Livelihood Assets and Survival Strategies in Coastal Communities in Kerala, India

by

Nandakumar Divakarannair
M.A, Jawaharlal Nehru University, New Delhi, 1982
M.Phil, Jawaharlal Nehru University, New Delhi, 1985

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Supervisory Committee

Dr. Mark S. Flaherty, Department of Geography
Supervisor

Dr. Jutta Gutberlet, Department of Geography
Departmental Member

Dr. Dave Duffus, Department of Geography
Departmental Member

Dr. Andrea N. Walsh, Department of Anthropology
Outside Member

Dr. Denise Cloutier-Fisher, Department of Geography
Additional Member

Abstract

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Dr. Dave Duffus, Department of Geography
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Dr. Andrea N. Walsh, Department of Anthropology
Outside Member
Dr. Denise Cloutier-Fisher, Department of Geography
Additional Member
Dr. A. John Sinclair, External Examiner, University of Manitoba

Marine fish stocks are under serious threat of depletion due to increasing numbers of resource users with competing interests, resulting in degradation and the decline of fish catch. Using qualitative and quantitative techniques such as in-depth interviews, focus group discussions, household surveys and remote sensing and GIS, this study addresses: (1) the complex and inter-related nature of resource dependency, (2) the role of assets in determining survival strategies of households in artisanal fishing communities in Ponnani, India, (3) how asset degradation impacts resource-dependent households, (4) how households develop survival strategies, and (5) considers access to social, political, physical, human and financial assets. Information is organized using the Sustainable Livelihoods Framework (SLF) with modifications to suite the local complexities.

Results show that households - engaged in diverse activities, including fishing, fish processing/marketing/culture and daily labour - evolved property rights of natural resources over generations. The *Pathemari* cargo business's limited knowledge of fisheries compared to artisanal fishers, and the government led modernization resulted in resource degradation. Therefore, artisanal fishers living in coastal wards threatened by intense erosion, abandoned traditional occupations in pursuit of livelihood security. Results from image analysis and derived thematic maps indicate increased erosion of 0.35 sq km shoreline coinciding with government development initiatives. To improve

livelihood options, the results indicate that 50% surveyed accessed political assets such as fishers' cooperatives and only 20% accessed financial assets such as government sponsored schemes and loans. In-depth interviews and focus group discussions revealed many limiting factors of access, specifically marginalization and lack of financial assets: only 6% surveyed could raise enough money to migrate. With changes in technology, from harvesting to processing, gender roles are being radically altered. Women are losing jobs and income. Politically, the study revealed that local participation helped governing bodies prioritize on housing, roads, water and sanitation.

Analysis of the information through the modified SLF suggests three strategies to enhance the asset base of coastal poor: strengthening grassroots organizations; transforming state relations; and developing new alternatives to conventional coastal development practice. Finally, the study suggests resource management policies to improve the households' livelihood options and well-being.

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GLOSSARY

Ara	:A room constructed exclusively for the newly weds in wealthy muslim households.
Arayaar, Dheevara, Mugayira, Vellala	: Sub-castes within Hindu religious group whose main occupation is fishing.
Beedi	: A thin local cigarette wrapped in tobacco leaf.
Chakara	:A biophysical phenomenon that has great significance to the fishing communities as this upwelling create calm waters in the midst of stormy deep sea and attract fish to take refuge. Chakara stimulates fishing activities and generates employment and income in an otherwise lean season.
Chapa	:Fish drying and fish oil extracting areas where there will be a large yard for fish drying and a thatched shed for storage and fish-oil extraction.
Choonda, Valiya-beppu and Cheriya-beppu	:Different types of hooks and line used in traditional fishery.
Dalit	: A person often called an untouchable or outcaste in the Indian Caste System.
Grama-sabha	: Lowest political unit consists of members of the households who come together on regular meetings and who play an important role in the on going decentralized planning in Kerala.
Jamaat	: The religious administrative assembly centered on a Muslim mosque.
Harijans	: A term coined by Mahatma Gandhi attributed to backward caste people in India.
Kadakodi	: A community based fishery management institution, prevailed as late as 1980s in northern Kerala.
Karanila	: A traditional system of income sharing popular among the marine fishers in central Kerala.

Kattamaram, Vallam, Vanchi	: Traditional fishing crafts – three to five logs are tied together to build a Kattamaram (catamaran) while vallam or vanchi could be a dug-out or plank-built canoe.
Kayal	: Brackish lagoons and lakes and also called backwaters.
Mapilas	: An earliest known sect of Muslims in India, especially in the northern region of Kerala.
Mara	: A bamboo curtain often hung in front of the houses to ward off heat and dust, and also for privacy.
Mukkuvar	: A Sub-caste involved mainly in fishing within the predominantly Christian religious groups, although there are mukkuvar within Hindu religious groups as well.
Panchayat	: An administrative unit within the three-tier of local governance.
Pappad	: Flat crispy bread taken together with the meal in Kerala and Tamil Nadu.
Pathemari	: Large, sea-faring cargo sail ships popular in 1940s and few are still in service.
Pokkali	: A saline resistant variety of paddy that grows in the inter-tidal estuarine locations in Kerala.

Chapter 1

INTRODUCTION

1.1 Nature of the Problem

The poorest 40 percent of the world's population, about 2.5 billion people live on less than $2 a day (UNDP, 2006). In the developing world the livelihoods of the poor are highly dependent on natural resources. The natural resources they depend upon, however, are coming under intense pressure (Barbier, 2005). This has led to degradation and depletion (Kesavan and Swaminathan, 2006; Bolorunduro *et al*., 2005; Midmore and Whittaker, 2000; Scherr, 2000). The intensification may be due to adaptation of export oriented growth strategies such as trade liberalization and population growth (Hall, 2006). In developing countries, the institutional and policy environment for managing natural resources is generally weak (UN, 2006).

Coastal areas are among the poorest of the poor, particularly in developing countries. The poor have relatively free access to the coastal seas; therefore, fishing is an opportunity of last resort to make a living (Macfadyen and Corcoran, 2002). The open access nature of fishery relates to property rights, and in reality the government (200 nautical miles of Exclusive Economic Zone) or community (often inshore waters of varying distances depending on the structure of the continental shelf) owns the property and use rights. However, due to the mobile nature of the fish resource, it is difficult to

define the rights and therefore the prevalence of open access. Because of this open access nature, fishing is considered an activity of last resort (DFID, 2004a). Traditionally, coastal fishing communities used to have different sets of rules and regulations to control and exert rights on individuals over this common property. These traditional institutional arrangements contributed indirectly to the conservation and sustainability of fish stocks (Kurien, 2003). However, modern efficient extractive technologies, government control over the resource with ill-conceived coastal zone management regimes and increasing numbers in population dependent on coastal resources led to reductions in fish stocks (Macfadyen and Corcoran, 2002). These analysts hold industrial fleets responsible for over-fishing. Industrial fleets have greater ability to move to other areas once they have exhausted stocks to a level that makes fishing un-economic (Macfadyen and Corcoran, 2002).

In Asia, coastal communities face immediate challenges to their livelihoods, from unsustainable production patterns leading to resource degradation intensified by coastal erosion and pollution of coastal waters (Solomons *et al*., 2005). Assessing the land-based drivers, pressures and coastal impacts in East Asia, Solomons *et al*., (2005) refer to increased sedimentation due to upland deforestation, coastal flooding, coastal erosion and accretion in the Mekong River delta and Red River delta. In many countries in Asia, patterns of unsustainable use and conflicting policies contribute to continued loss of biodiversity (UNEP, 2002). Fishing activities sustain a large number of poor and therefore, sustainable use, conservation of fish resource and biodiversity deserve attention.

The problem of poverty is highly regionalized and its intensification is concentrated in South Asia and sub-Saharan Africa (ODI, 2006). In defining poverty, Narayan *et al*., (2000) gathered the views, experiences and aspiration of more than 60,000 poor women and men from 60 countries, and describes their hunger, precarious lives, lack of assets and their limited or lack of ability to access loans and capital. In such circumstances, poor people's livelihood strategies are in the informal economy which consists of low paying jobs that are risk-prone and extremely hard work (Narayan *et al*., 2000). The poor are often disadvantaged when they try to access basic services such as shelter, drinking water, sanitation, health services and education. They live in geographical isolation, slums in urban areas, and remote marginal lands in rural areas with inadequate or non-existent transport, electric supply and access to information. They are exposed to environmental hazards and are vulnerable to epidemics, floods, famine and pollution (UN, 2007). This situation is acute particularly among resource dependent communities in developing countries.

Over the last 30 years there has been a steady rise in population numbers and density along, or close to, coastlines around the world. It is estimated that within the next three decades an additional one billion people will occupy the coast (Hinrichsen and Robey, 2000). Shi and Singh's (2003) estimate stands at 87 people per sq.km within 100 km from the coastline. According to Berkes *et al*., (2001) the total number of fishers (coastal marine and freshwater) is over 51 million in the world, amongst which 99 percent are small-scale fishers, and 95 percent from developing countries. High population densities, however, may not be the most important factor influencing livelihoods. It may be due to the combined effect of increasing natural resource

degradation (such as water scarcity, declining fish catch) and overcrowding or the lack of opportunities (absence of entitlement to physical, financial, social and health assets) that drives them into dependency on natural resources. A large majority of coastal populations are dependent on fishing for their livelihoods. More than fifty million fishers in Asia, Africa and Latin America are artisanal, meaning that they are engaged in small-scale fisheries (Berkes, 2001). This sector, however, accounts for nearly fifty percent of the global fish production from capture fisheries (FAO, 2005).

Small-scale fisheries are critical for local food security and employment in many developing countries. The livelihoods of small-scale fishing communities, however, are increasingly at risk due to over-fishing and degradation of natural resources. They are faced with lack of employment opportunities and rapid population growth. They are often forced out of their habitats and displaced from coastal areas due to industrial development, tourism, pollution, environmental degradation and conflicts with large commercial fishing operations (FAO, 2005).

In 2001, India had a population of 1.03 billion. Three fourths of this population lives in rural areas (Census of India, 2001). More than sixty percent of the workforce in the country depends on agriculture, fisheries and forestry for their livelihoods (Census of India, 2001). Three million people, spread over 3600 near-shore villages, depend on capture fisheries for their livelihoods (ICSF, 2005). These areas have also experienced high concentrations of population due to increasing urbanization, infrastructure development and intensification of natural resource extraction (Salagrama, 2001). Local livelihoods are solely dependent on capture fisheries[1]. The nature and degree of this

[1] 'Capture fishery' refers to the sum (or range) of all activities to harvest a given fish resource. It may refer to the location (e.g. Morocco, Georges Bank), the target resource (e.g. hake), the technology used (e.g.

dependency is influenced by a variety of factors such as lack of alternative activities, culture and tradition. In particular, the fishing skills they developed over generations are characteristic to many near-shore communities in India. For example, in shore-seine fishing operations, 40-60 people were directly employed, but due to reduction in fish catch, shore-seine operations have declined over the years. Degradation of resources, uncertain employment and earnings, limited livelihood assets and subsistence almost entirely from fishing impacts these community's livelihood options. Rao *et al.*, (2005) and, Beck and Nesmith (2001) argue that there is a need to give greater attention to the role of Common Property Resources (CPR) in poor people's livelihoods. Many studies focus on coping and adaptive strategies for sustainable livelihoods (Thornton *et al*., 2006; Carney, 1998).

There are many studies on coastal area degradation and its impact on people who are directly or indirectly engaged in fishing in India (See, for example, Damodaran, 2006; Ramachandran *et al*., 2005; Paul, 2005; DFID, 2003; Salagrama, 2001). These studies, however, have not fully captured the importance of biophysical, social, cultural, economic, political and institutional factors that largely determine the livelihood options of poor artisanal fishing households in India. There is little information available on the status of their livelihood assets. Assets are the resources upon which the near shore communities base their livelihoods. Assets therefore, can be defined as goods and services that are acquired or accumulated by the individual's effort or transferred from one generation to the next. Assets may be biophysical (e.g. water, beaches, estuaries, flora and fauna, schools, hospitals and fishery harbors), social and cultural (e.g.

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trawl or beach seine), the social characteristics (e.g. artisanal, industrial), the purpose (e.g. commercial, subsistence, or recreational) as well as the season (e.g. winter) (FAO, 1997).

community, family, social networks, knowledge and skills), political (e.g. voice, political representation) and institutional (e.g. rights, regulations). The poor may combine one or more of these assets that are accessible in the pursuit of different livelihood strategies. Access to clean drinking water is an important aspect that impacts the health of the coastal people. For the coastal poor in India, provisions to improve service delivery (e.g. clean water and sanitation) are yet to be ensured. Similarly, land and housing are important assets that give the poor economic security, as are education, health facilities and access to legal institutions. Therefore, a deeper understanding of the status of bio-physical, social, cultural, political and institutional factors is critical to suggest resource management policy measures that improve the household's livelihood options and well-being.

The concept of assets is fundamental in this research. The nature of assets (productive or unproductive) is a distinguishing characteristic of the near-shore communities. They live in squatter settlements, often paying rent in overcrowded houses, as opposed to being like other groups in society who live in houses they own, and having access to agriculturally productive land. Thus, the near-shore communities are frequently encumbered by debts. Assets, or the lack of them, reflect the presence/absence of certain entitlements (i.e., particularly and importantly rights) and capabilities of people which are shaped by social, economic and political forces (Sen, 2000).

'Resource Dependency' refers to the conditions under which particular communities are heavily reliant on one type of economic activity such as farming, mining, fishing, or logging (Samal and Dhyani, 2007; Bailey, 2004). For people in coastal communities there is a near complete reliance on the fish resources. Resource

dependency in the fisheries sector is severe among artisanal fishing communities. So is poverty. Although the diversity of the tropical marine ecosystem offers some occupational diversity, coastal fishing communities are unable to take advantage of it. This is so because through generations the skills they acquired make them fine fishers and confine them within fishery activities. Apart from the marine fish resources, the communities have very limited access to political, financial and social assets. Therefore, any fluctuation in the resource situation would translate into, and be reflected in, their livelihoods.

Until recently, most of the research on sustainable livelihoods focused on poverty reduction programs, and examined ways to develop strategies for poverty eradication (Kay, 2006; Mitlin, 2002). Nevertheless, relationships between household poverty and the well-being of rural communities have been central to many studies. In many studies, lack of assets has remained implicit (Estudillo *et al*., 2006; Craig and Porter, 2002; Thin, 2001). Many investigations adhered to policy prescriptions and are often been based on fisheries-sector analyses (FAO, 2004a). Less attention has been paid to household's responses to fluctuating resources and the extent of their resource dependency.

In India, although the industrial fisheries constitute only a small segment of the sector, they still have the most political influence and power. Nevertheless, governments at various levels – Central, state and local – are beginning to recognize the extent to which artisanal, small-scale fisheries contribute to the food security of the larger population. There are several examples of changing emphases at the governmental level; prominent among them is the coastal State governments yielding to the long struggle of artisanal fishers demand to ban monsoon trawling since 1980 (Kurien, 2005).

However, little attention was paid to the strategies the poor use to access biophysical, social, cultural, political and institutional assets to sustain their livelihoods. Therefore, there is an urgent need to carry out such investigations to examine how single-resource dependent households develop survival strategies to cope with changes in assets and/or degradation of natural resources. Many attempts have been made to define a criterion that would synthesize the concepts of survival strategies with livelihood assets, but very little that examine whether members of the single-resource dependent households have diverse livelihood options. Therefore, there is a need to examine the relationships between resource dependency, changes in asset situation and survival strategies among the coastal fishing communities where livelihood options are limited. This will provide a better understanding of the problems faced by people living under marginal conditions.

1.2 Purpose and Objectives of Research

The overall goal of this research is to improve our understanding of how single resource dependent households, cope with changes in their asset situation by adjusting their livelihood options. Particular attention is paid to the strategies they adopt to access social, cultural, political and institutional assets to sustain their livelihoods. The specific objectives are:

- To critically review the literature on sustainable livelihoods and resource dependency so as to better understand the processes that underlie poverty within the social, cultural, political and institutional contexts in which near-shore populations live.

- To investigate how households in coastal communities are responding to changes in the assets available to them.
- To assess whether the status of households assets is impacted by environmental degradation or changes in their access/rights or due to a combination of both.
- To suggest resource management policies that improve households livelihood options and well-being.

1.3 Thesis Outline

This dissertation has seven chapters. Chapter 2 reviews the literature on sustainable livelihoods and resource dependency among artisanal fishing communities in both developed and developing countries. It also examines the livelihood assets of coastal fishing communities particularly of the artisanal, small-scale fishing sector with an emphasis on India. Chapter 3 presents the basis for analyzing livelihoods of the coastal artisanal fishing communities of developing countries and presents the background for the analytical framework, taking into consideration issues of sustainability and livelihood assets and their implications for rural poverty. Chapter 4 presents the methodological framework adopted for this research. It describes how natural resource assets are used by artisanal fishing communities to create livelihoods. It also examines the strategies people use to access social, cultural, political and institutional assets. This chapter also describes the biophysical and socio-economic characteristics of the study area, data collection procedures, and ethical research considerations. Chapter 5 presents the results from the field investigation. It describes the key livelihood assets as well as the policy and institutional context. Chapter 6 presents findings from the in-depth interviews and focus

group discussions. Chapter 7 offers conclusions and suggests directions for further research.

Chapter 2

Sustainable Livelihoods: Approaches and Frameworks

This chapter outlines the conceptual framework adopted for this study, and reviews the literature that examines the relationships between coastal fishing communities and the resources they depend on for their livelihoods. It also examines the types of information that can help resource managers develop management strategies to ensure the well-being of fishing communities and the sustainable use of marine resources.

This chapter also reviews the concept of Resource Dependency, and reviews the survival strategies adopted by artisanal fishing communities to access social, cultural, political and institutional assets to sustain their livelihoods.

2.1 Poverty and Natural Resources

In the developing world the majority of the poor live in rural areas. The rural poor are highly dependent on natural resources for their survival. Further, the number of poor people dependent on natural resources is growing steadily (DFID, 2006a; Seeley, 2005; Duraiappah, 2004). While the percentage of the global population living in poverty is decreasing, the overall increase in global population means that the actual number of people living in poverty has increased (Banerjee *et al*., 2006). The causes of poverty are complex and multidimensional, and involves aspects ranging from culture, gender to

public policy or lack of access to essential goods, services, assets, and opportunities (DFID, 2006b; ADB, 2004).

Many studies have been undertaken to improve our understanding of the factors that influence the scale and nature of poverty. Some deal with constraints such as governance failure and lack of innovation (Devas and Korboe, 2000). Others consider the lack of access to assets (ADB, 2004), lack of an effective system of private entitlement to land and other income-earning assets (Duncan and Pollard, 2002; De Soto, 2000), and lack of growth and redistribution of income (Dagdeviren *et al.*, 2002). These studies analyzed the ways in which the poor may or may not be benefiting from the current economic situation; and identified how the present arrangements for the provision of services impact the poor. They also investigated how those living in poverty attempt to access and influence the agenda of the governing institutions. Studies also suggest that, in order to lift the poor into mainstream development, crucial components must be considered such as social development through empowering people by transforming institutions (Sachs, 2005; World Bank, 2005). This is a holistic approach that includes social, economic, cultural and spiritual aspects of living that meet individual, household and community needs (DFID, 2006b; Pound *et al.*, 2003). This links to the SLF particularly where poor access and influence transforming institutions.

Many analysts argue that population growth is the major factor contributing to poverty in developing countries (Batini *et al.*, 2006; Birdshall *et al.*, 2001; UNFPA, 2001). The common view is of a downward spiral of resource degradation and poverty as factors contributing to declining productivity, reduced livelihood options, and desperate households in developing countries thereby degrading the natural capital stock (Dasgupta, 2003; Homer-Dixon, 1999). This perspective, however, is challenged by

many micro-level case studies (Gausset *et al.*, 2005; FAO and CIFOR, 2005; Scherr, 2000). These studies suggest that poor households have considerable capacity to make changes in the livelihood assets that forms the basis of their livelihoods. In reviewing micro-scale empirical research, Scherr (2000) found diversity in environmental management by the rural poor, and concluded that the effects of population growth on land and forest quality were indeterminate. According to Scherr (2000, P.481),

> *As the cost of land relative to labour increased, people often changed their methods of managing plants and animals and made land improvements to offset initial declines in productivity resulting from more intensive land use*.

Studies of livelihood strategies have revealed that diversification is a commonly used strategy for coping and adapting with changes in the availability of resources, and that the poor are continuously "*doing something"* in response to stresses and shocks (Marschke and Berkes, 2006, P.1). 'Doing something' may stem from a combination of livelihood skills and household adaptability that contribute toward their well-being. Declining productivity or reduced livelihood options would prompt the poor to attempt to diversify their assets and activities. Such strategies may even improve the natural resource base and reduce household poverty.

2.2 Sustainable-Livelihoods Approaches (SLA)

The central concern of a Sustainable-Livelihood Approach is poverty. The approach is a comprehensive and effective means of organizing the management of assets -- the natural resources, human, social, political and financial capital -- that poor people access to make a living (Assby, 2003). This holistic approach advocates linking poverty

with the state of the environment and improved environmental management as a critical step in the process of reducing poverty and enhancing sustainable growth in communities (Ellis, 2000).

The sustainability of development emerged as a vital concern in the 1970s and 1980s. With the World Commission on Environment and Development's publication of "Our Common Future" (WCED, 1987), the definition of sustainable development – as meeting the needs of the present without compromising the means of the future generations to meet their own needs – was widely accepted. Sustainability became a central theme in many development discourses and a focus of the debate over environment and development (Sneddon, 2000).

Definitions of sustainable livelihoods vary according to scale, location, management program, and focus. Livelihoods are the ways in which people make a living. Poor households attempt to balance their lives with food and income-earning activities. They use multiple strategies to sustain the activities. The poverty situation worsens when one or more of the strategies fail. Understanding the livelihoods of the poor therefore, helps reveal how the poor live through difficult times and situations. The SLA takes a holistic view, identifying and building on people's existing assets and not merely their needs when planning interventions (FAO, 2006b; Norton and Foster, 2001). It places the people themselves at the centre of the framework.

> *A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base* (Chambers and Conway, 1992, pp, 7-8).

The Stockholm Environment Institute places the individual within the larger human, natural and economic system and defines sustainable livelihoods as,

> *…the creation of conditions that are (self-) supportive of sustainable development in human, natural and economic systems, which, whilst safeguarding resources and opportunities for future generations, provides individuals with means to provide themselves with food, shelter and an acceptable quality of life...* (www.york.ac.uk/inst/sei/sustainability/livelihoods/def.html)

Livelihoods are sustainable when the poor are capable of coping with stresses and shocks. Livelihoods are also sustainable when they provide benefits without undermining the natural resource base on which they rely (DFID, 2006a and 2006b; UNDP, 2006; World Bank, 2005b; EC, 2004). Sustainability, within the SLF is, therefore, not considered a static and balanced state but is ever changing and in need of constant adaptation.

According to Jeffrey Sachs:

> *The key to ending extreme poverty is to enable the poorest of the poor to get their foot on the ladder of development*. (Sachs J D, 2005. P. 244)

Sachs argues that the extreme poor lack six kinds of capital – human (so that health, nutrition and skills would make them economically productive), business (to increase productivity, they need machinery and transport), infrastructure (a component of critical input into business productivity), natural (capital that provides environmental services), institutional (to enhance division of labor), and knowledge (that helps increase productivity and raise physical and natural capital). According to Sachs (2005), outside donor funds are necessary to break the poverty trap. The initial capital investment would raise the level of capital per person, which, in turn, will produce a capital stock that will lift the economy to be sufficiently productive to meet basic needs.

The United Nations Conference on Environment and Development (UNCED) was instrumental in developing the concept of Sustainable Livelihoods (SL) to assist the member nations to explore and design policies and strategies for the improving welfare of the poor. Livelihood approaches have gained wide acceptance as a valuable tool for understanding the factors that influence people's lives, especially among the rural poor. The SL concept advocates linking poverty with the state of the natural environment (DFID, 2002; Norton and Foster, 2001). Improved environmental management is seen as a critical step in poverty reduction and enhancing sustainable livelihoods in communities. This approach focuses on the goals of eradicating poverty and hunger, promoting environmental sustainability and well being among communities. The means of achieving these steps are improved governance and enhancing the livelihood assets of the poor by reducing their weaknesses and defenselessness, and ensuring the equitable and judicious use of natural resources. In this way, the approach aims to expand livelihood opportunities, promote sound environmental management and reform policy measures (DFID, 2006a).

Several research approaches have developed out of the concept of Sustainable Livelihoods. They include the Asset Vulnerability Framework (SIDA, 2002; Moser, 1998) and the Social Risk Management Framework (Heemskerk *et al.*, 2004; Holzmann and Jorgensen, 2000). While strengthening the capital assets of communities is the primary focus in the former framework, protecting basic livelihood as well as assisting the poor to develop appropriate risk-management instruments is the emphasis in the latter. The latter framework, according to Holzmann and Jorgensen (2000), will help the poor to engage in riskier but also higher-return activities and hence gradually move them

out of chronic poverty. Both frameworks are useful for analyzing livelihoods. However, they take a very limited view of poverty.

The definition of poverty, or well-being, is commonly based on estimates of income or consumption expenditures (see for example, Van Campenhout, 2007; Headey and Wooden, 2004; Khan, 2001). These analysts, however, do not acknowledge the complex nature of poverty (Kingdon and Knight, 2006). While poverty is associated with a lack of income and productive assets (such as cultivable land), poverty is also associated with higher morbidity and mortality (Watts *et al*., 2007; Joeffe, 2007; Lopez, 2003), limited or no access to basic sanitation, minimal health services (Levesque *et al*., 2007; Brocklesby and Hinshelwood, 2001) unhealthy and unhygienic living conditions, illiteracy and lack of formal education, lack of political power or exclusion and overall marginalization (Nichola, 2006; DFID, 2002a; Narayan *et al*., 2000). These features of poverty make the poor vulnerable (Johnecheck and Holland, 2007; Chandrasekhar and Ghosh, 2002; Holland, *et al*., 2000). Individuals and households in poverty are, therefore, exposed to food insecurity and diseases, and are often forced into occupational and livelihood displacement. These vulnerabilities are very complex. Understanding them requires a comprehensive approach that is capable of integrating diverse factors in a meaningful manner.

The theoretical foundation for SLA is in the realm of poverty and environment (Baumann, 2002). In Baumann's report on *Improving Access to Natural Resources for the Rural Poor*, reference is made to "approaches", meaning a set of principles supported with a set of tools rather than a single method (Bauman, 2002. Pp. 6-7). Bauman stresses that the single most important factor in understanding livelihood strategies is determining the ability of the poor to access assets. This research, uses SLA principles and tools, and

is designed to address access to assets, livelihood strategies and outcomes in the context of single resource dependent households of artisanal fishing communities.

2.3 Sustainable Livelihoods Framework

The Sustainable Livelihoods Framework (SLF) is the most widely used and conceptually sophisticated of all livelihood models (Lautze and Raven-Roberts, 2006; Pain and Lautze, 2002). SLF is used by a growing number of research and applied-development organizations including the UK's Department for International Development (DFID) and the United Nations Development Program (UNDP). SLF is a conceptual framework that allows users to identify the role of assets in defining the range of livelihood options. A number of Non-Governmental Organizations (NGO), such as CARE and OXFAM, apply it in developing countries with modifications to suit their objectives and local complexities (Adato and Meinzen-Dick, 2002). The framework has also been used to investigate the underlying causes of poverty and ill health, and to suggest strategies for poverty reduction and health improvement (Holland et al., 2000) by international institutions such as the United Nations Development Program, the World Bank, and the British Department for International Development (DFID, 2006a, 2006b; EC, 2004; UNDP, 2006; World Bank, 2005b; Jahan, 2004).

An important feature of the SLF is the way in which it organizes information regarding the conditions in which people live. In assessing the value of this framework, Adato and Meinzen-Dick (2002) considered *an expanded understanding of poverty that goes beyond income or consumption-based headcounts or severity measures, to consider many other factors that poor people in different contexts define as contributing to their vulnerability, poverty, and well-being* (Adato and Meinzen-Dick, 2002, P.2). Their

evaluation of agricultural research is drawn from five case studies - (1) modern rice varieties in Bangladesh; (2) polyculture fishponds and vegetable gardens in Bangladesh; (3) soil fertility management practices in Kenya; (4) hybrid maize in Zimbabwe; and (5) creolized maize varieties in Mexico. Applying the SLF helped them highlight the complex interactions between agricultural technologies and the conditions in which people live, their asset base, intervening institutions, and livelihood strategies. One of their major findings that are particularly relevant to this research is from the case study in Zimbabwe. Severe drought impacted farmers, particularly those who had adopted hybrid maize through widespread crop loss, fertilizer burn. This resulted in loan defaults. While richer farmers were protected because of their diversified activities such as farming and cattle rearing, poor farmers who lived on a purchasing power parity of one dollar a day, or household consumption of 2000 calories per person per day, were dependent on a single source of income from agriculture (Adato and Meinzen-Dick, 2002). Adato and Meinzen-Dick (2002) used SLF to identify different sources of vulnerability and a wide range of assets and livelihood activities and strategies is considered.

> *Livelihood activities may be composed of, for example, year-round or seasonal formal-sector employment, informal trading or sale of labor, home gardens and food processing, livestock production, cultivation or use of natural or common property resources, labor exchange among family or neighbors, contracted "home work," borrowing, scavenging, stealing, and begging. They may be on or off farm, include local or international migration, involve elderly household members or children, be legal or illegal. For poverty analysis and poverty reduction interventions to be effective, it is important to understand*

> *these multiple activities in order to understand the multiple sources of vulnerability faced by the poor, the multiple ways in which their lives are affected by structures and institutions, and the varied ways in which development interventions may strengthen or weaken these livelihood activities* (Adato and Meinzen-Dick, 2002. Pp.3-4).

Adato and Meinzen-Dick's (2002) investigation also considered how different policies, institutions, and organizations mediate poor people's ability to access research outcomes and technologies and convert them into positive livelihood outcomes.

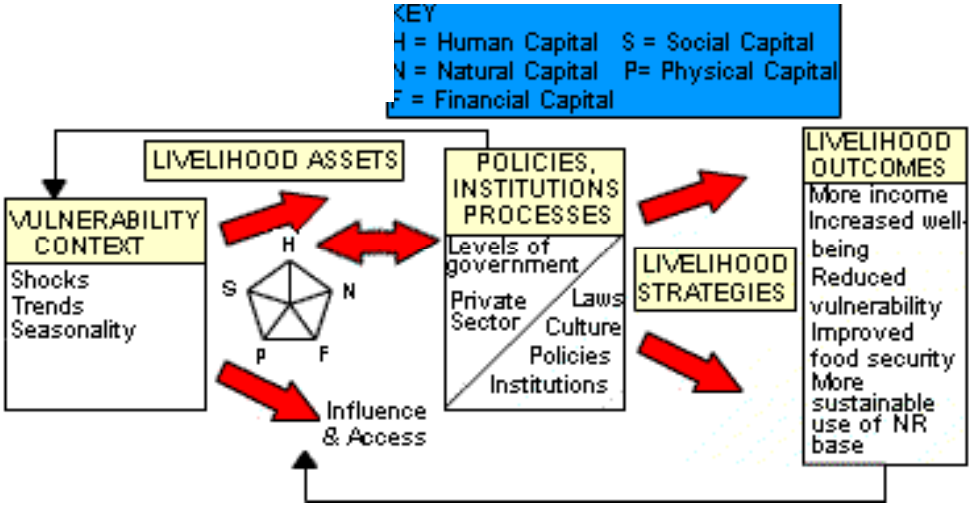
SLF recognizes people as actors with assets and capabilities who act in pursuit of their own livelihood goals. This aspect of the framework could be useful for identifying appropriate entry points for assisting the coastal poor to create better livelihoods. It provides guiding principles that can be used to identify factors that influence the ability of the coastal poor to adapt to changes in assets. It also sketches out the way in which changes in different assets are linked to each other (Figure 2.1). The Framework draws attention to core influences and processes, and emphasizes the multiple interactions between the various factors that affect livelihoods. The Framework provides a way of organizing livelihood analysis, either from the people's vulnerability context or from the assets they have. The pentagon in Figure 2.1, lists five important assets or types of capital - human, social, natural, physical and financial capital, that are the core of the livelihood framework (DFID, 2000a). The shape of the pentagon shows variations in people's access to assets. The centre point of the pentagon where the lines intersect represents zero access to assets while outer perimeter, maximum access. These assets interact with policies, institutions and processes to shape the choice of livelihood strategies. Human capital stands for people's skill, knowledge, ability to labor and good health, together

enabling them to develop strategies to better their well being. Social capital is the resource upon which people draw in pursuit of their livelihood objectives. DFID's sustainable livelihoods guidance sheets acknowledge social capital as a "resource of last resort" because it provides a buffer that helps the poor to cope with shocks such as death in the family. Social capital also acts as an informal safety net to ensure survival during periods of intense insecurity, and compensate when other types of assets (for example, shared labor) are lacking (DFID, 2000a). Therefore, social assets give the people a sense of community, family and social networks. Natural capital is the resource from which people derive all or part of their livelihoods. Natural capital includes land, forests, marine/wild resources, water and air (DFID, 2000a). Physical capital is the basic infrastructure and goods (tools and equipments) needed to support livelihoods. Infrastructure comprises changes to the physical environment that help people to meet their basic needs and to be more productive. Financial capital refers to the financial resources (for example, cash, loan) that enable people to access different livelihood strategies (DFID, 2000a).

Poor households may have one or more of the assets and combine them in different ways to secure their livelihoods. Assets are also closely linked to capabilities that the poor have. Poor people may have assets but may lack the capabilities to use them. According to Sen, human capability is *the ability of human beings to lead lives they have reason to value and to enhance the substantive choice they have* (Sen, 1997. Pp.1959). Capability, therefore, serves as a means for social development of the poor. Assets relate with policies, institutions and processes to shape the choice of livelihood strategies. These, in turn, lead to livelihood outcomes. These outcomes feed back into the future asset base.

Basic indicators of livelihoods include household consumption levels, access to assets, levels of human capital, and processes such as resilience and adaptation. Different tools and indicators are required to understand the various components of livelihoods (DFID, 2000). Allison (2005) examines the potential of the SLA as a framework to guide policy and management in the European inshore fisheries, drawing from the experience gained from its application in developing countries. Her findings suggest common features in livelihood strategies, which include diversification and risk-spreading behavior as they are practiced in low-income countries in the tropics.

Fig. 2.1 Sustainable Livelihoods Framework



Source: DFID/IDS, 2000.

The people who live in coastal areas are not homogeneous. Even within a single community, there may be different coastal resource users with distinct orientations. Fishing households, for example, may be full-time, part-time, seasonal or migratory. Similarly, households may have a commercial or subsistence orientation.

In this research an attempt is made to understand the complex nature of the socio-political and economic interactions within coastal fishing communities, and to recognize the wider macro influences, particularly after the trade liberalization process. Following

trade liberalization, many maritime nations in the developing world, focused their attention on export-oriented fisheries. While development of export-oriented fisheries attracted increased employment potential, it severely impacted local livelihoods. Local livelihoods were dependent on skill while export-oriented fisheries with their modern technologies attracted labor that needed no skills and thereby many from outside the fishing communities entered fishery. Increased export of fresh fish took away the local livelihoods of women who traditionally were engaged in fish drying and other processing for local trade. Export-oriented industries were located in and around urban centers to access better transportation to facilitate export. Consequently, employment opportunities attracted labor migration from rural surrounds. In order to capture the complex nature of these impacts at the local level, the SLF has been modified in this research (Figure 2.2).

2.4 Modified SLF

The central theme of this research, assets and livelihood strategies, is examined through a modified SLF. Although, the framework provides a versatile approach to organize the main factors of and influences on people's livelihoods, DFID suggests modifications to suit different contexts (DFID/IDS, 2000). Therefore, SLF has been modified, taking into consideration of global influences that shaped the resource-stakeholders interactions at regional and local levels and also the political assets which plays a determining role in the livelihoods of the artisanal fishing communities. The modified SLF illustrate global influences on the livelihoods of the households in artisanal fishing communities at regional and local levels by representing three concentric circles in the diagram (Figure 2.2). Following summary on limiting national rights and jurisdiction over the oceans to a narrow belt of sea surrounding a nation's coastline would

help understand the need for such a modification. Growing concern over *spreading pollution, competing demands for lucrative fish stocks in coastal waters and adjacent seas, growing tension between coastal nations' rights to these resources and those of distant-water fishermen, the prospects of a rich harvest of resources on the sea floor, the increased presence of maritime powers and the pressures of long-distance navigation and a seemingly outdated, if not inherently conflicting, freedom-of-the-seas doctrine* – (www.un.org) led United Nations to convene and declare 200 nautical miles of sea surrounding nations coastlines to have sovereign right over it. Further, the 1995 FAO Code of Conduct for Responsible Fisheries gave greater significance to artisanal and small-scale fisheries. Indian fisheries sector entered the global market during the early seventies. The pressure to increase foreign exchange earnings coupled with increasingly liberalized market brought pressure for the artisanal and small-scale fisheries as well. Through widespread adoption of motorization, small-scale fisheries have grown significantly and the increased fishing capacity under open access regimes led to overfishing pressures on coastal fisheries resources, especially in Asia and Africa (Mathew, 2001).At the national level, this translated into state governments promoting increased production by replacing country crafts with trawlers and efficient gear and subsidies encouraging fishers to increase fish production. Poor households in fishing communities make use of the limited assets they have to derive livelihoods. They access these assets, such as skills and capabilities to act or change their circumstances and activities that are required as a means of living. The smallest unit of study in this research is the household in artisanal fishing communities. All members of the household, including extended families living within that household are included in the study. The

starting point for this study is the vulnerability context (Box **2** in Figure 2.2) within which poor operate. According to FAO technical guidelines for responsible fisheries (2005),

> *Poor people tend to be more vulnerable (more exposed and more sensitive to risk and with less adaptive capacity) than the non-poor. The poor generally cannot access insurance or good quality services (e.g. health, education), for instance, and may depend highly on the fisheries to ensure their food security. But it is also true that in a given environment, with the same level of income and similar access to public services, some people may still be more vulnerable than others due to the very nature of the activity on which they depend.* (P.7)

Vulnerability encompasses *trends, shocks and seasonality*. *Trends* in resource/market dependency (trade liberalization), social exclusion (caste, religion), lack of/or no physical assets (housing, infrastructure), high population densities (large family size), having no political assets (marginalized and powerless) place the poor households of the fishing community in a vulnerability context. For example, trade liberalization led to increased fishing effort and coupled with rising fuel costs, have significantly increased the cost of fishing operations. This makes fishing operations a failure for many and therefore, the fisher end up with more debts. Trade liberalization had an impact on fish trade. Increasing export of fresh fish led to decline of traditional fish drying and processing centers where local employment, particularly for women, helped sustain poor households. Poor households in fishing communities face social exclusion that increases their vulnerability context. Being low in caste hierarchy, members of fishing communities have limited access to assets particularly, political and financial assets. Their increased vulnerability is also due to lack of proper housing. Often they live in

overcrowded thatched shacks that need basic amenities. This is particularly true among those with large family sizes. Communities engaged in small-scale fishery in developing countries are often marginalized from mainstream population and they lack representation to voice their powerlessness. *Shocks* such as changes in bio-physical environment, competitions for limited resource, depletion of fish stocks, changing technology, financial liability, fluctuating prices for their produce (fish landed) and weak governance increase the vulnerability context. Fish and fishery products are a cheap means of protein intake, particularly for the coastal poor in the developing regions. Fishing, therefore, is an important activity that contributes to the food security of many coastal populations. This situation is changing as demand for fish and fishery products has higher monetary value as a commodity bringing better income to various stakeholders. Attracted by the opportunity in fisheries, more and more people join the trade and population engaged in fisheries doubled within the last two decades, so is the number of fishing fleets (FAO, 2004). However, this boom in fishery brought along a host of socio-economic and biophysical problems - increasing pollution of coastal waters contribute to the degradation of marine habitats and many marine resources are on the decline. Increasing competition for limited stock of available fish brought more financial liability to fishers. Open access nature and weak governance further contributed to the heightened vulnerability among fishing communities. Other factors affecting vulnerability include trends in resource and market dependency and social exclusion due to caste hierarchy or belonging to a religious minority. *Seasonality* in migration of shoals of fishes, algal blooms, mud-bank formations (*chakara*), monsoon storm surges and outbreak of epidemics situate the households in the vulnerability context. However, communities derive certain benefits from seasonality as well, such as the mud-bank

formations where shoals of fish congregate. The vulnerability context in which the poor operate is beyond their control and may also vary from one community to the other.

