as economic factors, poverty-related factors, environmental factors are also found to be similar in all regions. In the case of all study areas, loss in fishing days increased cost of fishing, increases household expenditure, indebtedness, uncertain livelihood, seasonal unemployment, low capacity for investment, low income, erratic income have contributed to the economic factors which appear to be the same in all regions. In the case of poverty-related factors, all cases have mentioned poor availability of drinking water facilities. Environmental factors which lead to vulnerability is almost unique in all spheres of study sites.

### **10.3 Livelihood diversification among the fisherfolks in Kerala**

It was reported that vulnerability in the fisherfolks led them to change their traditional livelihood to some other jobs than fishing. It can be noticed that a high level of risk related diversification could be the foremost reason is they are diversifying from their fishing field to another. Due to the high risk of the fishing job and low income which they are presently receiving, is contributing to this. The study reiterated that fishing is defensibly considered a high-risk profession which is supported by available data on deaths of fisherfolks in natural calamities and at sea, indicating the need to undertake steps to reduce the vulnerability of fishermen and fishing communities (Kurien, 1998). The fishing is not sufficient for livelihood as they could not support them with a sustainable income. The risk involved in the sailing and unpredicted torrential rainfall and high tides always set the fishermen into anguish. The constant raids to the sea in the challenging conditions have deprived them of health issues. Spending a long time sitting in the sand while in the repairing of nets has also alleviated their problems related to the spinal cord, disc, and legs.

Livelihood diversification was high due to Economic related factors and they opined that the income from fishing alone would not be sufficient to meet their escalating needs in the present situation. The reduction in the potential fishing days as an outcome of the global changes sandwiched with the meager amount of money they receive from the fishing has driven them to search for a substitute for the livelihood option. The secondary profession is found to provide an ample supply of employment days apart from the stable income. Fishing is highly sensitive to the weather changes and the inconsistency in the working days and profits made by them more vulnerable.

The proportion of psychologically related diversification among the fisherfolks in Kerala is equally distributed. Educated youth in the fisherfolks are not interested to follow their parent's profession as they consider it is with a low profile job. A furthermore elevated level of education among youth diverted them to follow alternative paths in their profession. It was evident that the low profile of the fishermen has always remained an obstacle to the marriage of their children, which forced them to settle them in places away from the coastal area. The study exposed that, livelihood diversification is mainly caused by economic factors, such as seasonal unemployment, the mismatch between income and expenditure, weather influenced uncertain income, followed by risk-related factors.

The intensity of the livelihood diversification is high in those who are engaged in marine fishing alone than marine plus inland fishers. The aspects such as risk and economic-related factors are profoundly seen in those who are engaged in marine fishing. In the case of inland fishing, the fish catches are not profoundly affected by seasonality and other climatic driven factors are not influenced heavily. The livelihood diversification was not common in the case of marine plus inland fisheries.

It was observed the livelihood diversification is very high in the case of motorised fishing, as it consumes hefty amounts of money as the cost of fuel and labour charge etc and this amount would not be reimbursed through the catches. Hence they would move for the secondary options. The livelihood

diversification is constantly performed during the lean periods of the fishers especially when they are losing their fishing days due to monsoon and other weather events.

Hence there is a significant difference among different regions of fisherfolks with respect to factors of diversification factors that economic-related diversification and psychological related factors among fisherfolks in Kerala. It was observed that among the regions of the study Eranakulam was with a high rate of economic-related diversification. In Eranakulam they had the potentials to change their livelihood options as the region is very near to the urban area with immense possibilities of jobs. While in the case of psychological related diversification, it is reported that Calicut had a higher rate of livelihood diversification which was supplemented with local migration of the people from the coast to receive fair alliance for the other parts of the society.

#### **10.4 Theeramythri project and its contribution to the well-being of fisherwomen**

One of the important objectives of Theeramythri is to provide alternative livelihoods to the fisherwomen and ensure financial stability among them. They earned a reasonable income which equips them to struggle against their deprivations and was able to support their partner. The Theeramythri project ensured, high-level financial stability as members are expressed their views in favor of the above.

Theeramythri project has provided training programmes to develop their soft skills such as technological, leadership, and management skills which always helped them to improve their business.

The Theeramythri Project ensured, a high-level social security factor to the members as many of them have had the opinion that, their social security aspects have improvised. Theeramythri project has provided sustainable income-generating activities through micro-enterprises, which levered them with more financial independence.

Although there are various objectives for the Theeramythri project, among them to provide financial stability by providing financial assistance for starting micro-enterprises is the major and dominant one. Members of the Theeramythri is also trained by the mission coordinators to develop the soft skills among them. Most of the Theeramythri units are running very well, and it creates confidence among the members and they can able to live with a high standard of living. There is a significant difference between different age groups of fisherwomen concerning the factors of Theeramythri project that provide financial stability, soft skill enhancement.

There is a significant difference between the financial stability factor of Theeramythri and the different categories of units that the members are working. Food activity groups' sales turnover over the past three years was increasing followed by the garment sector and Provision stores. All these activities have got an unseasonal demand and thus the enterprises were used by all. While considering the regions of the Theeramythri units it was found that there is a regional difference in the case of financial stability factor, social security, and soft skill enhancement.

It was found that half of the fisherwomen have secured a high level of economic empowerment after joining the Theeramythri Project. The project, however, has not unscaled the legal empowerment component as it can be observed that the majority of the fisherwomen were getting a low level of legal empowerment. As envisaged in the objective, the psychological empowerment after joining in Theeramythri Project was found to be higher. While examining the extent of empowerment factors it can be observed that Economic empowerment was found to be high followed by Social, Psychological, Political, and Legal empowerment. Of these five significant factors, empowerment by economic factors is the most effective. This is a crucial part of empowerment as all the other factors are to consider as the outcomes of economic empowerment. In other words, the success achieved by the successful implementation of the project would be measured by recording the scales of upliftment in the economy incurred in the due

course of the time. There is a significant difference between the different age groups of fisherwomen and psychological factors of women empowerment among the members of Theeramythri in Kerala. This could be because of their adaptability to the changing scenarios as they are mostly entrusted with high responsibility in their homestead.

There is a significant difference between the economic empowerment factor of women empowerment and the different category of units running by the members of the Theeramythri project with regard to the factors of women empowerment. The outcomes approve that the economic factor has the most significant impact on empowering the fisherwomen of Theeramythri activity groups. Associations with financial institutions and proficiency in financial transactions are the two main reasons for their increase in the empowerment level. The economic empowerment of the different sectors of the activity group members indicates that the food sector is the most empowered sector since the origin of these Theeramythri groups. There is a significant difference between the economic and social empowerment among the fisherwomen who running their units in different regions in Kerala regarding the women empowerment factors. The Educational status of the members influenced the well-functioning of the project. In Ernakulum almost all units are running very well especially the food, textiles, and garments units.

Based on the notions of earlier studies, five research hypotheses were developed for testing the effects of the Theermythri project on reducing Vulnerability and Livelihood diversification of fisherfolks and enhancing the empowerment of fisherwomen in Kerala.

### **10.5 Result summary of hypothesis testing**

By testing these five hypotheses, a SEM model has developed in the present study. All hypotheses proposed by the study were supported except one hypothesis that the Theeramythri project has positive effects on reducing the livelihood



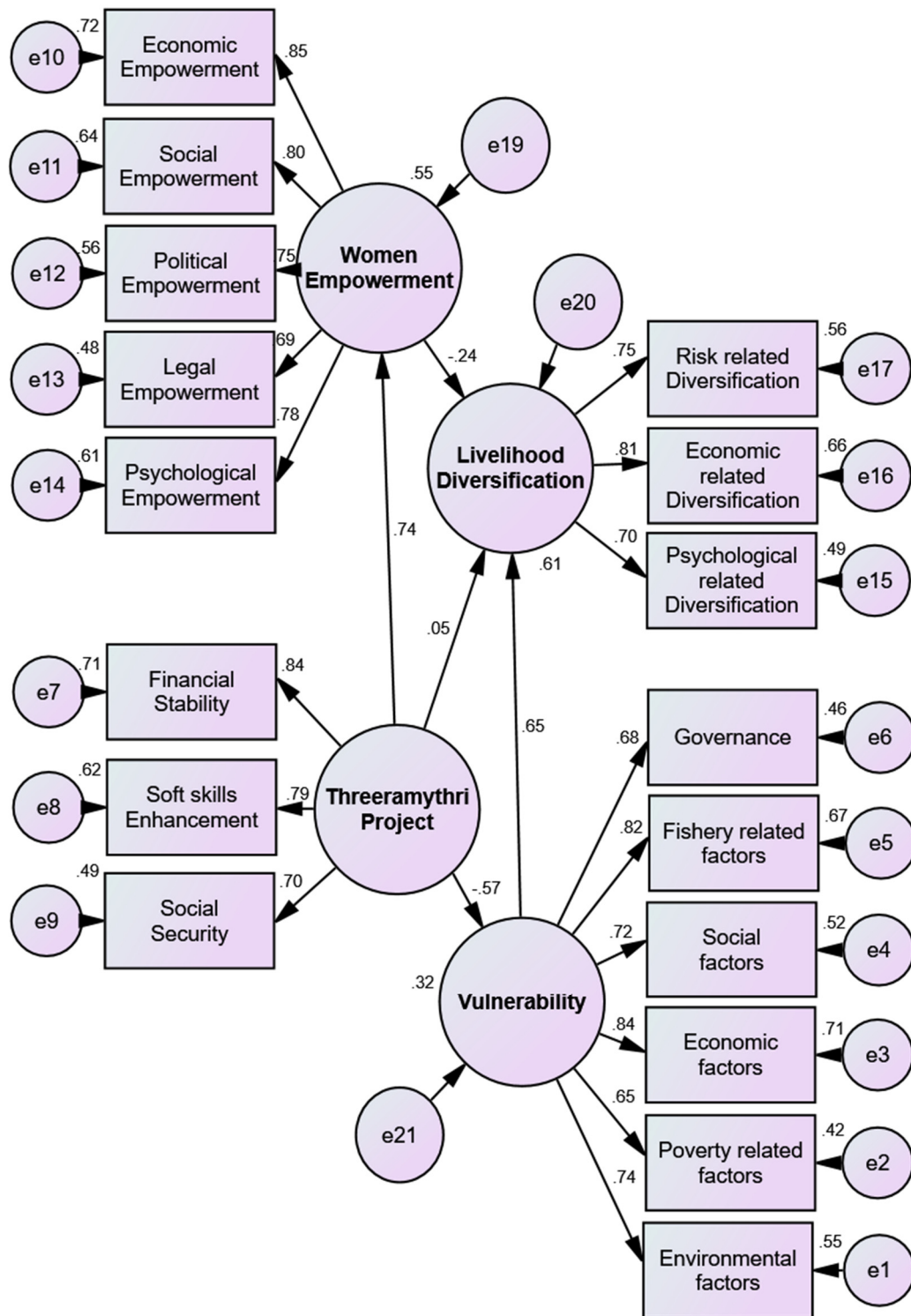
diversification among fisherfolks in Kerala. The following table explains the result summary of all hypotheses testing (Table 10.1).

