

WOMEN SEAWEED HARVESTERS IN CHINNAPALAM



DISCOVER INDIA PROGRAM
2019-20



CERTIFICATE

This is to certify that the work incorporated in this report titled “*Women Seaweed Harvesters in Chinnapalam*” submitted by the undersigned Research Team was carried out under my mentorship. Such material as has been obtained from other sources has been duly acknowledged.

Sr. No	NAME OF THE STUDENT	DESIGNATION	SIGNATURE
1	Aashka Shah	Photographer/ Videographer	
2	Ajai Elango	Logistics In-Charge	
3	Amruta Veer	Logistics In-Charge	
4	Esha Patel	Writer	
5	Manasi Menon	Logistics In-Charge	
6	Manya Kotera	Writer	
7	Michelle Clement	Photographer/ Videographer	
8	Priyanka Rajagopalan	Writer	
9	Radhika Tyagi	Photographer/ Videographer	
10	Shalki Gupte	Writer	
11	Shrushti Bhosale	Group Leader	
12	Shwetha Nair	Writer	
13	Thripatha Shivanand	Writer	
14	Upasana Chadha	Photographer/ Videographer	
15	Yaamini Gupta	Writer	

Mentor: Dr. Juhi Sidharth

Signature:

Date:

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ABSTRACT

Seaweed is a type of marine algae whose consumption by humans dates back to the fourth century. The recent commercializing of seaweed has transformed it into a booming industry which acts as a sustainable occupation. The rise in global warming and the spreading awareness about climate change significantly impacts this trade with a rising demand for products utilizing seaweed.

Seaweed harvesting in India started in the year 1966 around the Gulf of Mannar region yet the harvesting trade remains largely unorganised even today. Chinnapalam, situated on Rameswaram island, is the biggest seaweed harvesting village along the coast where more than two hundred people harvest seaweed, largely women. In some cases, the income from harvesting supplements the primary income from fishing but it also acts as primary income for the women harvesters who otherwise work in pre and post-fishing activities. Although there is a general understanding about the economic aspect of harvesting there is an absence in our knowledge about the role of the women seaweed harvesters involved whose work is often romanticised to sound empowering which is not the case.

Using qualitative research methods, the study describes, and analyses information obtained through interviews in the form of life stories (specifically, oral histories) of the women. The men engaged in the seaweed trade work mainly as middlemen and factory workers higher up in the seaweed processing chain. The women have limited opportunities as most other sources of income like making shell garlands and fishing also depend on the sea. These livelihoods are often precarious given the risks involved, especially with natural disasters like tsunamis given that the 2004 tsunami is marked to have had a significantly negative impact as ascertained from the study.

There is a general sense, among the fishing community, of the failure of the government in providing safer livelihood opportunities and alternative jobs during the ban periods which restricts fishing and seaweed harvesting for over two months in a year. Other identified problems are the rampant alcohol abuse, heavy incurred debts, and an inefficient education system which fails to equip the younger generation to pursue occupations which are not made accessible to these populations.

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INTRODUCTION AND METHODOLOGY