The boxes depicting different aspects of livelihoods of people in the coastal fishing communities are placed according to their linkages within these circles. For example, Box **2** (vulnerability context) and Box **4** (policies, institutions and processes) span across all three levels. The influence of Box 5 (livelihood outcomes) is limited to regional and local levels. Box **3** (livelihood strategies) is local. The **asset base** (Box **1**, Figure 2.2), upon which people build their livelihoods, includes a wider range of assets than are usually considered.

- *Human Capital* includes education, skills, knowledge, health, nutrition, and labour power. In the SLF, this set of assets focus on economically productive members of the household.
- *Physical capital* is basically infrastructure which includes roads, buildings, shelters, water supply and sanitation, energy, technology, and communications. As the focus of this research is on coastal fishing communities, their assets include fishing craft and gear, property, houses and other amenities.
- *Natural capital* includes land, water, forests, marine resources, air quality, erosion protection, and biodiversity. For coastal fishing communities, this set of assets is extended to include coastal waters, fish and other marine life.
- *Financial capital* includes savings (cash as well as liquid assets), credits (formal and informal), as well as monetary inflows (state transfers and remittances).
- *Social capital* includes: any networks that increase trust, ability to work together, access to opportunities, reciprocity; informal safety nets; and membership in

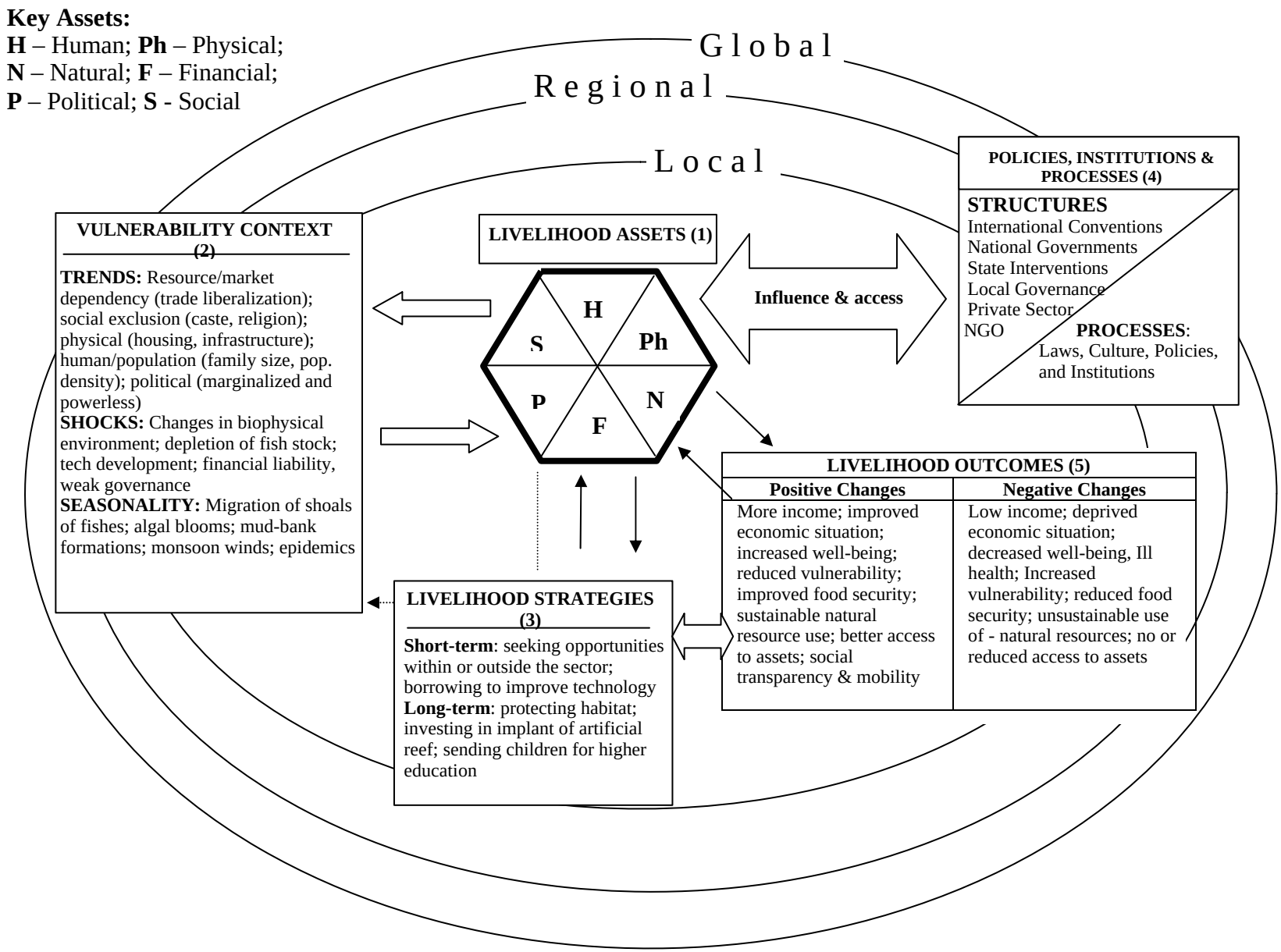
organizations. In this research, social capital embraces cultural institutions and family networks that support household livelihoods.

The SLF considers an asset portfolio of five different types of assets taking into consideration of the vibrant political history of study location, one more type of assets, *political capital* is added in this research. The study area chosen is politically vibrant in many ways. Although dominated by orthodox Muslim religion, historically the area was home to few progressive political leaders and the politicization process among the fishing communities started much before India's independence in 1947. It seemed, during initial field visit, that certain sections within the fishing communities having access to government sponsored welfare schemes while having limited access. Political assets seemed, therefore, an important component which needed further investigation.

- *Political capital* includes membership in political parties, and the participation and representation of household members in the mainstream political power structure.

Links between these assets and other influencing factors are shown by one or two-way arrows. As the nature of assets is intrinsically linked, certain sets of assets are grouped together– human and social assets are complementary in the same way as natural and physical capital assets are also complementary.

Figure 2.2 Modified Framework for the analysis of Assets and Livelihood Strategies (modified from DFID/IDS, 2000).



The third component in this framework is the **Livelihood Strategies** (Box **3** in Figure 2.2) that households adapt in a particular vulnerability contexts. Livelihood strategies also include the choices they employ in pursuit of income, security, health, and other productive goals. The strategies could be short-term, seeking opportunities within or outside fisheries or long-term, protecting local habitats, creating artificial reefs as a fish aggregation device and sending children for higher education. A short-term strategy could be also to borrow money to buy better fishing gear or craft. As a short-term strategy, poor may seek opportunities within the fisheries sector or in other sectors to escape the poverty situation (DFID, 2003; ICSF, 2003). For example, a study by Sen (2003) has shown that individuals and households escape from poverty and descend into poverty due to fluctuating fortunes. The study revealed that entry or exit from poverty depends on the initial asset position (for example, amount of land owned). Access to assets facilitated and encouraged diversification of income deriving activities that has an outcome of short-term benefit (Sen, 2003).

The SLF recognizes that individuals and households often pursue multiple strategies in pursuit of more secure livelihoods. The term livelihoods is understood here as individuals in communities' engagement in a number of activities which is not limited to a particular trade. This engagement may or may not involve income. Income is also derived from assets and entitlements (UNDP, 1999). For example, a fisher may have a small business or part-time casual labour work other than the main activity in fishing.

This framework also helps organize the extent to which the poor access and influence **policies, institutions and processes.** Box **4** in Figure 2.2 refers to both the formal and informal institutions and organizations that shape the livelihoods of

individuals and households by influencing access to assets, livelihood strategies and vulnerability. These policies, institutions and processes exist at multiple levels: local, regional and national. Policies, institutions and processes, according to Baumann (2000) *is also a capital asset – political capital that links an individual or a group to power structures and policy outside the locality* (P.9). The public and private sectors, civil society, and community institutions may all be relevant considerations, as are laws and culture. Macro-level policies, institutions and processes may influence decentralized decision-making that in turn, may affect local livelihoods and therefore, responses to local demands (Baumann, 2000).

Changes in their vulnerability context compel fishers to create new livelihood strategies within the constraint of limited assets, leading to positive or negative **livelihood outcomes** (see Box **5** in Figure 2.2). Positive outcomes are increased incomes and improved economic conditions, increased well being, reduced vulnerability, improved food security, sustainable natural resource use, better access to assets and social transparency. Negative outcomes include low incomes, a deprived economic situation, decreased well-being and ill health, increased vulnerability, reduced food security, unsustainable use of natural resources; and reduced or no access to assets. The outcomes thus have a feedback effect on a fisher's vulnerability status and asset base.

The SLF emphasizes the importance of understanding poor people's existing assets and needs when planning development interventions as well as the factors contributing to poor people's vulnerability. For example, coastal community members may be vulnerable for several reasons. They may lack proper housing and basic facilities such as sanitation and water supply; they may live in congested, crowded conditions and often unhygienic conditions; or they may lack regular income. Most of all, they may lack

the means of production to fish, and control over the price of the product as a result of their labour. All of these factors affect the state of their health and well-being at the household level.

The Framework provides a means of examining multiple and interactive influences so as not to overlook important explanatory factors. Researchers are better able to identify the parameters of the "*big picture*", and focus on "*what can have the highest impact or what is most relevant to the important stakeholders*" (Adato and Meinzen-Dick, 2002, p.11).

To gain some insights into the broader dimensions of livelihood strategies and the assets used by coastal households, particularly when they are faced with resource depletion and degradation, the concept of resource dependency is integrated into this research.

2.5 Resource Dependency

There are very few studies that have dealt specifically with resource dependency (Robards and Greenberg, 2007; Stedman *et al*., 2004, 2005; Fisher, 2001; Perkins *et al*., 2003). The theme of dependency is often found in studies that look at issues such as transnational migration and remittances (Ojeda, 2003), social change among resource-dependent communities (Force *et al*., 2000), timber-dependent communities and rural development (Force *et al*., 2000). Many of these studies focus on dependency in developed countries, especially in North America, rather than in developing countries where numerically larger populations are dependent on primary resources.

Using the micro trans-national Social Accounting Matrices and Computable General Equilibrium (SAM/CGE) framework, Ojeda (2003) examined the effects of

transnational migration, remittances and development on efforts to improve the living conditions of migrant families, and the sustainable and equitable development of communities in both the US and Latin America. The focus of this work is to provide a micro trans-national SAM/CGE framework and the possibility of empirical case studies to be used to calibrate the full multiplier effects of migration and remittance-policy reforms on a macro regional and global scale. It brings out the current cheap-labour dependency of the US on resource-dependent regions such as Mexico. However, it fails to express the explicit link to the demographic changes that shape the economies of the dependent regions. For example, using household level data for a resource-dependent coastal region in northern Vietnam, Adger *et al.*, (2002) showed that, the effects of demographic change, resource use and environmental health due to migration are evident on social resilience, erosion of collectivized social structures and reduced social cohesion which are manifested in (i) land allocation process, creating winners and losers, differentiated particularly in the highlands by ethnic group, gender, and access to power; (ii) opening up of new enterprises such as aquaculture reinforcing the processes of marginalization (Adger *et al.* 2002).

Force *et al.* (2000) use regression models to examine the relationships between four dimensions of community social change (size, structure, cohesion, and anomie) and the alternative "engines of change" in seven resource-dependent communities in the Pacific Northwest over a fifty-year time period, data ranging over different time periods (1920-1994). They suggest that broad societal trends and local historical events can explain much of the variation in the size and structure of community social change. They also suggest that local resource production has a modest explanatory power when

combined with these other "engines of change", e.g. local historical events and broad societal trends (Force *et al*. 2000).

By comparing two localities that have followed very different developmental trajectories -- the state of Wisconsin in the United States and the Hokkaido Prefecture in Japan -- during the period from 1970 to 1990, Fisher (2001) re-examines the common research conclusion that resource extraction leads to poverty instead of expected prosperity. The study finds that the relationship between extraction and poverty is dependent on location (Fisher, 2001). According to Fisher, despite the many differences, the strongest correlates of poverty in the US and Japan involve the proportion of land in an area that is forested: "*percentage of forested land is the most significant variable in the final regression equations*" (Fisher, 2001. P.198). She also discussed the distance to a metropolitan place and topography as having a significant association with poverty on a bivariate level in both locations. However, the relationship is significant in the multivariate analysis only in Hokkaido. She attributes this to the differences in their geography or because of differences in employment structure. Similar findings are echoed in various studies in the Canadian context, particularly with regards to timber extraction and rural prosperity (Stedman *et al*., 2004, 2005; Perkins *et al*., 2003).

Racevkis and Lupi (2006) examined a managed forest ecosystem in Michigan's Upper Peninsula, to better understand the preferences and viewpoints of its rural, timber-dependent communities and recreational users from a nearby urban area of Michigan's Central Upper Peninsula. *The resources provided by forest ecosystems generate both market (e.g., timber) and nonmarket (e.g., wild- life) values to individuals* (Racevkis and Lupi, 2006. P.480). Using six focus-group discussions to understand the trade-offs between different management goals, they examined, whether residents of rural, timber-

dependent communities hold strong anthropocentric views of forest management, or non-timber-dependent community residents hold strong biocentric views of forest management (Racevkis and Lupi, 2006). Content analysis of their discussion-group transcripts revealed that rural populations expressed familiarity to non-market forest services, while participants from urban locations showed affinity to a range of non-market services, emphasizing significance on the recreational use of forest.

Russell and Harris (2001) examined the dimensions of community autonomy among timber-dependent communities in the interior of the Columbia basin. Their study showed that:

> *In comparison to less autonomous communities, autonomous communities were found to be more likely to (1) have a mix of industries within their community and provide more services to residents; (2) exhibit stronger civic leadership, aside from local community government; (3) have a stronger sense of community cohesiveness and place attachment to their community; and (4) rate their community higher on measures of quality of life and sense of community* (2001, P.21).

An important aspect in their finding is that communities in the Columbia basin that are geographically isolated, are better adapted to changes in timber resource availability.

Most of these studies probe into problems relating to dependency on a single natural resource such as minerals, forests or fish. Their analysis of what happens when minerals or forestry resources are exhausted, however, is limited. Most of these studies are concerned with forest or timber-dependent communities. Many situate the concept of resource dependency within the North American context (see for example, Racevkis and

Lupi, 2006; Rory *et al.*, 2004; Russell and Harris, 2001; Force *et al.*, 2000). Few studies have examined dependency on marine resources.

There are varying degrees of resource dependency in rural communities. Those dependent on forests often live close to the forest edge, and those dependent on fish live close to water bodies. In the case of marine fishing communities, Rab *et al.* (2005) suggest that 'fishing villages' have the highest degree of dependency on fishery resources while 'farming villages' have the least dependency. On the basis of a socio-economic survey of rural households around Tonle Sap Lake in Cambodia, Keskinen (2003) goes beyond looking at the degree of dependency and suggests that fish-dependent people living close to the lake are in many ways in a worse situation than those living farther away from the lake or higher up in the mountains. He draws a spatial as well as altitudinal line – urban areas and land above 6 meters – to show the degree of dependency on natural resources. He concludes that people in the lower zones are generally poorer, less educated, have fewer livelihood options, do not own agricultural land and depend strongly on common property resources such as water bodies and flooded forests for their livelihood. And folks living farther away from the lake rely primarily on rice cultivation for their livelihood (Keskinen, 2003).

Many researchers have examined the interrelationship between natural resources and people living in resource-dependent households. Pyhala *et al*., (2006) examined poor households dependent on non-timber forest products (NTFP) within a forest reserve area to examine whether forest resources serve as an economic buffer. Through a census survey of households, designed to reveal the economic livelihood strategies employed by each household, they found that NTFP provide only a relatively small portion of income, and that despite access to market, only a small proportion is commercialized. This, they

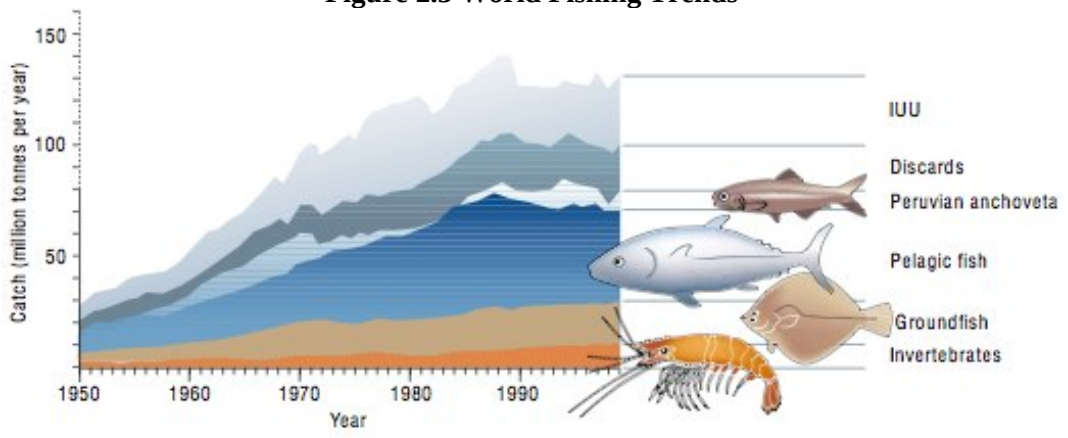
find, is explained by unequal access to capital assets used for extraction, to natural resources and to product markets.

Livelihood options of resource-dependent communities are limited by many factors. The poor often gain livelihood resources from their immediate environment such as forests or the ocean. Diversity and productivity of these resource bases are the key factors contributing to their well-being. In many areas around the world, the exploitation of these resources is exceeding their regeneration capacity, resulting in resource depletion (DFID, 2006a; FAO, 2000a; Porter, 2001). Some livelihood activities depend on exchange through market institutions or on direct provision of entitlement from state welfare. These are vulnerable to volatile nature of markets. This is particularly true for those who are dependent on single resources.

The primary resource that determines the livelihoods of the artisanal fishing communities is the sustained availability of fish in their immediate marine waters. Fish bring in income are also a source of protein and nutrition for the family (FAO, 1974, 2003; Bouis, 2000). However, FAO statistics indicate that the world's fishing capacity is so large that the entire global stock of fish has been depleted severely (Morato, 2006; FAO, 2005; Christensen *et al*., 2003). The decrease in marine fish catch since the late 1980's is estimated to be about 0.7 million tons per year (Pauley *et al*., 2002). Their study of the depletion in world fishing, using global fish-catch data mapped the ocean's biomass and examined fish stocks around the world over the last 100 years. Their findings show that there is an increasing tendency towards fishing down the food chain

(Pauley *et al*., 2002). This study indicates that by targeting larger and more commercially lucrative species, there is considerable reduction of average size of fish in the population. They observed that the global decline of 0.05-0.10 trophic levels per decade in global fisheries landings imply, *the gradual removal of large, long-lived fishes from the ecosystems of the world oceans* (Pauley *et al*., 2002. P.691). Since species with long life

Figure 2.3 World Fishing Trends



FAO Catch Statistics (adjusted for over-reporting from China) for Invertebrates, Groundfish, Pelagic fish and Peruvian anchoveta. Illegal, Unreported or Unregulated (IUU) catches were estimated by identifying the dominant jurisdiction and gear use (and hence incentive for IUU) Source: Pauly *et al*., 2002.

cycles cannot bounce back as quickly as short-lived ones, targeting them results in marine communities becoming dominated by short-lived species. This affects the structure of marine communities as fishers target lower and lower trophic levels. Wilen (2006), examines the other hand, assessed the failure of fishery management from the perspective of failed property rights systems, which lead to perverse incentives, overcapitalization and political manipulation. He states:

> *The problem is not inherent in fishermen as individuals but is induced by the governance systems they are forced to operate within. In particular, fishermen's fundamental decision-making incentives are distorted by insecure harvest privileges (often called property rights) so that they are led to compete wastefully with each other, and with managers, for increased quantities of fish. Insecure harvest privileges, in turn, are a historical artifact of the peculiar institutions within which fishermen and other user groups operate in most modern fisheries* (Wilen, 2006. P.530).

Correcting incentives through a strengthening of property rights, he argues offers the means of conserving fish stocks for the future.

Whenever there is a lack of acceptable alternative sources of employment and livelihood available to fishers, the insecurity of losing access drives them to resist change (Cochrane and Doulman, 2005; Cochrane, 2000). The overexploitation of cod stocks in the North Atlantic is a classic example of the collapse of a fishery and the loss of livelihoods (Government of Newfoundland and Labrador, 2003). More than 30,000 jobs have been lost in the Atlantic Provinces and 10,000 in BC as a result of reductions in the Atlantic groundfish and Pacific salmon fisheries (Markey *et al*., 2000). According to the Report of the Auditor General of Canada, $3 billion was spent as a stopgap measure to assist with social welfare payments and other payouts in supporting the industry during this period (Anon 1997). This financial assistance provided interim relief while most of the fishers looked for other opportunities. They diversified their strategies to influence policies and institutions for positive outcomes (Kearney *et al*., 2007; Allison, 2005; Ellis and Allison, 2004). A good example is the case of Chemainus in British Columbia where

closure of a sawmill in 1983 laid off over 650 workers. The Chemainus community diversified their activity into tourism by depicting local history through giant murals and now they attract half a million visitors annually (Barnes and Hayter, 1992).

From the oceans to the dining table, fish and the fishing industry attract many actors and stakeholders. The collapse of a fishery can have disastrous consequences for many diverse livelihoods. This is explicit in the assessment of fisheries resources and science in Newfoundland and Labrador, where researchers examined the ecological, social and economic crisis in the Atlantic ground fishery (Rose, 2003). According to this independent assessment, the marine catch has declined mainly due to unsustainable fishing practices, reliance on exploitive technologies, and self-defeating government policies (Rose, 2003). The problem, according to Cochrane (2000), when general policy is turned into decisions and actions, some fishers are excluded or end up with reduced income. According to him,

> *…dependency on the resources may become the politically over-riding factor in determining whether this will exist* (Cochrane, 2000, P.14).

This problem is particularly acute in developing countries, where a lack of investment in social welfare measures keeps governments from closing fisheries at the first sign of collapse. Fishers in these countries will continue fishing until a lack of returns forces them to live in a state of poverty. Schemes to buy back their craft and gear or rehabilitation schemes to compensate their loss is not an affordable option for developing nations.

The difficulties faced by developing countries are recognized in FAO's Code of Conduct, in which Article 5 is dedicated to 'Special Requirements of Developing Countries' (FAO, 1995). It urges states to develop responsible fisheries and to find

alternative sources of livelihood for those who will be displaced when fishing effort is reduced to achieve sustainability. Diversification, therefore, is critical to the sustainable livelihood strategies of the poor (Bailey and Pomeroy, 1996). Within this context, resource dependency can be viewed as a subset of the SLA. This is because livelihood strategies depend for their success on access to assets (e.g. bio-physical, social, political and human). In many communities, the right to access resource assets may not be defined. In this kind of open-access situation, an over exploitation of the resource may take place. Households provide the best source of information on the prevailing rights to resource assets (Grosh and Glewwe, 2000).

2.6 The Case Studies

Several studies have sought to understand the relationship between coastal fishing communities, their livelihoods, sustainable development and the environment (see for example, Chuenpagdee and Bundy, 2005; Bouahom *et. al*, 2004). Most of these studies analyze these relationships at macro levels, since secondary data are often available at national, state and, in some cases, district levels. These studies are important in many ways, indicating general trends and spelling out policy implications. However, they fail to highlight the specific choices people make for their survival, the livelihood strategies that have evolved, and the decisions governments make in mediating these relationships at the micro level. Therefore, this research makes an important contribution by filling that gap.

The coastal areas in which the marine fishing communities make their day-to-day livelihoods contain marine and terrestrial ecosystems with a high level of primary productivity. Fishing communities have traditionally lived mainly off the fauna, and especially fish, of this zone. Many studies have documented how these communities have

organized themselves to maintain the harmony of the coastal ecosystem, while at the same time drawing sustenance from it, up until the beginning of fisheries modernization (Mensah *et al.*, 2006; Kurien, 2003; Sebastian, 2002; Leival *et al.*, 2001; McGoodwin, 2001). The modernization of the fisheries has resulted in over fishing and fish-resource depletion (Pauly *et. al.*, 2002; Kurien and Paul, 2001; Porter, 2001). It has also led to increasing conflict between the industrial and mechanized sector and artisanal small-scale fishers (Kura *et al.,* 2004). These conflicts combined with lack of empathy from government to the artisanal sector put the small-scale fishers at a disadvantage compared to the industrial sector.

There are several other factors such as fish trade and food security that threaten their livelihoods (Kurien, 2004; Kent, 2002). The threats arise from decline of traditional institutions, which used to bind the fishers with a sense of ownership of the community resources. This sense of ownership had given rise to common set of rules and regulations, and also, sharing of resources. However, with the introduction of modern technologies and fisheries policies, the deeply instituted traditional process of care and concern was replaced with gain and profit (Kurien, 2004). Threats also arise from the declining fish resources. Households in artisanal fishing communities are impacted adversely when fish stocks are depleted particularly when there are fewer options available to them in terms of local employment. The location of land and houses close to the shore, where fishers have easy access to the sea, is a major physical asset and is a right they enjoy, although property rights in the coastal zone are relatively ill defined (Damodaran, 2006; Ramachandran *et al.*, 2005; Kurien, 2003). However, this could also be a limiting factor as often artisanal fishers develop fishing methods and fishing gears tailored to catch particular species within their home/fishing ground (Kura *et al.*, 2004).

The crisis in many of the worlds fisheries due to open access and unregulated common-property regimes, are major concerns in fisheries management (Eggertson, 2002; Mutunga, 2002; Adhikari, 2001). Historically, communitarian social structures, environmentally friendly technologies and limited market extension kept populations and ecosystems in a relative balance. The present situation is quite different. New developments and technological advancements have helped increase production, but the disparity between the rich and poor has widened. Increasing profits have also attracted new claimants to the resource, and this has led to competition and conflicts. Having been drawn into the mainstream of modernization, several communities have played an active role in achieving high production, and contributed to state and national income. However, these communities are now threatened because of the fluctuations in, and access to, the resource. This is elaborated in the following section. The case studies chosen here are also representative of issues relating to resource dependency and livelihoods within the context of the poverty-environment nexus.

With the degradation of the resource, members of these communities diversify their occupational strategies and move into other sectors. This is evident in studies relating to migration and remittances (Adger *et al.*, 2002; Kannan and Hari, 2002). Adger *et al.* (2002) investigates the relationship between demographic change, social resilience and sustainable development, and the effects of migration and remittances on resource-dependent communities in population source areas of coastal Vietnam. A sizable population constituting ten percent of the workforce in Kerala, India, works in Middle Eastern countries and sends remittances that constitute a significant share of state income (Kannan and Hari, 2002). These studies acquire importance as coastal fishing

communities in this study form a large number of labour migrants to the Middle East (Zacharia, 2001a).

In a study for the FAO, Tietze *et al.* (2000), conducted macro-level studies and field surveys at the community level, to understand fertility indicators; occupational mobility; income and education; perception of environment, resources and economic situations; and changes in livelihood of fishing communities in Bangladesh, India, Malaysia, the Philippines, Senegal and Tanzania. For comparison, they included control populations of non-fishing communities within the same ecosystem. The study revealed that among coastal fishing communities, there is slightly higher fertility and mortality than among other rural residents. Moreover, the younger generation has markedly different attitudes from those of their elders regarding fertility and family; fisheries no longer seem to be a '*last resort employment*' (Tietze *et al.,* 2000). The majority of the fisher folk in the selected countries, Tietze *et al.* (2000) noted that resources and the environment have seriously declined because of an increase in the number of fishers and fishing fleets (and due to domestic and industrial water pollution). However, they also observed an overall decline in the number of fishers in the countries studied.

Investigating gender, welfare and labour in India, Nieuwenhuys (1989), reports that over 200 million children contribute to family livelihoods. She argues that the Kerala case-study provides a blueprint for the ways in which the women and children among artisanal fishers are excluded, while the sector itself is confronted with increasing competition from modern fishery sector. She suggests that although women and children are perceived to be marginal, they are in reality playing an indispensable role in on-shore activities, very much connected with the well-being of poor consumers in coastal areas. This, in turn, has allowed fishers to stay in the fishery even when modernization could

lead to their exclusion. At the same time, as conditions worsen, alternative gender and age roles came into existence in response to new work opportunities, growing demands in terms of schooling and the need to cope for oneself following the out-migration of men (Nieuwenhuys, 1989).

In most of the recent studies on coastal fishing communities, particularly artisanal fishing communities, lives and livelihoods rely on the methodology developed by Kurien (2005, 2004, 2003, 2001, 2000). The basic idea in Kurien's work that is relevant to this research is to give a sense of history of the life and livelihoods of coastal fishing communities. The artisanal fishing communities are not depicted or regarded as passive victims and recipients of government policies or external aid. Rather, they are people with immense knowledge who are assertive of their rights. In his paper on 'Factoring Social and Cultural Dimensions into Food and Livelihood Security Issues of Marine Fisheries', Kurien (2000) examines the visible manifestations of artisanal fishing communities' deeper social and cultural attributes in the marine fishery sector. This, according to him, is fashioned over a very long history.

The visible manifestations of social and cultural attributes include the nature of the sharing patterns in the fishery, traditional knowledge and technology, old and new institutional arrangements in fishing communities, the question of food security, and the role of women (Kurien, 2000). Reduced vulnerability through social security is investigated by analysing various supply and demand factors that influence the provision of social security measures in Kurien and Paul (2001). This study also provides useful information on individual earning dynamics such as the variability of individual income, which is a share of the sum of income from an enterprise.

According to Kurien and Paul what matters to the fisherman is that:

> *A fisherman would depend in large measure on his contribution to the labour of the specific fishing trip and to his overall share, if at all, in the capital of the enterprise. This, and the fact the harvest from the sea is a fluctuating fortune and the price of first sale is by no means predictable, results in highly fluctuating daily incomes* (Kurien and Paul, 2001, p.9).

Kurien's (2005) paper is written in the style of a personal statement. It moves from social security and livelihoods to provide insights into the manner in which Kerala's fishery has become unsustainable since the 1980s. A description of the important aspects that led to this unsustainable fishery can be found in his earlier work with Thankappan, in which they restricted their assessment to five major areas:

> *(a) the open access nature of the fishery (b) the use of inappropriate technology (c) the demand-pull factors that create galloping prices (d) financial subsidies offered by the state which encourage investment and (e) the pressure of population on the coastal commons* (Kurien and Thankappan, 1989, p 11).

The studies reviewed here have attempted to express the relationships between coasts, coastal fishing communities and the resources they depend on for their livelihoods. They leave several questions unanswered, namely how the households in community respond to changes in the status of bio-physical, social, cultural, political and institutional assets on which they base their livelihoods and whether the status of these assets are impacted by environmental degradation or changes in their access/rights. The sustainable livelihoods framework is useful in this regard, to fill in these gaps and explore different types of information on assets and strategies of the coastal artisanal fishing communities that can help policy makers, researchers and resource managers explain the

circumstances of fishers and their households and to develop management strategies to ensure their well-being and conserve marine resources.

2.7 Summary

This chapter has reviewed the approaches and framework of the concept of Sustainable Livelihoods that is the basis of this study. It gave an overview of the approach as well as other approaches that attempt to address poverty issues. It then focused on the Sustainable Livelihoods Framework, exploring different components in the schematic diagram that was developed by DFID and UNDP. It also explained the modifications made in the framework that would help this study map key priorities, identify links between localized phenomena to wider national and international processes.

The chapter also reviewed the literature on Resource Dependency, which is fundamentally important in this research, but is generally poorly understood in the developing-countries context, and is distinct from dependency in developed countries. Finally, a few case studies have been reviewed to highlight the particularities of specific choices that people make for their survival strategies that have evolved, and the decisions governments make in mediating these relationships at a micro level.

Chapter 3

Coastal Livelihoods

This chapter sets the context for investigating livelihood options in coastal artisanal fishing communities. It takes into consideration issues of sustainability regarding fish resources and physical, political, economic and socio-cultural assets on which the households build their livelihoods. It begins by examining fishing communities' access to assets, particularly in the Small-Scale Fisheries (SSF). It then illustrates how the artisanal fishing communities are constrained in their access to assets within the context of civil society and the economy of India. It then examines how India's caste system affects livelihood options in coastal fishing communities.

3.1 Coastal livelihoods in Developing Countries

The coastal sea is the most biologically productive zone of the marine environment because of its high level of biological diversity, including coral reefs, marine mammals, and economically important fisheries (Stegeman and Solow, 2002). World's coastal marine resources and services are valued at US $ 21 trillion (McGinn 2002). The US Commission on Oceans Policy (2004) reports, however, that there are serious threats to the coastal environment from coastal population growth, pollution, and over-fishing. The blueprint for Oceans Policy states that, "*expanding coastal sprawl can also destroy natural habitats, thus compromising the environment's ability to provide*

food and refuge for wildlife or supply ecosystem services, such as maintaining water quality" (Commission on Oceans Policy, 2004. P.42). Increasing coastal development presents stresses and greater vulnerability to the coastal communities. There is a tremendous influx of human population flocking to coastal settlements since the beginning of this century. Fourteen of the 17 of the world's mega-cities with a population of more than 10 million are located in coastal areas, and 11 of them are in Asia. According to Tibbetts (2002), these mega cities are sprawling across coastal environments, degrading coastal habitats and destroying important natural resources. Two-fifths of the world's major cities of 1-10 million people are also located near coastlines (Tibbetts, 2002). Habitat degradation is particularly intense in poorly managed coastal areas. Estimating threat to coral reefs from human activities, mainly in Caribbean and Latin American countries, Burke and Maidens (2004), found that dredging, land reclamation, mining of sand and limestone, dumping of spoils, runoff from construction, sewage discharge from human settlements, uncontrolled tourism, poorly planned and implemented construction and careless recreation on reefs are the major causes for the degradation of marine habitats.

The dynamic nature of the coasts compels coastal communities to adapt to the constant changes in the environment. This is particularly true for the poor who risk their lives to derive livelihoods from the coastal resources and live on the margins of the land. While the dynamic elements of the coastal environment pose risk to their life and livelihoods, they also represent areas of opportunity for the poor (Hunter, 2006; IMM, 2003). Opportunities arise from the common pool of coastal resources that the poor are able to access. Coastal zones offer many opportunities for the poor. For example, a number of women and children are engaged in the collection of wild shrimp seed for the

hatcheries that supply shrimp fries to the thriving aquaculture industry. This opportunity came along with the development of coastal aquaculture (IMM, 2003). Farmed and marine capture fisheries in Asia account for over 7.6 million tonnes of fish, sharks, shrimp, crabs, cephalopods and other invertebrates. More than 50 percent of the production is consumed within Asia (Stobutzki *et al*., 2006). Fish constitute the main source of protein intake for both coastal and inland populations in Asia.

Most of these coastal communities in developing countries are poor and their high dependence on natural resources makes them vulnerable to any changes in the resource situation (Pomeroy *et al.,* 2006). The changes in the resources situation are mainly due to coastal habitat degradation, overfishing of coastal fish stocks and excess fishing capacity (Caddy and Seij, 2005; Silvestre *et al.,* 2003). Increased demand for fish and fish products, combined with the move by many nation states to liberalize their economies so as to ease market access, led new entrants into fisheries. Trawl fishing took a prominent role among new entrants. Although primitive trawl nets were in use as early as 1376, trawling on an industrial scale started only in the 1970s and became widespread in developing countries during late 1980s (Gianni, 2004). Morgan *et al.*, (2005) attribute the reason for increased trawling to rising demand for fish in developed countries. Bottom trawling is now recognized as one of the world's most destructive type of fishing, summarized as "plunder and push on" (Morgan *et al.*, 2005). Commercial fishing has had an impact on nearly all of the known seamounts with summits shallower than 1,000 meters (Stone *et al*., 2004).

Most fisheries in developing and developed countries and along all coasts are now recognized as being heavily exploited or overexploited (FAO 2001). Among the many competitors who access this common pool resource of the ocean, small-scale fisheries, in

Asia account for the largest employment and an important share of fishery output (Kurien, 2003). Small-scale fisheries and aquaculture make a significant contribution by providing the means of livelihoods, particularly in labour-surplus coastal economies in developing countries.

3.2 Small-scale Fisheries in Developing Countries

Small-scale fisheries are an important characteristic of fisheries around the globe. In its broadest definition, a small-scale fishery (SSF) relates to traditional or artisanal fisheries. These typically involve entire households, relatively small capital investment, low energy use, the use of either small fishing craft or none, fishing close to shore, and catering to local consumption (UN, 2000). Depending on local circumstances and country, however, the interpretation of the term varies. For this reason, the FAO Working Group on SSF found it inappropriate to formulate a "*universally applicable definition*" for SSF (FAO, 2004b). Instead the report suggests a definition based on the range of characteristics particular to that specific fishery:

> *"Small-scale fisheries can be broadly characterized as a dynamic and evolving sector employing labor-intensive harvesting, processing and distribution technologies to exploit marine and inland water fishery resources. The activities of this sub-sector, conducted full- time or part time, or just seasonally, are often targeted on supplying fish and fishery products to local and domestic markets, and for subsistence consumption. Export-oriented production, however, has increased in many small-scale fisheries during the last one to two decades because of greater market integration and globalization. While typically men are engaged in fishing and women in fish processing and marketing, women are also known to engage in near shore harvesting activities and men are known to engage in fish marketing and distribution. Other ancillary activities such as net-*

> *making, boat building engine repair and maintenance, etc. can provide additional fishery-related employment and income opportunities in marine and inland fishing communities. Small-scale fisheries operate at widely differing organizational levels ranging from self-employed single operators through informal micro-enterprises to formal sector businesses. This sub sector, therefore, is not homogenous within and across countries and regions and attention to this fact is warranted when formulating strategies and policies for enhancing its contribution to food security and poverty alleviation"* (FAO. 2004b, p 21).