**Table 10.1. Result summary of hypothesis testing**

<b>Hypotheses No.</b>	<b>Hypotheses for model building</b>	<b>Result of Hypotheses testing</b>
SM.H1	Theeramythi project has positive effects on enhancing the empowerment of fisherwomen in Kerala	<i>Supported</i>
SM.H2	Theeramythi project has positive effects on reducing the vulnerability among fisherfolks in Kerala	<i>Supported</i>
SM.H3	Theeramythi project has positive effects on reducing the livelihood diversification among fisherfolks in Kerala	<i>Not Supported</i>
SM.H4	Women empowerment has positive effects on reducing the livelihood diversification among fisherfolks in Kerala	<i>Supported</i>
SM.H5	The vulnerability has positive effects on livelihood diversification among fisherfolks in Kerala	<i>Supported</i>

*SM.H indicates Structural Model Hypotheses*

The effects of the Theermythri project on reducing Vulnerability and Livelihood diversification of fisherfolks and enhancing the empowerment of fisherwomen in Kerala are provided in figure 10.1.



**Figure 10.1** Testing the theoretical Model that the effects of Theermythri project on reducing Vulnerability and Livelihood diversification of fisherfolks and enhancing the empowerment of fisherwomen in Kerala.

The model was assessed by various fit indices such as CMIN/DF, P-value, RMSEA, GFI, AGFI, and CFI and almost all of these fit indices fulfilled the recommended threshold level. Therefore, the model was a good fit.

Further to the testing of the hypothesis, it was proven that the Theeramythri project has positive effects on enhancing the empowerment of fisherwomen in Kerala. The literature also backed up the argument, as Salim et al (2017) have reported that there has been a significant improvisation of the backwardness of women in the fisher community. They have played a vital role in achieving the goals of empowering fisherwomen and developing a sustainable income that supports the livelihood and to initiate a successful model. Swain and Wallentin (2007) strongly demonstrate that on average, there is a substantial intensification in the women empowerment of the SHG members group in India. In the backdrop of the previous reports and studies without any doubt, it can be concluded that the Government supported self-employment programs such as the Theeramythri project has positive effects on enhancing the empowerment of fisherwomen in Kerala.

While testing the hypothesis, it was found that the Theeramythri project has positive effects on reducing the vulnerability among fisherfolks. The argument was supported by a few researchers. Galab and Rao (2003) have reported that access to credit has helped women to meet their consumption as well as production needs. They have also added that microcredit has contributed to woman to obtain the income from low-risk activities which ultimately increases the income of the poor and reduce the vulnerability. Based on the previous studies it can be deduced that projects such as the Theeramythri have been instrumental in the reduction of vulnerability among fisherfolks in Kerala.

The hypothesis on the Theeramythri project has positive effects on reducing the livelihood diversification among fisherfolks in Kerala that have not been supported by the present study. Although the Theeramythri project, have contributed positively towards the upliftment of woman, through them their family too.

The hypothesis was supporting the women empowerment has positive effects on reducing the livelihood diversification among fisherfolks. Previous studies have also been backed up by the findings. Galab and Rao (2003) have reported that women empowerment through alternative livelihoods has improved their control over their families. Till then, they were depended on a single source of income, from fishing. After the onset of the said programs, further specifically, women have improved access or control over the power to survive, possessions, liberty to move and interact, and leadership positions. Allison (2005) has also in support of the argument as the fishermen can stick on the fishing and no need to diversify their source of income. In harmony with the above findings, it can be concluded that through woman empowerment livelihood diversification can be reduced to some extent.

Based on hypothesis testing, this study shows that vulnerability among fisherfolks in Kerala has positive effects on their livelihood diversification. Previous studies have alignment with these findings that Climate variability, associated with farm-income variability, is recognized as one of the main drivers of livelihood diversification strategies in developing countries. Diversification provides a safety-net for the rural poor. Diversification, as a risk-management and shock-coping strategy, may yield lower average welfare outcomes, but should lead to more income security when an extreme event does occur (Barrett et al. 2001, Bandyopadhyay and Skoufias, 2013). In tune with previous findings, this study also shows that vulnerability in terms of climate variability leads to livelihood diversification among fisherfolks in Kerala. Therefore, this study also supports previous research findings.

### **10.6 Limitations of the study and directions for future research**

The sampling is done only in the three districts in the State of Kerala, which could be a limitation as there are nine coastal districts. The subsamples collected along the study areas would have differences as the study areas are spanned across the different scales of the proximity of urban setup. Some of the limitations of this study may be the inclusion of married women with children and living with

husband, and thus the findings may not be generalized to other women. Although the present research has provided, insights on the income and expenditure pattern which is a base of any research that question logical links between the socio-economic standpoint, a detailed explanation with more sampling is a prerequisite for further analysis. Due to logistical reasons, a comparison between the other marginalised communities was beyond the scope of this research, which can enlighten another avenue to inspect the backwardness of similar communities. The ethnicity and urban residence may further affect the empowerment. A study with the involvement with the young regeneration in the related conditions would be fascinating from multiple co-ordinates, which has not been covered in the present study. An interdisciplinary study of the related subjects which involve the climate data science and association with similar organisations would be fascinating in terms of the strengthening of the arguments provided with respect to vulnerability and livelihood. Further to this establishing such relationship would go a long way in taking the appropriate management decisions by the Government.

### **10.7 Suggestions and policy implications**

A thorough understanding of the need and state of art of the functioning of Theeramythri is envisaged to have a better formulation of policies which is a prerequisite for every outcome-based project. The need for a more diverse and flexible range of measures, tailored to local priorities and conditions and ensuring that poor people can access the benefits of fisheries whilst achieving their sustainability, is identified by the project.

More proper dissemination of the monetary supports and increased amount of allowance on time to the fishermen is a pre-requisite for the maintain their proper living standard. A supply of more safeguard measures could be advisable as they could resolve misfortunes in the sea. Ensuring the plantation of mangrove belts have proven to be worth as they can prevent soil erosion and mudflat formation. A more refined mode of operation in the Theeramythri with technological up-gradation would be noteworthy. Imparting awareness of legal and

financial literacy would play an influential role in bringing them with more confidence.

The policy implications of these strategies are found to be differentiated and poorly represented in practice by socio-economic analysis that either undervalues fisheries or treats them solely as livelihoods of last resort and by traditional approaches to fisheries centered on single earing families. The need for policy interventions to increase livelihood diversification is appreciated. The Government can induct steps to decrease the vulnerability in the region by means of implementing similar programs with a broad spectrum of beneficiaries by including the youngsters. As the project Theeramythri has proved to be beneficial, better management of the program is needed, that could enable the reach of the program into multiple beneficiaries.

## **10.8 Conclusion**

The inherited backwardness and impoverished nature of the fishing community in Kerala was considered to be an outlier of the Kerala model of development. The reason for this was attributed to the different types of vulnerability both in terms of natural and manmade. This vulnerability invades the community and persuades them to search for new fields that can fetch them with a support of income that would sustain. It is observed that this sort of livelihood diversification would ultimately drain the traditional fisherfolks manpower as their imparity in revenue while comparing with other sources in the backdrop of risks. Governance plays a pivotal role in the management of nature and natural resources which is a central point in the deciphering of the concerns adhered to the fisherfolks. In order to curb the ground reality, apart from the Government supports, Government initiatives such as Theeramythri have to be promoted to have a better living for the Fishers. There have been remarkable changes in the upliftment in the community employing the introduction of programs such as Theeramythri. Better management and policy formations are to be incorporated and have to closely monitor to ensure sustainability.

Among the fisherfolks, in Kerala, the vulnerability is high due to the economic, environment, and fishery-related factors. The magnitude of vulnerability is also very high in those fishers who are doing marine fishing only. The conditions are very pathetic in those who perform with non-motorised fishing, those who belong to Thiruvananthapuram. Such conditions may curtail them in securing a stable income and forced to divert their occupation into some other fields. The fishers are diversifying their livelihood, due to high risk and economic-related factors. At this juncture, the growing necessity of multiple earners in the family is a prerequisite for their sustenance. Project such as Theeramythri, has played an instrumental role in negating the inherent anomalies attributed to the downtrodden marginalised community especially fisherwomen that strive for the living, by empowering them. It is envisaged that with adequate methodological changes required for the different regions, a concurrent study on the impact of climate change on at a global scale on a group like fisherfolks, would be fascinating from many angles.