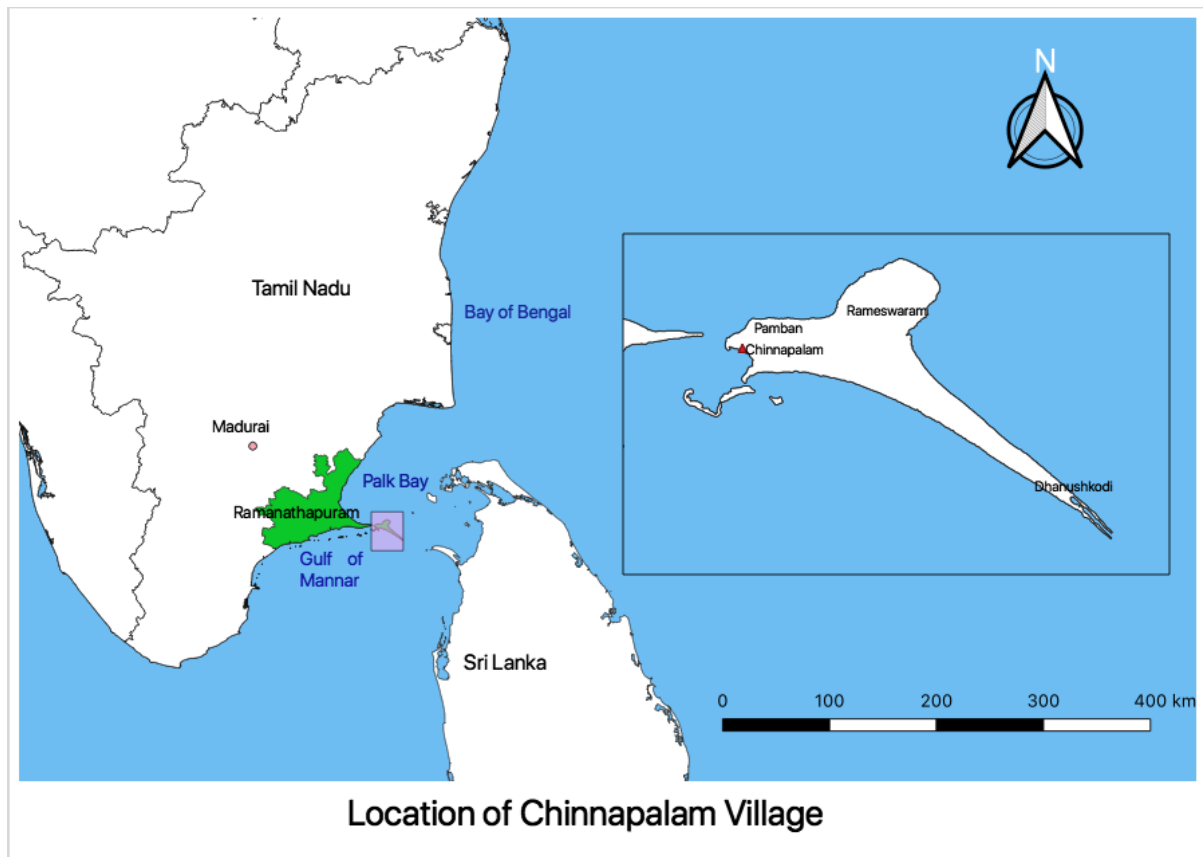
1.INTRODUCTION

Seaweed is a shared term for all marine plant species as well as algae. They may grow in oceans, rivers, lakes as well as other water bodies (NOAA). The use of seaweed by humans can be traced back to the fourth century in Japan. In more recent times, China, Japan, and South Korea have led the consumption of seaweed as food. With the migration of people from these countries to the rest of the world, the demand and therefore the supply of seaweed has become global. In addition to its increased demand as food, there were several other uses of seaweed that have been discovered over time. Today the use of seaweed includes, but is not limited to cosmetics, fertilisers, extraction of gum and other chemicals (Guiry 2020). Therefore with time, this increasing demand has even surpassed the “supply”, or the stock of seaweed available naturally (McHugh 2003).

Around the world in many countries including Japan, Indonesia, Philippines, South Korea, Tanzania and India, people dive into the sea to extract marine resources. In a majority of communities that practice diving as an occupation, we observe a pattern of these “divers” being women, a practice also seen in India (See Section 2.1 of Literature Review). The women divers in Rameswaram have since 1966 been collecting the *Gelidiella*, *Gracilaria*, and *Sargassum* varieties of seaweed. Later, in 1975, *Turbinaria* was also included in the list, and *Gracilaria crassa* in 1983. Since the seaweed industry in India is largely unorganised, there is very limited research surrounding the subject in India (Krishnan & Narayankumar 2010).

Despite the lack of research, the industry has recently been at the center of media attention. Stories of women who “bravely conquer the sea for their families” were covered by several notable news outlets (Arya,2019).

The people most often at the centre of this attention are from Chinnapalam- the village we have chosen to study. Chinnapalam is situated in the Pamban panchayat on the island of Rameshwaram, in the Ramanathapuram district (Panipilla & Marirajan, 2014).



Source: Created using DIVA GIS data on QGIS software

As of 2014, the village had a population of about 1100 people comprising around 400 families with 612 men and 562 women. Most of the people in the village are engaged in sea-based activities, including seaweed collection. There are around 200 seaweed collectors in the village. Sixty of the women seaweed collectors also participate in fishing. The people of the village are predominantly Hindu, and more specifically belong to the Valaiyar or Mutharayar community, which are both categorized as ‘Most Backward Castes’ (Panipilla & Marirajan, 2014).