FAO estimates that there are 38 million fishers (2004b) and fish-farmers across the globe, and that 90 percent of them are engaged in SSF activities. An additional 100 million people are believed to be dependent on associated occupations (FAO 2004b). SSF are the main drivers in many rural economies. Although they are found across developed and developing countries, it is in developing countries that their contribution to food security, nutrition and poverty alleviation is most apparent (FAO, 2004b). In the Mekong Delta region of South East Vietnam, for example, more than 15 million people are classified as small-scale fishers (Staples *et al.*, 2004. P.1). In Indonesia, FAO estimates that 2 million ocean going fishers use non-motorized canoes (FAO, 2000). A survey conducted by World Resource Institute in 2000 revealed that 89 percent of Philippine's low-income small-scale fishers feed their families from the daily catch. In Thailand 50,000 households spread over 2500 rural fishing villages, subsist from small-scale fishing (World Bank, 2004).

International and national legal instruments have recognized the importance of small-scale fisheries. Section 17.74b in Agenda 21 of the Rio Declaration on Environment and Development of United Nations, emphasizes that States should take into account traditional knowledge and the interests of local communities, small-scale

artisanal fisheries and indigenous people in the design of fishery development and management programs. Article 6.18 of the Code of Conduct for Responsible Fisheries developed by FAO also recommends the protection of the rights of fishers and fishworkers, particularly those engaged in subsistence, small-scale and artisanal fisheries so as to provide them with secure and just livelihoods. It also recommends that artisanal fishers be given preferential access to traditional fishing grounds and resources in the waters under their national jurisdiction (FAO, 1995). Although the Code of Conduct is a voluntary instrument and therefore, not binding on any country to implement it, several countries have adopted it. In India such a measure is already adopted in law by having exclusive zones for artisanal fishing. A national level committee was constituted to oversee the progress of implementation of the Fish Code. The Code has been translated in to all the regional languages spoken along the coastal belt (FAO, 2007a). Other legislation that is relevant in applying the Code to Indian fisheries sector are The Territorial Waters, Continental Shelf, Exclusive Economic Zone and other Maritime Zones Act, 1976 of India. The Maritime Zones Act (1976) of India, for example, recognizes (Section 7 Para (4) (a)) the sovereign rights to conservation and management of living resources in the Indian EEZ in addition to their exploration and exploitation. Section 15 (c) further gives power to the Central Government to make rules, *inter alia*, for conservation and management of the living resources of the EEZ and Section 15 (e) for the protection of the marine environment (Mathew, 2000).

International recognition of the importance of SSF in providing food and income to impoverished communities, spurred the development of the sector with international funding assistance. The sixties and seventies saw a dramatic increase in small-scale fishing capacity. Together with improved fish processing and modern marketing

techniques through value additions to the catch (canning and vacuum packaging of fresh fish), the fishing industry has undergone continuous changes (Pauley and Palomares, 2005; ICSF, 2003). Fisheries cooperatives were developed to prevent exploitation of fishers by middlemen, and to protect fishers from indebtedness. Support for the development of SSF was gradually reduced when national government turned to the development of larger capital investments in industrial and offshore fishing, and redefined their exclusive economic zones to 200 nautical miles. This created many new challenges for the communities and households in the SSF sector. Kurien and Thankappan (1998, P.14) states,

> *…in the fish economies of developing Asia the structural adjustment program resulted in fresh compulsions to adopt new technologies, pressure to export more fishery products and efforts to redefine the access rights to the coastal marine resources.*

There has also been movement by some nation states to devolve fishery management to lower administrative units. This creates a paradoxical situation whereby the increasing opportunities that decentralization offers in decision-making relating to natural resources is at odds with national trade liberalization initiatives. Development of coastal infrastructure such as road, rail and harbor became the priority. Parallel to this development, increasing urbanization and tourism impinged on traditional grounds of coastal communities.

Pressure to meet increasing demand for fishery products lead to widespread development of coastal aquaculture. Among the farmed finfish, oysters, mussels and other shellfishes, shrimp became most favored. Booming trade and profit in shrimp attracted investment in coastal aquaculture but the negative impacts such as loss of

mangroves, salinization of ground water and pollution of coastal waters due to effluent discharge, destruction of fish habitats and increasing demand for property development displaced them from their habitats and loss of direct access to the sea (ICSF, 2003).

3.3 Coastal India – society and economy

India is the largest sovereign nation in the South Asian region. Although it has a secular and democratic constitution, and the states are divided on a linguistic basis for the sake of administration (Figure 3.1), its social and political life is determined by diverse facets of religion, caste and class. India's pluralistic traditions and secular, democratic constitution are often under severe strain due to religious and caste-based politics. Religion, caste and their various subgroups influence every aspect of day-to-day life (Deshpande, 2000).

India supports over sixteen percent of the world' s population (GOI, 2000). Census enumeration of 2001 revealed that India became the second country in the world after China to officially cross the one billion mark; population stood at 1,027,015,247 while China has 1,227,600,000 (Census of India, 2001). India's decadal growth of population since the turn of the century was phenomenal – from a mere 238.4 million in 1901 to 1027 million in 2001. The long-term objective of the National Population Policy of the Government of India is to:

> "*Achieve a stable population by 2045, at a level consistent with the requirements of sustainable economic growth, social development, and environmental protection*" (GOI, 2000, p.4).

Between 1991-2001 there was an increase of 180 million people. The net addition since 1961, however, has shown a steady declining trend. The declining fertility rate is

acclaimed to be in tune with the fifth phase in the classical theory of demographic transition (GOI, 2000).

India's economy is characterized by two distinct periods since it's independence in 1947: Pre-liberalization phase till late 1970s and liberalization phase after the 1980s. The former period is characterized by centralized government planning and import substitution industries (such as textile manufacturing to various heavy industries, transportation and telecommunication). Economic growth was built largely on unsustainable increases in public expenditures and excessive foreign borrowing (Srinivasan, 2003). Sixty percent of the population derives livelihoods from agriculture but account for only 18.3% of gross domestic product (GDP) in 2005 (World Bank, 2007). The liberalization phase is characterized by increase in privatization of the economy (particularly government controlled public sector industries, service sector and reduction in tariffs on imported capital goods) and rapid growth in information technology (Rao and Dutt, 2006). Trade liberalization had severe implications on the fisheries sector particularly in coastal states where effective fisheries management is absent or being influenced by stronger industrial lobby. With liberalization, trade in seafood has become a primary source of export earnings (Roheim, 2004). Consequently, fisheries production in captured fish and aquaculture has doubled in the last 30 years (FAO, 2000a). Over half of global fish exports by value come from the developing nations (Roheim, 2004). Another notable feature of trade liberalization is the reduction of tariff barriers in the seafood sector. Developed countries increasingly turned to use countervailing and antidumping petitions as a means to erect trade barriers to seafood imports from both developed and developing countries. For example, India and the US have bilateral trade relation and US is the largest trading partner of India. However, the

U.S. has a track record of countervailing and antidumping suits in seafood products and currently, anti dumping and countervailing duties is imposed on frozen or canned warm water shrimp and prawns (USITC, 2006).

Comparing the growth prospects of the leading emerging market economies — Brazil, Russia, India and China (BRIC) — with those of the G-8 countries - the US, Canada, the UK, France, Germany, Italy, Russia and Japan, Goldman Sachs[1] predicts that the combined size of the BRIC economies will exceed that of the G-8 countries in dollar terms by 2039. At present, they account for just 15 per cent of the combined GDP of the G-8.

> *India has the potential to show the fastest growth over the next 30 and 50 years. Growth could be higher than 5% over the next 30 year and close to 5% as late as 2050 if development proceeds successfully* (Wilson and Purushothaman, 2003, p.4).

Among the many sources of potential dynamism that trigger economic development in the country, projections based on assessment from demography gain popularity, characterized as "*demographic dividend*" (Chandrdasekhar and Ghosh, 2006; Srinivasan, 2006). Also called demographic bonus, this situation occurs when a nation has the advantage of a large population of the working age-group between age 15-59. However, this dividend is an advantage only when the working age group within the population's age structure remains large and thereby has fewer dependent age groups. When the dependency ratio is smaller, it is favorable for the economies to boost savings and increase its investments in human capital. India has a very large working population (Sundaram, 2007). According to Census of India's estimate, there is a surplus of 47

[1] Goldman Sachs acts as a financial advisor to some of the most important companies, largest governments, and wealthiest families in the world and is one of the world's most prestigious global investment banks. It is a primary dealer in the U.S. Treasury securities market.

million people in the working age group (Census of India, 2001). While this demographic dividend could open up a window of opportunity for India, critics point out that the policy environment may not be conducive to take advantage of this (Chandrasekhar and Ghosh, 2006; Srinivasan, 2006; Navneetham, 2002). The new liberalized economy with its current stage of demographic transition is set to take off to a higher economic growth trajectory. Another aspect that has been pointed out is the impact of free capital flow in the new liberalized economy leading to economic stagnation and greater unemployment (Patnaik and Rawal, 2005). According to Patnaik and Rawal (2005), such direct foreign investment will only replace domestic investment and also the import content of the output flow is higher than that of domestic investment causing de-industrialization and unemployment.

Coastal India has a population dynamics that is distinct from the rest of the country. For example, the fertility rates are higher and the sex ratios are favorable to females. Coastal communities have higher population growth rates than the rest of the country, which has resulted in higher densities. This has placed increased stress on coastal ecosystems.

In India, the scarcity of natural resources has begun to preoccupy policy-makers, conservationists and researchers, as conflicts over resource use are rising (Baviskar, 2003). Estimating the extent of damage and degradation of India's natural resources since independence, project GREEN (Growth with Resource Enhancement of Environment and Nature) suggests that India was losing over 10% of its GDP as a result of damage and degradation of its natural resources (Pachauri, 2004). In coastal areas, high population densities, demographic pressure, changes in landuse, pollution and related industrial

development added pressure on natural resources (Damodaran, 2006; Kaladharan *et al*., 2005; ICSF, 2003).

India has a large coastline of 8,118 km that is occupied by diverse groups of fishing and non-fishing communities. The people speak different languages, follow different religious faiths and have a very complex caste system. More than 3 million fishers spread over 3,638 fishing villages derive their livelihoods from capture fisheries which are spread over the 2 million sq. km of Exclusive Economic Zone of India (Table 3.1). One out of three are active in fishing and there is a large population dependent on fishing in these villages.

Although both the seafaring traders and fishing communities were not always compatible with each other, they have undergone substantial transformation in the past century as improved technology opened up different opportunities of mechanization, motorization and infrastructure development through roads, railways and communication (Sebastian, 2005; Ramachandran, 2005). Consequently, trade improved as old sailing vessels that carried goods across to distant countries and along the coast to distant markets were replaced by modern ships and cargo carriers. While corporate trading

Table 3.1 A Profile of marine fisheries in India

Marine fishers population	3 million
Marine fishers households	0.50 million
No of active fishers	1.025 million
Ratio of active fishers to total	1:3
Average number of sea-going fishers per village	282
Average number of fishers population per village	825
Fish landing centers	2251
Marine fishing villages	3638

Source: Central Marine Fisheries Research Institute (CMFRI) - Indian Council of Agricultural Research, Cochin, India (2001).

companies operated these large cargo vessels; small scale and traditional fisheries became more capital-intensive competing with industrial fisheries. The focus shifted from fishing for survival to maximizing profit. Countries and companies began to establish national and private rights over marine resources. One of the major outcomes of this process was a need to establish the Law of the Sea. In the background paper to the Lome Convention of 1982, UN report justified the need for establishing territorial rights of the nations,

> "*A tangle of claims, spreading pollution, competing demands for lucrative fish stocks in coastal waters and adjacent seas, growing tension between coastal nations' rights to these resources and those of distant-water fishermen, the prospects of a rich harvest of resources on the sea floor, the increased presence of maritime powers and the pressures of long-distance navigation and a seemingly outdated, if not inherently conflicting, freedom-of-the-seas doctrine - all these were threatening to transform the oceans into another arena for conflict and instability*"(UN,1998.http://www.un.org/Depts/los/convention_agreements/convention_historical_perspective.htm#Historical%20Perspective)

This convention enabled countries to establish an Exclusive Economic Zone (EEZ) of 200 nautical miles. Within the EEZ, countries are responsible for managing fisheries on a sustainable basis. Consequently, governments in these countries formulated legal mechanisms and investment incentives. In India, the small-scale fishworkers and their unions, however, were concerned that these measures were implemented to privatize and develop marine areas for open ocean aquaculture and other industrial uses (Mathew, 2005).

By the 1990's and with the New Economic Policy, the role of the Government of India decreased considerably, paving the way for liberal policies where market conditions alone would stimulate development. Fish landings increased considerably between1985 and 2000 (CMFRI, 2005b). The economic and social status of the working fishers, however, did not improve substantially. At the same time, the new trading class in this sector, especially the marine products exporters, made enormous profits. There also emerged a new owner class of mechanized boats (trawlers) mostly represented by people from outside fishing communities. This was not a uniform process all along the coast. In terms of the fishing technologies used, dramatic changes occurred even among the traditional fishers, especially in the last two decades. More capital intensive, fossil-fuel dependent, active (as opposed to passive fishing techniques) and very efficient technologies are in use everywhere. While this has helped traditional fishers to compete with mechanized trawlers, their net returns did not improve. In many areas, there is fierce competition even among the traditional fishers themselves. The resource depletion that this kind of competition has resulted in, is the crisis faced by the fishers all along the coast. By the late 1980s, the World Bank's support for developing nations to open up traditional fishing grounds to foreign trawler fleets and entering into joint venture industrial fishing began to impact the traditional fisheries sector in India. Since 1990s, the Government of India approved over 100 international joint ventures for deep-sea marine fishing and processing in its waters. The goal was the massive export of fish to earn foreign exchange, an opportunity augmented by the Structural Adjustment Program (SAP) advocated and sponsored by World Bank and the International Monetary Fund (IMF). The government approval for joint ventures in fishing rights directly affected the livelihoods of 8 million artisanal fishers (Dietrich and Nayak, 2003). The Central

Government's policy was to promote the maritime states through centrally sponsored schemes for providing infrastructure facilities to increase fish production from the inshore waters. It also encouraged deep-sea fishing by larger trawlers in the private sector by providing soft loans (Dietrich and Nayak, 2003). Government did not initiate any management measures in fisheries till late 1970s. It was only in the late 1970s, subsequent to conflicts between the small-scale traditional and mechanized fishers, that the States were asked to enact legislative measures. The national government urged increased production to earn better foreign exchange earnings: "*sustained high rates of growth of exports will be essential for keeping the current account deficit within manageable limits*" (GOI, 2002, p 12). At the national level, the basic fisheries legislation is the Maritime Zones of India Act, 1981 (Regulation of Fishing by Foreign Vessels). Fisheries within the 12-mile territorial limits are managed under the Marine Fishing Regulation Acts (MFRAs) of the coastal States, to protect the interests of fishers on board traditional fishing vessels. MFRA was enacted in response to demand from artisanal fishers operating un-powered fishing vessels to protect their fishing space and equipment from bottom trawlers. During the enactment of this legislation, there was increasing conflict between the trawl sector and artisanal sector over access to fishing space and resources, occasionally leading to destruction of life and property (Bavinck, 2005; Kurien and Vijayan, 1995). An important legislation for regulating the use of coastal areas on the landward side is the Coastal Regulation Zone (CRZ) Notification of 1991. This notification was issued under the provisions of the Environment (Protection) Act of 1986. CRZ lays out details as to permissible and non-permissible development activities within 500 meters from the highest high tide line of the sea. It defines the coastal stretches of seas, bays, estuaries, creeks, rivers and backwaters which are influenced by tidal action in

the landward side, up to 500 m from the high tide line (HTL) and the land between the low tide line (LTL) and the HTL, as the CRZ. The CRZ has been classified into four categories for the purpose of regulating development activities. Maximum restrictions apply to the ecologically sensitive areas and heritage sites of CRZ-I. Although the notification provided scope for setting up coastal management authorities at the national and state levels to identify and prepare coastal management plans, it was ignored by the states until the Supreme Court of India made a judgment on the fate of coastal shrimp aquaculture. Most of the modern coastal shrimp aquaculture farms were located in these zones, and were a prohibited activity within CRZ regulations. Coastal aquaculture, on the other hand, had already made an impact on the Indian economy despite its increasing conflict with the fishing communities and environmental groups. In India, the early 1990s witnessed the opening of the economy through export-oriented programs. Coastal aquaculture, particularly shrimp farming, was given high priority in terms of policy, strategy and planning at the national level. The government sponsored several people-oriented and production-oriented development programs for augmenting marine product exports (Mulekom *et al*., 2006; Krishnan and Viswakumar, 2001). Attracted by government subsidies and incentives in terms of soft loans, tax breaks and import tariff relaxation, a large number of private entrepreneurs and corporations invested in shrimp farming. This, in turn, resulted in very high production of shrimp in the first half of the 1990s in India (Pandian, 2001). Total shrimp exports rose from 58,000 metric tons valued at US $115 million in 1989-90 to 101,000 metric tons valued at US $ 623 million in 1994-95 and in 2003-04, the export of shrimp was 130,000 metric tons, valued at US $ 997 million (MPEDA, 2007).

In addition to coastal aquaculture, there were other interest groups such as property developers, tourism promoters and resort builders who were also impacted by the regulations imposed on their development activities. Even the coastal communities were dissatisfied with Floor Space Index (FSI) restrictions imposed on their dwelling units by CRZ regulations (Nandakumar and Murali, 2000). Apart from CRZ, which impacted all of coastal India, a significant legislation at State level is that of the Kerala Fisheries Development and Management Policy of 1993. It has a strong focus on issues of poverty and livelihood security. The policy highlighted the need for reforming legislation pertaining to the territorial and inland waters to ensure that the rights of ownership of fishing assets rest only with those who fish. It also called for the "right of first sale" to be ensured to the fish harvester. Rights to sell fish harvested by the fisher rested with financiers or landlords who allowed the fishers to build small thatched huts near the seashore. Financiers claimed this right by not charging interest to the money they advanced to the fisher and landlords, not taking rent for the land and house. It is more profitable to claim fish and fix price arbitrarily (Kurien, 2005). The policy also stresses the need to improve coordination among various government supported institutions, to improve credit availability, to raise the level of skills and productivity of fish workers, to raise the socioeconomic status of those involved in fisheries-related activities, and to enhance the participation of fish workers and women in the management of coastal resources and in the fish economy (Government of Kerala, 2004). Although this policy initiative was the first of its kind in the country, the policy has yet to be translated into concrete programs of action (ICSF, 2003).

Estimates of the potential fishery resources of India's Exclusive Economic Zone stand at 3.8 million metric tonnes as per 2002 data (FAO, 2004). Of this, 73 percent of

the demersal and 71 percent of the pelagic fish resources are found along the west coast. Three-fourths of the fish are caught within 50 meters of the continental shelf where the artisanal fishing communities operate. This resource is distributed in inshore waters (58%), off shore (35%) and deep seas (7%). According to the estimates, the major shares of the resources are demersal (2.02 million tonnes) followed by pelagic (1.67 million tonnes) and oceanic species (0.24 million tonnes) (CMFRI, 2005). Thus more than half of the marine fish resources are found within the inshore waters, which is a considerably smaller area than the offshore and deep seas. According to the Ministry of Agriculture of the Government of India, the current annual marine fish landings of the country is around 2.7 million tons, indicating that there is scope for further augmenting fish production by about 1.2 million tons (GOI, 2004b).

Table 3.2 Continental shelf area and potential marine fishery resources

	Length of coastline in Km	Continental shelf area in Sq. Km	Potential fish resource within 50 m depth in tones
India	8118[1]	0.5 million[1]	2.28[2]
Kerala	590[3]	39,139[3]	571,317[4]

Source: [1]GOI, 2004b. [2]Yadava, 2004. [3]DFID, 2003. [4]Alagaraja, 1994 (Lack of consistency and unavailability of current data are major constraints for any study on Kerala)

The following table gives the production figures for both marine and inland fish catch since 1950 (Table 3.3). Although marine fish catch dominated the total production till the late 1980s, with the boom in farmed fish and shellfishes, production figures showed a sharp increase during the 90's and exceeded that further after 2002.

Table 3.3 Marine and inland fish catch 1950-51 to 2004-2005

Year	Marine	Inland	Total
1950-51	5.3	2.2	7.5

1960-61	8.8	2.8	11.6
1970-71	10.9	6.7	17.6
1980-81	15.6	8.9	24.4
1990-91	23.0	15.4	38.4
2000-01	28.1	28.5	56.6
2002-03	29.9	32.1	62.0
2003-04	29.4	34.6	64.0
2004-05	27.8	35.3	63.1

Source: Government of India, Dept of Animal Husbandry and Dairying, Ministry of Agriculture, New Delhi, 2004a.

The good fishing season varies in India between the west and east coasts (Madhupratap *et al.,* 2001). For example, for Karnataka and Kerala on the west coast, July to March is considered to be the best fishing season while in the east, Tamil Nadu and Andhra Pradesh enjoy a good season during October to March (Figure 3.1).

The estimate of fisheries contribution to the economy in terms of the fish and fish products exported during 2005-06 was USD 1.6 billion (MPEDA, 2006). Most of this, about 67 percent, comes from the mechanized fishing units (ICSF, 2003). Mechanized fishing units[2] dominate along the west coast, except for Kerala where fishing is dominated by motorized units.

The objectives of a planned development in fisheries evolved only after India attained independence. State jurisdictions for administrative purposes were limited to 12 nautical miles from the shoreline while the Central Government controlled the sea beyond that to 200 nautical miles of EEZ. The 12-mile territorial limits for fisheries are managed under the Marine Fishing Regulation Acts (MFRAs) of the coastal States.

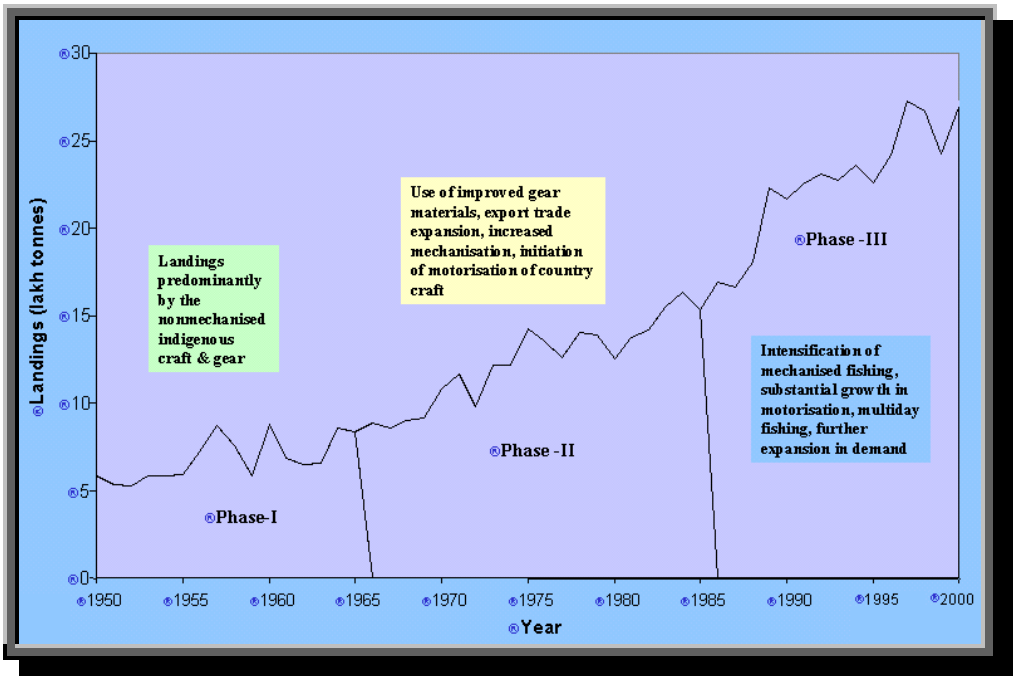
[2] Mechanized fishing units referred here meant for the craft and gear combined and particularly when the bottom trawl nets could be operated only from the mechanized boats. Motorization, on the other hand, refers to use of outboard motors either in traditional *Vallam, Kattamaram* or in plywood boats.

MFRAs regulate fishing vessels within their territorial sea mainly to protect the interests of fishers, as traditional fishing was largely concentrated in the inshore waters. India's five-year plans, particularly the plan of 1997-2002 laid emphasis on development of deep-sea fishing. However, there is now recognition of the need for conservation and management, in view of the over-fishing, particularly of coastal waters. Modernization that was heavily state subsidized, meant the introduction of new craft and gear and the development of landing centers and fishing harbors thereby centralizing the fish landings. The Central Government played a crucial role in this growth by creating infrastructure through the Centrally Sponsored Schemes, and facilitating a network of scientific and

Figure 3.1 Map of India with its coastal states and Union Territories

research institutions, organizations and export trade promotion agencies. Meanwhile, state governments created fishermen cooperatives as grass-root economic organizations to help the poor access political and financial assets. These organizations gradually became yet another bureaucratic set up for disbursing subsidies. However, by the 90's, the New Economic Policy with market liberalization led to a considerable reduction in the role of the State.

Figure 3.2 Estimated total marine fish landings in India over different growth phases



Source: Central Marine Fisheries Research Institute, Cochin.
http://www.cmfri.com/frad_grph02_b.gif

With the shift in economic policy, trade increased and there was increasing pressure to harvest more. Export of fish and fish products recorded an all time high - from USD 7.6 million in 1970-1971 to USD 1.6 billion in 2006. Shrimp aquaculture has come to occupy an important place in exports, with 56 percent of shrimp exports (in value terms) coming from cultured shrimp in 2006 (MPEDA, 2006). However, the

economic and social status of fishworkers remained the same while the new trading class, called marine products exporters, made enormous profits (Dietrich and Nayak, 2003; Kurien, 2004). Fishing became an attractive business proposition and people from non-fishing communities took shares or bought new mechanized trawlers and hired fishers to work on their trawlers. Meanwhile the traditional fishery was also undergoing dramatic changes over the last two decades, as more capital intensive, fossil-fuel dependent and efficient technologies replaced wind and human powered country crafts. Switch to motorized craft helped the traditional fishers compete better with the mechanized trawl sector. However, it did not improve their net returns as competition among and within them increased, as did the number of motorized units. The combined effects of over fishing and increased use of non-selective gear groups such as bottom trawling, lead to resource depletion and degradation of the coastal waters (Kurien, 2005). This led to over capitalization in fishing capacity in both mechanized and traditional sectors. The spin off effect from increased motorization, however did benefit subsidiary sectors such as nylon net-making companies, outboard motor retailers, plywood and fiberglass boat building industries who reaped larger profits than fishing communities improving their living standards (Kurien, 2005).

Another initiative from the State is to regulate fishing efforts during the spawning periods, particularly shrimp, with a ban on fishing by all mechanized vessels. The ban usually commences from the onset of monsoon rain-bearing winds in June and continues until August 15. The ban, at present is applicable to all mechanized craft including country craft, boats and canoes fitted with inboard or outboard motors and other mechanized boats using nets for the purpose of fishing within the territorial waters of coastal states. This ban is implemented with the help of the Coast Guard and naval

authorities. Violations of this ban result in the suspension or cancellation of licenses or registrations. Fishing vessels can also be seized. During the ban period, all fisheries harbors and landing centers are sealed, and are in the custody and control of the district magistrates. As a precaution, diesel fuel retail outlets that are attached to the harbors and landing centers and operated by fishing co-operatives, are required to shut down during this period. Insurance companies are also given orders to suspend insurance policies and not to entertain any claims of compensation due to accidents occurring as a result of fishing activity during the ban period. Another measure is the directive given to the Regional Transport Office to cancel the licenses of vehicles used to transport fish illegally caught during the ban period (Tenzing, 2006).

In November 2002 the Government of India announced new "Guidelines for fishing operations in the Indian EEZ", which applies to fishing operations by all vessels flying the Indian flag. It focuses on the registration status of the fishing vessels, unlike the previous policy that stressed the mode of acquisition of vessels. Under the new guidelines there is no obligation for the vessels to return to their base in a stipulated time. They can undertake mid-sea transfer of catches, employ foreign crew, move to other EEZ or high seas, and return again. Technically, this means that the same fishing vessels can fish under different flags and return legally to the Indian EEZ. As there are no vessel quotas or license fees based on the value of the catch, these regulations favor foreign fishing vessel operators registered as Indian companies. These new guidelines were opposed by fishers' organizations of the country as more foreign fishing vessels of larger size entered Indian seas (Government of India, 2004). They raised questions about whether large deep-sea vessels (more than 20 m length) were needed in India. The

government, in turn, did not address or acknowledge the fact that about a quarter of the mechanized fishing vessels in the country are capable of fishing beyond the territorial waters and were actually doing so. Fishing boats in states like Kerala, Gujarat, Tamil Nadu and Andhra Pradesh have already shown that they are capable of harvesting resources up to 200 miles offshore and beyond. These boats are called high-tech boats and are involved in multi-day fishing trips of between10 to 30 days and employ 4 to 6 workers in each. They employ modern equipment including GPS, fish finders, eco-sounders and wireless communication devices (Dietrich and Nayak, 2003).

There is a growing awareness in the government that there is a need for improved fisheries management in both the inshore and offshore waters, and that focusing only on increasing production is not the best option. The national government has recognized that

> "*Exploitation of resources within the 50 meters depth zone is showing symptoms of depletion and in the inshore waters it tends to cross optimum sustainable levels...policy guidelines, therefore calls for a stringent fishery management system to be in place*." (GOI, 2002b. Online http://dahd.nic.in/fishpolicy.htm).

However, no tangible measures have been implemented to conserve and manage Indian fish resources.

3.3.1 Caste system within coastal fishing communities

More than one million households in coastal communities belong to the major religious groups of Hindus, Muslims and Christians. Cutting across these three major religious groups, however, is a very complex social phenomenon known as the caste system. It is, by and large, a source of social identity particularly in rural India. Coastal

communities in India, particularly marine fishing communities, have very low social status as they are considered to be at the lower echelons of the caste system. Lower castes were untouchables prior to India's independence in 1947. According to Mukherjee,

> *"The jati division of society was viewed in the realm of "Cultural" relations, viz. inter-dining, intermarriage, purity-pollution, and such other customary behavior and perception. The fact that in British India the landlords, big landowners, wholesale traders, moneylenders, etc., belonged essentially to the high castes was overlooked, as was the fact that the bulk of self-sufficient peasants, small-scale artisans, petty traders, etc, belonged to the middle castes in general. And, those at the lowest echelon of the growing colonial-capitalist class structure (such as, the marginal peasants, landless workers, etc.) belonged overwhelmingly to the lowest castes and the "Tribes." This is how the caste structure had invaginated* (infiltrated) *itself into the class structure that evolved in colonial India"* (Mukherjee, 2000, P.334).

Post-independent India abolished untouchability and initiated compensatory, affirmative action in education and employment for *Harijans* (children of God) who had gone through centuries of social and economic prejudice. In modern India, caste identity consciousness has increased.

> *…untouchable castes that were once considered supine and docile are now militant, aggressive and fully conscious of their power and rights in a democratic polity* (Gupta, 2004, p *X*).

Their expressions are found in being identified as *dalits*[3] and their goals are the annihilation of caste, the promotion of *dalit* identity and *dalit* integration. Communal and

[3] *Dalit* is the most politically correct of many terms used to refer individuals and communities considered lower in the hierarchy of the Indian Caste System.

caste conflicts often constrain the livelihood options of local communities and limit their ability to take advantage of development opportunities (DFID, 2004).

As a whole, coastal communities do not form one uniform caste. Within a community there can be numerous sub castes. Religion may cut across sub castes and members within a sub caste may belong to different religions. Children of inter-caste marriages often take on the father's caste lineage (Anderson, 2003). Often the occupations that they are engaged in reveal their caste identity. *Kattamaram* (Catamaran) fishers belong to one caste, while shore seine fishers may belong to another. It is not very common to find intermarriage between sub castes. For example, members from a family using shore seine nets may not marry into a family of catamaran fishermen due to the difference in sub caste affiliation. However, modernization has played a key role in eliminating to a certain extent the caste feelings. Political factors have been decisive in delivering economic benefits thereby reorganizing them into a non-caste based social groupings (Krishna, 2001).

The caste system plays an important role in determining the livelihood options of the poor. The way it operates varies throughout the country. However, using National Sample Survey data, Deshpande (2000) observed that inter caste disparities underlie overall inter group disparities (such as religion, caste, region, class and gender). This was found to be the case "*even in a relatively egalitarian State like Kerala*" (Deshpande, 2000). Coastal Kerala mainly has only two castes – *Mukkuvar and Arayar.* There are, however, numerous sub castes (often based on their profession) within these two castes. Many of the members of certain sub castes are not active fishers and their work involves

services such as barbers and head-loaders[4]. Middlemen, contractors and boat-owners may belong to higher sub caste groups.

The geographical spread of the caste system among the coastal fishing communities in Kerala is also unique. The southern districts are predominantly Latin Catholic Christians with small pockets of Hindus and Muslims, while central Kerala has a concentration of Araya or Dheevara of Hindus. The northern districts are dominated by Mapilas of the Muslim community. There are sub-castes such as Mukkuvar, Mugayira, Ezhava and Vellava of Hindu communities as well. Although there are various other castes among the religious groups in fishing communities, they are mainly among the inland fishers.

Religion plays a significant role in the everyday life of coastal communities. The way fishers are organized also defines a) gender roles b) plays a part in conflict resolution. The presence of religion and caste is evident in their respective maritime traditions, use of fishing technology, the way trade is handled, and in a host of other practices. Disputes over credit- labour relations, compensation for destruction of fishing crafts/gear, and disputes over certain schools of fish targeted by other groups within the Hindu community were settled by their traditional village based fishery institution such as '*kada kodi'* while similar disputes among Christians were handled by the Church (Paul, 2005; Kurien, 2000). Although religious institutions play active and decisive roles among Muslim fishing communities, they are not as important in the case of Hindus or Christians. For example, women of the Muslim Mapila fishing communities of the northern region are confined to roles as mothers and providers of the basic needs of their

[4] The wage laborers who carry heavy loads on their head.

family. Hindu and Christian communities permit women to participate in economic activities relating to fish processing, buying and selling in distant markets (DFID, 2003).

Although caste, religion and other social factors play a significant role in the everyday life of the people in India, very little research has been done to examine the way they are linked to the livelihoods of people in coastal fishing communities. Caste and religion continue to be a decisive factors determining how households in fishing communities access assets in Kerala. Kerala's political lineage as the first state to have a communist government in the country helped redefine caste to class to a limited extent. For example, the lower castes were denied rights to ownership of land prior to land reforms implemented by the communist government in 1957. The redistribution of wealth was a priority for that government. However, increasing demand for a diminishing natural resource brought to surface the component of caste particularly in coastal areas (Dietrich and Nayak, 2001). Originally the caste was defined on the basis of the profession. Regrouping into caste was one of the strategy adopted by some as there was increasing competition to claim the diminishing natural resource. Few studies have examined the strategies of the poor from a sustainable livelihoods perspective at the household level.

3.4 Summary

This chapter has set the context for investigating livelihood options of coastal fishing communities, particularly those who are engaged in small-scale fisheries. The chapter began with a description of SSF in developing countries and looked at the status of fisheries in India. It then focused on coastal India, reviewing its diverse religion, caste

and subgroups that influence every aspect of life and livelihoods. Particular emphasis was given to traditional resource management institutions in this chapter.

The next chapter presents the methodological framework adopted in this research and discusses the survey methods used for data collection in the field.

Chapter 4

Research Methodology and Study Area

This chapter presents the methodology employed for this study, and describes the different quantitative and qualitative methods applied during the field investigation, data collection and analysis procedures. The chapter begins by outlining the rationale for the methods used in this study and then describes the approach in detail. The socio-economic and biophysical characteristics of the study area selected for field investigation are described, as well as the constraints faced and strategies adopted during the field investigation.

4.1 Methods

There is a considerable literature that provides a foundation for qualitative research methodologies (Lofland and Lofland, 1984; Walker, 1985; Kitzinger, 1995; Baxter and Eyles, 1997; Denzin and Lincoln, 1994; Green and Thorogood, 2004). Qualitative research, according to Creswell is,

> *…an enquiry process of understanding based on distinct methodological traditions of inquiry that explore a social or human problem. The researcher builds a complex, holistic picture, analyzes words, reports detailed views of informants, and conducts the study in a natural setting* (Creswell, 1998. P.15).

It also means that the underlying perspective of qualitative research is rooted in exploring the meaning of social reality. Methods vary greatly, with some analysts using structured interviews while others code observed behaviors (Denzin and Lincoln, 1994). Information on local livelihoods and asset situations of the coastal artisanal fishing communities are organized through the SLF and are addressed through qualitative research. This is because the social realities of the artisanal fishing communities are very complex and they need to be observed in the context of their natural setting in order to be well understood. Using only quantitative data takes the communities out of context and, therefore, fails to fully capture the social reality. The main reason is that the quantitative data provide summaries and generalizations rather than capturing the social reality as perceived by the members of the community. The crucial consideration for this research, therefore, is to adopt a multiple methods strategy. Used in combination, multiple methods reinforce each other in improving the quality of data through consistency, validity, reliability and contextual value (Denzin and Lincoln, 1994; Huberman and Miles, 1998). It worked to the advantage of this dissertation research as multiple methods strengthened the understanding of various situations as elaborated in the following sections.

4.2 Field techniques, field strategies and sources of information

The field methods adopted in this research can be considered what Green calls ‘expert-driven community research’ as opposed to ‘community-driven’ models of social and natural science research,

> *Expert-driven community research is led by academics who conduct interviews, focus groups, and surveys, all directed by their own research questions* (Morford, 2004, P. 2).

As opposed to quantitative methods where the units of study and target population are important in designing the sampling strategy, qualitative sampling is specific to the aims and objectives of the study. This in the words of Green and Thorogood

> *…the sample size for an interview study depends on the aims – what you are expecting the data to do in terms of answering a question.*
>
> (Green and Thorogood, 2004, P.102)

Sample selection criteria, therefore, may vary from one to many depending on the research purpose, questions and methods.