## **REFERENCES**

- Adger, W. N. (1999). Exploring income inequality in rural, coastal Viet Nam," *Journal of Development Studies*, Taylor & Francis Journals, vol. 35(5), pages 96-119.
- Adger, W. N. (2006). Vulnerability. *Global Environmental Change*, 16, 268-281. <http://dx.doi.org/10.1016/j.gloenvcha>.
- Aerthayil, M., (2000). Fishworkers' Movement in Kerala (1977–1994). The Role of Non-Party Political Organizations in Social Transformation in India. New Delhi: Published by Indian Social Institute. Ahmed and Lipton (1988) 183 pages. ISBN-13: 978-8187218302
- Alemu, S.H., Van Kempen, L., & Ruben, R. (2018). Women Empowerment Through Self-Help Groups: The Bittersweet Fruits of Collective Apple Cultivation in Highland Ethiopia. *Journal of Human Development and Capabilities*, 19(3), 308-330. <https://doi.org/10.1080/19452829.2018.1454407>
- Alexander P. (1982). Sri Lankan Fishermen: Rural Capitalism and Peasant Society. Monographs on South Asia 7. Australian Maritime Museum. Canberra, Australia.
- Allison E. H. (2005). The fisheries sector, livelihoods and poverty reduction in Eastern and Southern Africa. *Rural livelihoods and poverty reduction*, 256-273
- Allison, E. H. (2006). Human Rights and Property Rights: Strategies for Addressing Both Millennium Development Goals and Responsible Fishing In Small-scale Fisheries In West and Central Africa. : International Institute of Fisheries Economics and Trade.
- Allison, E.H. and Kelling, I. (2009) Fishy crimes: the societal costs of poorly governed marine fisheries. Third Annual Convention of the Consortium of Non-Traditional Security Studies in Asia, Singapore, 3-4 November. Available at: <http://www.rsis-ntsasia.org/activities/conventions/2009-singapore/Edward%20Allison.pdf> (accessed 23 June 2017)
- Allison, E.H., Horemans, B. and Béné, C. (2006) Vulnerability reduction and social inclusion: strategies for reducing poverty among small-scale fisherfolk. Paper presented at the Wetlands, Water and Livelihoods Workshops, Wetland International, St. Lucia, South Africa, 30 January–2 February

- Alwang, J., (1999), 'Labour Shortages on Small Landholdings in Malawi: Implications for Policy Reforms', *World Development* 27(8), pp 1461-1475.
- Alwang, J., P. B. Siegel and S. L. Jorgensen (2001). 'Vulnerability: A View From Different Disciplines', *Social Protection Discussion Paper Series* 0115. Washington, DC, World Bank.
- Anderson S.C., Ward E. J., Shelton A.O., Adkison M. D., Beaudreau A. H., Brenner R. E, Haynie A. C., Shriver J.C., Watson J. T., and Williams B. C. (2017). Benefits and risks of diversification for individual fishers *PNAS*, 114 (40) 10797-10802; <https://doi.org/10.1073/pnas.1702506114>
- Arenas, M.C. and Lentisco, A. (2011). Mainstreaming gender into project cycle management in the fisheries sector. RAP Publication 2011/15. Bangkok, FAO. 92 pp. ([www.fao.org/docrep/014/ba0004e/ba0004e00.pdf](http://www.fao.org/docrep/014/ba0004e/ba0004e00.pdf)).
- Asian Development Bank (2003) Asian Development Bank Operations Evaluation Department Special Evaluation Study On ADB's Fisheries Policy, Reference Number: SST:REG 2006-07 Project Number: 26194
- Asian Development Bank (2003) Asian Development Bank Operations Evaluation Department Special Evaluation Study On ADB's Fisheries Policy, Reference Number: SST: REG 2006-07 Project Number: 26194
- Asravor, R. K. (2018). Livelihood diversification strategies to climate change among smallholder farmers in Northern Ghana. *Journal of International Development*, 30(8), 1318-1338.
- Asravor, R. K. (2018). Livelihood diversification strategies to climate change among smallholder farmers in Northern Ghana. *Journal of International Development*, 30(8), 1318-1338.
- Aysan, Y. F. (1993). "Keynote Paper: Vulnerability Assessment." In: P. Merriman and C. Browitt, eds., *Natural Disasters: Protecting Vulnerable Communities*, pp. 1- 14.
- Aysan, Y. F. (1993). "Keynote Paper: Vulnerability Assessment." In: P. Merriman and C. Browitt, eds., *Natural Disasters: Protecting Vulnerable Communities*, pp. 1- 14.

- Bakhtiari, S. (2006). Microfinance and Poverty Reduction: Some International Evidence. *International Business & Economics Research Journal (IBER)*, 5(12). <https://doi.org/10.19030/iber.v5i12.3550>
- Bali, Swain, R. (2006), Can microfinance do it? Women Empowerment and the Self Help Group Bank Linkage Programme in India, draft, Department of Economics, Uppsala University
- Bane, Mary Jo and David T. Ellwood. (1986). "Slipping Into and Out of Poverty: the Dynamics of Spells." *The Journal of Human Resources*, Volume XXI, Number 1:1-23, Winter.
- Barange M., Fernandes J.A., Kay S., Hossain M.A.R., Ahmed M., and Lauria V. (2018) Marine Ecosystems and Fisheries: Trends and Prospects. In: Nicholls R., Hutton C., Adger W., Hanson S., Rahman M., Salehin M. (eds) *Ecosystem Services for Well-Being in Deltas*. Palgrave Macmillan,
- Barrett, C. B., Reardon, T., & Webb, P. (2001). Nonfarm income diversification and household livelihood strategies in rural
- Bermio, J. & Caezar, Gerald & Peralta, R & Leila, Sylvia & Bautista. (2020). Empowerment in Coastal Areas: Wives of Fisher folks' Perspectives. 10.7828/ljher.v15n2.1322.
- Bharathi, S.B. (1999). *Coromandel Fishermen – An ethnography of Pattanavar Subcaste*. Pondicherry Institute of linguistics and culture, Pondicherry and Religion, Tamil Nadu.
- Blasiak, R., Spijkers, J., Tokunaga, K., Pittman, J., Yagi, N., & Österblom, H. (2017). Climate change and marine fisheries: Least developed countries top global index of vulnerability. *PLoS ONE*, 12(6), e0179632. <https://doi.org/10.1371/journal.pone.0179632>
- Brugère, C.; Holvoet, K. & Allison, E. (2008). *Livelihood diversification in coastal and inland fishing communities: misconceptions, evidence and implications for fisheries management*. Working paper, Sustainable Fisheries Livelihoods Programme (SFLP). Rome, FAO/DFID. 39p. Accessed on 11.01.2020

- Bryceson, Deborah Fahy, (1996). "Deagrarianization and rural employment in sub-Saharan Africa: A sectoral perspective," *World Development*, Elsevier, vol. 24(1), pages 97-111, January.
- Bryceson, Deborah Fahy. (1999). *Sub-Saharan Africa Betwixt and Between: Rural Livelihood Practices and Policies*. African Studies Centre Working Paper 43. ASC, Leiden.
- Campbell, S.J., L.J. McKenzie and S.P. Kerville. (2006). Photosynthetic responses of seven tropical seagrasses to elevated seawater temperature. *J. Exp. Mar. Biol. Ecol.* 330: 455–468.
- Carter, M and May, J (2000). *One Kind of Freedom: Poverty Dynamics in Post-Apartheid Africa*. *World Development*. 29.
- Castro L.V. 2014 *Measuring women's empowerment and women's autonomy in the Philippines*. Philippine Statistics Authority
- Chambers, R. (1983) *Rural development: putting the last first*. Harlow: Prentice Hall <https://opendocs.ids.ac.uk/opendocs/handle/20.500.12413/178>
- Chambers, R. and Conway, R. (1992). Sustainable rural livelihoods: Practical concepts for the 21st century. *IDS discussion paper*, No. 296. pp. 127-130.
- Chandrasekar, K S & C S, Siva. (2010). The Role of Information Communication Technology In Women Empowerment And Poverty Eradication In Kerala. *Asia Pacific Journal of Research in Business Management*. Volume 1, Issue 2, ISSN 2229-4104
- Chavez F.P., Ryan J, Lluch-Cota S.E., and Niquen C.M. (2003). From Anchovies to Sardines and Back: Multidecadal Change in the Pacific Ocean. *Science*, 299 (10), 217-221
- Christophe Béné, (2004). Poverty in Small-scale Fisheries: A Review and Some Further Thoughts. *Poverty and Small Scale Fisheries in West Africa*. 190-208. 10.1007/978-94-017-2736-5\_5.
- Compton's encyclopaedia. NewMedia, Inc (1995) Mpc Ed CD-ROM - ISBN-13 : 978-1557300201

- Cunningham C.J., Branch T.A., Dann T.H., Smith M., Seeb J.E, and Seeb L.W., Hilborn R. (2018) A general model for salmon run reconstruction that accounts for interception and differences in availability to harvest. *Can. J. Fish. Aquat. Sci.*, 13, pp. 1-13
- Davis, A. (1996). Barbed wire and bandwagons: a comment on ITQ fisheries management. *Review of Fish Biology and Fisheries* 6:97-107.
- Davis, Neil A., (2008). "Evaluating collaborative fisheries management planning: A Canadian case study," *Marine Policy*, Elsevier, vol. 32(6), pages 867-876.
- Davis, R. A., D. H. Thomson and C. I. Malme. (1998). Environmental Assessment of Seismic Exploration on the Scotian Shelf. 1998. Prepared for Mobil Oil Canada Properties Ltd., Shell Canada Ltd., and Imperial Oil Ltd. for submission to the Canada-Nova Scotia Offshore Petroleum Board
- Davis, S.K. (1996). Multispecies management: An alternative solution to the bycatch problem. Pp. 251–259 in *Alaska Sea Grant 1996. Solving Bycatch: Considerations for Today and Tomorrow*. Alaska Sea Grant College Program Report 96-03, University of Alaska, Fairbanks.
- Daw, T., Adger, W. N., Brown, K., and Badjeck, M. C. (2009) Climate change and capture fisheries: potential impacts, adaptation and mitigation. In: *Climate change implications for fisheries and aquaculture overview of current scientific Knowledge*, Cochrane, K., Young, C. De, Soto, D., & Bahri, T. (Eds). *FAO- Fisheries and Aquaculture Technical paper: No. 530*, pp.107-150, FAO, Rome.
- Delgado, C., and Siamwalla, A (2018). *Rural Economy and Farm Income Diversification in Developing Countries*. 10.4324/9780429457326-8.
- Department of Fisheries (2005) *Marine fisheries of Kerala at a glance 2005*. Downloaded from the website: <http://www.fisheries.kerala.gov.in/> on the 18th of August 2015.
- Dercon, Stefan (1999). *Assessing vulnerability*. Occasional paper. Jesus College and CSAE, Department of Economics, Oxford University
- Dercon, Stefan. (2005). *Vulnerability: A micro perspective. Securing Development in an Unstable World*.