As with all other villages on the coast of Gulf of Mannar where seaweed collection is an important component of the household income, seaweed collection as a commercial activity began around 1966 (Krishnan & Narayankumar, 2010). However, the reason for the emergence of the occupation remains unknown.

Seaweed collection here and across the Gulf of Mannar is an important secondary source of income for most households. It is however, even more important for women as they are not actively engaged in fishing (Krishnan, M., & Narayankumar, R., 2010). Fishing here does not include pre and post fishing activities where women are usually involved, this is likely

because these activities do not directly contribute to income generated. It is said that “for some single and destitute women, it is the only source of income” (Kumar, 2019). It should be noted that very little is known about these women, this includes the age demographic of women in these occupations or even marital status. Understanding these variables is particularly important as it would help understand the relevancy of this occupation as a source of income in the area.

Seaweed harvesting is known to be an occupation passed on from mother to daughter in the region (Kumar, 2019). However, in a few articles, women express strong disapproval of their daughters being involved in the trade in the future (Sentahilir, 2019). The presence of such contradictory information is because the study regarding the sector is very limited, and is usually limited to an economic overview of the sector rarely taking into view the actual people involved in the trade.

Seaweed collectors have and continue to face several problems after the establishment of the Gulf of Mannar biosphere. In 1989 when the Gulf of Mannar Biosphere reserve was declared, 21 islands and their surrounding waters were declared as reserved land (Panipilla & Marirajan, 2014), including the islands the people of Chinnapalam once accessed. People were denied access to the islands as fishing grounds and for seaweed collection (Rajagopalan 2008), and in 2002, due to concern for the fragile coral ecosystem, the regulations became more stringent. It has been reported that to steer the people away from these activities, forest department officials have resorted to extreme measures (Mukherjee, 2019).

To find a solution to this crisis some fishing unions in partnership with NGOs had a joint meeting with the Forest department and the district administration (Mukherjee, 2019). The women seaweed collectors of Chinnapalam, in particular, joined and formed a new subsection under the Ramnad Fisherworkers Trade Union. While different villages made different agreements with the forest department, the agreement specific to the Ramnad Fisherworkers Trade Union was that they would limit seaweed collection to 12 days in a lunar month. They would have a 45 day ban period from first April every year, and they also agreed to stop using metal tools to scrape seaweed, that is, only hand plucking of the seaweed would be allowed (Panipilla & Marirajan, 2014). Even after this agreement, however, the harassment of people trying to access the Gulf of Mannar continued as the rights of the community within the park area as established in the agreements have not been clearly established. In 2016, the

Fisheries Department distributed identity cards to all the womenfolk in the fishing community (Sethinar, 2019). Despite this long history of conflict with the government in the region, there have been no detailed studies of the impact of such policies in the region.

1.1. Research Aim and Objectives

This study aims to explore the intersections between social, cultural and economical factors with regards to the trade of seaweed harvesting in Chinnapalam and how this occupation continues to shape the lives of the women involved.

The research objectives involve exploring these dimensions through the following factors:

1. Social: gender, age, marital status, household relations, education, health, caste, religion.
2. Cultural: food, clothing, rituals and practices, religion(s), community space.
3. Economic: job security, alternative sources of income, government policies, asset ownership.

1.2. Research Methodology

The present analysis draws on the insights derived from field research conducted between 8th and 14th February in the village of Chinnapalam in Rameswaram, Tamil Nadu. It is a qualitative study and has used semi-structured interview guides, and face-to-face interviews to obtain data in the form of life histories. This was done alongside non-participant observation of the different processes involved in the seaweed trade.

Several secondary sources also were consulted, based on which semi-structured telephonic interviews were conducted with several researchers and journalists, and with the key point of contact Lakshmi Murthy. These formed the basis and the direction of the on-field research.

Due to the time constraints of the research project, the interviews conducted with our sample population, as well as our additional on-field interviewees such as with middle-men and manufacturing companies had to be conducted in a brief span of time, rendering the study a cross-sectional one.