4.2.1 In-depth interviews

In-depth personal interviews are those when a researcher probe "in-depth" a participant (Jones, 1985). There are different approaches indepth interviewing - from informal conversational interviews, where the researcher avoids any formal structure such as a typed form, to standardized open-ended interviews with guiding questions (Jones, 1985). The latter approach is adopted in this research as it helps in staying within the SLF structure (see Appendix 1). Multiple interviews of fourteen participants were undertaken. Although questions were asked verbatim, depending on the answers, improvised probes (additional questions for clarity) followed. Green and Thorogood note that:

> *…the interview is a setting in which it is acceptable to ask relatively personal questions, the interviewee will respond to prompts provided by the interviewer, and the interviewer (usually) will provide less information about themselves. There is a 'social role' for the interviewee, just as much as for the interviewer, and qualitative*

> *interviewing relies on all parties understanding of the conventions of an interview* (Green and Thorogood, 2004, P.91).

While the entire interview with the carefully selected fourteen participants were recorded using a digital recorder, notes were also taken on meaningful body language such as sighs, shrugs or nodding. Soon after each interview these notes were elaborated upon to capture the context, and then coded to fit the transcription from recordings. Care was taken to conduct these interviews, which ranged from one and half to two hours and for a couple of persons. All interviews were conducted at a location selected by the participants. This is true especially when the interaction is with a total stranger and the interview consists of long detailed conversations which can be, in the words of Walker, (1985, P.4), "*essentially artificial*". This can be further complicated by existing social difference between the interviewer and interviewee. In the current research the interviewer is probably perceived as urban, educated, and often from another caste or class. These differences

> …*can exist in relation to nationality, race, class, socio-economic status, age and gender* (Green and Thorogood, 2004, P.92).

Baxter and Eyles (1997) reviewed 31 papers in Social Geography, which employed in-depth interviews, to explore some perceptible tension between creativity and evaluation in qualitative research processes. In their words,

> …(There is) *an apparent tension between the creativity of the qualitative research process – which implies contingent methods to capture the richness of context dependent sites and situations – and evaluation which implies standardized procedures and mode of reporting* (Baxter and Eyles, 1997, P.505).

One of the advantages of in-depth interviews is that they permit the researcher to probe and to follow-up unanticipated points of interest during the survey. They can also help to identify and illustrate specific colloquial terminology in use. This was an added advantage, as I understand the nuances of certain words that emerged during the interview, which could have different meanings in diverse contexts.

4.2.2 Focus group discussion

Focus group discussion is a type of group interview wherein the communications between the individuals in the group generate and form the data (Kitzinger, 1995).

> …*they challenge one another, the questions they ask, the evidence people bring to bear on an issue, the sources they cite, and what arguments seem to sway the opinion of other members of the group* (Kitzinger, 1994, P.114).

A focus group discussion and their narratives, set within their cultural setting is useful for obtaining information through humour, consensus or dissent on certain issues. Because of its sensitivity to culture, this approach is widely used in cross-cultural studies and research on minorities (Hughes and Dumont, 1993). The rationale for adopting focus group discussion as a method of enquiry is because it allows a variety of perceptions that individuals in a community hold regarding issues to be brought out. These issues are aimed at supporting the objectives of this research. The broad focus of the discussion was to gather data that would be helpful in understanding how the market expansion and introduction of modern hi-tech technology impacted on the livelihoods of small-scale artisanal fishing communities. Broad topics such as ‘fish resource depletion: causes and consequences’, ‘proposed fishery harbour and environmental deterioration’ and ‘barriers

to participation in work, *grama-sabha* meetings and health' were also included in the discussion. While the first two themes were developed for the men's group, the third theme was used in the women's group discussion. As all the participants were drawn from the coastal wards of Ponnani and from a fishing community, they are a '*natural*' focus group (Conradson, 2005. P.134). In terms of group size, Bloor *et al*., (2001) suggest somewhere between four and ten as an ideal number. Mays and Pope (1995) are flexible in terms of the number of group members required for discussion, but note that participants should reflect *characteristics or live in circumstances relevant to the social phenomenon being studied* (Mays and Pope, 1995. P.110). In this study, group size ranged from 14 to 17 for the men's group, and less than 10 in the women's group. In this research, therefore, the number of participants for group discussion was consistent with the number of participants generally interviewed in qualitative research. The length of each discussion ranged from ninety minutes to two hours. Two students from the local college helped in facilitating the discussion. In the women's group, a fellow researcher and a female student from the college conducted the discussion. In all the group discussions, a digital tape recorder and a camera were used to capture the verbal and visual expressions of participants, which, along with the notes taken during the discussion, helped at the time of transcribing the interviews. I took a less directive or more unobtrusive role throughout the discussion and allowed the group dynamics to unfold with their comments, explanations and share each one's experiences. Transcribed text supplemented with moderators notes regarding group dynamics; mood and gestures produce a rich qualitative record of a focus group discussion (Conradson, 2005). As a group, members argued between themselves on problems regarding resource depletion,

which revealed intricate and complex issues such as bottom trawling, emergence of new set of entrepreneurs from outside the community and not having a say in governing issues. Similar concerns were discernible from the discussion on the proposed fishery harbour as well. Focus of discussion among the women group provided rich material for analysing sustainable livelihoods through identifying barriers such as access to work, access to political assets (*grama-sabha* meetings) and access to health services. Participant views also helped me to understand the social/gender relations, particularly regarding the role women have in decision-making, both within the family (number of children) and the community (freedom to appear in public). Although Conradson (2005) warns of individual dominance particularly over a controversial or sensitive topic such as gender roles, the three group discussions were balanced and not overtly dominated by any one individual.

4.2.3 Household questionnaire survey

There are no previous systematic social science research done in Ponnani and available secondary data sources are either at the municipal or higher level. Very little information is available regarding the community's assets, opinions, or factors that influence local livelihood strategies. Therefore, a survey was designed which involved house-to-house interviewing at the lowest administrative units called wards in Ponnani. A total sample of 100 households in a stratified random sample were drawn from the electoral list held in the local governing office of the municipality. Selection of the sample was done to include fishers, fish-workers, boat owners, fish traders and unemployed (includes retired and widows), since the size of each is known from list. The

questionnaire was carefully structured to reflect the characteristics of the different categories of workers and the nature of their livelihoods (Appendix II). Parfitt (2005) classified survey data into three types: *(i) data that classify people* (age of respondent, income, housing details etc.) *(ii) data that relate to the behaviour* (where do they access assets, where do they work etc.) *and (iii) data that relate to attitudes, opinions and beliefs* (P.79). In this research emphasis is given on the first and last types since the second and third objectives of the research require specific data on assets and changes in asset situation and access/rights of the members of the community. Contextual issues such as the choice of strategy adapted at heightened vulnerable situations are also woven into the questionnaire survey. A pilot survey was conducted to test the questionnaire and also to train the seven assistants. With the revised questionnaire, one hundred households were surveyed in the twelve coastal wards of Ponnani. The survey results are presented in chapter 5. Questions were structured to allow the respondents to elaborate on their experience or attitudes. Where little is known about a certain issue and household questionnaire survey could not provide sufficient information, it was noted to probe further with in-depth interviews employed later.

4.2.4 Documentary research

Documentary sources are often helpful when situations or events cannot be investigated by direct observation or questioning (Hammersley and Atkinson, 1995). Normally documentary analysis involves the study of existing documents to understand the history of events or experiences that are relevant to the enquiry. These may be in the form of media reports, government publications, procedural documents, personal letters

and communications. There are various government reports and historical records such as Kerala State Planning Board's annual economic reviews, State Archive's library, Government of India's population census and reports from various scientific research institutions in the State.

Secondary sources of information consisted mainly of reports and databases from the United Nation's Food and Agriculture Organization (FAO) and the International Collective in Support of Fishworkers (ICSF) that gave insights at global scale. The population census reports of the Government of India, the Five Year Plan and the Annual Plan documents of the Planning Commission of India, study reports and projections of the Central Marine Research Institute (CMFRI), of the Department of Ocean Development and of the Indian Institute of Oceanography provided information at national level. Reports and other publications from the fisheries department of the Kerala State Government, craft and gear census of the South Indian Federation of Fishermen Societies (SIFFS) as well as various other State and Central Government reports were the main source of information at state level. It also included census data from different decades providing details of present and past population size, intergenerational occupational changes, migration, education, sex ratio, fertility, infant mortality and other health status data.

SIFFS carry out a periodic census of fishing crafts and gear for the entire coast of Kerala. This has been the major source of documentary information for this research to detect changes in the physical assets of the fishers since the start of modernization (like trawling or Outboard Board Motors). Apart from this there is hardly any detailed information on the socio-economic aspects of the fishing communities in Kerala.

4.2.5 Remote sensing and GIS

During the initial field visit and interviews, I sensed concern and urgency among members of the community about coastal erosion. They took me to the coastal wards, which are vulnerable to intense erosion. Their estimate of the land lost due to advancing sea, however, seemed exaggerated. Therefore, cross verification using remotely sensed images for different time periods was adopted for this research.

Remote sensing (RS) and GIS are widely used in the analysis of natural resource management (NOWPAP CEARAC, 2005; Beland *et al*., 2006; Chu *et al*., 2006). NOWPAP CEARAC (2005) is part of the regional seas programme of the United Nations Environment Programme (UNEP). They used RS technologies to monitor marine environment and contribute to the conservation of the marine environment. In the early 1990's, a comprehensive survey of land use and land cover along the coastal zone was undertaken to develop a land use and land cover database in China. Central and provincial governments use this database for regional planning and management (NOWPAP CEARAC, 2005). Using RS, Beland *et al*., (2006) proposed change detection methodology in the assessment of mangrove forest alterations caused by aquaculture development, as well as the effectiveness of the measures taken to mitigate deforestation in the district of Giao Thuy, Vietnam, between 1986, 1992 and 2001. The results of this study showed that 63% of mangrove areas apparent in 1986 had been replaced by shrimp ponds in 2001. *Between 1986 and 1992, 440 ha of adult mangrove trees had disappeared, whereas the mangrove extent increased by 441 ha between 1992 and 2001*

(Beland *et al.,* 2006). Using multi-temporal remote sensing data of Landsat MSS and TM from 1976 to 2000, Chu *et al.,* (2006) examined the changing pattern of accretion and erosion of the modern Yellow River subaerial delta in China, with GIS tools. They were able to identify the areas prone to erosion, particularly, the stable and unstable areas along the coastline. Their study also showed that wave-induced longshore current is the major driving force to transport sediment from eroded areas.

In this research, GIS and RS are used to determine the diversity and intensity of human activities at the ward level in Ponnani. Information on land use and cover as well as degradation of the study area was derived from published maps, digital satellite images (IRS-IC+PAN merged), aerial photographs and village and municipality maps. Data generated through land use/land cover assessment and classifications with population survey data at the individual, household and community levels are examined with the help of map-based analysis.

Natural assets and vulnerability are two important components in SLF. A comparison of the thematic maps developed in GIS, facilitated the calculation of the spatial extent of the loss of this natural asset.

4.3 Study Area

Each State[1] in India has its own language and culture. India's ethnic, linguistic, and regional complexity is reflected in its subdivision into states, which were reorganized after its independence in 1947, primarily on the basis of language. India's languages reflect the intricate levels of social hierarchy and caste. An understanding of local culture

[1] There are 28 states and 7 union territories in India

and language is an important consideration in developing a research program that considers the participation of local people. This, therefore, makes it difficult for researchers to work in different areas of India.

There are eight coastal states and five Union Territories in India, all of which have coastal communities that are highly dependent on natural resources. Kerala was selected as the study area for several reasons. First and foremost among them is that I was born and bought up in Kerala, and I speak the local language, Malayalam. Those speaking Malayalam are called Malayalees. Being a Malayalee, I have the oppurtunity to get a more nuanced understanding of the local cultural complexities. Another reason for selecting Kerala for the study is because of its important fishery. Being largest in terms of fish consumption and highest in export of fish and fishery products, Kerala is foremost in India's fisheries. In 1953, there was a joint agreement between United Nations, Government of Norway and Government of India to upgrade the existing fishery and improve the standard of living of the fishing communities in Kerala (Kurien, 2005). Before commencing the Indo-Norwegian Project (INP), Kerala had mainly a beach based artisanal fishery. The INP acted as an *unintended catalyst for launching the whole of Kerala's fisheries into a new western-oriented export drive* (Kurien, 2005, P.5). Consequently, the state government policy, from 1960 to 1980 was to promote modern trawl fishery through financial support in the form of subsidies (Kurien, 2005). However, a study in collaboration with FAO's Bay of Bengal Programme published in 1982 that evaluated the cost and earnings during this period indicated that the artisanal fisheries sector seemed far more important than trawl sector (Kurien and Willmann, 1982). Despite government support for the trawl fishery, it was the artisanal sector that

accounted for 80 percent of marine fish harvest during the same period (Kurien, 2005). In the 1980s, government turned their attention to assist small-scale fisheries, give them outboard motors (OBM), beach landing crafts and fishing nets made from synthetic materials. With the better technology in hand artisanal fishers were fishing deeper and wider (Kurien, 2005). However, despite these developments in the artisanal sector, members of the fishing communities remained poor. Kerala state is known worldwide for its particular model of development (popularly called, Kerala Model[2]) whereby it has reached high levels of social indices such as low infant mortality, reduction in population growth, elimination of acute poverty and high literacy despite very low income. It took the 73rd and 74th Constitutional Amendments[3] seriously and initiated a People's Plan Campaign to make decentralization both a political and economic reality. This process not only gave an important role to local bodies in determining their own course of development, but it also took the role of women in local governance seriously. Although there have been shortcomings, the local participation that this programme generated has been phenomenal. Having access to funds and deciding on local priorities has had a visible impact at local levels with housing, roads, water and sanitation. However, sharing the responsibilities between the State Government and local bodies has not been easy. Control of power for party and personal ends has often led to conflicts at the local level.

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[2] Despite low per capita income, Kerala achieved nearly total literacy, long life expectancy low infant mortality and birth rates and high access to medical care. This was considered by many social researchers in USA and Europe, as comparable to many developed nations (Franke and Chasin, 1995)

[3] The 73rd and 74th Amendments of the Indian Constitution passed in 1993, were for creating the autonomous institutions of local self-governments and decentralized development both in rural and urban areas. Provisions under the constitutional mandate envisage not only the full participation of people in the decision-making process, preparation of economic development plans, and ensuring social justice, but also in the execution of such plans. The Acts also lay out special provisions for establishing an autonomous State Finance Commission for sharing of financial resources directly to these local bodies and make them economically independent. It is formulated based on the Gandhian Vision of Panchayati Raj Institutions to create sustainable improvement in the quality of life of the people, and evolve a social order based on the principles of equality, prosperity, and security.

The response from women has been the most encouraging, but here too, the patriarchy prevalent in the State has seen to it that this energy is reigned in through administrative systems that limit the autonomy of women. In practice, studies on poverty alleviation and decentralization of governance suggest that such delegation of power will not necessarily produce favourable outcomes for the poor.

Delegation of power, according to Berkes (2001) is the passing of some authority and decision-making to local officials. The delegating authority, however, can take away the power at any time. What actually is needed, according to Kalikoski and Satterfield (2004), is devolution, which is a transfer of power and responsibility to local authorities. Nevertheless, some analysts argue that without certain pre-conditions decentralisation processes might predominantly empower local elites rather than the poor (Batterbury and Fernando, 2006; Jutting *et al.*, 2004; Johnson, 2003; Crook and Manor, 2002). Distilling findings from empirical studies of decentralisation processes in 60 countries, Manor (1999), concluded that three factors are essential for ensuring better outcomes in terms of promoting sustainable livelihoods for poor people:

- *Elected bodies at lower levels must have adequate funds*
- *They must have adequate powers*
- *Reliable mechanisms must exist to ensure two kinds of accountability: the accountability of elected representatives to citizens, and the accountability of bureaucrats at lower levels to elected representatives* (Manor, 1999, p.1).

Manor concludes that when these factors are in place decentralisation can enhance the transparency, responsiveness and accountability of government for people at the local level. They can also enhance political participation, and provide incentives for people to develop new and stronger forms of organisation (which corresponds to ‘strengthening

social capital' within the SL framework). There is also evidence that under these conditions decentralisation enhances the effectiveness of health, education and environmental programmes, by making it possible to adapt the programmes to local conditions and preferences (Manor, 1999).

According to the 2001 census, Kerala's population was around 31.8 million, which is 3.1 percent of India's population. Kerala contains only 1.1 percent of the total land area in the country. The annual growth rate of the population was 0.93 percent during 1991-2001. The population density in 2001 was 819 persons per square kilometre, the third highest among the states in India. The sex ratio is favourable to females, i.e. 1058 females per 1000 males, which is significant when compared to 933 for the country. (Census, 2001) Kerala state as a whole has a higher female sex ratio which is one of its distinguishing demographic features. Ponnani municipality also shows more females than males (Table 5.6). However the sex ratio of the population in the age group 0-6 is only 958 females to 1000 males, which indicates a gradual masculinization of the sex ratio

Table 4.1 Sex Ratio in Ponnani, Malappuram and Kerala

YEAR	PONNANI MUNICIPALITY	MALAPPURAM DISTRICT	KERALA STATE
1971	1050	1041	1016
1981	1061	1052	1032
1991	1067	1055	1036
2001	1100	1066	1058

Source: Census of India, 2001

in the ages 0-1 in urban areas in at least six districts of the state (Census of India, 2001). The state is in the final stage of the demographic transition with low fertility and mortality. A family of four or more – mother, father and two children – which was the

norm, is now replaced with fewer than four members. Late marriage and high literacy among women are considered to be the primary reasons for this shift in family structure. Zachariah *et al.,* (2001b) suggests that within the next twenty years, the gap between birth and death rates will close, and any rise in the mortality rate will result in a drop in actual population (Zachariah and Irudaya Rajan, 2007; Zachariah *et al.*, 2001b). In other words, Kerala is well on its way to zero population growth. By 2022, around 33 per cent of Kerala's population is expected to be age 49 or older (Zachariah *et al.*, 2001b). In contrast to this, marine fishing communities have a population dynamic that exhibits certain special characteristics that are distinct from the rest of the state. Their rates of fertility are higher and while sex ratios are favorable towards females at the younger age-group (i.e. 0-6) (Census of India, 2001) they shift thereafter. These communities are also marked by a higher population growth rate compared to the rest of the country, which results in higher densities along the coast. The State Government estimates (Government of Kerala, 2004) the population of fishing communities in Kerala to be about 1.85 million, of which 220,000 are active fishermen. Their dwellings, estimated at 835,000 in number are spread over 220 densely populated fishing villages along the State's 560 km coastline (Census of India, 2001). Apart from the actual fishing communities, about 165,000 people are engaged in fishery-allied activities in the State. The government recognizes that coastal fishing community's general living conditions and economic status are not up to the standards of the general populace of the state (Government of Kerala, 2004). Thirty three percent are Hindus and are concentrated mostly in the middle of Kerala, while 31 percent constitute Muslims in the north and 36 percent Christians in the southern parts (Paul, 2005).

Kerala ranks first with respect to human development indicators among the states in India. Around 91 percent of the population are literate (ages 7+) in Kerala. There is also only a relatively small variation in the literacy rate among males and females being 94 percent and 88 percent respectively (Census, 2001). The infant mortality rate and life expectancy at birth are comparable with that of many developed countries. The infant mortality rate was 14 per 1000 live births and the life expectancy at birth was 70 for males and 76 for females in 1996-2000 (Census, 2001). According to the National Sample Survey Organization's (NSSO) 1999-2000 estimates, 81 percent of the males and 35 percent of the females participate in the labour force (ages 15+). However, Kerala has the highest incidence of unemployment among the major states in India. Around 8.6 percent of the labour force was unemployed in the state (Census, 2001). Here, the female unemployment rate was greater (15.1 per cent) than the male rate (5.6 per cent). Low infant mortality, high literacy and high levels of education among women have not increased the labour force participation rates of women. Some analysts believe that the developments in health and educational status of women were motivated by very deep-seated patriarchal values rather than the actual liberation of women (Devika, 2002, 2005).

Kerala's economic growth has been accelerating since the 1990s and per capita SDP growth was around 5.5 percent (Zacharia *et al.*, 2003). Kerala has been an out-migration state since the 1960s. During the period 1991-2001, the net out-migration rate was –0.27 percent. The number of migrants from the state was estimated to be 3.7 million. The major flow of migration is to Gulf nations. Money they sent back home, remitting through banks was a major factor for accelerating the economy since 1990s.

Consequently, the percentage of population below the poverty line has declined to 12 percent (Zachariah and Irudaya Rajan, 2007; Zacharia *et al.*, 2001b)

Although Kerala is spared the industrial pollution common to other states, pollution from urban domestic waste and the increasing use of chemical fertilizers and pesticides in the agricultural fields pose a continuing threat to the natural environment of the state (Kerala State Planning Board, 2005). The only natural buffer is from the three National Parks and 12 Wildlife Sanctuaries spread over 0.27 million ha, which constitute 6.9 percent of the state in area (Kerala State Planning Board, 2005). The forested areas are considered to be important watersheds. However, a shortage of drinking water, particularly in the large urban centres, has become a major issue (Batcherlor *et al.*, 2003; Nisha, 2005).

Kerala saw the boom and bust of the marine fishery as early as the mid 1970s, which was followed by greater capital intensification even of the traditional fishers. This intensification had an adverse impact on the coastal resources. Increasing backwater and beach tourism has also impacted the coastal fishing communities. Most of the traditional symbiosis (complementing aquaculture filtration ponds with saline resistant *Pokkali* rich cultivators) that existed between the fishing communities and other agricultural communities has been disrupted with modern industrial and agricultural development pursued in the state. This is evident in the decline of the traditional shrimp aquaculture and *Pokkali* rice cultivators or in the traditional shell collectors and rice farmers of Kuttanad backwater areas. There has been degradation of Kerala's natural resources. This is due to the developmental activities such as construction of coastal roads that have destroyed the marshlands, dammed streams and rivers, deforestation and reclaiming of

the backwaters. Construction of the sea-wall by laying groins, rocks and stones on the beaches which are prone to high erosion, impacted negatively on the coastal living resources, thereby depriving people of access to livelihood options (Padmanabhan *et al.*, 2001).

Increased fishing and fishing over sustainable limits threaten the livelihoods of the coastal fishing communities. Fishing was largely concentrated in the inshore waters up until early 1970s. The potential yield from the shelf area up to 200 m depth has been estimated at 750,000 tons per annum (GOI, 1991). The major pelagic species are Oil sardine, Indian mackerel, Whitebait, Carangids, Ribbonfish, Tuna and Mullets. The important demersal species are Penaeid prawns, Elasmobranches, Eels, Catfish, Perches, Sciaenid, Silver bellies, Cephalopods, Lactarius, Pomfret, Sole and Lizard fish (Figure 4.1). Over generations, coastal fishing communities have evolved different kinds of methods and fishery to catch them and thereby, derived their livelihoods as well as the nutritional requirements from this natural asset.

The State Government has played a major role in fisheries development. The focus of the first to seventh Five Year Plans (1951-1993) was on improving the economic conditions of the fishers through increased fish production (protein for the poor) and improved distribution (GOI, 1985). Export oriented growth to build up foreign exchange reserves gradually took over and remained the focus until the Seventh Five Year Plan, when the development of deep-sea fishing received attention. Modernization that was heavily state subsidized, meant the introduction of new craft and gear and the development of landing centers and fishing harbors thereby centralizing the fish landings. The Central Government played a crucial role in this growth by creating infrastructure

A day's catch from may boats

Squids and shrimp are handpicked from the day's catch for export

Figure 4.1 Demersal species for export.

through the Centrally Sponsored Schemes and facilitating a network of scientific and research institutions, organizations and export trade promotion agencies. The rapid development of the fishery, however, also had several negative impacts. Trawlers started infringing on inshore waters, which led to conflict with traditional fishers, particularly in the southern districts. Similar conflicts started in other states, initially in Goa on the west coast and Tamil Nadu in the east. Traditional fishers started organizing a nationwide agitation demanding fishing restrictions on mechanized trawlers. The need to protect their natural assets and sustain their livelihoods was evident as they fought through nation wide agitation (Kurien, 2004b). The State responded by using provisions under the Marine Fisheries Regulation Act (MFRA), to reserve the inshore waters for traditional fishers. The traditional fishers mostly use small mechanized fishing crafts and traditional boats such as *Kattamaram* and *Vallam* (Figure 4.3 (1&2)). A ban on trawling was also imposed during the southwest monsoon period of June to August. Under the MFRA, state governments have jurisdictional powers only within the inshore waters of 12 nautical miles. The good intentions of MFRA were defeated due to the fact that there was neither enforcement or protection force set in place nor capacity to enforce the Act. For the same reason, there was no effective enforcement of monsoon trawl ban even as the fish workers of Kerala were in the forefront demanding state intervention. Demand for a ban on night trawling was also met but without effective enforcement, the trawl continued unabatedly. However, since 1989, a closed season of 45 days for trawlers has been enforced. This is achieved by the traditional fishworkers organizations continued agitation and long legal battles in various courts of law. However, the government

yielded to political pressure from trawl boat owners and associations and reduced the period of the ban. Between 1980 and 1990, the Kerala Government focused its attention on the traditional sector and implemented the following actions:

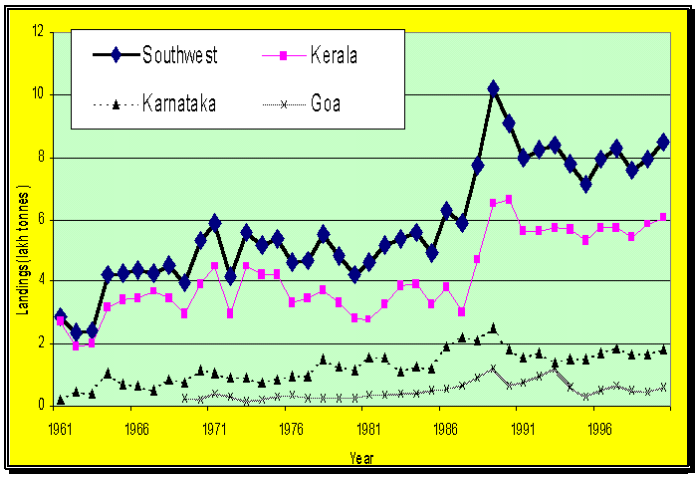
- Stopped financing trawlers
- Promoted investment in the motorization of fishing crafts of traditional owner-worker fishers.
- Created *Matsyafed* (the Kerala State Cooperative Federation for Fisheries Development Limited) to facilitate fish marketing and capital investment for fishers of motorized units.

Matsyafed, with Central assistance through the National Cooperative Development Corporation spent US$ 27 million for the development of fishery co-operatives to finance traditional fishers to acquire modern and efficient fishing and marketing inputs (NCDC, 2004). This fund was used by *Matsyafed* to provide subsidies and loans to traditional fishers to buy imported Out-Board Motors for their crafts and nylon and monofilament nets for their gear. All together, the level of investment in the fisheries sector was significant during this period.

Overall catch data for Kerala reveals an upward trend: 0.59 million metric tonnes in 1999-2000, 0.57 in 2000-01, 0.59 in 2001-02, and 0.62 million metric tonnes in 2003-2004 (CMFRI, 2005). However, these figures do not reveal many important changes that are taking place in Kerala's fishing situation. There has been an increase in the operational area of the fishing craft based in Kerala, with more fishing in the offshore seas, outside the territorial waters of the state and even outside the EEZ of the country. Species wise landing data reveals some of this trend. Of the 61 species listed by the

Central Marine Fisheries Research Institute (CMFRI), Kerala ranks very high among 27 species, many caught from distant waters. The fishery is becoming increasingly capital intensive with larger boats equipped with advanced fish finding and navigational devices

Figure 4.2 Trends in the total marine fish landings in the southwest region



Source: Central Marine Fisheries Research Institute (CMFRI), Cochin, 2000.

replacing the current fleet. Field visits revealed increasing mid water trawls, mini trawls and large in-board canoes (Figure 4.3 (3&4)). Many vessels are engaged in night trawling, using fishing gear with small purse seines, small mesh sizes and large nets. These gears are destructive to the fishery because they can damage seabed habitats, and capture large number of non-target or bycatch species and juveniles as well as threatened or protected species. Such destruction often leads to a situation where fish stock cannot recover. Local newspapers have reported dynamite fishing which destroys habitats and kills everything.

With rising levels of indebtedness and pressure to pay debts, year round fishing became a necessity. With that came the demand for safe launching, landing and berthing

facilities. The Governments of Kerala responded by constructing several fishing harbors and safe landing centers along the coast. There is a feeling of resentment among the fishworkers that the State Government is turning over the construction and management of these harbors to the private sector. Government on the other hand is following the Build, Operate and Transfer (BOT) policy. Using the BOT system, private developers design, finance, construct, and operate revenue-producing public projects. At the end of the payback period, projects are turned over to the government. Since public projects are often caught in a web of bureaucracy, and take much longer than expected to reach the operational phase, BOT is seen by many as a solution for speedy implementation to have functional harbors. However, handing over such responsibility to the private sector without creating any terminal management authorities could lead to mismanagement and denial of fishing community participation. Moreover, fishers allege that the Government of Kerala has not shown any political will in enforcing management regulations except for a 45-day trawl ban during the monsoon months.

4.3.1 Ponnani, Kerala: coasts, coastal communities and fishery

The field investigation for this research was carried out within twelve coastal wards of Ponnani Municipality in Malappuram District which covers an area of 3.8 km^2. Ponnani in Malabar is located in the south west coast of India (Figure 4.4). This area is experiencing the transition from traditional to modern fisheries, which is taking place all along the Kerala coast. Ponnani was selected for field investigation for three main reasons: firstly, Ponnani is situated in the estuary of one of the largest rivers of Kerala,

Figure 4.3 Types of crafts used in Kerala's fishery.

Bharatapuzha and, therefore, has a rich pelagic fish resource. Secondly, the traditional fishing communities of Ponnani retain some of their age-old fishing practices and skills, which is one of their most important livelihood assets. Thirdly, Ponnani is the most densely populated of all municipalities in the state (Census of India, 2001). Ponnani Municipality with its 10.32 km long coastline has a total area of 22 sq km till 2000[4]. The Bharathapuzha River bordering on the north and Kanjiramukkupuzha River on the east and south makes Ponnani Municipality water bound. The rivers form estuaries on the northern and southern ends of the Municipality. There is a canal that runs parallel to the shore about half a kilometer away from the sea, which connects the Bharathapuzha River with the Kanjiramukkupuzha River. This canal is part of the Travancore-Shornur canal system, which runs further down to Kolachal in Tamil Nadu, and was the main waterway for transporting people and goods in the past.

4.3.2 History of Ponnani

Historically, Ponnani was a landing port for Arab trading; therefore Islamic culture was integrated into the cultural mosaic of Kerala. Gradually through both intermarriage and conversion, the Muslim population increased and Ponnani grew to be a Muslim dominated town after the 14th century. Ponnani served as an important port on the west coast of India due to its natural harbour during the British colonial period. The port handled large quantities of cargo, including the import of food grains and salt and the export of timber, pepper and coconut. The old sailing cargo vessels, locally known as *Pathemari* were used for this purpose. These age-old vessels are still in use today.

[4] This includes only the wards chosen for field investigation and the area is computed from the geocoded map in GIS

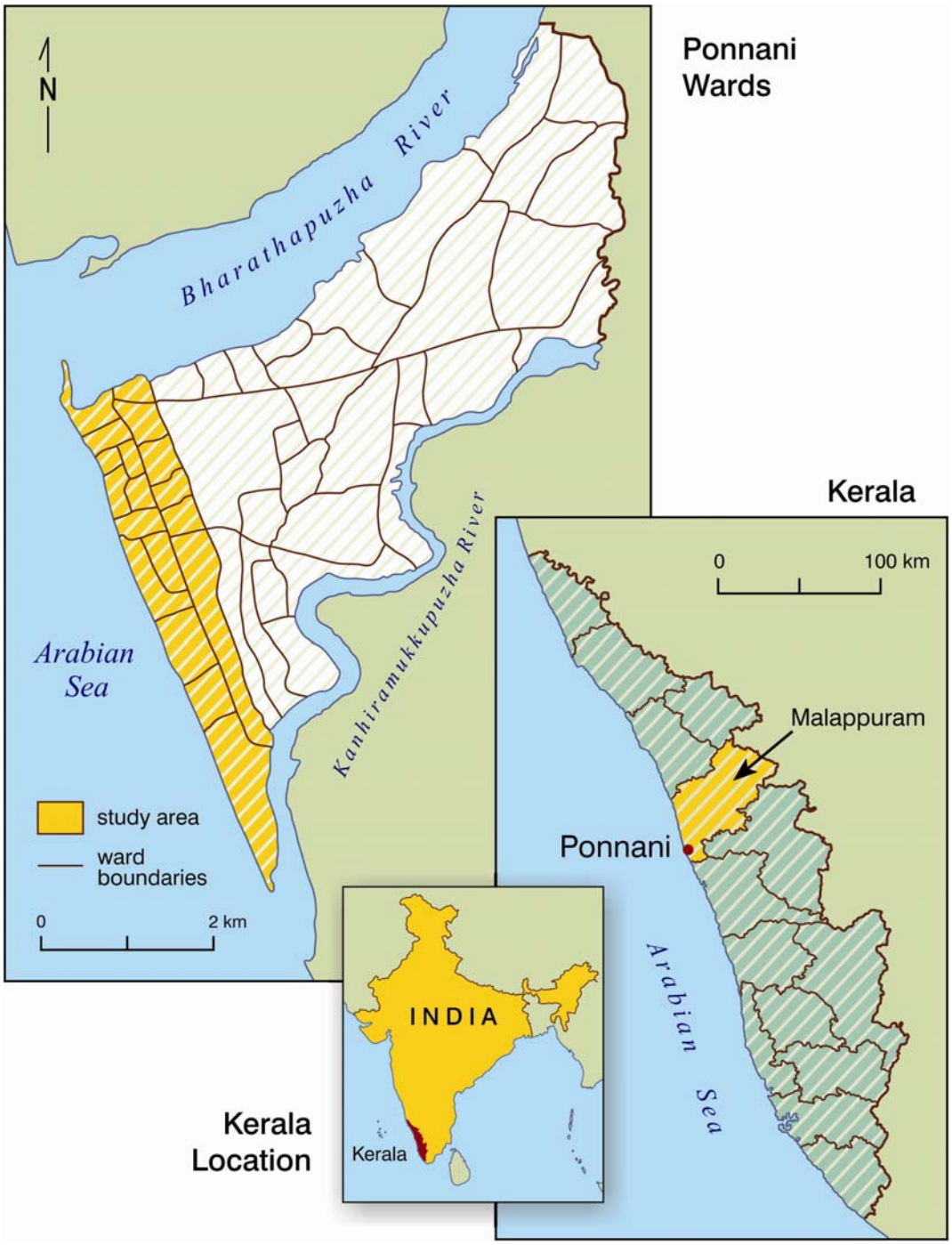


Figure 4.4 Location of study area.

The majority of people living in Ponnani are Muslims and the rest are Hindus and Christians, with the Christian population being small. The Muslims of Ponnani were called the Mapillas (Mapila) in erstwhile Malabar[5]. The origin of the Mapillas has been attributed to the inter-marriage between Arabs and native women. The term Mapilla is a combination of two Dravidian[6] words – Maha (great) and Pilla (child). Pilla is also a title as well, among the Nayars/Nair of Travancore. Additionally, Pilla is a term of endearment. The title Mapilla was conferred upon the Muslim immigrants in Malabar from Arab countries by the local rulers, particularly the Zamorin of Calicut. These Arabs had contact with the Malabar Coast even before the advent of Islam in India in the seventh century. Ponnani was considered a centre of Islamic learning. People from different parts of the state, who sought knowledge of Islam, were directed to Ponnani. Religious education was in the forefront of Ponnani life; all secular educational institutions came much later.

Generally, orthodox Muslims do not comply with government initiatives for birth control. The Muslims of Ponnani, however, appear to be exception to the general rule. Their decadal population growth (1991-2001) reveals an interesting picture, as Ponnani Municipality registered a fall in the decadal rate of population growth. The recent change of attitude to have a planned family with fewer children and the increasing use of contraceptives is an indication of efforts of individuals in the community rather than a special drive by the government (Basheer, M P, 2006). This change in attitude could be

5 Prior to reorganization of the states on linguistic basis after India's Independence, Kerala had three major divisions, Malabar in the north, Travancore in the south and Cochin in the middle.

6 The Dravidians are believed to be the earliest inhabitants of India. Their subsequent migration and admixture with invading racial groups has been of scientific interest for population geneticists. See Thomas, Nair and Banerjee, 2006).

attributed to a multitude of factors such as resource or income constraints, political consciousness or education.

4.3.3 Physical Environment

The uniqueness of Ponnani's estuarine zone is revealed in its daily tidal effects, littoral currents, storm waves, its distinct flora and fauna, coral reefs, tidal and mud flats,

Figure 4.5 Ponnani estuaries.

sea beaches and estuaries (Figure 4.5). This transitional strip of land and sea straddles a coastline that contains some of the most productive and valuable habitats in the biosphere, including estuaries, lagoons, coastal wetlands and fringing coral reefs. Although sand and sediment deposition have not caused extensive delta formation in the river mouths of Ponnani, the action of waves and currents occurs simultaneously with the fluvial deposition, which creates backwaters or '*kayals*' (lakes) and creeks. While the sequence of deposition in the beaches extends horizontally, it is vertical in these

backwater and creek regions. Most of these depositions consist of silt and clay in the estuaries, while beaches are composed of grains of sand. Ponnani's tidal effects are not as extensive as in the northwest coast. However, the rhythmic rise and fall of sea level and the currents set in motion influence the shaping of its coast, especially the estuarine environment (Baba and Kurien, 1988). Because the wind is a driving force for waves, coastal Ponnani is influenced mostly by a monsoonal regime, which has a reversal that is characteristic of the wind systems that occur in the Indian subcontinent. The most important parameter of the wave climate is wave height, which indicates the power that dissipates on the shoreline. Ocean and littoral currents play a major role in sustaining life in the marine ecosystems. While the oceanic currents keep water moving, littoral currents circulate food, nutrients and oxygen, and play a major role in the reproduction of fish fauna. The southwest coast of India is characterized by a reversal of littoral currents and upwelling of the sea. This has not only influenced shoreline stability but also the distribution of biotic resources in the coastal and estuarine waters. One biophysical phenomenon that has great significance to the fishing communities of Ponnani is the upwelling, locally known as '*chakara*'. This is an important local phenomenon that helps them through difficult and rough weather seasons. During *Chakara*, the water columns are calm with silt and sediment in a state of suspension along the coast. The calm waters in the midst of stormy deep sea attract fish to take refuge. This phenomenon also provides easy launching and landing of their boats which otherwise are idle during the rough weather. *Chakara* is quite important for artisanal fishing communities as it stimulates fishing activities and generates employment and income in an otherwise lean season. Although it is more common along the central regions of the Kerala coast during the

southwest monsoon period, fishers from the far north find their way through the myriad of backwaters and canals to the central and southern Kerala. *Chakara* is associated with the seasonal reversal of circulation of ocean waters. Most of the well-known areas of upwelling are found in lower latitudes that are associated with light intensity at the surface. This increases primary productivity, which in turn increases the availability of herbivorous fishes such as sardines and anchovies. The presence of herbivores attracts predators such as mackerel that feed on them. A high percentage of catches are associated with the upwelled waters and higher primary productivity during the summer monsoon period. Species such as oil sardine, anchovies, perches, carangids and mackerels proliferate and spawn off the Kerala coast (Madhupratap *et al*., 2001).