- Dhanuraj D (2004) Traditional Fishermen Folk in Kerala & Their Livelihood Issues, CCS Research Internship Papers. Centre for Civil Society, New Delhi.
- Dietrich, G. and Nayak, N. (2002) Chapter 4: Fishing as a Traditional Occupation. In: Transition or Transformation? A study of mobilisation, organisation and emergence of consciousness among the fish workers of Kerala. Tamil Nadu, Department of Social Analysis, Tamil Nadu Theological Society. p 58-81.
- Dineshbabu A. P., Sujitha Thomas, Prathibha Rohit, and G. Maheswarudu (2019). Marine spatial planning for resource conservation, fisheries management, and for ensuring fishermen security – global perspectives and Indian initiatives. *Current Science*. 116, (4) 25
- Dineshbabu A. P., Thomas S., Rajesh K. M., Burman S. D., Shailaja S., Saha P. and P. U. Zacharia (2019) Spatial planning for integrated aquaculture development in coastal waters of Karnataka doi:10.6024/jmbai.2019.61.2.2096-01
- Duflo, E. (2012). Women's empowerment and economic development. *Journal of Economic Literature*, 50(4), 1051-1079. (<http://economics.mit.edu/files/7417>)
- Economic Review (2019) State Planning Board, Thiruvananthapuram, Kerala, India Volume One
- Ellis, (2000c). The determinants of rural livelihood diversification in developing countries *J. Agric. Econ.*, 51 (2) pp. 289-302
- Ellis, F. (1998). Household strategies and rural livelihood diversification. *Journal of Development Studies*, 35(1), 1–38. doi:10.1080/00220389808422553
- Ellis, F. (1999). Rural livelihood diversity in developing countries: Evidence and policy implications. In *New resource perspectives*, no. 40. Livelihoods, diversification and Poverty. London: ODI.
- Ellis, F. (2000a). *Rural livelihoods and diversity in developing countries*. New York, NY: Oxford University Press.
- Ellis, F. (2000b). The determinants of rural livelihood diversification in developing countries. *Journal of Agricultural Economics*, 51(2), 289–302. doi:10.1111/j.1477-9552.2000.tb01229.x

- Emilda R., and Varghese SA (2016) Isolation of actinomycetes from mangrove and estuarine sediments of Cochin and screening for antimicrobial activity *Journal of Coastal Life Medicine* 4 (3), 207-210
- FAO (1998) Rural non-farm income in developing countries. The state of Food and Agriculture, Report No. 31 ISSN 0081-4539
- FAO (Food and Agriculture Organisation of the United Nations). (1998). The state of food and agriculture 1998 (No. FAO Agriculture series No. 31). Rome: FAO
- FAO, (2012a) The State of World Fisheries and Aquaculture 2012. FAO Fisheries and Aquaculture Department. Food and Agriculture Organization of the United Nations, Rome (2012)
- FAO, (2012b) The State of Food Insecurity in the World 2012 Food and Agriculture Organization of the United Nations, Rome (2012)
- FAO, (2013b) FAOstat Food Supply database (accessed 17.4.13) <http://faostat3.fao.org/home/index.html#DOWNLOAD> .
- FAO. 2013a. Fisheries Global Information System database (accessed 15.4.13) <http://www.fao.org/fishery/statistics/en> .
- FAO/UNEP (2009) Expert Meeting On Impacts Of Destructive Fishing Practices, Unsustainable Fishing, And Illegal, Unreported And Unregulated (IUU) Fishing On Marine Biodiversity And Habitats
- Firth (1966) Firth, Raymond, Malay fishermen. Hamden, Conn.: Archon Books. 398
- Fornell, C., and Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of marketing research*, 39-50.
- FRAD, CMFRI, (2019). Marine Fish Landings in India 2018, Technical Report, CMFRI, Kochi
- Francis, RICC and Shotton, Ross. (2011). "Risk" in fisheries management: A review. *Canadian Journal of Fisheries and Aquatic Sciences*. 54. 1699-1715. 10.1139/f97-100.



- Frantzeskou, Elpida & Kastania, Anastasia & Riza, Elena & Jensen, Olaf & Linos, Athena. (2012). Risk factors for fishermen's health and safety in Greece. *International maritime health*. 63. 155-61.
- Fry, Jillian & Ceryes, Caitlin & Voorhees, Jill & Barnes, Nancy & Love, David & Barnes, Michael. (2019). Occupational Safety and Health in U.S. Aquaculture: A Review. *Journal of Agromedicine*. 24. 1-19. 10.1080/1059924X.2019.1639574.
- Garcia, S.M. & de Leiva Moreno, J.I. (2003). Global Overview of Marine Fisheries In: Sinclair, M., & Valdimarsson, G. (eds) *Responsible Fisheries in the Marine Ecosystem*. FAO & CABI Publishing 2003, pp. 1-24.
- Gilberthorpe, Emma & Hilson, Gavin & Haley, Sharman & Fisher, David & Martin, David & Trigger, David & Parmenter, Joni & MacDonald, Ginger & Zoe, John & Satterfield, Terre & McGregor, J. & Salagrama, Venkatesh & Bahadur, Aditya & Warnaars, Ximena & Bebbington, Anthony & Ackah-Baidoo, Abigail & Yakovleva, Natalia & Farran, Sue & Sillitoe, Paul & Sanchez, Ma. Daniela. (2014). *Natural Resource Extraction and Indigenous Livelihoods: Development Challenges in an Era of Globalization*, (2014) E. Gilberthorpe, G. Hilson (Eds.). London: Routledge. *The Extractive Industries and Society*.
- Golla, A., Malhortra, A., Nanda, P., Mehra, R., (2011), 'Understanding and Measuring Women's Economic Empowerment: Definition, Framework and Indicators', International Center for Research on Women (ICRW) [http://www.icrw.org/pdf\\_download/1659/download/348](http://www.icrw.org/pdf_download/1659/download/348)
- Gordon, H. S. (1954). The Economic Theory of a Common-Property Resource: The Fishery *Journal of Political Economy*, 1954, vol. 62, 124 <http://dx.doi.org/10.1086/257497>
- Groh, M., Krishnan, N., McKenzie, D. *et al.* (2016). The impact of soft skills training on female youth employment: evidence from a randomized experiment in Jordan. *IZA J Labor Develop* 5, 9 <https://doi.org/10.1186/s40175-016-0055-9>
- Haggblade S, Hazell PBR, Reardon T (2007). *Transforming the rural nonfarm economy*. International Food Policy Research Institute and Johns Hopkins University Press, Washington DC.

- Hair, J.F., Black, W.C., Babin, B.J., & Anderson, R.E. (2010). *Multivariate Data Analysis*. Seventh Edition. Prentice Hall, Upper Saddle River, New Jersey.
- Hair, J.F., Black, W.C., Babin, B.J., and Anderson, R.E. (2010). *Multivariate Data Analysis*. Seventh Edition. Prentice Hall, Upper Saddle River, New Jersey.
- Haque M, Islam TM, Tareque I, and Mostofa G (2011). Women empowerment or autonomy: a comparative view in Bangladesh context. *Bangladesh e-Journal of Sociology*.;8(2):17-30.
- Haque, A., Rahman, S., and Haque, M. (2011). Religiosity, ethnocentrism and corporate image towards the perception of young Muslim consumers: Structural equation modeling approach. *European Journal of Social Sciences*, 23, 98-108
- Hardin, G., (1968). The tragedy of the commons. *Science*, 162, 1243–8
- Hazell, Peter B. R., and Roger D. Norton (1987). *Mathematical Programming for Economic Analysis in Agriculture*. New York: Macmillan Publishing Co., 1986, xiv & 400 pp., *American Journal of Agricultural Economics*, 1987, vol. 69, issue 3, 715-716 <http://hdl.handle.net/10.2307/1241712>
- Heckert FAO (2016). Technical and socio-economic characteristics of small-scale coastal fishing communities, and opportunities for poverty alleviation and empowerment, by Uwe Tietze. *FAO Fisheries and Aquaculture Circular No. 1111*. Rome, Italy.
- Heckert J., D. Olney, and M. Ruel., (2019) Is women's empowerment a pathway to improving child nutrition outcomes in a nutrition-sensitive agriculture program?: Evidence from a randomized controlled trial in Burkina Faso. *Social Science & Medicine*, 233, pp. 93-102
- Heinz, J. (2000). *The H. John Heinz III Center for Science, Economics and the Environment. Fishing Grounds: Defining a New Era for American Fisheries Management*. Washington, DC: Island Press
- Holzmann, Robert & Jorgensen, Steen. (1999). Social protection as social risk management: conceptual underpinnings for the social protection sector strategy paper [http://www-wds.worldbank.org/servlet/WDSContentSer ...d/PDF/multi\\_page.pdf](http://www-wds.worldbank.org/servlet/WDSContentSer...d/PDF/multi_page.pdf)