1.2.1. Research Design

The tools used in the study were semi-structured interview guides. They were used superficially while conducting the interviews with the participants. The interview guides varied according to the research participants. For example, questions that the women seaweed harvesters were asked differed from questions their household members or middle men in the trade were asked. The questions in the interview guides could be broadly categorized into three types (as defined in the research objectives, see Section 1.1), depending on what kind of data they helped procure.

The interview guide for the people of Chinnapalam consisted of questions pertaining to their social, cultural, and economic lives. Information such as names were recorded solely for the purpose of keeping track of interviewees, while age and gender were recorded as information important to the study. Apart from these, most of the questions included in the interview guide were open-ended, so as to allow for elaborate answers and for the participant to give more information in the form of life histories. Information such as their perception of the trade, views on education, and opinions on government schemes were integral to our research and further gave a better understanding of the lives of the participants. The semi-structured format also allowed for on-the-spot probing by the interviewer based on the answers. On-field, the previous answers obtained from women were reviewed and the interview guide was revised accordingly.

To better illustrate, a few examples from the original interview guide for the Women divers of Chinnapalam have been given below.

Questions relating to social factors:

For how long have you been in the seaweed trade?

Are there any risks involved in your work?

Could you tell us about the tsunami of 2004?

Questions relating to economic factors:

How much do you earn on a typical day?

Do you have any means of alternative income?

Questions relating to cultural factors:

Can you tell us more about your costume for diving?

Do you have any rituals before you head out to sea?

Such questions gave room for the interviewee to answer freely, which turned up new information that could be probed upon and incorporated into the interview guide later on. For example, in response to the question on the women's costume for diving, probing led to information on perception of the trade by the women themselves, as well as the men of the village, and how that impacted their work.

Other participants in the study also included, apart from the target population, household members of the women, middle men in the trade, a worker from a seaweed processing plant, an NGO called People's Action for Development (PAD), a community radio called *Kadal Osai* and a seaweed-based company called Sathyam Bio. Interview guides for PAD and Kadal Osai drew heavily on the perception of the trade by outsiders, while the ones from Sathyam Bio, and the seaweed processing plant worker were to primarily obtain information on the seaweed trade after collection and transport.

Examples of questions asked:

In your opinion, how is the government helping the fishing community? (PAD and Kadal Osai)

What is the final product used for? (Sathyam Bio and seaweed processing plant worker)

1.2.2. Research Methods

Snowball sampling, a non-probability method of sampling, was the primary method to collect data and to recruit participants to interview in this research project. Convenience sampling, a non-probability method which involved approaching potential interviewees around the village who were willing to participate, was also used.

All interviews, save for Kadal Osai, were conducted in the regional language, Tamil, and were recorded, according to the participant's comfort, using digital means as well as note taking. All interviews were started only after obtaining the informed verbal consent using a particular statement (refer Appendix A).

Interviews were conducted in two groups of four, each having one fluent Tamil speaker as the interviewer, one prompter, who was usually one of the people who were not fluent in Tamil, but had some understanding of it, and finally a voice recorder and a camera-person. This made for efficient collection of data. The rest of the team was engaged in photography for this report and filming for the documentary. Splitting the research team into these groups as per skills proved to be advantageous.

During some interviews, participants expressed their desire to keep their information confidential and anonymous. We thus took informed consent concerning the audio and video recording of the interview, as well as the inclusion of recorded material in the documentary or report before participants were recorded in any way.

Non-participant observation was also a means of collecting data for the research. Observing the practices of the women divers of Chinnapalam, how they brought in the seaweed from the boats, spread it out to dry and weighed it; these were some of the integral pieces of information procured by observation. The group was also able to observe and collect photographs of different kinds of seaweed the women collected, as well as the gear they used in their occupation. Photographs and videos were obtained only with the informed verbal consent of the subjects. Understandably, many were reluctant to have their pictures taken due to unfortunate experiences with media and other researchers in the past.

1.2.3. Population and Sample Size

It is important to note that there are women seaweed harvesters across Tamil Nadu. For the purpose of producing a detailed study, and looking at the on-field time constraints, we decided to limit the study to the village of Chinnapalam in Rameshwaram. This is partly due to the fact that the people from Chinnapalam had previous experience giving interviews to media outlets, making it easier for us to approach them. It was also partly due to it presenting a unique case of study as we have explained in the rationale.