4.3.4 Socio-economic Environment

Kerala's social and economic history is reflected in Ponnani Municipality. Its working class and other social reform movements facilitated the growth of social awareness and a broader democratic polity, despite the orthodox influence and presence of Islam. However, Islam does impose greater restrictions on women. It is un-common in Ponnani to see women mingling freely. They are usually confined to home and families. Women face considerable hardships in many households as their homes lack basic amenities such as sanitation facilities. While men use the open beach to defecate, women are socially obligated to relieve themselves only after dark.

Unhygienic living conditions such as open defecation, impact the health of the people. Health problems are further aggravated by the physical property of the soil in the near-shore areas. High soil porosity, coupled with the high water table, allows

contaminated open sewage to seep into ground water and thereby into the wells. This provides grounds for the outbreak of contagious diseases such as dysentery, filaria and cholera that can spread rapidly due to the congested living conditions. Government hospitals and health clinics in Ponnani are often overcrowded and lack adequate funds to meet people's medical needs. Few studies have investigated the health conditions of the poor in Ponnani. One study found high rates of respiratory and skin infections, diarrhoeal disorders and hookworm infestations in these areas (Panicker, 1999). Survey results from a recent report indicate very poor health conditions of people in Ponnani when compared with state averages. While the wealthy have access to modern health facilities in private hospitals, poor households have low accessibility to affordable healthcare that makes them vulnerable to chronic diseases like tuberculosis, and vector borne diseases such as malaria, filaria and leprosy (Nandakumar, 2005).

Urban growth of the Municipal town of Ponnani was towards the south of the estuary, where institutional establishments cluster near the port area. Ponnani was known for its boat-building industry during 1950s and 1960s - large sea-faring vessels such as the *Pathemari* were built here. Other industries of importance were terracotta tile making, local cigarette (*beedi*) making units and large fish processing and drying centers known locally as c*hapas.* (Figure 4.6) These fish processing and drying centers provided considerable employment opportunities for women. C*hapas* exist even today, although they are few in number. Other industries did not fare well. Records reveal that Ponnani had the largest match factory in the northern Kerala region, in which 400 worked and earned a livelihood. This industry does not exist anymore in Ponnani. Other industries that are present today are a few small oil, rice and flourmills, engineering workshops, and

ice plants. The cottage industries that still continue are *pappad*[7], coir and *beedi* making enterprises where women form the bulk of the workforce. There are also two modern but small industries, the *PoloPlast* pipe manufacturers and a needle manufacturing plant. The decline of *chapas* and the closure of the match factory, however, did not leave Ponnani a ghost town. Its importance as a religious centre continued to attract people, particularly the Muslim population. Those engaged in fisheries related activities are persistent in demanding a modern fishery harbour from government. It would seem an ambiguous demand as there are many unused boats and the catch is declining. However, this is a strategy adopted by the local population as a means to attract fishing crafts from neighbouring and distant areas to bring in their catch. This in turn would help the fish trade of Ponnani to prosper.

4.3.5 Demographic Environment

The modernization of fisheries, in-migration, and high birth rates are all factors that have contributed to rapid population growth in Ponnani. Several inland fishers moved to the Ponnani area and became fish traders when the fish catch declined due to increased damming up of most of the tributaries of the Bharatapuzha River (CWRDM, 1991). The Municipality is divided into wards, but with the growth of the municipality, the number and area of the wards has changed over time. In 1977 Ponnani had 24 wards, which increased to 28 in 1984 and then to 32 in 1995. The area, however, remained the same. In 2000, the area was extended to 23 sq. km and the wards were reorganized and increased to 50. The population in Ponnani has grown rapidly over the years. A five-fold

[7] Flat crispy bread served during any meal, mainly in Kerala and Tamil Nadu.

Figure 4.6 Fish drying in Ponnani, locally known as *Chapa*.

increase from a mere 10,000 people in 1901 to 51,770 in 1991. In the most recent census it stands at 87,495 (Census of India, 2001). However, the population growth rate was 1.91 percent per year during 1971-81 and a notable increase of 6.9 percent in 2001. The marginal decline in the growth rate during 1981-91 could be due to migration and fertility decline. Despite this decline, it is still slightly higher than the growth rate of Malappuram during the same period. The rapid increase since then shows that there has been a phenomenal increase in population in the Municipality.

Table 4.2 Demographic and Social Profile of Ponnani Municipality (1971 to 2001)

	1971	**1981**	**1991**	**2001**
Area in Sqkm	9.32	9.32	9.32	24.82
Population Total	35723	43226	51770	87,495
Male	17426	20973	25048	41,855
Female	18297	22253	26722	45,840
Literates	12594	20029	32608	63,788
Sex ratio (females to males/1000)	1050	1061	1067	1095
Literacy rate	35.25	46.34	62.99	72.9
Density of population	3833	4638	5555	3525
Growth rate		2.1	1.9	6.9
Scheduled Caste population	1.06%(378)	2.024%(875)	1.91%(991)	5695
Scheduled Tribe population	0.498%(178)	(1)	.014% (7)	11
Average household size (persons)	7.39	7.62	8.18	6.74
Workers to total population	29.05%(10377)	24.57%(10620)*	26.04%(11254) *	

Source: Census of India, 1991. *Total workers are taken as Main + marginal workers

Population density in Ponnani has been very high from the beginning of the twentieth century; it reached 5,555 persons per sq km in 1991. This is the highest population density among all the municipalities in the district, and ranks fourth among all the municipalities in the state. The area under municipal jurisdiction increased during the decade, 1991-2001, adding new areas, which were nearly uninhabited thereby lowering the population density (Census of India, 2001). In order to compare population densities between the 1980s and 1990s, the newly added areas of the municipal boundary were ignored (Table 4.4). Population density declined to 3525 in 2001 as more area was added. The density increased to 6819 persons per sq km in the coastal wards, which remained the same size.

Table 4.3 Population densities of Ponnani, Malappuram and Kerala (people/Km^2)

YEAR	PONNANI MUNICIPALITY	MALAPPURAM DISTRICT	KERALA STATE
1971	3833	510	544
1981	4638	677	655
1991	5555	872	749
2001	3742	1021	819

Source: Census of India, 1971, 1981, 1991 and 2001.

Ponnani has a higher ratio of women to men, compared to the state. This could be a result of male out-migration. Between 1971 and 2001, the literacy rate increased significantly in Ponnani. The overall literacy rate was around 35 percent in 1971 and it increased to 73 percent in 2001, while the literacy rate in Kerala was around 90 percent in the same period. Mass literacy campaign in the state of which women were the main beneficiaries, had a beneficial impact on the birth and mortality levels (Census of India, 2001). In the local body elections, 33% of the seats were reserved for women and in Ponnani Municipality, and the seat of the Chairperson was reserved for women as well.

Average household size which increased from 7.4 members per household in 1971 to 8.2 in 1991, decreased to 6.74 by 2001. This may be due to the changing family structure wherein *matrilineal* (tracing ancestral descent through the maternal line) traditions are replaced by *patrifocal* (one that gives precedence to men over women) system (Eapen and Kodoth, 2002). The sex ratio of the population is favorable to females. In 1991, there were 1063 females for 1000 males and in 2001 it increased to 1095. Part of the reason for higher sex ratio could be explained by the out migration of males (Pushpangadan and Murugan, 2000). The literacy of the coastal population is very different from the district as a whole. Since the data at ward level is not available, questions on literacy are included in the household questionnaire (Appendix II).

4.4 Methods employed in this study

Combinations of five methods were employed in this study: in-depth interviews, focus-group discussions, questionnaire surveys, documentary research and land-use changes through satellite image interpretation. In the questionnaire survey, respondents from selected households were interviewed using structured interview schedules (Appendix 1). These interviews provided the possibility to connect with the members of the households and gain insight into their livelihood situation and the constraints they face that prevent them from finding better opportunities. It also helped to investigate the ways in which resource dependent households find strategies to access government sponsored financial assistance and bank loans when their natural resource assets, particularly, marine fish resources are unavailable. It also provided an opportunity to identify best candidates for in-depth interviews. Open-ended discussion guidelines were employed during these in-depth interviews. These interviews helped uncover the thinking and logic of individuals in the community use when making decisions about particular livelihood strategies.

A combination of methods has been considered to assess the extent of social, political and natural assets on which artisanal fishing communities base their livelihoods to analyze how they strategize in accessing these assets. An initial field visit, interviews and survey of literature of the study area suggested that artisanal fishers of Ponnani are experiencing asset degradation. Asset degradation may take place due to factors such as: erosion of land and coast leading to habitat destruction; rapid increase in population densities resulting in over crowded households and declining fish catch affecting income

returns. This often compels the resource dependent households to access other social, cultural, political or institutional assets (DFID, 2002; Scherr, 2000). In-depth interviews with four out of fourteen participants revealed the concern and impact of coastal sea erosion on their wards and particularly for some, on their property. Time-lapse analysis with satellite images of Ponnani municipality revealed the extent of coastal erosion in these coastal wards. The spatial extent of erosion documented from both methods was the same. The strategy adopted to employ validation through triangulation helped confirm the findings. This therefore, conform to Merriam's (2002) assertion that, "*when reality is viewed in this manner* (through observation and interviews), - *that it is always interpreted – internal validity is considered a strength of qualitative research*" (Merriam, 2002. P.25).

To understand local fisheries resource and fishing practices, secondary data were collected from government and related departments and archives. Documents relating to past fishing practices, locally abundant fish species, and any changes in technology use were gathered. Tracing the subsistence activities of these fishing communities can help provide insights into the interconnections between the coastal and marine system and the livelihoods they derive from it (Allison and Ellis, 2001). One hundred households were surveyed using questionnaires (see Appendix 2).

The in-depth interviews were conducted over a span of four months and were recorded. Based on these interviews key informants were selected taking into consideration their age, experience and occupations, particularly in different kinds of fisheries. Interviews were conducted with elderly fishermen of the locality in order to

understand the changing nature of their interaction with the natural resource base and trends in modernisation of harvesting techniques.

Focus group discussions (two men's groups and one women's group) were undertaken to examine how members of the community access their political assets. People in the group were encouraged to discuss on topics such as role of *matysafed* and other fisheries department, subsidies and loans available to them and need for a fishery harbour. Although homogeneity within groups is recommended, a diverse group would help to observe different perspectives arising from different life experiences that are common to that cultural specificity in Ponnani. Two sessions of men's groups consisting of eight to ten students, boat owners/workers, fish merchants, union leaders and Panchayat members of the community, totalling 13 to 17 people, participated in the discussions. One women's group of six students, wage labourers and housewives, totalling ten participants, was carried out. The communities' response to the market expansion and introduction of modern hi-tech technology that impacted on their livelihoods was the focus of discussion, particularly with the artisanal fishers group. Later discussion helped to understand the social/gender perspective, particularly regarding the role that women have in decision-making, both within the family and the community. Topics in these discussions ranged from choice of family size, freedom of mobility and options and their role in accessing resource assets. Group discussions can provide deeper understanding of specific livelihood issues when they discuss their experience in accessing various social, political, economic and natural resource assets. The objective here is to let the group dynamics capture the discussion of the issues

important to them in their own vocabulary and their own cultural setting. To help initiate and focus the discussions, several questions are posed at the beginning.

To understand the history of the State's role, data from various sources such as the state archives and various historical studies that dealt with the maritime influences on the subcontinent, government records such as Census data, National Sample Surveys, Fisheries Department Statistics and research organizations working in the field of ocean and earth sciences were obtained.

4.4.1 Sample Selection

Collecting primary data from all communities was beyond the scope and resources of this investigation. Therefore, representative communities were identified and sampled. For the purpose of administration, the states in the Indian Union are divided into districts. Kerala has fourteen districts. There are three tiers of local government – district, block and gram *panchayats* and 1,364 census villages (Census of India, 2001). There are 1,214 local governments in Kerala. Urban areas within the districts are categorized into municipal corporations and city corporations depending on the population size.

A detailed household survey in the 12 coastal wards from a total of 50 wards was carried out. Names and address of the respondents were accessed from the electoral list at the Ponnani Municipality. These twelve wards consisted of 2597 households encompassing a population of 25, 775 people (Ponnani municipal records, 2003). Based on this, a stratified random sample (to capture diverse fisher groups) of 100 households was selected.

The fisher population of Ponnani can be divided into three categories on the basis of the fishing craft they use – (1) trawler fishers, (2) those using plywood fishing craft with outboard motors, and (3) traditional fishers who use dug-out country crafts. This research focuses on the third group – small-scale artisanal fishers. Members of this fishing community of Ponnani generally live very close to the seashore. This nearness to the sea has the advantage of convenient beach landing for their catch. However, there is also the risk of unpredictable storm wave generated sea ingression. This happens twice a year when coastal Kerala faces strong monsoon winds and storms generating high waves that engulf beaches and property.

Although the respondents were selected randomly, care was taken ensuing that there was diversity in the range of participants. This was achieved by sampling from trawler boat owners/workers, outboard motor boat owners/workers and non-motorized craft owners/workers, independently. This is important since the perception of asset degradation of artisanal fishers may differ between large boat owning fisherman or those involved in non-fishing professions.

The selection of key informants for the in-depth interviews was obtained from the Municipality which periodically renews the electoral list of all members within their jurisdiction. This list was the initial source of names and addresses. After grouping members of different types of fishing categories, random sampling was applied within each group. A letter explaining the research, intention of the interview and approximate time required was given to the potential interviewee. The following table illustrates the time taken, number of participants, composition of participants and field assistance provided in this research.

Method	Focus on	Period	Sample Size	Composition (age-group)	Number of facilitators/ assistants
In-depth Interviews	Information on survival strategies	4 months	14 persons	8 fishers (24-52) 3 boat owners (45-64) 1 widow (50) 2 elders of the community (70, 72)	1 male and 1 female
Focus-group Discussions	Assets and strategies	3 days	10 (1st day), 13-17 (2nd and 3rd day)	8-10 students (19-28), 2 boat owners (45, 52), 2 workers (30, 38), 1 fish merchant (49), 2 union leaders (36, 40) 1 Panchayat member (54)	2 males and 2 females
Household Surveys	Livelihood assets	3 days	100 households	12 coastal wards	4 males and 4 females
Document Research	Methods, Framework, relevant studies	8 months	-	-- --	self
Remote Sensing and GIS	Bio-physical assets	1981, 2000	-	-- --	self

Gaining Access: In this study, gaining entrance to the communities proved to be the most difficult part. Although I am a Malayalee (one who speaks Malayalam, the official language of the Kerala state), which is a major asset to gain access to the artisanal fishing communities of Ponnani and also access the documents at the local governing offices, religion and gender were major barriers. Ponnani being a Muslim dominant community, women were restricted from interacting with strangers, particularly men. Initial visits to the field revealed that even men were modest and reserved. Therefore, the need to find a key informant, "*the gate keeper*" (Punch, 1994.P.84) and research assistants were imperative. Selection of a key informant who is knowledgeable of the community he or she represents is very important (Neuman, 2000). Through this informant, participant recruitment is facilitated (Conradson, 2005). In Ponnani, a prominent elder from the community who is socially and politically influential facilitated my entry into the

community. Using his political influence, he is active in promoting fishers welfare schemes. He is also a member of the governing council of the Municipality. He is well educated and was delighted to meet me. He introduced me to the governing council of the Municipality and to other members of the community. It was very important to pay informal visits to the members frequently and to gain acceptance before formally launching into the interviews, focus group discussions and household surveys.

Selection of Participants: Consistent interaction with members of the local governing body helped in gaining access to review the municipal voters list. This helped in creating a list of persons and households in local artisanal fishing communities. From this list I could identify informants for in-depth interviews and members for focus group discussions. One hundred households that were surveyed helped in identifying key persons for in-depth interviews. Through this chain process, other participants who held important roles in community affairs and members from fishing communities, government officials, students and teachers were also selected for group discussion. There was much enthusiasm from teachers and students of the local college who also helped in household surveys and in-depth interviews.

The Process: The process of selecting community members, gaining access to the community and selection of participants helped to reveal common cultural understandings related to the phenomena under study. These subjective but collective understandings on a subject are often interpreted to be more significant than objective data. In this case the information collected addresses the core question of how the asset

situation of artisanal fishing communities determines their livelihood strategies and options. The next step in the process is to review the literature pertaining to the culture, and identify variables of interest -- typically variables perceived as significant by members of the culture, for example, religion and religious beliefs. In Ponnani, irrespective of political allegiance, every child in the community starts education at a religious institution called *Jamaat*. The next move involves gaining entrance to the culture, which in turn sets the stage for engagement of the researcher with the local culture. In some situations, it may take several months or even years to get involved and gain the confidence of the informants and to use them to gather additional informants in a chaining process of gathering data in the form of observational transcripts and interview recordings (Paré, 2002). Data analysis comes at the end.

Data Analysis: In qualitative research, data refers to the raw experience of the people, objects and situations (Huberman and Miles, 1994). These are converted into words and are compiled and transcribed into textual format. Normally interviews and conversations in focus groups are captured using tape-recorders or video recordings. These recordings are later transcribed and translated. The text is often enriched with field notes made by the researcher. During the present study, interviews conducted at the work place gave me the opportunity to take photographs. The photographs along with field notes helped to enrich the data while transcribing interviews. The quantity of qualitative data, as Huberman and Miles put it, "*can be daunting, if not overwhelming*" (Huberman and Miles, 1994, P. 430). Processed field notes and transcriptions of interviews alone can turn out 8-10 pages per interview in length. This, therefore, demands a good database

management – storage and retrieval. Good database management, according to Huberman and Miles (1994), is *critical for keeping track of what data are available for permitting easy, flexible, reliable use of data.*…(Huberman and Miles, 1994. P.430). Although this is a concern for large volumes of generated data as in the present study, data gathered from fourteen in-depth interviews and three focus groups was manageable without the help of any data retrieval systems. The transcribed interviews are color-coded and pasted under recurring themes such as 'strategies', 'dependency', 'assets' and 'degradation'. These themes were then cross-referenced to the SLF. SLF provides a window for livelihood analysis, either from the people's vulnerability context or from the assets they have (human, social, natural, physical, political and financial capital). The extent of dependency and degradation that they describe from their day-to-day experience in life indicate how vulnerable they are. It helps to explain from their own perspective, the status and extent of resource dependency. Their asset situation determines the ability of the members of the community to interact with policies, institutions and processes that shape the choice of livelihood strategies. For example, political assets such as fishworker's union may have better bargaining power to get members to access bank loans or other funds from the government. This, in turn, helps to identify responses from livelihood outcomes, which is an important component of this research. Different methods were used in validating these data.

Validation: Use of multiple methods or triangulation strengthens the study results by helping to minimize misinterpretation, identify redundancy of data gathered (repetitiveness) and recognize challenges in the analysis. Drawing on many different

perspectives or sources of data and information in research is defined as triangulation (Denzin and Lincoln, 2003). Triangulation also helps to fill in the gaps in information that may exist if only one method, either the in-depth interviews or the focus group discussions, is used. According to Baxter and Eyles (1997), *Triangulation is one of the most powerful techniques for strengthening credibility* (P.514). In triangulation, the same dependent variable is investigated using multiple procedures such as focus groups, content analysis, ethnography, participant observation or narrative analysis (Ryder, 2006). In this study, triangulation involving qualitative and quantitative methods is mixed, in order to gain insights. An overlap of both methods makes the study more comprehensive (Tashakori and Teddle, 1998). The aim is to use the methods simultaneously so that they complement each other and allow local complexities to be better understood. This conceptualization corresponds to human change process of social reality and, therefore, the need for mixed method research (Tashakori and Teddle, 2003). Questionnaire survey, image interpretations and secondary data from government records accounted for most of the quantitative methods employed which were complimentary in investigating the extent of physical, social, political and financial assets the households had. In-depth interviews and focus group discussions facilitated a deeper understanding of diverse assets and family resources. How changes in the asset situation impacted the strategies the members of the households choose in their pursuit for better livelihoods. To a limited extent, participants were also involved in cross-validation of data and thereby the analysis. Data obtained through secondary sources such as census data and landuse changes map from satellite images were examined and validated by participants.

According to Kesby *et al.*, (2005), *Triangulation and 'member checking' (respondents certifying the validity of data) are built-in* features of qualitative research (P.165).

4.5 Analysis

The methods used in this research offered several entry points to examine the livelihoods of the artisanal fishing communities. They are:

Contexts and Trends: Analysis of historical records, government statistics and population census data, in-depth interviews, satellite images and thematic maps helped to understand which contextual features are important for livelihoods, and why they are important. They also facilitated as assessment of the changes the communities are undergoing over time. Textual information from historical records was recorded that indicated evolution of Ponnani as an important centre of maritime trade and the changes it has gone through to become prominent in fishing and fisheries. Prominence of religion in the life of the community in Ponnani could be analysed from the material gathered from the historical records. Meanings and values underlying in government documents and records were matched with in-depth interviews, particularly with those with elders of the community to analyse the history of the place and society of the study area. The population census that is carried out on a decadal basis by the Census departments gives a demographic profile of the municipality. Decadal changes in population, density of population, and male and female literacy and education levels were obtained from this database. Land use and land cover assessments were made from satellite data IRS IC, ID LISS III, as well as from aerial photographs. Thematic maps of existing and past landuse over different time periods, 1981 and 2000, were digitally prepared and geo referenced.

For image processing of satellite data ERADAS software was used and supervised classification techniques were adopted based on training sites. Post classification steps were performed to eliminate the noise on the classified data before vectorisation. The vectorised maps with thematic data on land use were overlaid in ARCINFO software to analyse the change in land use and land cover. The National Remote Sensing Agency in India has a standardized classification system of categories for land-use and land cover. This scheme of classification was adapted in this research (Garg *et al*., 1998). The shoreline change over time was analysed to understand the impact of coastal development activities and land degradation over time.

Livelihood Assets: Household surveys, in-depth interviews and focus group discussions were particularly helpful in assessing the asset situation of the artisanal fishers. Data from one hundred household surveys were entered in a spreadsheet. From the spreadsheet, according to various themes such as human and social, physical and natural assets, tables were made. Analysis was also done to understand the complex ways through which combination of assets are accessed by the members of the community to find survival strategies. Although focus-group discussion was streamlined with guiding statements, transcribed texts from taped recordings amounted to large quantity of seemingly random information. The next step involved classifying and coding according to various themes. The final step in the analysis was interpreting the patterns. Important observations from the discussion are noted, classified and described. The encoding, according to Boyatzis (1998), provides us with the link between a new or emerging pattern and any and all patterns that we have observed and considered previously (P.4).

The pattern found in the descriptions and coded according to themes has set the stage for thematic analysis. Themes, in this study, are the components of SLF: contexts and trends, livelihood assets, institutions and organizations, livelihood strategies and sustainable livelihood outcomes.

Livelihood Strategies: Patterns discerned from the data gathered on the fishing trips and catch, their investments in gear and craft, education, marriage and migration helped analyze the combination of livelihood strategies members of the community pursued. Sustainable Livelihood Outcomes: Conclusions were drawn from the analysis and depicted whether the strategy pursued by the members of the community is sustainable.

4.6 Constraints and Strategies

The field investigation took nine months while data collection through surveys and interviews was carried out within a span of four months. Throughout this period many students from the MES College of Ponnani assisted in interviews and household surveys. Without them, it would have been very difficult to interview the participants, particularly the women. Getting women to participate was difficult. Ponnani is largely a traditional community of Muslims. Women are expected to stay behind the "*mara*", a bamboo curtain that allows them to peep into the outside world from inside their houses. Moreover, their culture does not allow women to be interviewed by strangers. A major constraint to investigating the livelihoods of coastal fishing communities in India is the lack of current data. The latest data on assets such as fishing gear and craft is from the survey conducted by South Indian Federation of Fishermen Societies (SIFFS). The SIFFS

published a census of the artisanal marine fishing fleet of Kerala for two time periods, 1991 and again in1998. Population information is collected by the Census of India. The most recent published decadal data, however, was in 2001. Although Census of India carries out detailed and widespread enumerations, it is very slow in publishing the results. Even after five years later, there are no published data at the village level. As well, few studies have been conducted on physical, social and cultural assets of fishing communities in India and particularly that of Kerala. Most of the published studies that relate to physical, social and cultural assets of the fishing communities in Kerala are prior to the year 2000. This information is unreliable, as many changes may have taken place locally. Unfortunately, even the data available at the Municipal chairperson's office and other government departments were fragmented and incomplete. Weak institutional infrastructures, poor funding and absence of any systematic collection or compilation of data and dissemination of information characterize most of these government departments. Despite all these constraints, I was able to gain insights from many government officials in the fisheries department who had long years of field experience. As long as I did not take out my digital voice recorder, they were very open and lucid with the information regarding the functioning and activities of the department and it's welfare programs.

4.7 Ethical Considerations

Ethical considerations were part of the whole process of this study. Provisions were made throughout the field research to be transparent and also to respect the privacy of the individuals involved with household surveys, in-depth interviews and group

discussions. As part of the research requirement at the University of Victoria, prior approval to conduct research on human subjects in the study area was obtained from Human Research Ethics Board (HREB). The research proposal, survey questionnaire and guiding questions for in-depth interviews were examined by the HREB and concluded that this research project would have minimal impact on the local communities.

The first step in the field research was to contact the local governing council members. After seeking permission from them to conduct the survey, they were asked to identify artisanal fishers in their community[8]. Potential participants were selected using random sampling method. One of the requirements of the HREB is that there be "informed consent" by the respondents. That means an approval is sought by giving them a consent letter or reading it out to them, as many of the participants were illiterate. This letter makes it clear that participation is voluntary and respondents could withdraw from the interview at any time. The majority of the interviews were conducted at the participant's residence. A few respondents requested that the interview take place at work. Prior permission was sought before photo-documenting the interviews, work and work places or households.

4.8 Summary

This chapter outlined the methodological foundations for the study. Although the emphasis is on qualitative approaches, a quantitative household survey was also conducted during the field work to provide a balanced and contextualized view. Although qualitative methods, particularly in-depth interviews with elders of the community, form

[8] "Community" is referred to mean a group of people sharing a physical environment and resources, having similar social characteristics and interacting within a common culture.

the core of the methods, digital image processing and GIS helped in analyzing physical changes taking place in the study area. The selection of Muslim communities of Ponnani helped highlight how cultural factors affect the ability of people to access State and other alternative assets when the resources they depend upon are degraded. The chapter described the history, physical, socio-cultural and demographic environment of the study area. The chapter also outlines the history of fishing and fisheries and the physical, socio-economic and demographic environment of the study area. Finally, the chapter explained the constraints faced in the field and the strategies adopted. The following chapter will describe the livelihood assets of the coastal fishing communities of the study area, Ponnani in Kerala State.

Chapter 5

LIVELIHOOD ASSETS OF COASTAL FISHING COMMUNITIES OF PONNANI, KERALA STATE

This chapter begins by identifying the key livelihood assets of the coastal fishing communities within the context of Kerala's economy and society. It then presents the results from the household surveys conducted in Ponnani substantiated with excerpts from in-depth interviews and documentary research. The key factors that define livelihood options are identified.

5.1 Key Livelihood Assets of Coastal Fishing Communities

For artisanal fishers in Kerala, the living resources of the oceans and seas are natural assets. The skills and knowledge acquired and passed down over generations have allowed them to derive food, work and income from these resources. The communities share these natural and human assets and depend on these resources as their primary source of subsistence. Communities have evolved rules and norms with regard to territorial claims and established property rights over fish stocks, which are highly mobile and invisible. They have also devised co-operative fishing techniques to harvest fish that *exhibit a highly nuanced ecological sophistication* (Kurien, 2003, p.6). Kurien defines *community* property over their property rights *to stress the role of the group as a community and not simply as a*

number of individuals (Kurien, 2003, p.7). This draws a distinction to the classic description of Hardin's 'tragedy of the commons', that unless the natural resources are in the custody of private or state property, ruin of the resource is inevitable (Hardin, 1968). Bromley and Cochrane affirm it with the statement that, "*everybody's property is nobody's property*" (Bromley and Cochrane, 1994, p.11). Common property is characterized as the private property of a group of individuals (Sterner, 2003; Stevenson, 1991; Berkes, 1989). When property rights and regulations are ill defined or absent, it is referred to as "open access" (Kurien, 2003; Yadava, 2003; IUCN, 2003; Gordon, 1954). In Kerala, well-defined property rights have evolved through generations, the remnants of which can be seen even today in certain parts of the State. However, there is "free access" to the coastal waters *as a last resort for the poor to eke out a living* (Kurien, 2003, p.6). Therefore, due to an influx of competing methods used in fishing, the community uses a variety of arrangements to regulate and ensure an equal opportunity for everyone to access the natural assets. Communities took the initiative to protect their natural assets, which are mainly fish and fish habitats, by erecting artificial reefs when repeated trawling degraded these habitats. Artificial reefs prevented trawlers from entering these grounds, as their nets would get entangled in them. Citing this example, Kurien points to potential strategies for visualizing natural resources as natural assets that can contribute *significantly to sustainable resource use, community empowerment, and well-being* (Kurien, 2003, p.6).

The traditional fishers of Kerala use three types of fishing crafts - plank canoes, dugouts (Figure 5,1 (1) and the *Kattamaram*. The *Kattamaram* is one of the oldest types of fishing crafts, which are made by tying together three or four logs of soft wood with coir ropes (Figure 4.2 (1)). While *Kattamaram* are more common in southern Kerala, particularly in Trivandrum district, dugouts and plank canoes are favored in the north. With

Figure. 5.1 Dug-out canoe

Figure 5.2 Kattamaram

increasing deforestation and a dearth of logs required for constructing *Kattamaram*, plywood boats have become popular. Fishing gear consists of cotton and nylon nets. These are used as shore nets or at a depth of up to 20 fathoms in the sea. Hook-line nets are used for fishing beyond 20 fathoms.

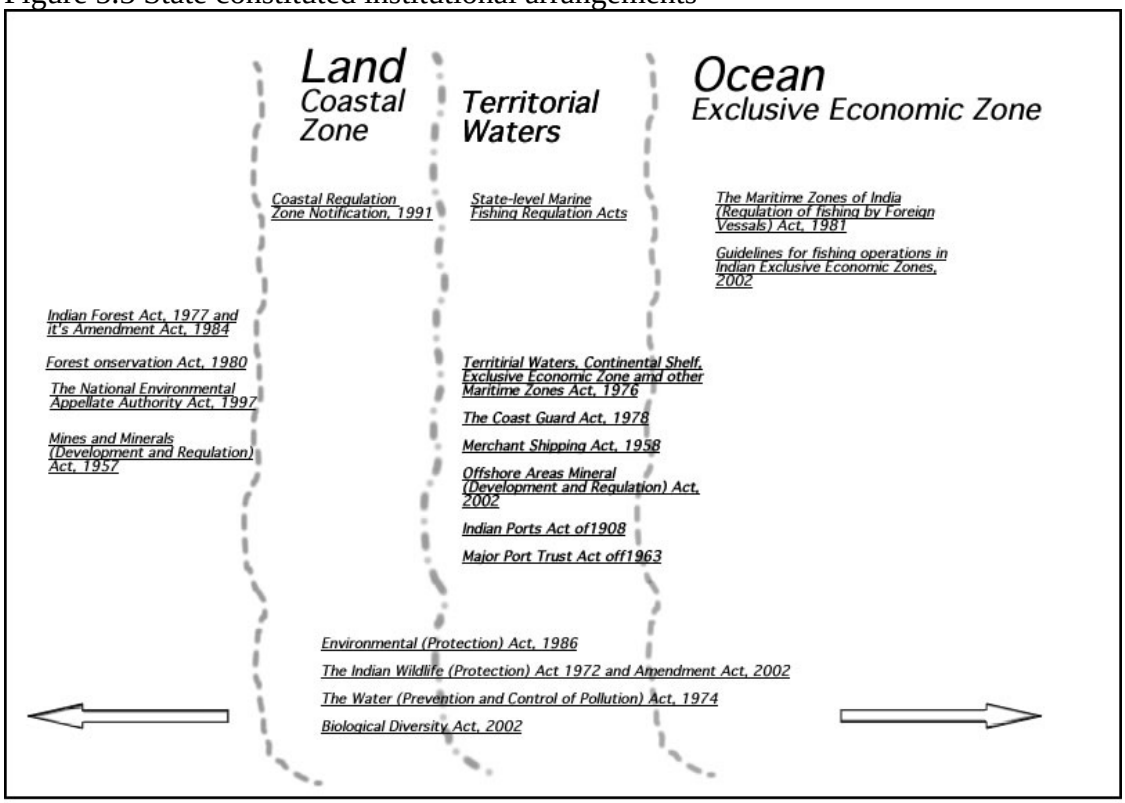
5.2 Access to Assets within Policy and Institutional contexts (State Regulations and Community-based Rules that Affect Access to Resources)

Traditional and modern institutional arrangements are among the most important social assets available to coastal fishing communities. While the *Karanila* system of income distribution among the members of the communities prevailed in southern Kerala during 1940s and 1950s, the *Kadakodi* of northern Kerala were concerned with conflict resolution. This century old traditional management system prevailed as late as 1980s. Conflicts were often related to the sharing of resources. *Kadakodi*, therefore, was a powerful institution that dealt with resource management. The literal translation of the word *Kadakodi* means 'sea-court', but it is more than a conventional judicial court. This traditional institution existed for centuries and is still functional within some coastal communities in the northern parts of Kerala. Paul (2005) identified three distinct types of *Kadakodi* based on administrative structure – temple centric *Kadakodi* of northern district of Kasargod. Here, the administrative structure consists of a magistrate (*achanmar*) and a general body (*poduyogam*) that the community entrusts with the judicial power to regulate the fishery. The second one is multi-community *Kadakodi* consisting of members from different religions. This secular institution consists of a general body of members of the community, an elected president and a vice-president. The third set of *Kadakodi* is

concentrated around the Vadakara Taluk of Kozhikode district. These *Kadakodi* consist of an action committee headed by a sepoy[1] (Paul, 2005).

Similar sets of institutional arrangements for managing natural resources existed in different communities in India (Kurien and Vijayan 1995, Bavinck 2001,

Figure 5.3 State constituted institutional arrangements



Source: CMFRI, www.cmfri.com accessed on June 2003

Gadgil and Guha, 2002). Among modern state institutions, the Department of Fisheries is a key asset for the coastal fishing communities (Figure 5.1). Kerala was one of the first to implement a Marine Fisheries Regulation Act (KMFRA) of 1980. This Act was promulgated to conserve fishery wealth and was an outcome of the collective action of fishers (Kurien, 2001). The Act empowers the State Government to restrict or prohibit

[1] Term used for an infantry private during the British rule of India.

activities, such as: fishing by unlicensed vessels; the use of purse-seine, ring seine, pelagic trawl and mid water trawl in the territorial waters; the use of bottom trawl gears in territorial waters with less than 35 mm mesh size in stretched condition; the use of bottom trawl gears from sunset to sunrise in territorial waters; and the use of fishing vessels fitted with mechanical means of propulsion, except country crafts in the area of the sea up to 20 meter depth along the coastline. In theory, government structures and institutions add strength to the social assets of the community. The governance of the fisheries sector is vested with the Ministry of Fisheries and the chief executive is the Secretary to the Government (Fisheries). However, it is the State Department of Fisheries that carries out all the development and management programs envisaged in the fisheries sector. The Director of Fisheries heads this department which is structurally stratified and organized under Executive Officers whose responsibilities and functions are given in Table 5.1.

Table 5.1 Functions of different layers of government departments

State	Directorate of Fisheries headed by the Director of Fisheries and Additional Director of Fisheries (Technical)
Zonal Level	Joint directorate of fisheries (has three zones - south/ central/north and are headed by a joint director each for each zone)
District	Deputy Directorate of fisheries (headed by 14 deputy directors)
Panchayat	Matsyabhavans (spread around the entire coast and are headed by about 200 Matsyabhavan officers)

The Department of Fisheries also has other commercial units:

- *Matsyafed*, which has district offices and commercial units
- Agency for the development of aquaculture with regional offices
- Kerala fishermen welfare fund board with regional offices
- Fisheries resource management society with regional offices
- Marine enforcement cell with fisheries stations

- Harbor engineering with sub divisions

Another important area where the department plays an active role is the rescue operation for fishers who are in danger at sea. Rescue efforts have often failed, however, due to the extreme conditions under which the fishing communities operate. Monsoon winds and other cyclonic storms create very rough seas. During monsoon season, larger boats are docked in the fishery harbors and the county boats and catamarans are dragged up on the beach. However, if stormy weather continues for extended period of time, young fishers from the community drop the boats in the sea from a pier to get across the strong waves. The catch they bring back from these trips is shared by the community. The Fisheries Department's other responsibilities and functions are shown in Table 5.2.

Table 5.2 Responsibilities and functions of fisheries department

Sl.No	Functions of the Department
1	Registration and licensing of fishing vessels/fixed engines/stake nets
2	Fisheries technical high schools with boarding facilities for the children of fisher families
3	Social Fisheries scheme for stocking fish seeds in rivers and other water bodies
4	Stocking of fish seeds in Reservoirs
5	Issue of special license for free nets and license for prawn fishing in private waters and paddy fields
6	Preparation of fishers list every year for identifying beneficiaries
7	Provides educational concession to the children of fishers
8	Provides housing assistance to fishers under NFWF Housing Scheme.
9	Saving and relief scheme to provide relief to fishers during the lean months
10	Sea ranching for increasing fishery resources
11	Registration and monitoring of fisheries cooperatives
12	Provide special bus service for fisherwomen vendors (Matsyafed)
13	Provide input security scheme to compensate the losses due to accident and/or natural calamities sustained to the fishing implements (Matsyafed)
14	Provide Group Insurance Scheme to insure all active fishers

15	Cash awards and scholarships for SSLC and higher education for the children of fishers and allied workers
16	Effective extension support for aquaculture in fresh water and brackish water areas
17	Financial assistance to the dependents of fishers in case of accidental death while fishing
18	Financial assistance for the death of the dependent
19	Old age pension and widow pension to registered fishers
20	Financial assistance for the temporary disability due to accident
21	Financial assistance to the dependents for the death of fishers for meeting the funeral expense
22	Financial assistance to registered fishers for the treatment of fatal diseases
23	Financial assistance to the wife of fishers or fisherwomen for maternity care
24	Financial assistance for the treatment of handicapped and mentally retarded children of fishers
25	Training to farmers in shrimp/fish/ornamental fish culture
26	Financial assistance for motorization of country crafts
27	Financial assistance for providing suitable components of fishing gear
28	Production of disease free quality fish seeds/shrimp post larvae for farmers and to control fish seed price in the open market

Source: Department of Fisheries, Government of Kerala, 2004

Specific questions to understand the strategies adopted to access political and institutional assets by households in fishing communities has shown that more than fifty percent of the fishers in the sample survey accessed various institutions to obtain loans. The hundred households surveyed among the twelve coastal wards revealed that fifty-seven percent of the head of the households were members of the Matsyafed affiliated cooperative societies. However, only twenty percent of them had accessed any economic benefits through loans from the government institutions mentioned in Table 5.2, row numbers 17 to 27. Fifty-nine percent of them said that their children got educational lump-sum grants from the Fisheries Department and forty-six percent said they got benefits from the Fishermen Welfare Fund Board.