- Holzmann, Robert & Jorgensen, Steen. (2001). Social Risk Management: A New Conceptual Framework for Social Protection. *International Tax and Public Finance*. 8. 529-556. 10.1023/A:1011247814590.
- Hulme, D. and Mosley, P. (1996) *Finance against Poverty*, 1 and 2. Routledge, London. *The Impact of Microfinance on Grassroot Development: Evidence from Smes in Kwabre East District of Ashanti Region of Ghana*. *Finance against Poverty*, 1 and 2. Routledge, London.
- Hulme, D., & Mosley, P. (1997). *Finance for the Poor or the Poorest? Financial Innovation, Poverty and Vulnerability*. Cited in *Role of Microcredit in Rural Poverty Alleviation: A Case study of Grameen Bikas Bank in Eastern Development Region, Nepal*, A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at George Mason, University by Hari Bansha Dulal 2007. (Original not seen)
- Human Development Report (2004) *Cultural Liberty in Today's Diverse World*. ISBN 0-19-522146-X. OXFORD, Carfax Publishing, Taylor and Francis Ltd, website at: <http://hdr.undp.org>
- ICAR Research Centre - Central Marine BNP. (2008). Big Numbers Project. "Food and Agriculture Organization of the United Nations; World Fish Center. 2008. *Small-scale Capture Fisheries: A Global Overview with Emphasis on Developing Countries*. World Bank, Washington, DC. World Bank. <https://openknowledge.worldbank.org/handle/10986/16752> License: CC BY 3.0 IGO."
- ICSF (2011). Draft report on damage assessment and livelihood rehabilitation strategy for tsunami affected coastal fishers in Tamil Nadu, India - Undertaken for the International Fund for Agricultural Development (IFAD) by the International Collective In Support of Fishworkers (ICSF)
- Islam, M.M., Sallu, S., Hubacek, K. (2014). Vulnerability of fishery-based livelihoods to the impacts of climate variability and change: insights from coastal Bangladesh. *Reg Environ Change* 14, 281–294 <https://doi.org/10.1007/s10113-013-0487-6>
- Jalan, Jyotsna & Ravallion, Martin. (1998). *Determinants of Transient and Chronic Poverty: Evidence From Rural China*.

- Jayakumar and Dileepkumar 2004. Study of turtles, traditional practices and rights of fishermen in the Kerala coast and development of an education strategy for protecting the coastal biodiversity through a community based Turtle conservation programme. Report by Tanal Conservation Action & Information Network
- Jayaweera I (2010). Livelihood and diversification in Rural Coastal Communities Dependence on Ecosystems Services and possibilities for Sustainable Enterprising in Zanzibar, Tanzania, MSc Dissertation submitted to the Stockholm University, Sweden, 67p
- Jojeebhoy, S. (1995) Women's Education, Autonomy and Reproductive Behaviour: Experience from Developing Countries, Oxford: Clarendon Press
- Kabeer, N. (1999). Resources, agency, achievements: reflections on the measurement of women's empowerment. *Development and Change* 30: 435–464.
- Kabeer, N. (2001). Conflicts over Credit: Re-Evaluating the Empowerment Potential of Loans to Women in Rural Bangladesh. *World Development*. 29. 63-84. 10.1016/S0305-750X(00)00081-4.
- Kakwani N and Son H.H. 2006 Pro-Poor Growth: The Asian Experience Research Paper No. 2006/56, United Nations University.
- Kanbur, R. & Squire, L. (2011). *The Evolution of Thinking About Poverty: Exploring the Interactions*.
- Kasperski and Holland (2013) Income diversification and risk for fishermen, *PNAS*, 110 (6) 2076-2081; <https://doi.org/10.1073/pnas.1212278110>
- Keen E.A. (1983) Common property in fisheries: Is sole ownership an option? *7* (3), 197-211 *Marine Policy* [https://doi.org/10.1016/0308-597X\(83\)90004-0](https://doi.org/10.1016/0308-597X(83)90004-0)
- Kerala Marine Fisheries Statistics (2018). Department of Fisheries, Published by Director of Fisheries, Prepared by: Statistical Cell, Directorate of Fisheries Vikas Bhavan, Thiruvananthapuram, 107 pages.
- Khandker, S. R. (1998). *Fighting Poverty with Microcredit: Experience in Bangladesh*. New York: Oxford University Press
- Khatun, D. & Roy, B. (2012). Rural Livelihood Diversification in West Bengal: Determinants and Constraints. *Agric Econ Res Rev*. 25.

- Kostov, Philip & Lingard, John. (2004). Integrated rural development - do we need a new approach?. Others 0409006, University Library of Munich, Germany. FAO, 2013a
- Kripa, V. (2018). Marine debris - a threat to sustainable fisheries. In: Prema, D., Molly Varghese, Shelton Padua, Jeyabaskaran, R., Sumithra, T. G., Reshma, K. J., Rekha J. Nair, Sobhana, K. S., Vidya, R., Jeena, N. S., Vivekananda Bharathi, Lavanya Ratheesh, Uma, E. K. and Shylaja, G. (Eds.). Book of Abstracts and Success stories, National Conference on Marine Debris (COMAD 2018), Marine Biological Association of India, 11-12 April 2018, Kochi, p. 19-21.
- Kurien J., & Paul. A. (2010). Social Security Nets for Marine Fisheries. *esocialsciences.com*, Working Papers. Accessed on 20.10.2018
- Kurien, J. & Paul, A. (2010). Social Security Nets for Marine Fisheries. *esocialsciences.com*, Working Papers.
- Kurien, J. (1995). Collective Action and Common Property Resource Rejuvenation: The Case of People's Artificial Reefs (PAR's) in Kerala State, India. *Human Organization*. 54. 10.17730/humo.54.2.rjm46x7874 75321k.
- Kurien, J. (1998). Traditional Ecological Knowledge and Ecosystem Sustainability: New Meaning to Asian Coastal Proverbs. *Ecological Applications* - 8. 10.1890/1051-0761(1998)8[S2:TEKAES]2.0.CO;2.
- Kurien, J. (2000a). Icelandic Fisheries Governance: A Third World Understanding. *Economic and Political Weekly*. 35. 3061-3066. 10.2307/4409655.
- Kurien, J. (2000b). Factoring social and cultural dimensions into food and livelihood security issues of marine fisheries: A case study of Kerala state, India. Centre for Development Studies, Trivandrum, India, Centre for Development Studies, Trivandrum Working Papers.
- Kurien, J. (2001) The Socio-Cultural Aspects of Fisheries: Implications for Food And Livelihood Security: A case study of Kerala state, India. In: Goodwin, J.R.M. (ed) *Understanding the cultures of fishing communities: A key to fisheries management and food security*. FAO Fisheries Technical Paper 401. p 196-217.

- Lehodey, P., Chai, F., & Hampton, J. (2003). Modelling climate-related variability of tuna populations from a coupled ocean-biogeochemical-populations dynamics model. *Fisheries Oceanography*, 12(4): 483-494.
- Malapit, H. J. L., Kadiyala, S., Quisumbing, A. R., Cunningham, K., & Tyagi, P. (2015). Women's empowerment mitigates the negative effects of low production diversity on maternal and child nutrition in Nepal. *The Journal of Development Studies*, 51(8), 1097-1123.
- Malhotra A, Jaiswal N., Upadhyay S. K., Malhotra Sandeep K., (2013) In: Proceedings of International Symposium on recent trends in climate change researches vis-à-vis biodiversity, (eds. Gupta N et al.) December, 2012, Bareilly, pp 3–4
- Malhotra, N. K & Peterson, M., (2001). Marketing Research in the New Millennium: Emerging Issues and Trends. *Marketing Intelligence and Planning*, 19, 216- 235.
- Mansuri G. and A. Healy (2000). Assessing Vulnerability: An Ex-Ante Measure and its Application using Data from Rural Pakistan. Development Economics Group. The World Bank: Washington, D.C. (Mimeo).
- Martin, S.M., Lorenzen, K. & Bunnefeld, N. (2013) Fishing Farmers: Fishing, Livelihood Diversification, and Poverty in Rural Laos. *Hum Ecol* 41, 737–747 (2013). <https://doi.org/10.1007/s10745-013-9567-y>
- Mayeux, L (1998) Women's empowerment and micro-finance programmes approaches, evidence and ways forward, DPP Working Paper - Development Policy and Practice Research Group, Open University (United Kingdom)
- Mayoux L (2001) Micro-finance and the empowerment of women - A review of the key issues
- Ministry of Agriculture, Krishi Bhavan, New Delhi and CMFRI, Kochi (2012) Marine Fisheries Census 2010 Part II. 6 Kerala
- Ministry of Agriculture, Krishi Bhavan, New Delhi and CMFRI, Kochi (2012) Marine Fisheries Census 2010 Part II. 6 Kerala. CMFRI; Kochi, Kochi.