5.3 Human and Social Assets

One of the most striking aspects of Ponnani is the population numbers. There has been a large influx of population in Ponnani (Table 5.3).

Table 5.3 Growth of population numbers and rate in Ponnani, Malappuram and Kerala, 1971-2001 (Arithmetic growth rates in brackets)

POPULATION	1971	1981	1991	2001
Ponnani	35,723	43,226 (2.1%)	51,770 (1.9%)	87,495 (6.9%)
Malappuram	1,856,362	2,402,701 (2.9%)	3,096,630 (2.8%)	3,629,640 (1.7%)
Kerala	21,347,375	25,453,680 (1.9%)	29,098,518 (1.4%)	31,838,619 (0.9%)

Source: Census of India, 2001.

Between 1991 and 2001, the population rose by 17.2 per cent. Although the total population has increased, the decadal growth rate shows decline since 1991. Malappuram district, with its 3.6 million people, has the highest rate of population growth among the 14 districts in Kerala. The district also has the highest fertility and infant mortality rates. Moreover, teenage marriages and pregnancies are still high in this district. A study carried out as part of the district Reproductive Health Project showed that out of 2,918 married women in the reproductive age group surveyed, 53 percent were married at an average age of 15 (Municipal hospital records, 2003). Early records show that population numbers of Ponnani reached a five-fold increase from about 10,000 in the year 1901 to 51,770 in 1991. The last decade shows a very high increase of 87,495 in 2001. Several reasons are behind this growth such as declining opportunities for inland fishers in their regular fishing grounds and thereby moving into trade in Ponnani, attraction of Ponnani as a centre of religion and culture, concentration of educational institutions and construction of a new

fishery harbor. In contrast to this, the decadal growth rate for the State has declined (Table 5.4).

Table 5.4: Population growth rate (in %) of Ponnani, Malappuram and Kerala

DECADE	PONNANI MUNICIPALITY	MALAPPURAM DISTRICT	KERALA STATE
1971 – 1981	21.00	29.43	19.24
1981 – 1991	19.77	28.87	14.32
1991 – 2001	68.74*	17.22	9.42

Source: Census of India, 1971, 1981, 1991 and 2001
∗Area under municipal jurisdiction has increased during the 2001 census.

Migration plays an important role in the survival strategies of the communities of Ponnani. Although the Government of India Census data is accurate, administrative boundaries change over time. Hence comparing data over time, especially below the district level, is difficult. The district level migration data is analyzed, and shows that in Malappuram district, according to the 1991 census, the total number of lifetime in-migrants was 1,800,000. Among them, 91 percent were from other districts in Kerala and 8 percent were from other States. Lifetime migration also increased over the years. The number of lifetime migrants was higher during the period 1971-81(62,403) compared to 1981-91 (40,267). However, the number of lifetime migrants from other states increased during the period 1981-91 (6639) compared to 1971-81 (4861). Zachariah *et al*., (2001a) assessed the major dimensions of migration, socio-economic and demographic characteristics of migrants and consequences and determinants of migration. According to him:

> *…there are about three-quarters of a million return emigrants in Kerala today. However, they are relatively old with an average age of 41.7 years. A few are even too old and/or too sick to work. Some feel that there is no need for them to work at all; with the money they have earned abroad,*

> *they would rather enjoy a leisurely life back at home. The majority of them have, however, neither the human nor the material resources to make a real contribution to Kerala's development. They have relatively poor levels of general education and technical education. Nor do there exist much of entrepreneurial abilities and leadership qualities among them. Most of them have already spent their savings and are looking for assistance to keep up the relatively high levels of living they have been accustomed to, following migration* (Zacharia, 2001a, p.4).

In Ponnani, it is common for men seeking employment to migrate to Middle Eastern countries. Migration, therefore, has been an important way in which people have been coping with the lack of local employment. The household surveys undertaken revealed that 6 percent of the heads of households surveyed work abroad. In-depth interviews with the members of the community revealed, however, that migration to the Middle Eastern countries is becoming more difficult because of emigration restrictions. Moreover, to migrate, one needs either a lot of money or some influential relatives who can make this possible. Those who are better educated have better possibilities, but for the most part, middlemen exploit the poor by selling work visas to Middle East. In order to buy the visa or sponsorship they borrow money by mortgaging their assets at a very high interest rate. Also, the government has never intervened in streamlining migration procedures and the migrant workers are at the mercy of middlemen and customs officials. Although it is relatively easy for wealthy people from Muslim communities to migrate to the Middle East, it is not easy for the poor to do so. High male out-migration leads to a higher sex ratio. In the twelve coastal wards where the household survey was conducted, there were1068

females to 1000 males. However, within the age group of 0 – 6, boys outnumber girls and the ratio is 942 girls per 1000 boys.

The Patrilocal system of marital residency is very common among the members of the community who have traditionally fished, and falls within the small-scale fishing groups. Those engaged in trade and big sailing vessels, *Pathemari*, have a matrilocal system and, therefore, follow a joint family structure. The features of this system include separate rooms for grown-ups and married couples, but shared kitchens. An in-depth interview with a key informant, Ak revealed some interesting features of family structure.

> *When it is time to marry a daughter, the father constructs a separate room, locally called "ara" for the bride-to-be with facilities depending on the economic status. This room is then furnished with all that a newly married couple requires except for a kitchen, as the kitchen continues to be a common one. The groom spends the evenings and nights in the "ara", but continues to work on his father's boat, and contributes to the household income of his father and eats at least two of his three meals in his father's house. He also brings some money to his wife but this is generally for the needs of the children and he can obviously save some money for the family's future needs. After several years of marriage, the couple may decide to get a place of their own. Then they not only get some money from the girl's father but also take away all the things in the "ara". The family continues to be a patriarchal structure with the father being the main decision maker and the women observing a system of "purdah".*
>
> *The importance of the wife of the patriarch is related to the economic status of the household. If the household is economically sound, the wife seems to have a major say in the family affairs. She will have other women in the household to do the chores while she supervises and directs the operations. She will also have money at her disposal and will have a certain freedom of mobility – more so as she advances in age. On the other hand, if the household lives on a tight*

budget, then the wife struggles to make ends meet, seeing that all are fed and she is working very hard. She is dependent on what her husband and sons bring into the home and in a way her life is drudgery

The efforts to keep women under strict control are very visible. Since assets are under the patriarch's control, it is indicative of both gender and generational bias. The traditional fishers, on the other hand, currently have a nuclear family structure. They are poor and other poorer Muslims adhere to a nuclear family structure as well. There is no "*ara"* system but the dowry system prevails. Often the dowry is so high that it is difficult for women in poor households to find husbands. In this community it is not unusual for men to have more than one wife. Although this is permitted by religion, many women do not willingly accept it. The other side of this is that widowed women are able to remarry. Here again, however, the women complain that this is mostly so that the men can obtain more dowries. In both communities woman live in great subjugation. They have no voice in their community-based institutions as well.

There are 16 mosques within Ponnani Municipality. Traditionally Mosques and their committees called *Jamaats* are the dominant community based institutions. *Jamaats* used to have a powerful influence over the community. *Maulavi*, the religious leader of *Jamaat* is often approached to resolve minor conflicts within the community. Although the caste hierarchy seen among Hindus is denied in Islam, and is not apparent in Ponnani, subtle variations in caste were noticed during field surveys. For example, there are marked differences in their ability to access political assets between the Muslims who fish and those who don't. The *Pathemari* sailing community near the harbor, Azheekkal, who later got into the trawl sector have stronger political bargaining power, better access to community services and better living conditions than the traditional fishers who live in the Puthu-Ponnani area. It is also apparent in the ways *Jamaat* operates within the community.

Although *Jamaat* used to be in the forefront regulating the social life of the community, including the fishery, currently its role is reduced to that of mediator in family disputes. The *Jamaats* are also economically weak, and are being maintained by donations sent by migrants from Gulf countries. The reduced power of the *Jamaat* is also due to the presence of political parties with a strong influence in the polity of Ponnani. The Municipality, by and large, is a stronghold of the communist party. This could be attributed to the class differences that are prevalent in the community. The apparent sense of equality among the members of the party, gave lower class Muslims a sense of dignity. However, a religious based political party, the Muslim League, emerged during the 2001 elections. It should be noted here that politics in the state is very complex. Many political parties have emerged that are caste and religion based. In order to attain power, however, broad alliances are built during the elections. These alliances have prevented any one party from becoming despotic.

There are *madrassa* attached to the mosques where children learn religious teachings as well as the Arabic language. William Logan, the Scottish Collector of Malabar wrote and published a Malabar Manual in 1887 in which he refers to Mapilla Board School and Mohammedan College of Ponnani where students from all over the region came to study religion. Today Ponnani has three high schools, three upper primary and six lower primary schools. There are nursery schools and *anganwadis* (day care centers) run by the Municipal Corporation. However, the only institution of higher education is the M.E.S College which was established in 1968.

Education and knowledge are the key components of human capital assets of the coastal fishing communities that help to improve their livelihood options. Traditional knowledge has been passed on through generations and earned them their livelihoods as skilled fishers. In the modern world, however, formal education is imperative.

Communities have adapted to this need, which is evident from the literacy data. The literacy rate increased significantly in Ponnani from 35 percent in 1971 to 84 percent in 2001. The literacy rate for the state as a whole was around 91 percent in 2001. Although Ponnani has lower literacy rates compared to the state, there was a large increase in female literacy between 1981 and 2001. This was due to a mass literacy campaign in the state of which women were the main beneficiaries in Ponnani (Table 5.7). Although the mass literacy campaign was not targeted to women, they better accessed this opportunity.

Table 5.5 Literacy rate among men and women in Ponnani

YEAR	MALE	FEMALE	TOTAL
1971	44.3	26.7	35.3
1981	53.4	39.6	46.3
1991	68.1	71.0	69.6
2001	89.4	80.3	84.0

Source: Census of India, 2001

Nevertheless, a closer look at the ward data for the year 2001 reveals a lower literacy rate among the coastal fishing communities of the municipality – 79.5 for males and 68.2 for females.

There are 2597 households with a significant number of joint families in the twelve coastal wards of Ponnani. 55 percent of the heads of 100 households surveyed were involved directly in the fishery or fish related activity. There were only three trawl boats and three traditional fishing craft owners. Therefore, the majority of those surveyed were workers on the traditional fishing craft. Thus the labor requirement was met from within the community. The survey undertaken suggests that there is a large group of people with very few assets in Ponnani and this is elaborated in the following sections. On the whole, 50

percent of the respondents in the Ponnani area were workers. Table 5.8 provides a breakdown of the sample by sex and occupation.

Seventeen percent of the households were female headed. Four of these women were single and the rest were widows. They were dependent on their sons, daughters, relatives or even neighbors for their livelihoods. In-depth interviews later revealed how households find strategies using dowries to access the money needed for seeking better job opportunities in the Middle East. Although illegal, the dowry system is considered an obligation by most of the families surveyed. In-depth interviews further revealed the impact

Table 5.6 Sample break-up and details of the head of households by sex and occupation

Category	Number		
	Male	Female	Total
Mechanized fishing boat owners	3	0	3
Mechanized fishing boat workers	7	0	7
Traditional fishing craft owners	3	0	3
Traditional fishing craft workers	37	0	37
Fish trader	5	0	5
Salaried	5	0	5
Working abroad	6	0	6
Self-employed	4	1	7
Casual labourer	5	2	7
Others	8	14	22
Total	83	17	100

of this system on women in Ponnani. Unsuccessful males in terms of securing a good job or saving money, often remarry many times to access money through this dowry system. Not all migrants are successful in securing good jobs abroad. Securing a job also means getting

a sponsor to issue a work visa. Many unsuccessful job seekers return when their three-month visit visa expires.

Habitat details observed during the household survey revealed that 46 percent of permanent structures with brick and concrete belong to non-fishing households while 36 percent are semi-permanent and 18 percent with thatched or shacks. Ninety two percent of the households owned houses. Only one respondent rented a house. All other respondents lived as joint families. The household size of the mechanized boat owners is twelve members on average. In general, fishery dependent households were larger than the others having an average of nine members while the others had seven.

The most important social asset that the people of Ponnani have is the collective effort they engage-in in their day-to-day life to make it through difficult times. This is evident even in the way they find strategies to make use of political assets despite their religious taboos. Ponnani municipality has always been in the forefront to capitalize on available assets. For example, as the entire state was going through massive reforms of Panchayat Raj, Ponnani benefited the decentralization efforts. One of the major achievements of decentralization in Ponnani is having a good supply of water, sufficient sanitation, sewerage and drainage facilities in the municipality and initiatives to have a solid-waste management program. These initiatives were among the first of this kind since the inception of Ponnani as a municipality in 1977 and can be counted as a disease prevention strategy.

Among other physical assets, only 71 percent of the households had electricity, 83 percent used firewood and 11 percent used Liquefied Petroleum Gas as the cooking fuel. This is a common phenomenon in Kerala, where large numbers of poor households use wood for cooking, as there are plenty of coconut trees around. Almost the entire coconut

tree is usable, primarily for thatching the roof, making brooms and coir for rope and stem for wood. However, poor households who had no coconut trees had to buy firewood. Use of firewood has health implications for women as they cook on open fires exposing themselves to smoke and therefore to respiratory problems (Sarkar, 2006; Budds *et al*., 2001). Interviews with women revealed concern regarding drinking water availability. They raised concerns regarding regular supply of water in the public taps and people reported that some wells had also begun to dry up for three to four summer months every year.

The decadal census enumerated for 2001, shows that the state of Kerala attained total literacy (Census of India, 2001). Illiteracy is high among all occupational groups, but highest among the fishing households than in the non-fishery (Pushpangadan and Murugan, 2000). Illiteracy is higher among the women, as 68 percent of females compared to 55.4 percent among males. This disparity is evident among educated as well. However, in the coastal communities only six percent had reached up to high school or beyond.

Table 5.10 reveals a marked change in educational achievement. In the age group greater than 18 years, 8.5 percent are illiterate among boys and girls. Nevertheless, there are very few children in the 18 + age group attaining higher education, even though there is a college in Ponnani. There are just 5 over 18 years and above who had been to college among these 100 households. Although higher education is a priority in the state, little progress has been made in that direction in Ponnani (Table 5.10).

During field visits, I observed large numbers of children going to the *madrasa*, for two hours in the morning, even if they have to drop out of regular school. At the focus group discussions, women expressed the view that religious education is a necessity and that they were willing to pay for it. Many of them expressed their personal disappointment

Table 5.7 Educational levels of children above six years of age

Education	Male		Female		Total		
	Age 6-17	Age 18 +	Age 6-17	Age 18 +	Age 6-17	Age 18 +	Total
Illiterate	0	16	0	18	0	34	34
1-12	62	131	59	111	121	242	363
Graduate	0	2	0	3	0	5	5
Total	62	149	59	132	121	281	402

for not having taken advantage of education earlier. Better education would have meant better jobs and better income. However, in those days, there was always an income from fishing and therefore, they were not persistent in pursuing education. In those days, many said fishing was a respected occupation and that they did not think beyond. Only as the fishery declined, did they realize that education could be a strategy to find better opportunities. However, better educational opportunities required money and this they didn't have. Although there are schools and a college situated in their vicinity, the community as a whole had not been able to benefit from it. Most women felt that women should also be educated and employed, not so much because this was a right or because it would give them added mobility and independence, but because life had become so difficult that one insecure income of the man was not able to keep the family going.

5.4 Physical and Natural Assets of Ponnani Fishing Communities

Fishing is the mainstay of most of Ponnani's coastal communities, and provides the largest employment for the people here. According to the Department of Fisheries, there was 3687 active sea going fishers registered with the State Fisheries Board. In addition there were 20 inland fishers, 200 people employed in fish processing, and 800 in fish marketing. The most recent head count by the department suggests a fisher population of 20,283 in Ponnani (Government of Kerala, 2002). The majority of these fishers are men. Household surveys in the coastal wards revealed the following occupations among the members of the community: The majority of the fishers were engaged in traditional fishing – 37 as workers and three as owners of traditional fishing crafts (Table 5.8). However, interviews conducted during the household survey revealed that 28 percent of the head of the households were earlier owners of some craft and gear. Fifty percent of them started fishing in non-motorized crafts at the age of 15 years or less. Thirty percent started fishing between the ages of16 to 20. Twenty four percent of these fishers did not know how to swim, one of the basic skills required for fishers. While 28 percent did not have the skills for using sails, 74 percent had no skills for operating OBMs. Those who started in the non-motorized crafts such as dugout canoes developed their skills using mackerel gill nets and also hook and line fishing. The decline in fish catch led many to take loans and obtain credits[2] from traders and moneylenders and enter into mechanized fishing. While this allowed them to fish in deeper waters, up to 30 fathoms, most of the interviewees said that the improvement in access to fishing areas did not improve their incomes. Rather, loan

[2] Borrowing money from traders and moneylenders is very common among the fishing communities in Kerala. Obtaining credit from these informal sources, often at much higher rates of interest, bind the fisher to sell their catch to the trader who advanced the money and unable to sell to any other higher bidder. Those who are unable to access assets (particularly, political asset) find it more difficult to access credit from formal sources (ICSF, 2003)

payments became an added burden and they were all in debt. The following is an excerpt from one of the interviews with Ak, who is an active fisher.

> *I started off as a worker on a dugout canoe using both mackerel gill net and hook and line and fished at a depth of 20 fathoms. We were five of us working together. But catches were poor and so eight years ago* (1995) *five of us took a loan from Matsyafed and we bought a second hand 22-foot plywood boat with a 9.5 HP Suzuki engine. In the first year the fishing was good because we could also go to fish in other areas like Thalassery and Alleppey. We went up to 30 fathoms with gill nets. But each year the fishing got worse and my other colleagues pulled out of the ownership and I still have a debt of Rs.160, 000* (Approximately, CDN$4500). *I haven't been able to do much fishing this year* (2003), *just a few days in fact. Because it is too expensive to put to sea and the returns are so poor. Even the big plank canoes are no longer in use. We had 5 ring seines in Ponnani, now there are only 2 and even those have not operated this year as the initial operating costs will be Rs.4000-5000* (Approximately, CDN$100 – 130). *It would have been easier to work as before without engine costs but then the trawlers and the foreign boats have taken away all our fish and the government does nothing about it.*

Migrating to distant places for fishing is one of the livelihood strategies fishers adopted when the catch in the near-shore waters of Ponnani declined. However, the survey revealed that 49 percent of the fishers had never fished beyond Ponnani. Even among those who migrated, only 10 percent had been outside Kerala's coast. Among those who migrated in the last year, 95 percent went along with their regular craft and gear units to nearby districts. All the fishers said that the fish landings in their area had declined during the last ten years. For most of these fishers, 2003 was a very poor year. Thirty one percent of them did not go to sea at all. Even among those who worked, only 38 percent got work for more than 6 months while 27 percent got work for less than three months. Sardines were the

major species landed by most of these fishers, followed by mackerel, prawns and anchovies. These traditional fishers blamed trawling as the main reason for overfishing. They pointed to the out declining landings of highly valued prawns an indicator of overfishing (Figure 5.5). Since the 1990's, trawlers have encroached into the traditional fishers domain of inshore waters, resulting in conflict with them. These trawlers were not only from Ponnani but also from rest of Kerala.

Thirteen trawler crewmembers and three trawler owners were interviewed. Among the crew, nine were deckhands and four were skippers. Thirty three percent of the crew started their career as trawl boat crew, only after 35 years of age and with previous experience working either in *Pathemari* or traditional fishing crafts. These trawl boats were engaged in either overnight (two-day) or single day fishing and not for longer durations. The crew size of all these boats was either 6 or 5 fishers. Many boats worked in shallow waters. The minimum depth at which 55 percent of the boats fished were less than 10 fathoms, and 66 percent of the boats never trawled beyond 65 fathoms. None of the boats used modern devices like fish finders and GPS. The majority of the crew were locals with a few from outside Ponnani. Seventy one percent of the crew had previously worked in *Pathemari.* An equal number also had working experience in traditional fishing crafts. However, only 14 percent had skills in hook and line fishing and 43 percent in gillnet fishing. While 64 percent were capable of operating an in-board engine, only 14 percent knew how to operate an Out Board Motor (OBM) boat. Only about 33 percent had migrated for fishing at other places. None had ever migrated to places outside Kerala. Of the three boat owners interviewed one had retired and of the other two, only one was active. All three had fishing experience in the non-mechanized fishery and one had worked on a

sailing vessel as well. Two of them acquired boats through government assistance, one in 1967 and the other in 1973.

In Ponnani, there were two main fish landing centers –Marakkadavu and Azheekal. While Marakkadavu was the landing center for traditional fishing crafts including motorized ones, Azheekal was for mechanized trawl boats. The latter one is being converted into a fishery harbor. At Marakkadavu, fishing crafts from neighboring villages also landed and sold the catches. A large number of small-scale traders used either bicycles or small motorbikes such as mopeds to carry the fish to neighboring markets. During the fishing season wholesale merchants came with trucks to both landing centers. The fish were taken as far down as Cochin either for export or to cater to other markets within and outside the state.

There were a few commission agents who acted as salesmen and auctioneers and some of them as suppliers to companies. They also advanced money to fishing craft owners and ensured cash payment to the fishers taking a commission of 5 to 10 percent.

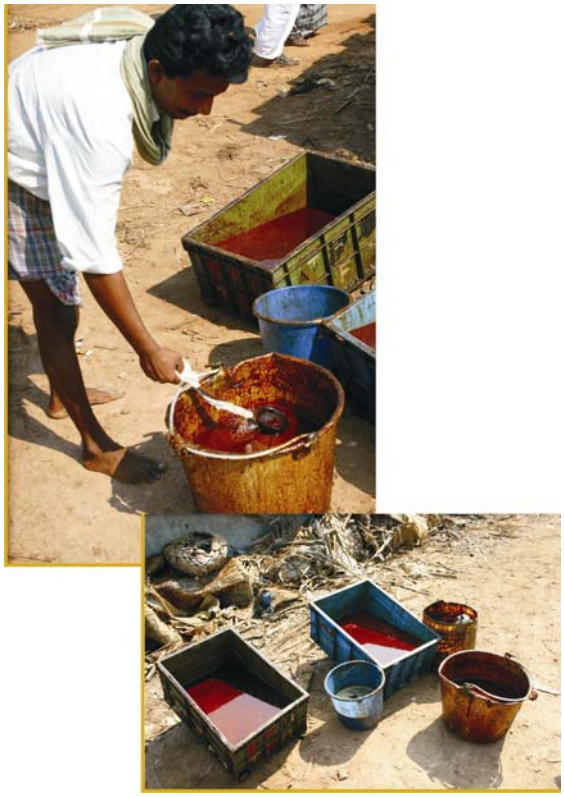
Chapas, the fish processing and drying centers, were the only places where large numbers of women were employed. The *chapas,* which previously processed sardines for oil, now dried them or sent them to distant markets or fishmeal companies. When the ring seine landings of sardines and mackerels fetched low prices the dried fish was also sold as fertilizer. Though there were no women vendors, a few Muslim women worked as laborers in the *chapas* (Figure 5.2). The *Chapas* declined and the jobs were lost to women and men when export and fresh fish markets became more lucrative. The decline of *chapas* also contributed to increasing unemployment in Ponnani. For the poor artisanal fishers, fishing is still the only option. Migration to other countries for work and better opportunities is a distant dream.

Field investigations and in-depth interviews with two elders (of the total 14) of the community revealed that the Ponnani fishery went through many changes during the post independence period. From a community of seafarers and traditional fishers using large wooden plank canoes and dugouts in the traditional fishery, present day Ponnani has a fleet of trawlers and motorized crafts. Unlike other parts of the Kerala coast, here the fishers and the sea faring traders live within the same community. During the interviews, it was evident that the *Pathemari* sailboat operators do not have extensive knowledge or skill in fishing or an understanding of the fishery. They do, however, possess excellent navigational skills. The presence of the *Pathemari* system in Ponnani was a great human and financial capital asset for the community. It provided employment to a large number of people for its cargo movement and loading operations. By the sixties the *Pathemari* system was declining as rail, road, air and faster freight cargo carriers replaced this slow mode of transport (from oral history).

The State Fisheries Department encouraged people to use the harbor in Ponnani that was in disuse with the decline of the *Pathemari* sailboats, for mechanized fishing boats. The Department created forty groups of twenty people, trained them, and gave each group a trawler. These groups of twenty later formed the fisheries co-operatives. Most of the members of these groups came from the *Pathemari* system. Only traditional fishers were given the opportunity to take part in trawl fishery training. Those who did receive training, however, did not pursue this career, as they were not accustomed to staying out at sea for long periods of time. The co-operative systems did not last very long. They became dysfunctional since some members made use of it only to misappropriate government subsidies. However, trawling thrived. There are about 220 mechanized trawling boats that permanently operate from Ponnani with individual ownership (SIFFS, 1998). Some own

more than one trawler and are often working fishers adhering to a shared system. Work sharing among the artisanal fishing communities is an informal insurance system (van den Berg and Lensing, 2007). This system ensures income spreads over large part of the labor available in the community and also making sure that adequate supply of labor is

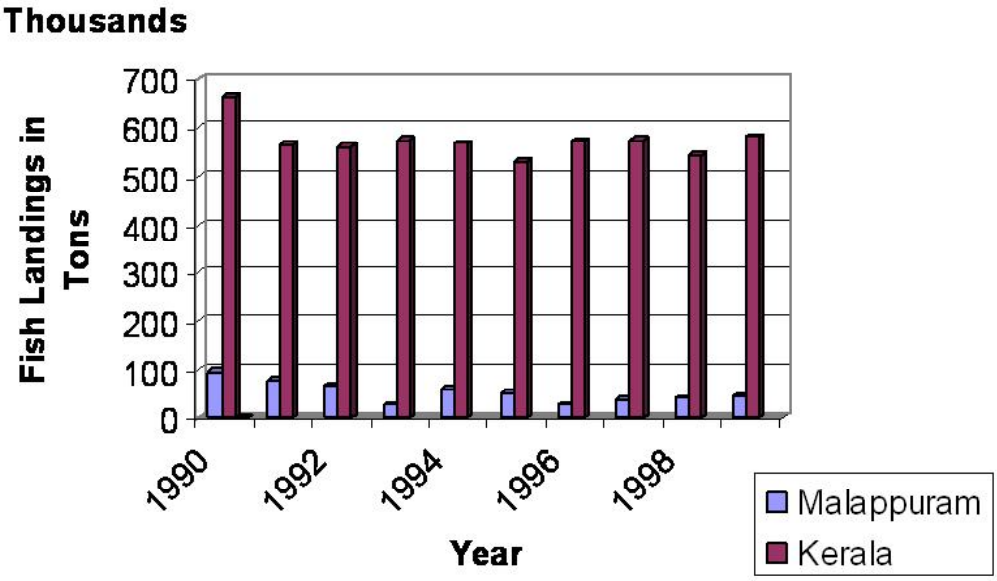
Figure 5.4 Fish oil extraction.



guaranteed. The absence of accumulation of large capital assets among individuals could be due to this shared system. *Karanila* system practiced in the shore-seine fishery operations is one of such income spreading arrangement. In *Karanila* system, fishers who take part in the fishing trip are considered the crew and those remaining back are temporary standby crew who has the *Karanila* meaning, “shore-status” (Kurien, 2000).

The boom in the trawl fishery in Ponnani declined due to high fluctuations in fish catch. Although there are no fish landing data for Ponnani, the district landing data published by the Department of Fisheries is indicative of this fluctuations and a general decline in fish landings (Figure 5.3).

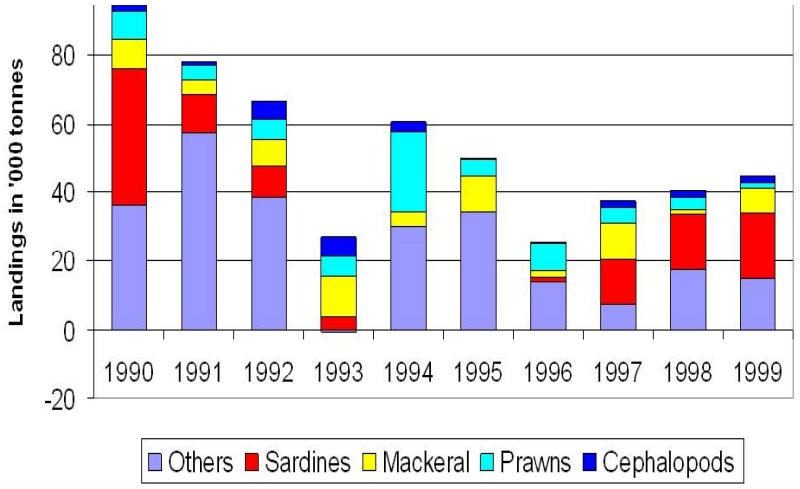
Figure 5.5 Marine Fish Landings from 1990 – 1999 for Malappuram district and Kerala.



In Ponnani, the bulk of the landing used to be sardines. The fishery related activities such as *Chapas* also centered on it. Department of Fisheries data on species landings shows a fluctuating trend with almost no landing of sardine for the years 1994 and 1995 but picking up again in 1997 (Figure 5.4). However, field observations revealed that the fish landed are small in size.

The decline of *Pathemari* and the introduction of trawling opened up possibilities for a section of the community to have better livelihood options. Fisher strategy in the trawling sector was to support the political party then in control and communist party was in power then. This could be one of the reasons for the large influx of followers to

Figure 5.6 Major species wise fish landings in Malappuram district, 1990 – 1999.



communist parties in this sector, as this helped them to find an alternative to the dying *Pathemari* trade. However, it was the workers of the *Pathemari* who made use of this opportunity and they even prevented the traditional fishers from forming co-operatives. Another strategy they used to their benefit was taking advantage of the old *Pathemari* dock area to dock their boats.

The government encouraged fishers in the trawling sector to form co-operatives, gave them training, loaned trawlers and gear. These initiatives were undertaken to exploit the demersal fish resources from the offshore bottom and mid-waters. But interviews with members of the trawl-fishing sector revealed the complex politics:

> *The idea of forming new cooperatives among the fishermen again surfaced. In 1987 cooperatives were registered throughout the State and in Ponnani three cooperatives were registered, all on the 17th of December 1987. However, it was more politics than fishing interests, which dominated the formation and functioning of these new cooperatives under the apex federation of the Matsyafed. Again the ruling LDF (Left Democratic Front government), which started the new*

> *cooperatives, saw them more as a local political tool to win more votes from the fishing community and they saw to it that all these cooperatives were under the control of their local party workers. In 1991, after the opposition, UDF (United Democratic Front) government came into power, in order to gain control over the Matsyafed and to divert loans and benefits to followers of their political parties, new societies were formed. In fact, five new societies were formed in Ponnani in 1992. According to the records there are 3220 (3150 males and 170 females) members in all these cooperatives together. According to the Fishermen's Welfare Fund Board, there are altogether 3687 marine fishers in the area and hence it can be concluded that a good majority of fishers have taken membership in the cooperatives, which is highly improbable. Though the cooperative society rules clearly state that all members should sell their fish landings through the cooperative auctioneer this does not happen in any society. The primary fish sales continue through the private middlemen and the cooperatives have not even tried to change that exploitative system* (From oral history with Ab).

Another government initiative during the same period was the introduction of efficient gear. The Central Institute of Fishing Technologies introduced the ring seine net. By the 90's it was very popular owing to its efficiency in catching an entire school of fish. Soon after this, there were changes in the traditional crafts as well. Large plank canoes that used the new ring seine with its single or double Out Board Motors (OBM) of 25-45 Horse Power (HP) were replaced with marine plywood boats of higher HP OBMs. Interviews with the traditional fishers revealed that they benefited from these changes only for a short period of time because the race for better gear and more power caught them in a debt trap:

> *Although the new boats had good catches initially, with increase in the number of units and the size of the nets the catches soon declined. These units initially cost between rupees two to three hundred*

> *thousand (US$ 4300 – 6500) and although the State did offer subsidy, the fishers were soon forced to borrow money for high rates of interest from the moneylenders, as there was a rush to catch up with the change. In fact in Malappuram district itself there were 332 large and small units (for sardine and anchovies) in 1991 and these decreased to 296 units in 1998. By this time the cost of these units had doubled and even trebled, as the size of the units also got larger. They thus fell into the debt trap as catches declined* (from oral history with Kh).

Interviews with the managers of the cooperatives revealed that eleven groups had taken loans from *Matsyafed* to operate ring seine units, and that all of them had defaulted. Even with the efficient plywood boats, the loan recovery was less than sixty percent. Currently only two groups are functional. As the catch declined and the debt with middlemen increased, the newly introduced ring-seine units became unviable and the groups were dissolved. Today, the abandoned crafts and nets are rotting away.

The promise of new technology and efficient craft and gear combination always gave renewed hope to the fishers. The next entry into the arena was the mini trawl nets – in Ponnani, there were 59 mini trawl nets and 21 plywood canoes. The South Indian Federation of Fishermen Societies (SIFFS) conducted a census survey of crafts and gear throughout the southern coast in 1991 and again in 1998. According to SIFFS, OBMs increased from 154 in 1991 to 193 in 1998. The total horsepower increased from 2058 to 3000 in the same period. On the other hand, the number of non-motorized dugout canoes declined from 242 in 1991 to 66 in 1998. Among the fishing gears there was also a sharp decline in the number of gill nets, from 730 in 1991 to 532 in 1998 (SIFFS, 1998).

Traditional fishing operations in Ponnani were very diverse. While fishing nets were made of cotton, hemp and jute were favored for drift nets, locally known as '*Vakkinte Vala*'. These targeted seer fish, tuna, catfish, shark and lobsters. The nets that targeted

sardine (*Mathikollivala*), mackerel (*Ayalavala*), pomfret (*Aavolivala*), anchovy (*Choodavala*), finned herring (*Veloorivala*), catfish (*Ettavala*) and ribbonfish (*Thalayanvala*) were made of cotton. These nets and hooks and lines were both in use during the same period. The crafts used for these operations were mainly dugout canoes locally called '*Vanchi*'. The task of fishing in these traditional crafts was carried out by a maximum of five men. They maneuvered through high waves using oars and sails and made use of ocean currents and tidal energy for power. Nets are often used in the near shore waters while hook and lines in the deeper waters. The hooks and lines, which were locally called '*Beppu choonda*', are of two types - '*Valiya beppu*' and '*Cheriya beppu*' the latter being smaller. It is common to hear the crafts being called in relation to the gear. For example, the dugout canoe, *Vanchi* when used in conjunction with bigger hooks and lines *Valiya beppu*, is known as *Valiyabeppu Vanchi*. Apparently, there were ten *Valiyabeppu Vanchi*s in Ponnani till 1950. An aging retired fisherman narrated the operation they carried out while at sea during those days:

> *First, iron chains and later steel wires were tied around coir rope to attach the lines. 150 hooks of number one size each at a distance of 15 meters were placed on the line to catch sharks and large rays. The bait was always small tuna or jewfish. The main varieties caught were cat shark, spinner shark and black tip reef shark. The catches were very good for which the merchants even advanced money* (from in-depth interview with Ak)

Many older fishers interviewed reminisced that the hook and line fishery in the 1950s was very lucrative. They would get sharks on all of the 150 hooks, and had so much difficulty loading them into their *Vanchi* that some were discarded. On hearing this, the

traders at the shore asked them to bring back the fins as they fetched good prices[3]. The price for shark meat at that time was around Rs.400 (approximately CDN$ 10) per *Kandi* (336 Kg). Fishing was done far and wide, at a depth ranging often beyond 150 fathoms. Trips extended from two to four days depending on weather conditions. During the rough season of monsoon winds, fishers would steer their boats through the Canoly canal that connects the entire length of Kerala's backwaters to reach the southern shores where the sea is calmer.

There were about 50 small hook and line, *Cheriyabeppu*, in Ponnani during the same time period.

> *It consists of about 2000 hooks of number 6 size. A set of 200 hooks made one 'pala' and there would be about 10 such palas. Sardine was used as bait in these hooks and the main species caught were catfish, sharks, seer and jewfish. These dugouts operated at a depth of 20 to 30 fathoms* (from oral history Kh)

Another craft that was in use was made of wooden planks used mainly in the shore seine fishery. The use of shore seine, locally known as '*Chavittu vala*', is a labor-intensive operation. In each unit, 40 to 60 people operate from the shore, dragging the net that is cast wide into the sea, by the plank canoes. Each haul would bring in large landings, mainly of sardine. Shore seine operations and sardine processing used to be one of the most important fishery related activities in Ponnani. However, the decline in the shore fishery led to the collapse of this system. Women were the most affected by this because shore-seine fishery was the backbone of *chapas*, supplying large quantities of fish for sun-drying process and, where women were the significant labor force. Many of those interviewed attributed the entry of the trawl fishery as the main reason for the collapse, while others mentioned the

[3] There was a growing demand for shark fins in Japanese and other Asian markets.

infrastructure development along the coast such as sea wall construction and breakwater construction for the harbor.

The physical assets that the households in the community owned are revealed in the following Table 5.8.