- Mohammed K. K, Gyanranjan Dash, Sonia Kumari, Sreenath K. R., N.P Makwana, Swatipriyanka Sen Dash, Ambrose T.V., Shyam, Salim Shyam, Kripa, V., Zacharia, P. U. (2017). Vulnerability of Coastal Fisher Households to Climate Change: A Case Study from Gujarat, India. *Turkish Journal of Fisheries and Aquatic Sciences*, 17, 193-203.
- Morduch (1994) Analysis of the Effects of Microfinance on Poverty Reduction, NYU Wagner Working Paper No. 1014 Issued June 28, 2002
- Moser, C. O. N., (1998), 'The Asset Vulnerability Framework: Reassessing Urban Poverty Reduction Strategies', *World Development*, Vol. 26, No. 1, pp. 1-19.
- Narayana, (2002), *World Development Report, 2002/2000*
- Oladimeji, Yusuf. (2019). Livelihood Diversification among Artisanal Fishery Households in North-Central and North-Western Nigeria. *Ethiop.J. Appl.Sci. Technol.* Vol.9 (1): 46-59
- Pandit A, Ekka A, B. K. Das, S. Samanta, Lokenath Chakraborty, and Rohan K. Raman (2019). Fishers' livelihood diversification in Bhagirathi–Hooghly stretch of Ganga River in India *Science*, V. 116 (10) 1748-1752 DOI: 10.18520/cs/v116/i10/1748-1752
- PDNA (2018), Govt of Kerala
- Philip D and Rayhan Md. I. (2004) Vulnerability and Poverty: What are the causes and how are they related? Term paper for Interdisciplinary Course, International Doctoral Studies Program at ZEF, Bonn 28 Pp.
- Plamoottil, Mathews & Win, Than. (2017). On some destructive fishing methods of Central Travancore of Kerala, India. *International Journal of Zoological Research*. 4. 6-12. 10.24896/jzbr.2017412.
- Rajan (2002). Labour mobility in the small scale fisheries of Kerala. Published by Centre for Developmental Studies Pp.83
- Ramchandani R. A. (2017). The Role of Microfinance in Women's Empowerment A Comparative Study of Rural & Urban Groups in India, Emerald Publishing Limited Howard House, Wagon Lane, Bingley BD16 1WA, UK, 44pp

- Rani B. J and Radhika S (2014). Impact of Self Help Group on Self Efficacy, Resilience and Psychological Empowerment of Rural Women in Telangana, *International Journal of Science and Research*, 3(11), pp 2030-2031
- Rao N.C, Galab S (2003) Poverty Alleviation and Empowerment Women's Self-Help Groups, *Poverty Alleviation and Empowerment* Vol. 38, Issue No. 12-13, 22 Mar,
- Reardon T and Vosti S. A. (1995) Links between rural poverty and the environment in developing countries: asset categories and investment poverty. *World Dev* 23(9):1495–1506
- Sachin AP, & Menon, N. & K.C. Sankaranarayanan, (2014). An Analysis of Various Coastal Issues In Kerala. *International Journal of Scientific Research And Education*. 2. 1993-2001.
- Salagrama, V. (2006). Post Tsunami Rehabilitation of Fishing Communities and Fisheries Based livelihood in Tamil Nadu Kerala, and Andhra Pradesh, India. *Proceedings of Regional Workshop on Post-Tsunami Rehabilitation of Fishing Communities and Fisheries based livelihoods*, 18 and 19 January 2006, International Collective in Support of Fish workers,
- Salagrama, Venkatesh (2012) Climate change and fisheries: perspectives from small-scale fishing communities in India on measures to protect life and livelihood. Chennai, India, International Collective in Support of Fish workers, (SAMUDRA Monograph)
- Salim S, S. & Narayanakumar, Ramani & Sathiadas, R. & Ushadevi, Manjusha & Antony, Bindu. (2017). Appraisal of the socio-economic status of fishers among the different sectors in Kerala, south-west coast of India. *Indian Journal of Fisheries*. 64. 66. 10.21077/ijf.2017.64.1.46875-11.
- Salim S, S. & Rahman. M, Ramees & P K Safeena. (2017). Assessing the Socioeconomic Profile of a Vulnerable Coastal Fishing Village in India. *Asian Academic Research Journal of Multidisciplinary*. 4.(2) 98-127
- Salim S, S. and Aswathy, N and Elizabeth James, Harsha (2019) Assessing fishers perception on disaster management across coastal Kerala. *Journal of Indian Fisheries Association*, 45 (1). pp. 47-53.



- Salim S, S. and Elizabeth James, Harsha (2018) Climate Change Challenges on Indian marine fisheries sector. In: *Climate Change and the Vulnerable Indian Coast*. Ministry of Environment, Forest and Climate Change, Government of India, New Delhi, pp. 263-273. ISBN ISBN 978-93-5346-195-9
- Salim S, S. and Elizabeth James, Harsha and Athira, N R and Rosey Xavier, Smitha and Shinu, A M and Meharo of, Mohammed (2018) Assessment of Online Fish Marketing in Ernakulam District, Kerala. *Asian Journal of Agricultural Extension, Economics & Sociology*, 27 (1). pp. 1-8. ISSN 2320-7027
- Salim S, S. and Elizabeth James, Harsha and Meharoof, Mohammed (2019) Goods and services tax (GST) reforms and implementation: An economic analysis in the marine fisheries sector of Kerala, south India. *Indian Journal of Fisheries*, 66 (4). pp. 135-143.
- Salim S, S. and Elizabeth James, Harsha and Shinu, A M and Athira, N R and Rosey Xavier, Smitha (2019) Assessing the Changing Rationale of the Fisher Youth in Climate Change Hotspots of Kerala. *International Journal of Environment and Climate Change (Previously known as British Journal of Environment & Climate Change)*, 9 (10). pp. 605-615. ISSN 2231-4784
- Salim S, S. and Joseph, Lina and Elizabeth James, Harsha and Shinu, A M and Athira, N R and Rosey Xavier, Smitha (2019) Assessing the Alternative Livelihood Options for Climate Change Vulnerable Coastal Fishing Villages in Kerala, India. *International Journal of Environment and Climate Change (Previously known as British Journal of Environment & Climate Change)*, 9 (4). pp. 204-216. ISSN 2231-4784
- Salim S, S. and Narayanakumar, R and Remya, R and Safeena, P K and Rahman, M Ramees and Elizabeth James, Harsha (2018) Climate Change Impacts on Livelihood Vulnerability Assessment-Adaptation and Mitigation Options in Marine Hot Spots in Kerala, India. *International Journal of Environment and Climate Change (Previously known as British Journal of Environment & Climate Change)*, 8 (3). pp. 180-199. ISSN 2231-4784
- Sannadurgappa, D & Ramesh, Abitha & Sukumaran, Soniya. (2011a). Vulnerability of freshwater fisheries and impacts of climate change in south Indian states economies. *Interdisciplinary environmental review*. 12. 283-297. 10.1504/IER.2011.043338.

- Sannadurgappa, D.; Abitha, R.; Sukumaran, S. (2011b). Vulnerability of freshwater fisheries and impacts of climate change in south Indian states economies *Interdisciplinary Environmental Review*, vol.12(4);; 283-297
- Sarstedt, M., & Mooi, E. (2014). *A concise guide to market research: The process, data, and methods using IBM SPSS statistics*. Berlin: Springer. Sen 1993, *Capability and Well-Being* ISBN-13: 9780198287971 Published to Oxford Scholarship Online: November 2003 DOI: 10.1093/0198287976.001.0001
- Sathiadas (2005) *Socio Economic Scenario of Marine Fisheries in Kerala - Status and Scope for Improvement, Socio Economic Evaluation and Technology Transfer* Division Central Marine Fisheries Research Institute, Cochin-682018
- Sathiadhas R. and Prathap S. K. (2009) *Employment Scenario and Labour Migration in Marine Fisheries*. *Asian Fisheries Science* (22) 713-727
- Sathiadhas, R & Narayanakumar, Ramani & Natarajan, Aswathy. (2011). *Efficiency of domestic marine fish marketing in India -a macro analysis*. 58.
- Sathiadhas, R and Prathap, K Sangeetha (2009) *Employment Scenario and Labour Migration in Marine Fisheries*. *Asian Fisheries Science*, 22 (2). pp. 713-727.
- Sen (1990) *More Than 100 Million Women Are Missing*, *The New York Review of Books* Volume 37, Number 20
- Sen, A. (1999). *Development as freedom*. Oxford: Oxford University Press. Introduction
- Shantilin, S (2011) *Empowerment of women through education a case study of Puducherry union territory*, Department of Education, Manonmaniam Sundaranar University, P 1-326
- Shiyani and Pandya (2016) *The State of World Fisheries and Aquaculture 2016. Contributing to food security and nutrition for all*. Rome. 200 pp.
- Situmeang, W. H. & Nasution, C.N. & Seminar, Annisa & Kinseng, R.A.. (2019). *Roles of fisher folk social organization in Pati Regency*. 10.1201/9780429280702-13. *Social Science Quarterly*; 2003, 84(2): 242-261. Cutter SL and Emrich CT.

- Skoufias, E., Bandyopadhyay, S. and Olivieri, S. (2017), Occupational diversification as an adaptation to rainfall variability in rural India. *Agricultural Economics*, 48: 77-89. doi:10.1111/agec.12296
- Smith M D, Roheim CA, Crowder L B (2010) Sustainability and Global Seafood, DOI: 10.1126/science.1185345, *Science* 327(5967):784-786
- Sraboni et al. (2013). Women's Empowerment in Agriculture: What Role for Food Security in Bangladesh?. *SSRN Electronic Journal*. 10.2139/ssrn.2373183.
- Sreeramulu G. and P. Hushenkhan (2008), Political Empowerment of Women Through Self Help Groups (SHGs): A Study In Andhra Pradesh, *The Indian Journal of Political Science*, Vol. 69, No. 3pp. 609-617
- Ssewamala F M, Neilands T B, Waldfogel J, Ismayilova L (2012) The Impact of a Comprehensive Microfinance Intervention on Depression Levels of AIDS-Orphaned Children in Uganda, *Journal of Adolescent Health* 50(4):346-52
- Stephen J. (2015) Fishing for space: Socio-spatial relations of Indian trawl fishers in the Palk Bay, South Asia, in the context of trans-boundary fishing PhD thesis Submitted to University of Amsterdam, 194 p. <https://hdl.handle.net/11245/1.470302>
- Stephen, J. (2015), Managing change in fisheries: a missing key to fishery-dependent data collection? *ICES Journal of Marine Science*, Volume 72, Issue 4, May 2015, Pages 1152–1158, <https://doi.org/10.1093/icesjms/fsu184>
- Steven et.al. (2010). Economic Incentives and Global Fisheries Sustainability. *Annual Review of Resource Economics*. 2. 10.1146/annurev.resource.012809.103923.
- Suhr, D. D. (2009). Principal component analysis vs. exploratory factor analysis. *SUGI 30 Proceedings*. Retrieved on 5 April 2012. *Turkish Journal of Fisheries and Aquatic Sciences* 17: 193-203 (2017) ISSN 1303-2712, DOI: 10.4194/1303-2712-v17\_1\_21
- Swain R B, Wallentin F Y (2009) "Does microfinance empower women? Evidence from self-help groups in India," *International Review of Applied Economics*, Taylor & Francis Journals, vol. 23(5), pages 541-556.

- Tietze U (2016) Technical and Socio-Economic Characteristics of Small-Scale Coastal Fishing Communities, and Opportunities for Poverty Alleviation and Empowerment, FAO Fisheries and Aquaculture Circular No.1111. FIAO/C1111 (En)
- Tuler S, Agyeman J, Silva PP, Russo K. R L (2008) Assessing vulnerabilities: Integrating information about driving forces that affect risks and resilience in fishing communities, National Oceanic and Atmospheric Administration, Human Ecology Review 15(2):171- 184
- Uma H.R and Rupa K.N (2013). The Role of SHGS in Financial Inclusion. A Case Study International Journal of Scientific and Research Publications, Volume 3, Issue 6, Pp-1-5
- UNDP, (2005). Human Development Reports – 2005. United Nations Development Program. Washington D.C.
- Vipinkumar, V. P. and Asokan, P. K. (2014) Study of Self Help Group Dynamics of Women in Malabar Fisheries Sector. Indian Research Journal of Extension Education, 14 (2). pp. 25-30.
- Viswanathan, (1996), Community Perspectives - Exclusivity of Rights, Center for Living Aquatic Resources Management (ICLARM),
- Vivekanandan E., (2009), Climate Change: Challenging The Sustainability Of Marine Fisheries And Ecosystems Journal of Aquatic Biology & Fisheries Vol. 1(1 & 2) 2013: 54-67 Department of Aquatic Biology & Fisheries University of Kerala
- Walker B, Holling C. S., Carpenter S. R, Kinzig A 2004, Resilience adaptability and transformability in Social ecological systems. Journal of Marine Science, Volume 64, Issue 5, July 2007, Pages 1033–1043, <https://doi.org/10.1093/icesjms/fsm067> Published: 05 June 2007
- Wamukota A, Cinner J, Mcclanhan T. R. (2010) Social-Ecological Vulnerability of Coral Reef Fisheries to Climatic Shock, FAO Fisheries and Aquaculture Circular No. 1082 FIPI/C1082 (En), Food And Agriculture Organization Of The United Nations Rome, 2013

World Bank (2012), Hidden harvest. The global contribution of capture fisheries. Washington, D.C.

World Bank (2014), The Sunken Billions Revisited Progress and Challenges in Global Marine Fisheries, Environment and Sustainable Development

World Commission on Environment and Development, (1987) Standing Committee on Agriculture, Fisheries and Forestry. Soil at Risk: Canada's Eroding Future, A Report on Soil Conservation to the Senate of Canada (Ottawa: 1984).

Zea & Civelek, Mustafa (2018). Essentials of Structural Equation Modeling. 10.13014/K2SJ1HR5.



## APPENDICES

- *Questionnaire on Vulnerability, Livelihood Diversification and Women Empowerment among the Marine Fishers in Kerala: Exploring the role of Theeramythri.*
  - *Theeramythri Microfinance Project- questionnaire to fishermen*
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## APPENDIX 1

### Questionnaire on Vulnerability, Livelihood Diversification and Women Empowerment among the Marine Fishers in Kerala: Exploring the role of Theeramythri.

Dear Madam,

This Interview schedule is to analyse the effects of Threeramythri Project on Vulnerability, Livelihood diversification and Women empowerment of fisherfolks in Kerala. Your valuable views and opinion regarding this are highly important for the same. Any information collected will be used only for academic purpose. I assure you that all your response will be kept completely confidential. Kindly give open, honest and serious view.

Thanking you,

Dhanya., Assistant Professor and PhD Scholar,  
PG Dept. of Economics, MES Asmabi College, Kerala.

1. Name of the Respondent (Optional) : .....
2. Place/ region belongs : Kozhikode, Trivandrum, Ernakulam
3. Gender : M F
4. Age : 21-30, 31-40, 41 and Above

#### (I) Theeramythri Project (Give tick mark, wherever it is applicable)

Item code	Statements (Items)	Rank	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
<b>(A) Theeramythri – Financial Stability (TMFS)</b>							
<b>TMFS 1</b>	Theeramythri provides sustainable livelihood for fisherfolks of Kerala						
<b>TMFS 2</b>	Theeramythri helps to accelerate the income level of fisherwomen by providing alternative livelihood						
<b>TMFS 3</b>	Theeramythri helps the members to develop a saving habits						
<b>TMFS 4</b>	Theeramythri improves the living standards of the Members						
<b>(B) Theeramythri – Soft skill Enhancement (TMSE)</b>							
<b>TMSE 1</b>	Theeramythri helps to improve skills in diverse fields						
<b>TMSE 2</b>	It facilitates technology up gradation						



<b>TMSE 3</b>	Trainings to upgrdate technology provided by Theeramythri reduce drudgery						
<b>TMSE 4</b>	Theeramythri instils quality consciousness in product process						
<b>TMSE 5</b>	Theeramythri moulds management skills of its members through various training programmes						
<b>TMSE 6</b>	It inculcates leadership skills through the participation in training programmes						
<b>(C) Theeramythri – Social Security (TMSS)</b>							
<b>TMSS 1</b>	Theeramythri provides confidence to start enterprises through capacity development programme						
<b>TMSS 2</b>	Various training programmes organized by Theeramythri enhanced decision making power of its members						
<b>TMSS 3</b>	better standard of living						
<b>TMSS 4</b>	Theeramythri equips the members to support the family						
<b>TMSS 5</b>	Theeramythri helps its members to provide better education for their children						

**(II) Livelihood Diversification**  
(Give tick mark, wherever it is applicable)

<b>Item code</b>	<b>Statements (Items)</b>	<b>Rank</b>	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neither agree nor disagree</b>	<b>Agree</b>	<b>Strongly Agree</b>
<b>(A) Livelihood Diversification – Approach towards diversification (LDAD)</b>							
<b>LDAD 1</b>	Fishing is not sufficient for livelihood						
<b>LDAD 2</b>	Fishing is a risky process						
<b>LDAD 3</b>	Fishing creates problems related to health						
<b>LDAD 4</b>	The efforts invested for fishing is not reciprocated with income						

<b>(B) Livelihood Diversification – Economic related diversification (LDED)</b>							
<b>LDED 1</b>	Expenditure incurred on fishing cannot meet with the income derived from fishing						
<b>LDED 2</b>	As fishing is sensitive to weather changes, there exists an uncertainty in the income						
<b>LDED 3</b>	The fishermen experiences constant seasonal unemployment						
<b>LDED 4</b>	Fishing is not sufficient to meet the expenditure						
<b>LDED 5</b>	It is essential to adopt seasonal alternative jobs to meet the economic deficit						
<b>(C) Livelihood Diversification - Psychological related diversification (LDP)</b>							
<b>LDPD 1</b>	Livelihood diversification due to higher level of education among the youth of fisherfolk						
<b>LDPD 2</b>	Fishing has become a barrier to the marriage of girl children						
<b>LDPD 3</b>	Annoyance due to recurrent natural calamities						
<b>LDPD 4</b>	Livelihood diversification due to an urge towards urban life						

**(III) Vulnerability**  
(Give tick mark, wherever it is applicable)

<b>Item code</b>	<b>Statements (Items)</b>	<b>Rank</b>	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neither agree nor disagree</b>	<b>Agree</b>	<b>Strongly Agree</b>
<b>(A) Vulnerability -Governance (VLGV)</b>							
<b>VLGV 1</b>	Protection from invasion of fishing grounds by large boats						
<b>VLGV 2</b>	Patrolling and Surveillance from the part of govt will protect them from the encroachment of large boats						
<b>VLGV 3</b>	There should be an effective financial assistance from the part of govt						

<b>VLGV 4</b>	There should be an effective Protection method from the part of the govt						
<b>VLGV 5</b>	Lack of safe guard measures						
<b>(B) Vulnerability- Fishery related factors (VLFR)</b>							
<b>VLFR 1</b>	Fishing with light lures affects the small fishermen						
<b>VLFR 2</b>	Pelagic fishing						
<b>VLFR 3</b>	predator attack						
<b>VLFR 4</b>	Reduction of fishing zone						
<b>VLFR 5</b>	Migration of fishes						
<b>(B) Vulnerability- Social factors (VLSF)</b>							
<b>VLSF 1</b>	Occupational migration						
<b>VLSF 2</b>	Income from fishing is not sufficient to look after the large family						
<b>VLSF 3</b>	Female children considered as a liability						
<b>VLSF 4</b>	Destitution						
<b>VLSF 5</b>	Habitual drunkards						
<b>VLSF 6</b>	Alienation						
<b>(C) Vulnerability- Economic factors (VLEF)</b>							
<b>VLEF 1</b>	Loss in fishing days						
<b>VLEF 2</b>	Increased cost of fishing						
<b>VLEF 3</b>	Increased household expenditure						
<b>VLEF 4</b>	Indebtedness						
<b>VLEF 5</b>	Poor asset base						
<b>VLEF 6</b>	Uncertain Livelihood						
<b>VLEF 7</b>	Erratic Income						
<b>VLEF 8</b>	Low Income						
<b>VLEF 9</b>	Seasonal Unemployment						
<b>VLEF 10</b>	Need for multiple earners in the family						
<b>VLEF 11</b>	Low capacity for Investment						