Table 5.8 Percent of households with physical assets

Asset	% Households
Electricity	84
Toilet	65
Private Tap	23
Refrigerator	11
LPG connection	35
Television	46
Telephone	23

The twelve coastal wards selected for the study within the two revenue villages of Ponnani Nagaram and Kadavanad, together have a shoreline of 3.5km, while the entire taluk has a shoreline extent of 16Km. A Sea wall was constructed along this entire stretch since 1980. Since then the shoreline has undergone many changes. Another reason for the changes is due to modifications of the coast through construction. For example, construction of the breakwater at Ponnani began in 1999, and in the years 2002- 2003 the pace of construction progressed considerably. This impacted the shoreline as well as the estuarine banks. In the northern part alone, 0.23 sq km of land was eroded between 1981 and 2000. An average width of about 50 m with a maximum of 130 m of land has been eroded at the northern part of the Municipality during this period. Though the southern part

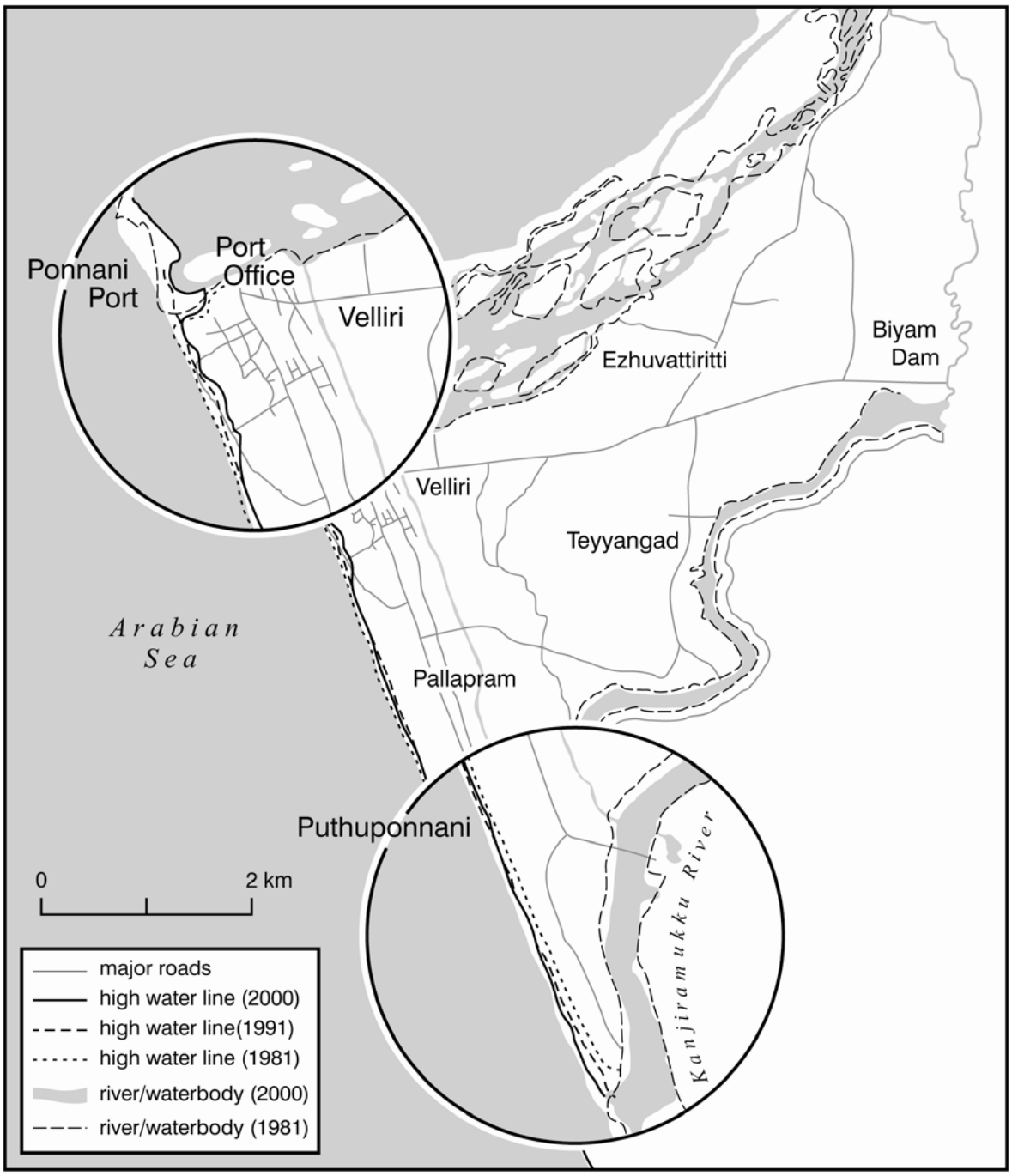


Figure 5.7 Shoreline change in Ponnani coast.

of the Municipality has experienced erosion in general, within the last decade, accretion has occurred only near the mouth of the Kanjiramukkupuzha. The change in the shoreline for the period between 1981 to 2000 is shown in Figure 5.5. The change in shorelines is also due to larger land developments that were happening in the interior. In order to understand these changes, land use and land cover changes of three different time periods (1981-1991-2000) were analyzed (Figure 5.6). The beginning of the work in the harbor in 1999 and the expedited pace in 2000 has led to drastic changes in the shoreline configuration near the port area and the estuarine mouth. The construction of the breakwater has extended into the sea leading to the formation of a bay at the estuarine mouth thus affecting the sediment dynamics of the region. This is apparent from the shifting of the sand bar formation further seaward in the front of the estuary. The summary of change in land use for the period 1981 – 2000 is given in Table 5.9

Table 5.9 Spatial extent of Land use Categories in Ponnani Municipality, 2000

Landuse category	Area in Sq km
Paddy	2.57
Settlement with mixed trees	18.1
Beach	0.52
Clustered settlement	1.06
Other major Establishment	0.15
Vacant/open land	0.22
Sand dune/sandy area	0.40
Total	23.00

There is a drastic change in the wetland and paddy area in the Municipality. Paddy fields are converted either for dry land cropping like coconuts or into built up land. Reclamation of paddy fields is a general trend in the changing land use of the entire state,

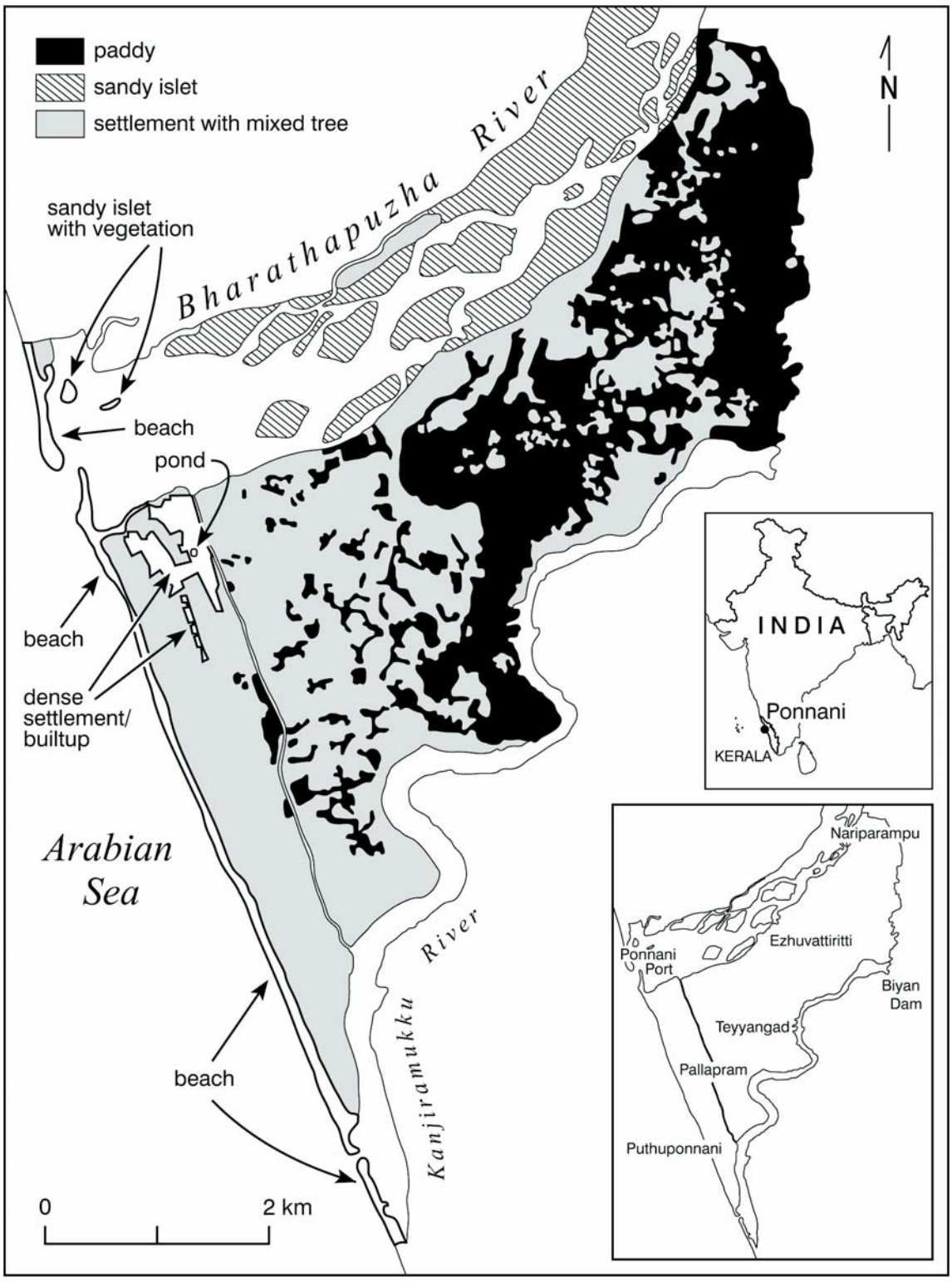
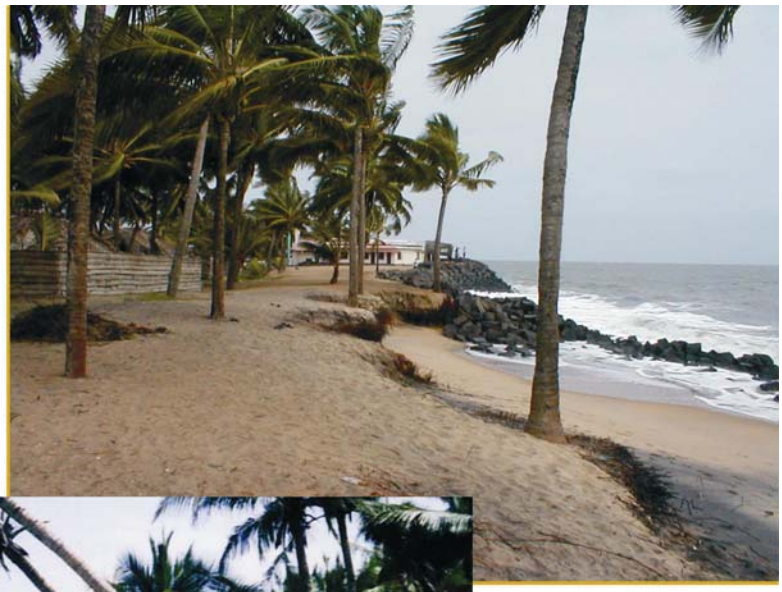


Figure 5.8 Landuse changes in Ponnani

as paddy cultivation gets more expensive with increasing labor costs. About 0.35 sq km of land has eroded in the last twenty years. Sea erosion is intense on the northern part of the Municipality. In 2001, there was a massive sea ingression in the Puthu-Ponnani Jaram area (Figure 5.7). The storm waves had uprooted many coconut palms and many huts were destroyed (Figure 5.6). The extent of sand removed could be seen from the exposed concrete well rings, two to three meters from its earlier level. During the field survey, the people affected mentioned that the shoreline was 60 meters away from the present sea ingress. Due to the strong southerly current along the coast, any obstruction constructed offshore could cause rapid erosion. Mining of sand from the riverbed for construction is a common phenomenon in almost all riverbeds of the state. The State Government has regulated this activity through a licensing system. However, illegal mining is rampant and there is lateral erosion or slumping of riversides, especially for the Kanjiramukkupuzha. The built up area including settlement and other establishments has increased (0.75 sq km, See Figure 5.6). The changes in the land use of the upper catchments of the Bharathapuzha River basin, especially deforestation, and the activities like extensive sand mining from the riverbed, construction of reservoir and irrigation projects, have affected the river discharge. These in turn have impacted on the river mouth as well as on the shoreline. The river channel of Bharathapuzha is characterized by shifting sandy islets and lateral erosion has been observed on the banks of both rivers. Bharathapuzha, being the second largest river in the state, through its 209 km course (and 47 km through Coimbatore district of Tamilnadu) transports large volumes of eroded material, which is deposited when the river reaches the plains and loses velocity. It has a total basin area of 6186 sq km and originates from the Anamalai hills at an elevation of 1964m (CWRDM, 1991). CWRDM computed the total

Ponnani Jaram Area: Several truckloads of rocks dumped to save the mosque from collapse



Severe erosion uprooted coconut trees and eroded property. Barrier constructed to prevent further erosion

Breakwater constructions for the harbor further down from high erosion zones intensified erosion.

Figure 5.9 Coastal erosion in different parts of Ponnani

surface water potential of Bharathapuzha as 7478 million cubic meters. Apart from the diversion schemes, there are six major and medium irrigation projects which block the free flow of water and thereby the nutrients that should have been released into the sea. In addition, the Kerala State Electricity Board envisages two hydroelectric power generation schemes in the basin – the Kuriarkutty-Karappara project and the Bhavani project.

Table. 5.10 Changes in the land use in Ponnani between 2000 and 1981

(Area in Sq km)

Change	1981	1991	2000	Change (1991 –1981)	Change (2000 –1981)
Beach	0.75	0.46	0.52	-0.29	-0.23
Built up*	0.37	0.76	1.12	0.39	0.75
Paddy	7.45	6.12	2.57	-1.33	-4.88
River	6.65	6.38	5.58	-0.27	-1.07
Sandy islet	3.39	3.58	3.13	0.19	-0.26
Settlement with mixed vegetation (coconut dominating)	14.75	15.56	19.6	0.81	4.85

* The built-up area comprises clustered settlements and other establishments (educational institutions, ports etc)

Note: These figures are achieved through overlay technique in GIS using spatial data from 2000 and 1981. Municipal area in 1981 was only 9.32 sq km. The area increased to 22 Sq Km in 2000. Therefore, for comparison, municipal boundary of 2000 was used as area of interest for the year 1981. Negative change means loss of land and positive change means increase in land (See Figure 5.6).

The Kanjiramukkupuzha River has been utilized for other estuarine-based activities such as coir retting, aquaculture and sand burrowing. There is a small fish-landing jetty constructed in the late nineties about 250 meters from the river mouth. However, the regular port for all fishing boats and sailing vessels is at the Bharathapuzha River mouth. Being the river mouth itself poses certain hazards - the dynamic sand bar at the mouth of the river obstructs and causes grounding and capsizing of boats. There was even loss of life of fishers. As the number of fishing boats increased, the facilities required for fish landing were insufficient. Moreover, there was increasing siltation at the river mouth as the river

upstream brought loads of eroded material. Deforestation, damming and many other human modifications impacted the whole Bharathapuzha River. Another negative impact due to increased siltation is the loss of mangrove vegetation that protected the river mouth. Loss of mangrove is also due to increasing demand for berthing space. Traders and fishworkers started demanding for all weather protected fishery harbor, which was approved by the State Government. The plan envisaged a new harbor project costing Rs.275.9 million (USD$60.2 million) with 50 percent assistance from the Central Government. At the time of field investigation, construction of the breakwater had already begun. Meanwhile, the Department of Ports of the State Government was proposing to create a commercial port in the same area.

5.5 Summary

This chapter has identified and described the key livelihood assets of the coastal fishing communities within the context of Kerala's economy, physical base and society. Access to assets within policy and institutional contexts particularly traditional institutions that existed once and how the state regulations affected the community-based rules that affect access to resources are dealt here. The secondary data that shows their demography, economic and social profile is explained. In the section on physical and natural assets of the communities, their land, their resources and the factors that affect the process of degradation are analyzed.

The following chapter discusses the household strategies and diversified livelihoods of the artisanal fishing communities of Ponnani.

Chapter 6

Discussion

This chapter examines the household strategies and diversified livelihoods of the artisanal fishing communities of Ponnani. The complex nature of the socio-economic aspects of their life and the resource dependency as perceived by selected key informants is discussed. The transcribed interviews which include the field notes are analyzed to provide insights into resource dependency, changes in asset situation and livelihood security, environmental degradation and survival strategies from the fisher's perspective. The sustainable livelihoods framework (SLF) is used to organize information from four focus group discussions and fourteen in-depth interviews.

6.1 Household Strategies and Diversified Livelihoods

Discussion from in-depth interviews revealed how resource dependent households find strategies to diversify their livelihoods by using different assets that they are able to access, particularly when their fish catch is declining. The discussions include changes in fishing and related activities particularly with reference to the use of technology, changes in work patterns and asset ownership. The interviews also revealed communities taking control and possession over key assets on which their livelihoods depend. This, as Melvin puts it, *profoundly affects the way they conduct their lives* (Melvin, 2006, P.1).

The following discussions reveal that individuals in the community have limited livelihood options. Despite this situation, they search and access different social, political and economic assets to withstand the shock of diminishing natural assets. In Ponnani, religious institutions such as '*madrasa*' or '*jamaat*' are a source of assets they depend on, despite strict religious rigidities.

6.1.1 Reorganizing their Economic Activity

With the decline of fish catch some fishers abandoned traditional methods to adopt modern technology that was available at that time. Many others simply moved away from the sector. Most of the older generation of traditional fishers were reluctant to let their children continue the trade they were engaged in over generations and made sure to educate them and seek employment elsewhere.

> *Ab had seven children – four girls and three boys. He tried to send them to school, but none of the children studied beyond Standard VII* (equivalent to grade 7 in Canada). *None of the boys opted for fishing either. The eldest son opted for masonry, but at the age of 19 he managed to go to the Middle East. The second son opted for general coolie labor, but he also went seeking employment in the Middle East* (commonly termed Gulf countries), *at the age of 23. The third son also followed them, but he left only a few months ago. With his sons working in Middle East, the family has managed to have some savings. Ab also felt that, many families around him became economically better off only after one or two sons started migrating to Gulf countries. Those who could not do so became poorer.*

The following story of Ik is fascinating in the sense that he came upon fishing not through lineage but by chance. He was an active communist party member when communism in the State was gaining momentum and party members were persecuted

both by colonial powers and feudal lords. The British colonial authorities tried to suppress support for communism by banning the formation of any formal political party. Later, after independence, Kerala was one of the first states to have an elected communist government. Those persecuted persons had gone into hiding, or 'gone underground' as it was termed in those days. Ik was one of those who went underground during 1940s.

> *It was during his underground stay at Calicut, he started doing fishing for the first time in his life. He got friendly with some fishers in Calicut through party connections. Interestingly, he started working with the Dheevara fishers* (Dheevara fishers could be either Hindu or Christian but not Muslim) *in large canoes using boat seines. The income was not bad as there was plenty of fish at that time. He remembered that, the hook and line fishers (*locally called, *Beppu choondakkar) who fished in offshore waters, used to inform the boat seine fishers whenever large shoals of fish were found moving towards inshore waters. The main species landed then were sardines, mackerel, Penaeid prawns and anchovies. Ik again went to Calicut in search of work. He managed to get work in a transporting vessel, and occasionally did fishing too. By that time, many foreign cargo-clearing houses left and it was taken over by more local and national entrepreneurs or agencies. For about eight to ten years Ik tried his luck with the trawl boat fishing in different capacities – first as a owner/worker in the cooperative group, then as a prawns trader/collection agent for exporting companies, and later as a single boat owner. But he could not make a living out of it, as he needed to spend much more time also for political activities. But he is also proud of his political roles, as that only helped the community to fall back on fishery to survive when everyone lost their job in sailing vessels. In 1975 he sold off his own trawl boat and retired by the time his children grew up and also started earning. Now his three sons are working in the Middle East. Only one son is now dependent on the sea. He works in the fishery harbor in loading and unloading of fish. He too*

may follow his brothers and waiting to get a visa with their help to leave the place.

The stories of Ab and Ik are contrasting in the sense that while Ab is a traditional fisher, Ik chanced upon fishing for a livelihood. Nevertheless, both of them represent a large number of the members of the community in their day-to-day struggle to make a living out of fishing. They also depict how despite adverse conditions in their life, they were able to reorganize their activities and earn a living.

6.1.2 Diversification due to Push Factors

Diminishing profits and increasing debt is the story of Ak. Once the loan payments for fishing gear and craft are made the rest of the profit is shared with the crew. Profit sharing is done after fuel, food costs and auctioning commission are deducted. Often there is hardly any profit at all. The continued state of hard work and no returns acts as the push factor for developing an alternative survival strategy. The close-knit social fabric helps communities absorb external changes and stresses while maintaining their livelihoods. The ability to access assets is shaped by the dynamic structures of livelihoods and social institutions. For example, migration may be one of their survival strategies - migrating to distant fishing grounds as well as seeking employment in the Middle East. This is similar to situation as that in the rest of Kerala. Kerala has been an out-migration state since the 1960s. During the period between 1991-2001, the number of migrants from the state was estimated to be 3.7 million. The major flow of migration is to Middle East nations. The remittances from migration have been a major contributor to the accelerating economy during the 1990s. Consequently, the percentage of population below the poverty line for the state as a whole has declined to 12 percent (Zachariah *et al*., 2003). Census figures show that nearly 1.5 million Malayalees live outside the

country. They send home more than $USD 89 million every year. This money is their financial asset when they return home. More than one million families depend on these savings for subsistence, children's education and other economic requirements (Zacharia *et al.*, 2001a). Although similar effects were observed in Ponnani, the majority of households remain poor. Using longitudinal data on livelihood sources in Vietnam, Adger *et al.,* (2002) argues that all aspects of demographic change, including migration have an impact on the social resilience of individuals and communities, and also on the sustainability of their underlying resource base (Adger *et al*., 2002). This discussion takes the argument further and identifies that the increasing dependency on a diminishing resource base equally determines the choice of livelihood options, which includes migration and other demographic changes.

Migration has also been an important means of knowledge exchange and often they bring back skills they acquired while abroad. Migration has diverse social, economic, and demographic consequences and effects on social resilience (Zacharia *et al.*, 2001b). It affects economic well-being and changes the structure of the community. Migration affects the income, wealth, knowledge base, and labor supply of both the sending and receiving areas. Migration also affects the use of natural resources, availability of technology, and characteristics of resource extraction.

> *Ak does not consider his father a boat and gear owning fisherman because he had borrowed money from middlemen (*locally, money-lenders are known as '*tharakan*'*) to put up the boat and four shares from the sales proceeds were given to repay that loan. The rest were almost equally divided among the crew as their shares. After working in the family boat for five years, when he got an opportunity, he went to the Middle East to work in a Japanese construction company in the year 1980. He worked for 10 years in that company and in 1990 he came*

back home. After returning from the Gulf, he invested his savings together with three friends, to own a new ring-seine unit. It cost them about Rs.2.5 lakhs (approximately, $6,000 CDN) *and he had one-fourth share in it. According to him, it was profitable in the beginning. But they had to take rent on two OBMs and a carrier boat to operate the unit. Then they got a loan of Rs.1 lakh* (approximately, $2,400 CDN) *from Matsyafed* (The apex body initiated by the government to assist the fishermen to assert their legitimate right over their produce and thereby enhance their income in the total development of the community.) *and it was in his name. He managed to repay the entire loan, and was one of the very few to do so. For almost a year he stayed away from fishing and built a shop selling groceries adjacent to his house and managed it. So for two years ago, he managed to get a bank loan of Rs.3 lakhs* (approximately $7,200 CDN) *and bought a second-hand in-board engine ring-seine unit. He was the first one in Ponnani to do so. It is a 62' boat which alone did cost him Rs.7 lakhs* (approximately $16,800 CDN). *But the large net used in it did cost him more – Rs. 10 lakhs* (approximately, $24,000 CDN). *He got different loans also for this. Rs. 5 lakhs* (approximately, $12,000 CDN) *from Matsyafed, another 5 lakhs from the Bank and 2 lakhs* (approximately, $4,800 CDN *from the middleman. About Rs.50, 000* (approximately, $1,200 CDN) *was required to organize the crew numbering 40.*

While Ak narrates the financial loss and risks involved that deterred him from depending on fishing, Ka's story clearly indicates the decline of fish resources as the major cause for diversification. He too tried to get his children educated and trained in different trades.

During his later years, when Ka could no longer go to sea, he started a teashop. He used to go as a worker on a motorized plank canoe as the dugouts became redundant. The owners tried several things to keep afloat. They even tried dory fishing so that they could be tugged to

deeper waters by a larger boat. But this too did not work. As fish catch decreased, he decided to try his luck in the Middle East and at the age of 45, one of his relatives helped him to go to the Middle East for which he had to pay Rs.20, 000 (approximately, $480 CDN). *There too he worked as a fisherman on a slightly better boat but with gill nets 1500 fathoms long but only 3 fathoms in depth. This was because the sea was rather shallow but the fishing was good and he would earn the equivalent of Rs. 15,000* (approximately, $360 CDN) *a month. Nevertheless, they could work for just 6-7 months a year, as it was too hot and dry for the rest of the months. During this time, the owners (Arabs) would provide them with food money and they would do some hook and line fishing for themselves. He says it was a very hard life as they lived in bad conditions and so he returned for good when he was 53. During the 8 years he was away, he returned home three times and sent money home through a friend who had a bank account. The girls have all studied up to the 10th standard* (equivalent to grade 10 in Canada). *Only one has passed the SSLC. But they are all at home now as he says he has not been able to pay for their further education. One of them took a three-month tailoring course but the course was not completed and hence she cannot really sew for a living. His son is now 18 years old and has been working as a construction worker and when there is work it is he who brings the money home to the family.*

Ab used to be an exceptional fisherman whose skills and knowledge of the sea made him a prize fisherman. He did not transfer his skills and knowledge to the next generation. Instead, he sent his children to school and into different trades. He himself migrated to the Middle East seeking better opportunities.

In 1964 his uncle sent him for training in Beypore (in the neighboring State of Calicut), *organized by the government. For this he received a stipend for one year. During this time he learned about boat mechanics and how to use the newly introduced trawlers. They were also sent to*

Cochin port where they learned navigation and then to the Trivandrum Medical College for a short course for first aid (emergency health care). *A few years after his marriage, when he had a son 4 months old in 1979, a friend offered him a visa and he went off to the Gulf to work.* (Unlike others, Ab did not go to the Middle East out of compulsion but saw an opportunity to experience the world outside Ponnani). *He says he just went to see the world as he continued to have good catches in the sea. But once he was there, he realized that life was hard. For the first two years he struggled and the Arab who gave him a visa was very rude. He worked with an electrician and learnt a bit of that trade. He also worked on a boat, but that was seasonal. He then worked in a department store and his job was packing fish. He finally ended up working in a hotel and his duty was to buy fish from the auction. During this time he learnt to speak some Arabic and had a good time with friends. He wanted to get the sons of his first wife to the Middle East as he had very little other contact with them and felt this was his duty. On his return to Ponnani, he initially did some real estate work for the first 5 years. During that time, people were beginning to sell their small homes on the shore and move out as some did make good money in the Gulf. Then he met an electrician from Cochin who worked in Ponnani. As he had learned this trade while in Gulf, he started working with him. Then he began to undertake work himself but with the seal* (License) *of the Cochin friend. Ab then managed on his own as there was a lot of work in the municipality and people were also building a lot. He was able to get the seal of another young electrician on payment and thereby undertake the work. He also plays a role in the local left political party and this gives him access to the establishments as well as the people. None of his sons now goes to sea. In fact he had taught none of them this work. He had taken one son to sea once but he was very seasick. He felt that this is not a safe job either and so did not force him to return. The second tried to go the Gulf but had bad luck. For this the family had mortgaged the land and house and taken loans. Today they still have about Rs.150, 000*

(approximately, $3,600 CDN) *debt. This son now works as a painter, but also has two children of his own. The third son who is unmarried makes a living from sand burrowing from the riverbed. He is the one who tries to pay back the loans. His income is quite meager as it is not very regular.*

In Ponnani, it is un-common to have a woman as the head of the household. In Be's case, it is different. She lost her husband eighteen years ago (1985), who was a fisher who worked on a dug out canoe. There was plenty of fish when her children were young. Youngest daughter is 19 years old now and life was good. She gave birth to 15 children but only nine survived; all are girls. They survive by making beedis (local cigarettes).

The third and fourth daughters learnt how to make beedis after the father died. An old Muslim widow taught them how to do this. This is not a usual occupation in Ponnani. They produce for the local sales. Once they got married they taught the younger ones. So this has been the income source since the father's death. The sixth daughter had also learned sewing and had an old machine. While she was at home, she also earned some money and more in the festival season when they too could buy some new clothes. When she got married the machine was also sold to get some money.

Diversification within the family unit can also be observed in Ponnani. The prevailing social system of joint families, particularly among the trawl boat owning fishers is turned into a survival strategy. Ha, his three sons and their extended families live together and have diverse occupational strategies. While working in an ice plant, Ha took a loan of Rs.600, 000 (Approximately, CDN$ 15,350) and bought himself a 56-foot trawler. According to Ha,

> "*I had seen the fishing develop and we knew that Ponnani would get a fishing harbour. Although my children are all educated, fishing was the only option for my two older sons. So I bought the boat. But we had bad luck as the boat sank in 2002. We recovered the engine and constructed a 56-foot long boat with which they are fishing now. My eldest son also manages a couple of other boats and my third son has a small carrier auto, which also helps to transport fish when necessary. So we have all been able to manage as we live together*".

Ha's joint family venture is successful and is a contrast to Be who struggle to survive as her earning daughters are married off.

6.2 Livelihood Security

Access to resources enhances the ability of people to secure a livelihood. The sustainability of it, however, depends on the kind and extent of assets that they have. Most of the respondents in Ponnani are well rooted in the fishery yet they own few productive assets. Most of them are wage laborers in the fishery. Although their skills are fine tuned to harvesting fish from the sea, the household surveys and in-depth interviews revealed that they strategize and diversify their occupations and migrate to distant lands in order to obtain greater livelihood security.

The concerns raised by many respondents reveal the limits that they as a marginalized community have in accessing the assets, particularly political and financial assets. SLF is an effective means to systematize the information on how the communities influence and access institutions and policies with their limited assets. However, it is important in this study to determine how far or to what extent the communities of Ponnani sought migration as one of the major survival strategies. They may have used their religion as an asset to influence seeking livelihoods in the Middle East. Transnational ethnic connection is a major factor that determines the migrant-flow to

specific destinations (Tsuda, 1999). Zacharia *et al.*, (2001a) suggest that 45 percent of the emigrants to Gulf countries are Muslims (p.8). On the one hand, the migrant fisher's ability to access one set of assets seemed to exaggerate existing trends and thus amplify preexisting conditions of having no access, particularly with rights. This aspect is explicit in the in-depth interview with Ab.

> *Ab lived in a small hut put up on a 'puramboku' land* (government assessed land distribution in order to redistribute as part of the land reform movement and declared large land-holding as excess land, which in Malayalam is known as *puramboku*). *During the communist government's time*, (Kerala was known for it's early communist movements and has been the first ever State to have democratically elected a communist government under the leadership of E M Sankaran Namboothiripad, lovingly called EMS), *Ab got pattaya* (land right) *for five cents* (100 cents is one acre and one acre is equivalent to 0.4 hectare) *of land. He got into a rather long shark-fishing career. Over the period, he learned different skills like line fishing, sailing, navigation with the help of stars etc, worked in different canoes and even migrated to places as far away as Malpe in Karnataka. He continued this until the age of 55. So, for about six months he did shark fishing along with catching baits from estuary and during four to five months as head-load worker. One shark fishing trip used to take two to three days and always beyond 16 fathom depth. Sometimes, they even did shark fishing at 200-fathom depth. They were fishing with long lines, about 100-125 hooks, each placed at a gap of 10 fathoms. They used to get a maximum of 15 to 20 sharks or rays at a time. They used to cook food in the canoe itself. They used to have three sails at a time to take advantage of the wind. They bought about 14 cents of land afterwards. They also built a small concrete house. Then about 12 years ago, Ab started the present pan shop* (a small kiosk selling cigarettes and beetle nuts, beetle leaves and tobacco). *with the help of some money from his sons. The shop helps to keep the house going.*

Asset degradation is one of the major factors that help to account for the continued marginalization of the households in Ponnani. The earlier discussion expressed how environmental degradation impacts the household's assets. The following interviews reveal that it is also due to changes in their access to assets.

> *Ik's father used to own a small sailing vessel (locally called 'Pathemari') named 'Khalid' which was based at Ponnani. There were about 50 such sailing vessels then based at Ponnani. People from outside Ponnani owned half of them – even as far away as from Gujarat. Most of the vessels were taking large logs of wood from here to Bombay and come back with salt. However, 'Pathemaris' were replaced with the advent of modern steamers, freight carriers, rail and road development.*
>
> *Mk is now 47 years old and still a fisherman owning a new-generation in-board engine fiberglass craft. There are only three such boats in Ponnani now. His father was a good skilled traditional fisherman and owned a boat seine. They used to fish with two boats together that time. Locally these fishers were called 'Valakkar'. They had mainly three types of nets to catch sardine, mackerel and catfish and ribbon fish. Together with his brother, he bought some land and built a row of small shops and a house there. He and his brother had equal ownership rights on this.*

The definition of human capital in this context includes the depth of knowledge and skill. Although the concept of human capital broadens the picture of resources, it needs supplementation, which otherwise forms only part of the picture (Sen, 1999). The following discussion with Ka and Ab shows that most of the artisanal fishers lack substantial physical assets such as fishing gear and craft. They also lack dwelling units. The community as a whole is able to access physical assets such as fishery harbor, schools and hospital, available to them. Physical assets, therefore, could be seen at two levels – personal level and community level. While the house they live and fishing units

they own are personal physical assets, the fishery harbor; schools and hospital are the common property and, therefore, physical assets that belong to the community.

> *Ka's father was a traditional fisherman too who used a dug out canoe with a cotton net that 5 of them acquired as a group from the government cooperative society. He owned several nets for different kinds of fish. He divided his land equally among his 8 children (even the girls) and each received 16 cents. There were five ring seine units that were given to the fishers of Puthuponnani by the Matysafed but all these were in disuse within three years. Then he got his eldest daughter married, as she was 28. For this he had to sell all his property, 16 cents of land and their home. It cost him 5 lakhs in all for the marriage as he had to give her 50 sovereigns of gold and Rs.100, 000* (approximately, $ 2527 CDN) *dowry. She married a boy who works in a hotel in Mumbai and now lives with him. With the balance of money remaining he bought 10 cents of land in a more interior area where there is no road access, and there is also no house there as yet.*
>
> *Ab was made a member of a group of five who formed a co-operative society and the State Government gave a boat each to different societies formed around that time. In his society there were two trawl boats of 32 feet. He recalls that this was made possible because of the role played by Comrade Imbichi Bava* (a prominent communist leader who became a minister in the first communist government of Kerala in 1957) *as only 10 traditional fishers were included in these societies. He worked 19 years on this trawler and he recalls that this was a good time. The trawlers cost Rs.150, 000* (approximately, $3,600 CDN). *The Society initially paid Rs. 5000* (approximately, $120 CDN) *to the government and was supposed to pay back the rest in installments. But each group had a leader who paid the initial installment and he was supposed to make the repayments. But in most cases this did not happen as the leaders used the money themselves. Finally there would be no money to repair and maintain the boats and the societies became defunct. Although there was a fisheries office and the like in Ponnani,*

the government officers were not very active. They had plenty of fish and Ponnani was booming, as there was plenty of work for people. Moreover, he was able to use his traditional skills and knowledge of the seabed so that the rocks did not damage the trawls. They fished at around 25 fathoms depth. For the first time they began to see so much shrimp. Originally, there was no price as the shrimp were sold for Rs.1 a kg (approximately $0.024 CDN) *and the Naran for Rs.12* (approximately $0.289 CDN). *They used to get 60% of the catch for the workers and 40% for the boat. He often got two shares because he did the engine repair as well and used his traditional knowledge for setting the net. He knew that the shrimp fed off the plankton and food off the rock bed at 16 fathoms and the best catches were there. According to him, " the catches have been decreasing and there are several varieties that we do not get much of these days like prawns for the last 10-15 years, pomphret for the last 8-10 years, and soles also since the last 10-15 years. Catfish has disappeared for the last 10 years". They had no compass those days but they had traditional knowledge of locating their bearings. Once he misfired and their net was badly damaged. At that time there was no lighthouse and very few of the trawl boats knew how to properly locate the shore, which he knew.*

As for Be, four years ago they received Rs.35, 000 (approximately, $843 CDN) *grant from the municipality when they had renovated their home. They realize this is their only asset. They initially had 16 cents of land but they have begun to sell it in order to make money for the marriage of the daughters. Two of her daughters make beedis from morning to night and with this they earn a maximum of Rs.50* (approximately, $1.20 CDN). *They say that this was a good wage but prices of food have gone up drastically and so it is difficult to think of two decent meals a day now. They have a cup of black tea in the morning. Then they have rice and some fish for noon. A cup of black tea at 4 p.m. and if they can manage they have rice gruel at night but that is not everyday. As the women do not go out, children of the neighborhood*

do all the grocery shopping and outside work. They do not seem to know of any other way to make money.

In-depth interviews with Ka, Ab and Be revealed how hard they struggled to access assets and create their livelihoods. Ka is a traditional fisher and he hardly owns any productive assets and now that he is old and unable to fish any longer, he runs a teashop for survival. Ab on the other hand found better strategies with his sons and also diversified into areas other than fishing.

6.3 Environmental Degradation and Sustainability

Loss of livelihoods due to declining fish catch has been central to all the in-depth interviews conducted. Many respondents attributed the decreasing fish catch to environmental degradation. They identified several factors from bottom trawling that made the seabed un-inhabitable for juvenile fish and fingerlings, sea wall and breakwater constructions that have arrested the flow of water from the Bharathapuzha River due to the construction of the dam upstream. Although the artisanal fishers blamed bottom trawling for the destruction of the seabed, the trawl fishers also admitted that their doing is detrimental to the fish habitats. As for the sea wall construction, there were differing opinions as some of them felt that it is necessary to stop the coastal erosion. The fishers are aware that the aggravated erosion during the monsoon season is also because of the construction of the breakwater. Bharathapuzha is the second largest river in Kerala. Before the river was modified with a series of dams for irrigation purpose, it used to transport large volumes of eroded material through its 209 km course. Deposition of this eroded material contributed to the sediment dynamics of the estuary and adjacent beaches.

In designing household surveys, Grosh and Glewwe say, *Households naturally know more about some kinds of environmental problems than about others. In general, respondents are likely to be most knowledgeable about the damage that they suffer from the degradation of air, water, and land resources, as well as about the local, renewable resources that they use and depend upon for their livelihood and sustenance- such as local forests, fisheries, and groundwater* (Grosh and Glewwe, 2000, pages 6,7).

Repetto and Holmes (1983) identified three non-demographic factors that contribute to environmental deterioration, particularly in developing countries. They are unequal access to process of commercialization of natural resources and the breakdown of traditional natural resource management systems. Although their study is based on agricultural systems of small farm communities, it is relevant and applicable to traditional fishing communities. In both cases, the traditional systems controlled access to resources by monitoring the impact of technology on fragile environments. At the same time, a stable population was maintained by socially regulated patterns of fertility, mortality, migration, and marriage. Traditional resource management that controlled access to livelihood assets was disrupted with the introduction of modern management by the colonial powers to national governments, creating open access. According to Repetto and Holmes (1983), environmental degradation is greatest when population is increasing rapidly and land is treated as an open-access resource. This outcome, according to them, may be the result of incomplete property rights, shortsighted official policies, or severe immediate economic need which causes people to sacrifice their future livelihood on the land to meet present needs. They question the idea that population growth per se is the main cause of resource pressures in the Third World. Focus group discussions and transcriptions from in-depth interviews pointed to the way in which access to assets were

interrupted with the breakdown of the traditional systems. It also showed how colonial powers and later government policies created an open access system and constrained their traditional rights. Open access coupled with high population density (3525 people per sq.km. in 2001) paved the path for environmental degradation and threatened their livelihoods.