<b>(D) Vulnerability- Poverty related factors (VLPF)</b>							
<b>VLPF 1</b>	Lack of securing housing						
<b>VLPF 2</b>	Poor location of houses						
<b>VLPF 3</b>	The household cooks with wood, charcoal or dung						
<b>VLPF 4</b>	Lack of amenities						
<b>VLPF 5</b>	Poor availability of water						
<b>VLPF 6</b>	Large family size						
<b>VLPF 7</b>	Food insecurity						
<b>VLPF 8</b>	Poor health & health care						
<b>VLPF 9</b>	The household has a dirt, sand or dung floor						
<b>VLPF 10</b>	Most of the fishing family do not have adequate sanitation or their toilet is shared						
<b>VLPF 11</b>	The household has no electricity						
<b>VLPF 12</b>	Because of low literacy the fishermen could not adapt to the changing circumstances						
<b>(E) Vulnerability- Environment factors (VLEN)</b>							
<b>VLEN 1</b>	Extreme weather events are one of the reasons for the vulnerability						
<b>VLEN 2</b>	Climate change leads to the habitat destruction						
<b>VLEN 3</b>	Sea wall destruction is another effect of extreme weather condition which always makes hazardous to the fishing community						
<b>VLEN 4</b>	Encroachment of sea destructs the houses of fishing community						
<b>VLEN 5</b>	Erratic Monsoon always reduces the fishing days						
<b>VLEN 6</b>	Increase in the sea water temperature would lead to the migration of fishes						

#### IV Women Empowerment

(Give tick mark, wherever it is applicable)

Item code	Statements (Items)	Rank	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
<b>(A) Women Empowerment – Social Factors (WESF)</b>							
WESF 1	Improved social status						
WESF 2	Improved Interpersonal Relationship						
WESF 3	Enhanced social connections						
WESF 4	Upliftment in living standards						
WESF 5	Cohesion with community						
<b>(B) Women Empowerment – Political Factors (WEPF)</b>							
WEPF 1	Involvement in public meeting						
WEPF 2	Improved say in financial transactions						
WEPF 3	Better knowledge about State's politics						
WEPF 4	Improved leadership						
WEPF 5	Representation in election						
<b>(C) Women Empowerment – Economic Factors (WEEF)</b>							
WEEF 1	Hike in income and savings						
WEEF 2	Economic Independence						
WEEF 3	Rational decision making						
WEEF 4	Association with financial institutions						
WEEF 5	Skill in financial transactions						
<b>(D) Women Empowerment – Legal Factors (WELF)</b>							
WELF 1	Improved knowledge on the legal aspects						
WELF 2	Better reach to legal information						
WELF 3	Ability to attend complex situations						
WELF 4	Courage to respond against discrimination						
WELF 5	Skills in conflict management						

<b>(E) Women Empowerment – Psychological Factors (WEPY)</b>							
<b>WEPY 1</b>	Improved self esteem						
<b>WEPY 2</b>	Better self confidence						
<b>WEPY 3</b>	Efficiency in problem solving						
<b>WEPY 4</b>	Better Quality of Life						
<b>WEPY 5</b>	Understanding one's potential						

## APPENDIX 2

### Theeramythri Microfinance Project- questionnaire to fishermen

Name of fishing Village.....Ward No..... District – TVM, EKM, CLT

#### HOUSEHOLD HISTORY

1. Is the above address household head's birth place? Yes (1)/ No (0)  
If no go question 2; if yes go question 4.
2. When have your household migrated?
3. From where have you come here? (Village:                      District )
4. Why did your household move to this village?

#### I. Socio Economic Profile

1. Name of Respondent :.....
2. Community :.....
3. Name of Members in the Family :.....
4. Number of Adults:..... Children:.....
5. Whether APL or BPL :.....

Relation	Age	Sex 1 male, 2 Female	Education no education-0, primary-1, secondary-2, higher secondary or technical-3, bachelor-4, master-5	Occupation Govt, private, others	Avg. Monthly Income	No.of earning days /month	Whether having bank account

6. Access to health care facilities– Adequate/inadequate / Child mortality, nutrition
7. No. of days in past 12 months this person was sick
8. Electricity- What is the electricity supply? (1) No connection (2) Shared connection (3) Own connection (4) Generator/solar panel?
9. What is the source of drinking water? (1) Rainwater, pond or river (2) Buy water (3) Public bore well (4) Shared communal stand pipe (5) if not, accessible in 30 minutes?

10. What type of toilet facility is available? (1) Bush, or no facility (2) Shared toilet (3) Own pit toilet (4) Own latrine (5) Own flush toilet
11. What type of roofing material is used in main house? (1) Plastic sheets, or wood (2) Thatch (3) Iron sheets (4) Tiles
12. What type of exterior walls does the main house have? (1) Plastic sheets, or branches and twigs (2) Mud walls and tree (3) Iron sheets (4) Timber (5) Blocks (6) Brick
13. What type of flooring does the main house have? (1) Mud or dung (2) Rough Cement (3) cement with additional plastering?
14. What type of cooking fuel source is used primarily? (1) Dung (2) Wood (3) Biogas (4) Electricity (5) Gas

**15. Ownership of Assets**

Physical Assets	Present Value
1. Land owned.....Cents	
2. What is the size of house? Small (1)/Medium (2)/Large (3) 3. What is the structural condition of house? Dilapidated(1)/Average (2)/Good(3) 4. Consumer Durables Does your household use the Radio? Yes (1)/ No (0) Does your household use the TV? Yes (1)/ No (0) Does your household use the Mobile? Yes (1)/ No (0) Does your household use the refrigerator? Yes (1)/ No (0) Does your household use the internet? Yes (1)/ No (0)	
5. Vehicles owned: Cycles- Yes (1)/ No (0) Scooters -Yes (1)/ No (0) Auto -Yes (1)/ No (0) Four Wheeler -Yes (1)/ No (0)	
6. Livestock 1. Cattle -Yes (1)/ No (0) 2. Sheep, goats, - Yes (1)/ No (0) 3. Poultry Yes - (1)/ No (0) 4. Pets - Yes (1)/ No (0)	
<b>Financial Assets</b>	
7. Gold	
8. Bank Balance	
9. Investments	
10. How much money does your household have as savings?	
<b>Liability</b>	
11. If yes, details (Private bank, Public bank, Money lenders	
12. Amount of debt < one lakh, one lakh- two lakhs, two lakhs- three lakhs, Above three lakhs	



13. Does your household own any fisheries related assets (physical capital) e.g. boat/net/drying plant/fish trading asset such as vehicle/others? Yes (1)/ No (0)

Name of fisheries related physical capital	Quantity	Size (very big - 4, big - 3, moderate - 2, small - 1, very small - 0)	Value	Notes
Boat				
Net				
Drying plant				
Vehicle for transport				

14. Does the household have food stored in the house or anywhere? Yes (1)/ No (0) If yes please give details

## II. Income and expenditure pattern

- Specify reason to join fishing? a) Traditional b) Un-employment c) Poverty d) Job opportunity with low investment e) Poverty/ Un-employment
- What was the average daily income of the family in the last year?
  - From Fishing Activity.....
  - From Non Fishing Activities .....
- Expenditure pattern (Average Monthly Expense)

Food	Medicine	Housing	Electricity	Water	Clothing	Education	Social Functions	Entertainment	Total

- Are you affected by the trawl ban? Yes/No
  - If yes are you involved in any economic activity during the period?
  - Are you involved in the inland fisheries activity? Yes/No
  - Other areas of occupation? Construction work /coolie/ others
- Average monthly income during trawl ban period?

6. Do you borrow from institutional sources to meet the monthly expenses during trawl ban period/lean seasons? Yes/No

(a) If No, What are the reasons?

Reasons	
Security cannot be given	
I don't know the procedure	
Bank does not provide such type of loans	
It takes more time while applying to banks	
Available finance from formal sources are insufficient	
Informal sources are available nearby	
Easy (timely) finance from informal sources	
No need for security	
Any other please specify	

7. What is the trend in fish catch? Increasing rapidly (1)/ increasing moderately (2)/ increasing slowly (3)/ constant (4) / decreasing slowly (5)/ decreasing moderately (6)/ decreasing rapidly (7)

In your opinion, what are the causes of low productivity (tick the relevant)

a) Illegal fish catch / Poaching b) Proper stocking system not available c) Seasonal effect and silt d) Low demand e) Fish processing unit not available f) Modern technique not adopted

8. What are the reasons for this trend? Any climatic reasons? (Temperature, rainfall, water current, cyclone etc) and how?
9. What are the other factors that are faced by the fishermen?

	Yes-1	No- 0	Remarks
Sea level rise			
Bank erosion			
Damage to house			
Damage to boat			
Damage to gears			

10. Are there any impact of the mechanized fishing in the yield of fish catch ? Yes /No, if Yes , what are the solutions to be implemented



18. What are the activities for which you borrowed in the last 5 years?  
 (F-Formal-Commercial banks, cooperatives, RRBs etc  
 IF-Informal-Money Lenders Friends and Relatives, Traders, Commission Agents-  
 Chitty)

Purpose	Source Specify	Interest	security	Amount borrowed	Time period	Amount outstanding	Specify purpose used
Construction & maintenance of Work	F						
	IF						
Education	F						
	IF						
Medical Expenses	F						
	IF						
Consumption in lean seasons	F						
	IF						
Purchase of household articles	F						
	IF						
Festivals	F						
	IF						
Purchase of Fishing Crafts/Gears/Fishing Equipment	F						
	IF						
Any Other Specify	F						
	IF						

Adult members of household (aged 15 and above)

No	Name	Status of HH	Relation	Age	Sex	Education	Can write	Main occupation, current year	Current member of any program?	Occupation	Avg. Monthly Income	No. of earning days /month	Whether having bank account

**PHOTOPLATES**



In Thiruvanthapuram Sea have encroached during monsoon, which have made difficult to usage of the boats in the entire season



The fishermen using non-motorized fishing vessel with their low yield



Theeramythri Units in different regions