Sustainable Livelihoods Framework was useful in organizing the information and helped analyze how members of the fishing communities in Ponnani use different assets they are able to access to develop livelihood strategies. The strategies they developed reflected the way various influencing factors affected their ability to use those assets. Although fishing is the single most influencing factor that sustain the community, very few own physical assets that support their activity. Their inability to create a viable, sustainable livelihood leaves the households vulnerable and in poverty.

6.3.1 Resource Dependency

The ways in which the community deals with their dependency on a diminishing resource base and how they develop strategies to sustain their livelihoods are discussed here. Although an attempt is made to present the point of view of the participants in their own words, field notes and transcribed material were compared and enriched with historical records and other documentary evidences. Care is taken to draw the views from the traditional fishing communities particular social and institutional context so as to avoid loss of data. This is a common error when textual data is quantified (Kaplan and Maxwell, 1994).

During the early 1950s the Government of India established a tripartite agreement with Norway and the United Nations for technical assistance in the fisheries sector to

enhance economic growth. It was known as Indo-Norwegian Technical Assistance. Initially the project was implemented in the State of Kerala between the period from1953 to1963. The intentions of the project were to improve the protein intake of the people within the State. Merchants in the sector, however, had a different objective – namely to export high value prawns to US and later to Japan. The Indo-Norwegian technical assistance provided technology for more sophisticated harvesting and processing of the fish caught. This program, however, did more to strengthen the export orientation of the merchants, than it did in improving the protein intake of the local population. In Ponnani, a number of fishers and sea-faring '*Pathemari*' sailors took this opportunity to adopt modern fishing. *Pathemari* owners formed cooperatives, switched to fisheries and accessed government subsidies. Many of the *Pathemari* workers became trawl boat workers. While this switch to dependency on modern technology had the immediate effect of bringing better incomes for the families, it was not sustainable. The traditional fishers were not interested in trawling. After 1976 there was a drastic fall in fish catches in the whole state. Conflict between the trawlers and other traditional crafts grew, especially in the southern districts. In Ponnani, there was no direct confrontation but resentment grew between the trawling sector and traditional fishers. The gradual decline in catch pushed the traditional fishers initially, and later, trawl fishers to seek opportunities elsewhere.

> *Ik earned his livelihood from the sea, including as a fisher. He recollects that most of the families in the neighborhood – in Azheekal – were dependent on sailing vessels, as many men worked as sailors. Even at that time, almost of 75 percent of the households in Azheekal area of Ponnani depended on sailing vessels and most of them were crew. Many sailing vessel owners left the scene, unable to overcome the militancy of unions on one side and the diminishing role of sailing vessels in cargo*

transport. So, many port workers became unemployed in Ponnani and this became a political question for the communists when they came into power.

From the age of 12 Ka went to collect clams from the riverbed while his brother went to get sand from the riverbed. In fact he remembers several young children going to work at that time. A few children of his age would hire a small dugout and go early in the morning with a rake and a scoop net to collect clams. They would pile them on the shore and the next day would wash them with water after they would have it opened. In this way they would get rid of the flesh and then could sell the shells to the merchants. If they worked like this from 6 am to 4 pm they would earn around Rs.6 (approximately, $0.14 CDN), which he considered a good earning as one nari of rice cost 1 anna (equivalent to current 6 naia paisa) those days. To start with he earned 4 annas a day. It took him two years to be able to be a lead fisherman and earn the same wage as the others. At that time they fished also with several gill nets at about 12-14 fathoms depth. This was beyond the horizon in terms of distance from the shore. It would take them half an hour to reach the fishing grounds if there was a good wind, but even 4 hours if there wasn't. They would start at 6 am and return at 4 pm. The reason for starting out early was to go out with the tide as this was the time that feed also reached the fish and they would surface to eat it. In this way they could be spotted and caught. He continued this work for about 10 years. During this time the nylon nets were introduced and there was one all purpose net which operated like a thattumadi with two canoes. This was a better fishing time and the catches increased initially. Then the nets got much larger and weighed 800 kg or more and were about 140 mar in length. At this time they fished at 40 fathoms depth and a single trip would cost around Rs.8000 (approximately, $192 CDN). He remembers earning a share of up to Rs.200 (approximately, $4.82 CDN) a day in this period. Finally by the early 1990s, the ring seines were introduced and these were large nets. The earnings of the workers went up initially but they soon began

to fall as the costs of fishing were increasing rapidly. Large investments were required not only to buy assets but also for provisioning each fishing trip. It was impossible for him to think of buying any assets himself.

Ka's narrative documents the transition from traditional to modern methods of fishing, the costs incurred and the difficulty in meeting the increasing capital costs. Despite his accomplished skills in fishing, Ab, who is currently 68 years old moved to a different profession and even migrated to distant lands to meet his survival needs. He narrates his family's dependency on the sea starting from when he was sixteen.

At the age of 16 Ab went on a traditional dugout that operated a thattumadi for three years. In this way he learned about the sea and all its secrets. Subsequently he went on his uncle's canoe with the hook and line fishers and really developed his skill as the sea around Ponnani is surrounded by a rocky seabed. He got to know this entire seabed and all the vegetation and the movements of the sharks in the shark season. Each line had around 100 large hooks baited with snakefish. Within a couple of years he became a skilled fisherman and cast the line. He recalls that they got pomfret at 10 mar, which was about 10-12 km from the shore. They also used nets for sardines and mackerel. Life was very hard as they started out early and worked hard with their bodies, but there was plenty of fish. After 4 years he started targeting shark at 20-23 fathoms, still with a sailboat. Very often they stayed out for three days at sea. It would take almost a day to reach the fishing grounds. They took provisions and a cooking stove on board. As shark did not spoil easily, they would come home with 5-8 tons of shark on each trip. Back on the land, the shark would be cut and dried. The fins would go to Sri Lanka or Singapore, stored in lime or ash, and the flesh to Aluva from where it was sent to other places. He recalls that the sharing system was half the share for the boat owner and half for the crew (four members).

The above account illustrates the complex issues relating to resource dependency. Determining the extent of resource dependency, when it comes to fisheries and particularly artisanal fishing is not easy. This is so because there are large number of factors that are interlinked and influence the ways in which members of the community interact with the natural resource. There are complex ways in which natural resources are appropriated. Despite these limitations, discussion on resource dependency is useful because it helps the poor to better understand the factors that determine the dependency and find strategies to improve their livelihoods.

6.3.2 Environmental Degradation and Livelihoods

The erosion of coastal land is the primary cause of degradation of natural assets (particularly, their land and fish resource) for the communities in Ponnani as noted in section 6.3. The damming of the river Bharathapuzha upstream and the construction of the breakwater have resulted in the silting of the river mouth and erosion of the shoreline. These have impacted the fishery with a loss of biodiversity due to sedimentation of fish habitats and destruction of mangroves in the estuary. This has also led people, particularly those involved in the fish trade in the community to demand a modern harbor, which is seen as the answer to their dying fishery. They opinioned that construction of the harbor would attract trawlers from other districts and states to land the catch and thereby compensate for the decline of fish landed in Ponnani. However, the views expressed by fishers brought in a host of other important factors that impacted on their livelihoods.

> *According to Abu, shark fishing is not practiced by anyone here and the major cause for its decline was the entry of large foreign fishing boats in their seas. He thinks it was good they did not opt for fishing as the*

income from fishing continues to be very low. Ik, on the other hand, has the opinion that the degradation started when the sailing vessels lost out to steamers and when larger ships entered the business. The small ports also began to lose its importance. By 1967, there were just 12 sailing vessels in Ponnani. And one of them belonged to the society. While keeping ownership, the society gave the vessel to a group of workers, who were also members on lease. However, the unrest among the people continued in the area as many became unemployed and most had no skills in traditional fishing. Ik is also very critical about the construction of the Malampuzha dam across the Bharathapuzha River upstream, as he felt that the downfall of Ponnani began from that period. The sea mouth got silted due to it and he said, 'Ponnani is no more a safe harbor'. According to him, the breakwaters being constructed now would not solve the problem. He also thinks that the situation will become worse as more erosion of beaches is going to take place.

Ak pointed out that after the tsunami there are more puffer fish in the sea and they damage the net. Loss of nets due to this and getting entangled in the reefs are the major problems. So, though he got some good catch and income all that was lost due to these unexpected events.

Ka recollects when the riverbed was paved with clams and even if they raked up some one-day, there would be a whole harvest the next day too. Today, there is no such rich production although some very poor men still try to collect them. But as the fish decreased there were times when they even went as far as Kozhikode to fish but then they would stay there for two days before returning. They get water at 10 feet depth despite the fact that the sea has eroded large tracts of shore (it was originally three fourth of a kilometer away) and water quality has always been good. Now the sea has advanced to 200 meters distance from the house.

When Ab got back from the Gulf the first time, several people asked him to get back on the boat, as he was known to be a good fisherman. He did get back for three months but then he realized that the

fishing was getting less and that the competition for the resources had increased. In order to get a good catch they had to go very early and return early to get a good price. Moreover, the sand bar at the mouth of the harbor was getting worse and several boats met with accidents there. There were also severe problems to offload the boat and the harbor got very crowded.

As for Be, the land does not fetch a good price because it is too close to the sea and whenever the sea is rough, it gets flooded.

The single and most important natural asset sustaining the coastal fishing communities of Ponnani is 'fish', which is also the major source of their livelihoods. The account revealed that fishers have been dependent on this resource for generations. And there seems to be a conscious effort among households to educate their children and seek opportunities elsewhere. A consistently declining catch forced the households to develop other strategies. Many of them remained in the profession, adapted to modern technology, and moved from traditional crafts and gear to mechanized or motorized crafts and more efficient gear. A large number of fishers, however, moved away from the sector, and migrated to the Middle East seeking employment in construction companies working as unskilled wage laborers.

6.4 Summary

This chapter discussed the household strategies and diversified livelihoods of the artisanal fishing communities of Ponnani from the content analysis of the in-depth interviews. The first section showed how they reorganized their activities as the fish resource they are dependent on declined. This was followed by a discussion on how some fishers abandoned traditional methods to adopt modern technology that was available at that time and some resorted to migration. Many others simply moved out of the sector.

The section on livelihood security discussed their ability to access religious, political and social assets in order to secure their livelihoods and their attempts to access other assets to improve the well-being. The last section focused on questions of sustainability particularly when their natural assets are degrading.

Chapter 7

Summary and Conclusions

This chapter provides a summary of the major findings of this study, and highlights the main conclusions that emerged from this research. It also presents recommendations for improving the application of the Sustainable Livelihoods Framework (SLF) in future development planning.

7.1 Summary

This study has investigated the complex and inter-related nature of the factors that led to resource dependency, and has considered the role assets play in determining survival strategies. The research has focused on how asset degradation impacts resource dependent households in artisanal fishing communities, and how they develop survival strategies. The social, political, financial and physical assets that members of the households access were also considered.

A thrust in this study was to critically evaluate the SLF and make suitable modifications to accommodate micro level complexities, particularly those encountered in developing countries. Deeper analysis of Ponnani documented the changing scenario of their livelihoods - *Pathemari*, trawling, shore-based fishery and land-based infrastructure developments. Using the modified framework, the study identified key

priority areas that members of households in the communities identified as being important to them. Further, the modified SLF helped explore links between localized phenomena to wider national and international processes. The framework was useful in organizing information and toward identifying linkages, and feedbacks within and beyond the daily lives of the members of the community. It also helped in identifying gaps in information and assisted in understanding relevant livelihood strategies.

The literature on resource dependency is distinct between developed and developing country contexts. The choices that people make for their survival, how they evolve strategies and make decisions, and government involvement in mediating these relationships at the micro level, are distinctly different. Households in poor countries are driven deeper into poverty when natural resource degradation intensifies. Weak institutional arrangements regarding property rights is one of the major factors that limit the ability of individuals in households to evolve strategies and make decisions to improve their well-being. Globally the processes of trade liberalization and structural adjustment programs have led to greater export and import of fishery products. In India, government support for export orientation has deprived poor households of cheap means of securing food. However, greater export orientation has had a positive impact on the workers in the fish-processing sector. They received higher income which contributed directly to their food security. Export orientation also disregarded traditional resource management such as *Kadakodi and Karanila* systems. Fishers started targeting non-selective demersal species of fish catch and this had a negative impact both on the fishing communities and fish resources.

In India, caste, religion and other social factors play a significant role in everyday life and are significantly linked to the livelihoods of artisanal fishers engaged in small-scale fisheries. Traditional resource management institutions play a major role in small-scale fisheries. The study area, Ponnani in Kerala, which is located in the southwest coast of India is predominantly a Muslim dominated region. In Ponnani, changes in technology and resource use resulted in an initial increase in resource output and household incomes. Over times, however, ecosystem degradation and resource depletion impacted on the households and further aggravated their poverty.

Households of the artisanal fishers in Ponnani have few physical assets. The houses in which they live are the most significant of them. Houses along the coastal wards, however, are severely impacted by erosion. Analysis of satellite images showed the extent of coastal erosion and field investigations revealed that the construction of breakwaters aggravated the erosion.

Population, family network, religion, health and education are important human and social assets of the community. While the actual population has shown an increase in both Ponnani and Malappuram, growth rates show a declining trend. Reasons are varied, revealed in household surveys and in-depth interviews. Despite religious restrictions, members of the community are adopting family planning programs implemented through the health department of the government. There is a growing consciousness about keeping families small, although financial constraints are not the main reason. Improved education has also contributed to this idea.

Ponnani has a patrilocal system of marital residency, particularly among the members of the community who have traditionally fished and who belong to small-scale

fishing groups. Those engaged in trade and big sailing vessels, *Pathemari,* have a matrilocal system and therefore, follow a joint family structure.

7.2 Conclusions

SLF, with modifications, is found be practical in organizing the information on livelihoods of the coastal artisanal fishing communities. Analysis of the information on asset situation and strategies adopted by the members of the artisanal fishing communities identified factors to suggest resource management policies to improve household livelihood options and well-being. In Kerala, intensification of marine fish resource use started in the 1970s. The State has gone through various phases in its attempt to modernize fisheries – from motorization of traditional crafts, efficient gear selection, trawl fishing, and high-tech long liners and better transport and export of fish catch. Despite these capital-intensive inputs and the consequent boom in fisheries, the coastal fishing communities continued to be poor and to struggle to survive. A focus on survival strategies of the artisanal fishing communities of Ponnani gave insights into factors that limit their ability to access assets and thereby improve their livelihood options.

All households in Ponnani engage in diverse income generating and livelihood activities, including fishing, fish processing, fish marketing, fish culture and daily labor regardless of their primary occupation. These low-income households are mainly small-scale, subsistence fishers with high livelihood dependency on the coastal seas. Clearly, their livelihood concerns such as secured access to resources, and basic rights to food security, jobs, education and health care need to be emphasized in discussions about

sustainable livelihoods in general and small-scale fisheries in particular. Fishing practices as a production system were accompanied by cultural practices that have kept the livelihoods in place over several generations among the traditional communities of Ponnani. Their culturally modified and sustainable patterns of traditional practices were regulated and controlled by time-tested institutions. The post independence thrust of modernization has had a forceful influence on these institutions. Motorization of traditional crafts and introduction of trawlers signified modernization. Introduction of new crafts and gear coincided with the decline of the *Pathemari* sailboats and therefore, the owners and workers of *Pathemari* trade were quick to respond and adopt into fishing. These new entrants had limited knowledge of fish and fish habitats in contrast to the traditionally acquired knowledge of the artisanal fishers. Lack of knowledge of the fish habitats and pressure to produce more, may have contributed to accelerated degradation of coastal environments and the decline of fish catch.

Modernization of fisheries had a homogenizing effect, particularly on caste and religion. Caste has been a factor that has defined the division of labour in Indian society and thereby defined the kind of work that a particular community undertakes. Religion, on the other hand, has provided the worldview within which a certain caste regulates its social life. Social life is structured within a given work order in relation to the larger society. Although fishing communities in general are identifiable by their caste affiliations, in Ponnani, caste is not the most important aspect determining livelihoods. Instead, their livelihood strategies are influenced by religion.

Religion also influences the social life of the community in Ponnani. For example, in many ways the *Jamaat* plays the role of an elected body totally male dominated that

controls the social life of the community particularly that of the women. In-depth interviews gave insights on how the *jamaat* take no measures to intervene when women are left deserted by their husbands through the provision of *talak* (divorce). Nor are there any prohibitions against the under-age (below 18 years old) marriage of girls.

Degradation of traditional resource management institutions and lack of concern or apathy from the government gradually made the community opt for migration seeking better livelihoods elsewhere. They migrated across space – mainly to Middle East or with better technology, to distant waters for fishing. Some left behind traditionally acquired skills and migrated to other trade such as construction laborer. Most of the migrants, particularly to the Middle East, moved from fishing to construction. Fishers are aware that the fish resource is declining and that they need to find ways of moving from this traditional occupation at least partly. Long-term recovery of declining fish stocks through bio-diversity conservation and minimizing impacts on fish habitats as part of the government resource management plans hardly meet the immediate survival needs of the fishing communities. The potential social cost of the recovery process is very high as rebuilding fish stocks may require a permanent reduction in fishing capacity and may also involve displacement of fishers (FAO, 2007). The long-term resource recovery plans particularly in densely populated fish resource dependent communities are challenging. The main challenge is to design a system that will take into consideration local livelihood needs and fishing practices that are effective in the short-term as well as capable of achieving long-term goals.

The government has not been able to put the required institutional arrangements into place to assist those who intend to move from fishing to other occupations thereby

government creates space for middlemen to come in and exploit the members of the community. Some fishers have persisted and tried to continue their livelihoods as the skills that have been learned through generations. This strategy, however, has resulted in enormous debt accumulated in order to continue fishing despite low or no returns. Short-term government efforts are not enough to break the poverty situation of the fishing communities. Long-term proposals to alleviate existing poverty situations are in discussion stages and not yet realized due to huge capital investment requirements. Initially these efforts were confined to development assistance, which included funds for technological upgrading of harvesting facilities, infrastructural development, and marketing assistance (Kurien and Paul, 2001). A review of five-year plan documents revealed that the direction of developmental assistance was towards mechanization of the artisanal fishery sector. Regarding social welfare, the approach of the government was to provide some 'quick-fix' welfare measures such as providing free food through public distribution systems, subsidies for fuel and soft loans. However, the government failed to address other visibly apparent dimensions of the poor quality of life such as poor housing, sanitation, illiteracy and low educational standards.

7.2.1 Assets and diversification behavior

A household's own assets, some of which are non-productive assets, such as jewelry and furniture give them a sense of secure wealth or savings and others of which productive assets, such as human capital, gear and craft, generate "earned" income only indirectly through their allocation to activities such as fishing, net-weaving or trade. Assets, activities, and income are thus complementary measures in the study of diversification behaviors (Barret *et al*., 2001). Although income is an indicator because of

its clear interpretation as a welfare outcome, it can be difficult information to extract because of many constraints such as the fear that revelation of actual income may hinder the individuals from accessing welfare schemes or cause them to worry about increased taxation. Assets, on the other hand, offer a storehouse of wealth as well as an alternative to sources of income. The livelihoods activities of the members of the households in the community help identify individuals' explicit diversification choices.

People living in the coastal areas like those in the interior locations derive their income from diverse sources such as agriculture, industries and service sectors. However, many near-shore rural communities have fewer opportunities. Local livelihoods are solely dependent on capture fisheries. The nature and degree of this dependency is influenced by a variety of factors such as lack of alternative activities, culture and tradition. The fishing skills developed over generations, are characteristic to many near-shore communities in India. Declining resources, uncertain employment and earnings and subsistence from fishing alone impacts these community's livelihood options.

One important finding of this study is appreciation for the evolution of livelihood strategies in coastal fishing communities. This has helped to infer the associations between communities and their strategies to access assets to help them through their poverty situation. One of the important physical assets of Ponnani is its location as a fishery harbor. This helped fishers market their landings. Market, therefore, is an important asset and an aspect that helped to determine their livelihoods. Historically, Ponnani was in an important location in terms of marketing the goods that came from distant lands in the traditional cargo, *Pathemari*. These skills have expanded in Ponnani. Fish trade was a flourishing business here. There were ancillary activities associated with

trade – fish drying, fish oil extraction, packaging and transport. All these activities were labor intensive and both male and female members of the households in Ponnani earned their livelihoods from this diversified occupation. At present, they have established market linkages at local and global levels. The operation of market forces is very significant not only in Ponnani but also in other coastal areas of the country and particularly in the fisheries sector. The market has become the most important determinant that governs their life and livelihoods. All respondents interviewed voiced their concern with losses in biodiversity, local traditional knowledge, and traditional occupational skills as a consequence linked to the transformation of the original livelihoods and level of market linkages.

Another important finding in this study is that technology has played a major role in transforming of local livelihood strategies and options. While technology is an asset that enhanced the livelihoods, opportunities to access it were limited to those who already had political and financial assets. One of the major implications of this adoption of new technologies is that the fish landings increased considerably while the economic and social status of a large section of those fishers who were unable to access technology, continue to decline. At the same time, the new trading class in this sector, especially the marine products exporters, increasingly benefited from improved fish landings. There also emerged a new owner class of mechanized boats (trawlers) who were mostly involved in *Pathemari* cargo. Fishing technologies among the traditional fishers also changed to more capital intensive, fossil-fuel dependent, active and efficient technologies through the introduction of Out Board Motors. While this has helped these traditional fishers to compete in fish resources with the mechanized trawlers, their profits did not

improve. Instead, it led to fierce competition among them. Field surveys in Ponnani suggest that over-capitalization in fishing capacity in both the mechanized and traditional sectors were a main contributor. Also, other subsidiary sectors such as nylon net making, outboard motors, marine plywood and boat making seem to thrive well compared to the artisanal fishers. The members of the community believe that this kind of development has resulted in resource depletion and is faced by the fishers all along the coast. Household surveys revealed that all fishers supported better management or conservation measures to improve the fish stocks. According to them, while the first measure was to stop night trawling, most of them also agreed with the seasonal trawling bans. Mesh size regulations and restrictions on the number and size of fishing boats, restriction of the horse power of out board motors were also accepted by most.

Another important finding in this study is that with change in technology, gender roles in the local economic activity are being radically altered. Hundreds of women were involved in the fish sorting and drying process in the *chapas*. With increased transportation and market integration, fresh fish could be transported to distant markets and the traditional *chapas* became redundant. Women lost their livelihoods. With the modernization through introduction of motorized crafts and trawlers and export of fresh fish, the fishery became more male dominant. The role of women even in small-scale artisanal fisheries became that of “house wife”. In the Azheekkal area where most of the trawler fishers live, the women had stricter restrictions and even the older women were not allowed in the public. The bamboo curtain, *mara* was the veil between the women and the world outside their homes. Younger women who use *purdah*, while recognizing it as a religious taboo, they acknowledged that it gave them a sense of security from the

offensive behavior of men. Generally, there is a feeling of disempowerment and helplessness at the social control that governed their lives. They were helpless when the husbands abandon them. They are powerless when the whole community affirms to the religious taboos. Women in Ponnani better accessed political assets when the State devolved its power through decentralization. There were three women elected members in the local governing body. These elected women succeeded in accessing the political assets and formed women's self-help groups throughout Ponnani. Through these self-help groups, they formed their own micro-credit programs and accessed other financial assets such as government loans.

Other strategies of the members of the household in Ponnani include accessing political assets as seen during the 1960s when a large number of them adopted communism as the communist government started the cooperative system and gave loans to buy and operate trawlers. Interestingly, in the State of Kerala, cooperatives in the fisheries sector were introduced in the early sixties by the Communist led government with the aim of providing new mechanized trawl boats among the traditional fishers on credit. In fact, this could also be one of the reasons for many people in these areas becoming followers of the communist party, as this helped them to find an alternative to the declining *Pathemari* trade. Interviews revealed that it was not only the owners, but the workers of *Pathemari* who also got into fisheries. The actual traditional fishers of that time did not show much interest in the trawl boats, and they were also not permitted by the former *Pathemari* owners to do so. This was mainly because the mechanized boats required a safer landing place and the older ones in the river mouth were under the control of the *Pathemari* owners. This is where the new fishing harbor is proposed.

Institutional arrangements in the management of resources have evolved from a traditional community to government regulations over time. For example, sea courts or *Kadakodi* gave way to a modern State controlled KMFRI Act of 1980. But unlike *Kadakodi*, which takes the local complexities into account, modern legal instruments are too general and therefore ineffective in regulating resource use.

Although the aspect of migration has not been the one of the primary objectives of this research, it was found to be an important survival strategy of the artisanal fishers of Ponnani. While the household survey results showed only six percent of the head of the households ever migrated long distances, the in-depth interviews and group discussions revealed it to be an important strategy which most of the members of the community recognized. During the survey, there were eight members who were abroad. Seasonal migration for work within the State is common and most of the fishers migrate, particularly south when *chakara* attracts large number fish aggregation. Migration resulted in the Ponnani municipality having more females than males. While seasonal migration for fish was common for a long time, recent migration seeking jobs in Middle Eastern countries is an important strategy adapted by many members of the community to better their livelihoods.

Another important finding in this study is that communities have been adaptive to the need for formal education which is also a key component of human capital asset that helped them improve their livelihoods. Traditional knowledge that has been passed on through generations earned them their livelihoods as skilled fishers and with changes in fisheries, members of the fishing community have been adaptive to the need for changes. For example, they were adaptive to the increasing need for better education. This is

revealed in the literacy data. The literacy rate increased significantly in Ponnani, particularly female literacy between 1981 and 2001. However, despite the depleting fish resources, fishing still seemed to be the single largest opportunity for large numbers of the future generation in Ponnani.

7.2.2 Vulnerability, Risk and Livelihood Strategies

The study found that vulnerability of the coastal fishing communities could be due to reasons within the dynamics of human-environment systems that are exposed to risk. The data from interviews illustrate that livelihoods of the coastal fishing communities are very complex with regard to their vulnerability (exposure, sensitivity, and resilience) and are affected by social and biophysical processes. Their ability to access political and economic institutions are determined by environmental, social and technological changes that are also reshaping regional and local environmental uses.

The study identified gaps in information for the monitoring of sustainable livelihoods and policy requirements to work towards better management of coastal environment and livelihood interactions. Government initiatives through policies and programs for the welfare of the coastal fishing communities seems to have had very limited impact. The study recognized that it may have been better to build on the assets they already have. Oliver (2003) writes that when people control key assets, whether they are educational, financial, or natural resources, they have a sense of ownership, power, and hope for the future that profoundly affects the way they conduct their lives (Oliver, 2003).

The findings of this study provide insight into government policies that placed emphasis on mechanized and intensive fishing technologies, while relatively less attention was paid to artisanal fisheries. The trawl fishery, while offering employment to people especially those fishermen who had no hook and line skills, is on the decline both economically and biologically. There has been no attempt to diversify. Furthermore, maintaining the old inefficient boats has become a burden on the owners. SLF may be very useful to suggest innovative ways in which policies towards them might be formulated. There were many initiatives from the government to enhance the fish catch through the introduction of different types of gear and craft. While few from the artisanal sector benefited from these initiatives, opportunities were accessed mostly by those who had better political and financial assets.

Another important finding in this study is the local participation initiated by People's Plan Campaign in Kerala to make decentralization a political and economic reality giving elected representatives of the communities of Ponnani access to government funds. This in turn helped them decide on local priorities and also had a visible impact at local levels with housing, roads, water and sanitation getting importance. Therefore, the issue of decentralization is clearly of critical relevance as policy should be more responsive to local level realities. In-depth interviews and focus group discussions with the members of the coastal fishing communities of Ponnani opinioned that decision-making at the community level will lead to more responsive public services.

One of the most interesting findings in this study is the extent of biophysical degradation that has impacted the communities of Ponnani. Large-scale developments

both in land (damming up of rivers, increased use of pesticides and fertilizer in agricultural fields) and coast (infrastructure build up such as roads, rails, harbor and seawall construction) have led to increased erosion of coast and estuary. This has negatively impacted natural assets. Image analysis and thematic maps developed in GIS indicated these negative impacts in Ponnani. Upstream development on the Bharathapuzha River has caused siltation of the river mouth and thus impacted the estuary. The sea wall built as a means to prevent erosion also has aggravated the coastal erosion. Present breakwater that is being constructed for the harbor has further impacted the land. However, many in the community strongly feel that the new harbor will bring back better fishing and regain some of the lost prosperity of Ponnani. This harbor is being built a couple of decades after the need was expressed, and when the fish catches has declined. The traders that control the harbor area are now exerting pressure to convert it into a commercial port.

7.3 Recommendations

The emerging lessons from the study suggest the use of three strategies to enhance the asset base of the coastal poor: strengthening grassroots organizations, transforming relations with the state and developing new alternatives to conventional coastal development practice. Aspects that have direct applicability for decision-making using the SLF include livelihood assets - physical, natural, social, political and financial – which are linked and should be treated accordingly. All parts of the SLF may not have the same significance in the poverty situations, subsystems and components, especially

social units, may experience exposure differently, register different impacts, and maintain different response options.

Although different frameworks are used in livelihoods analysis, place-based variations in the coastal communities and processes affecting their livelihoods favor multiple approaches; it is desirable that assessments follow a common general methodological framework.

Conscious efforts are needed to create institutional structures that link sustainable livelihoods approaches to decision making. Within these approaches, vulnerability analysis must be comprehensive, treating not only the system in question but also its multiple and varied linkages.

There is a need to enable people and communities to exert control over their lives and to participate in their societies in meaningful and effective ways. Therefore, programs such as asset building and community development should be encouraged that would help strengthen and increase the effectiveness against poverty and injustice (Sherraden, 2001). It would support communities and organizations that are building human, social, financial and environmental assets.

Integrated approaches to fisheries/aquaculture, agriculture, water and watersheds need to be adopted in development policy and planning. Studies to identify linkages between different sectors within fisheries and others are desirable before programs are formulated for development. The capacity for sustainable fisheries management needs to be increased and developed at all levels – community, regional and national. FAO's Code of Conduct for Responsible Fishing (1995) and Technical guidelines for responsible

fisheries (2005) need to be adopted in the planning of fisheries development in order to assure sustainable resource management and future food security.

It is important to emphasize gender perspectives in future fisheries planning and development strategies as women are the main force behind local food security. Therefore, women's existing space in the fishery needs to be safeguarded. This can be achieved through upgrading their skill in value addition of fishery products. It is also important to ensure safety at their work environment and therefore, effective institutional arrangements should be put in place.

SLF focus in this research helped to identify key strategies that households in artisanal fishing communities use to access assets and base their livelihoods. However, this research has not been able to cover all the areas that would have been helpful to better understand the complex socio-political and economic dynamics. Further research in this area would help identify policy spaces where interventions can be made through vertical institutional linkages. Modified SLF developed in this research would be useful to identify which of the institutions, organizations and policies would help shape the livelihood outcomes of the small scale fishers, particularly in poor countries.

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Appendix 1

In-Depth Interview schedule with Key Informants

Survey Number…… Date (day/month/year)……..

1. Location of the Survey Ward No: …… Place: …….
2. Respondent's credibility: (local governing member/community leader/local party member/……)
3. Respondent's main occupation: ……..
4. Respondent's family details:

   How many members in your family:……

   How many dependents …….....

   How many earning members ……...
5. Are you and your family dependent on marine fish catch? If Yes, explain……..…

   ……

   ……

   ……

   ……

   If No, explain other sources of income that sustain your household……. …… ..

   ……

   ……

   ……

   ……

6. What was your main activity (earnings) during the past one fishing season?

   .....

   .....

   .....

   .....

7. How many days do you get to go fishing during the season?

   .....

   .....

   .....

   .....

   .....

8. What kind of fishing do you engage in? Do you have skills in any other fishing? Please explain years of experience you have in each fishery.

   .....

   .....

   .....

   .....

9. Does your son/s come with you for fishing? Are they skilled in fishing? What does your daughter/s do? How much education did they get?

   ……

   ……

   ……

   ……

10. Do you have your own fishing gear and/or craft? If No, do you rent them?

    ……

    ……

    ……

    ……

11. Which fish species do you target? Why? Explain its seasonality, availability etc.

    ……

    ……

    ……

    ……

12. In your opinion, has the fish catch increased or decreased within the last one decade? If decreased, how did it affect your earnings? Have you noticed any changes in market price?

    ……

    ……

    ……

    ……

13. In your opinion what are the reasons for decline in fish catch? Has there been any change in Bharatapuzha river and the estuary in Ponnani?

    ……

    ……

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……

14. Have you lost any land due to sea ingression? If Yes, how much? Have you got any compensation from the government? In your opinion what are the reasons for the sea ingression?

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……

15. Has the sea ingression impacted the quality of water in your well? During the monsoon season how do you meet your water consumption needs?

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……

……

16. Are you aware of the coastal zone protection and other measures adopted by the government? In your opinion how effective are these measures?

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.....

17. During the last monsoon season, do you or any of your family members had diarrhea or dysentery or any other illness? If yes, please explain how you dealt

with that situation in terms of accessing health care and absence from fishing.

……

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……

18. Are you aware of any government support through subsidies and soft loans in the fishing sector? Are you able to access it through cheaper kerosene and diesel or to buy gear and craft?

……

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……

19. What are the government programs that you access? Please explain how helpful are they for you and your family?

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20. Other than fishing, were you able to make extra income from any other activities? Or what are the other skills you have to make a living?

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21. What type of work do you look for during the non-fishing season?.....

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22. How many days in the last fishing season were you unemployed? How did you manage your household during those lean months?

……

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……

23. Do you live in your own house or rented? If rented explain the reason why you are unable to purchase your own house and property.

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24. Do you have toilet in your house? If Yes, what type? If No, how do you and your family manage without it?

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25. What other assets do you own for yourself and family? (Livestock, poultry etc)

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26. Do returns from fishing sufficient to meet your household needs? If Yes, do you save the surplus? If No, do you borrow and how do you cope up with paybacks and interests?

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.....

.....

27. Have you worked anywhere outside Ponnani? If Yes, where? If No, has any of your family members work outside Ponnani and where?

.....

.....

.....

.....

28. Are you satisfied with the welfare schemes of the government (Fishermen's Welfare Fund/ Matsyafed loans etc)? Have you taken any loans? If yes, how often and why? If no, did you access loans from private money lenders?

……

……

……

……

29. Are you a member of Jamaat? Can you explain other social activities that you are engaged in? If no, explain why you do not take part in any such activities?

……

……

……

……

30. Are you a member of any political parties? If yes, please explain how that has helped you and your family? If No, explain the reason.

……

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……

……

31. What is your opinion regarding the people's planning campaign? Have you taken part in any *grama sabha* meetings? If Yes, what role do you play?

……

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……

32. Are you aware of the age old tradition of *kadakodi* ? Do you consider the modern coastal zone managements and KMFRA an equivalent to those traditional institutions?

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Appendix 2

Household schedule

Survey Number…… Date (day/month/year)……..

1. Location of the Survey Ward No: …… Place: …….
2. Respondent's (Head of the household) credibility: (local governing member/community leader/local party member/……)
3. Sex: Male / Female
4. HHH main occupation: ……..
5. Marital status:
6. Respondent's family details:

   How many members in your family:

   Male:

   Female:

   Total:

7. Is it a joint or nuclear family?

……

……

……

8. General Information:

Category	Place of Birth	Occupation	Education	Remark (Male/Female/Age)
Head of Household				
Spouse				
Father				
Mother				
Oldest child				
Child 2				
Child 3				
Child 4				
Child 5				

(Add additional sheets if needed)

9. Did you receive or give dowry for the marriage of your son/daughter?

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……

10. Habitat details: (Observe and record with a X mark)

Type of house:

Modern (brick and cement)

Partly modern

Thatched

Shack

Homeless

Does the house have a toilet?

11. Ownership details:

    Own

    Rented

    Illegal

    Temporarily/charity

    Common Property

12. Do you own land elsewhere? If Yes, how much and where?

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    .....

    .....

    .....

13. Does your household have any or all of the following items?

    Telephone

    Bicycle/Motorbike/Car/Any other mode of vehicle

    Power supply

    Fridge/Electric Fan/TV/Radio/etc

    Cooking fuel used……

14. Do you have a bank account?

    ……

    ……

    ……

15. Details of children

Number	Sex and Age	Level of Education	Occupation	Whether Married/Living in the household
Child 1				
Child 2				
Child 3				
Child 4				

(Add additional sheets if needed)

16. Details of Amenities in the house:

What is the mail source of drinking water for you and your household?

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Is that water sweet or salty?

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.....

Do you have a kitchen? If Yes, is it shared?

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What is the source of fuel for cooking? LPG, Electricity, Coal, Firewood?

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17. Details regarding health:

Do you or anyone in your household suffer from any chronic illness (Diabetes, T.B, Asthma etc)? If Yes, explain what illness and how you are treating it.

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Do you or other members of your family suffered from any water-borne diseases during the last monsoon season?

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Has anyone died from any illness in your family? If Yes, when and due to what cause?

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18. Do you use contraceptive and other family planning methods for birth control? If No, please explain the reason.

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19. Details of Assets

Ownership details of crafts and gear

Craft	Number	Gear	Registered under	Year of Acquisition
Trawler				
Plywood OBM				
Traditional craft				
Any other (*Pathemari)*				

20. Please give reasons for acquiring craft and gear.

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21. Were you or your father or any members of your family ever owned/worked in *Pathemari*? If Yes, still engaged or not? If No, why?

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22. Do you hire crews in your fishing operations? If No, do you or your family members are hired in fishing operations? Give details.

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23. Details of fish catch:

Period	Major species caught	Landing assessment (Very Good, Good, Poor)	Approximate share of each variety
Starting Year			
Peak Year			
Current Year			

24. Is the catch increasing or decreasing? When?

Same

Increasing

Decreasing

25. Duration and expenses per trip (approximate)

This year

Last year

26. Do you use GPS, fish finders etc for better catch? If Yes, when did you start using it and how did you come to know about it?

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27. Do you migrate to distant places for fishing? If Yes, how far do you go? Why do you go far for fishing?

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28. Is fishing your main source of income? If Yes, is it sufficient to meet all yours and your families needs? If No, what other sources do you access to meet the demand?

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29. Do you access present harbor? If Yes, what is your opinion regarding the government proposal to upgrade it to a full-fledged fishery harbor with modern facilities?

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30. What is your opinion regarding the management measures for sustainable fisheries?

Control/regulate number of boats

Regulate mesh size of nets

Increase number of days for monsoon trawl ban

Ban on fishing of endangered species (for example, whale sharks)

Zonal regulations

Record any comments on the above:

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30. Are you or any members in your family an affiliate of any political party? If Yes, what benefits do you derive from being a member? If No, why?

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31. What is your opinion regarding the ‘peoples planning campaign’? Did you participate in it? If No, why?

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