Preliminary research provided us with a rough estimate of the population of Chinnapalam, and in particular the women seaweed divers had numbered at around 150-300. Information on this topic also varied according to source on field, which made it very difficult to decide upon the sample size required for the study. To source the maximum information in

the small amount of time available, a tentative goal of fifteen interviews was set. The group managed to get sixteen interviews, excluding those not from the target population.

1.2.4. Analysis of Data

Data collected on-field was analyzed using qualitative means. Using the information from our interview transcriptions and literature review, data was segregated into various themes, which directly addressed our research objectives.

1.2.5. Potential Biases

Participants' responses could possibly be biased in certain ways and have acquiescence bias and social desirability bias. Social desirability bias could have been a factor if participants were attempting to answer in such a way, or neglecting certain facts in their answers, that they thought would show them in better light to the interviewer. This was seen during interviews with some participants who requested for monetary remuneration in return for their time during questions. Acquiescence bias was observed when participants of the study gave contradicting information, whether unknowingly or otherwise.

1.2.6. Limitations of the Study

During the research, several hurdles were encountered. The most significant is the time frame available on-field, as it limited the avenues of a detailed or in-depth study as a large chunk of our time went into establishing contacts on field.

Another significant limitation was the language barrier between us and the sample population, which we encountered on the field. The research team had only two fluent Tamil speakers, and 3 people who understood Tamil. Thus, it proved difficult to spread out and conduct multiple interviews at the same time. As we had anticipated this beforehand, additional Tamil speakers were recruited on the field. However, the translators were available only for a limited time and hence we could not conduct as many interviews as anticipated.

During the on-field research, the group also noticed the reluctance of some women to be interviewed as part of the study. The villagers in general were suspicious of outsiders and researchers as they had had adverse experiences in the past. While we were on-field, they

clearly mentioned how their privacy had been violated by these local news channels. The community itself had been approached multiple times by the media and other researchers, hence appeared fatigued while talking to us about the same issues that they had addressed to other researchers before. The manner in which those interviews were carried out, and how the information was disseminated led to them feeling exploited for information. Some people were therefore extremely wary of the group and to talk or answer questions, which may have led to some data being missed out on.

LITERATURE REVIEW



2.1. The Profession Of Diving: A Global Picture

Across the world, a substantial number of women from fishing communities dive for marine products like pearls and seafood, as well as seaweed. It historically occurs in places such as the African continent, Japan, China, Philippines, South Korea, Indonesia, Malaysia and India. Most notably written about in literature are the Ama from Japan and the Haenyeo from South Korea. There are numerous ethnographic, historiographic, socio-cultural and economic studies that have taken place on them, which has not occurred for the community of women that dive in India. The lack of existing academic research on the social or cultural aspects of the diving community in Tamil Nadu and most significantly their lives as working women is the main gap in literature.

It cannot be said that there are no men involved in diving for marine products, and that they are not involved in any steps of the process, but it is clear that it is largely women that dive for marine products, especially pearls and seaweed. Thus, there are also multiple studies attempting to understand the gendered nature of the practice of diving worldwide. Most studies of gender inequity in India are heavily focused on poverty alleviation- and do not look at bigger issues that involve property rights, advocacy and male-dominated monopolisation of profit. These issues in the kind of gendered research being done in aquaculture and fisheries have been addressed in a collection 21 papers published as *Gender in Aquaculture and Fisheries - Moving the Agenda Forward (2012)* that emerged from the 3rd Global Symposium on Gender in Aquaculture and Fisheries¹ (GAF3) (Williams et. al 2012).

No generalisations can be made, but literature shows that there is much that is common between the women from all these countries that dive for aquaculture.

The first is that their practice is a product of necessity. Globally, it has been observed that in fishing communities, men dominate the activities of extraction of marine resources, while women are engaged in the other components of the value chain, like gear making, sorting, processing, handling etc. Presumably, the practices of seaweed harvesting may have evolved from the need for income diversification (Matthews et. al 2012). In the chapter titled “*The Role of Fisherwomen in the Face of Fishing Uncertainties on the North Coast of Java, Indonesia*” from the GAF3 collection, Zuzy Anna writes that to cope with the uncertainties caused by ecological (drought, pollution and season), economic (lack of fixed income and low income),

¹ A triennial women/gender Symposium organized by the Asian Fisheries Society.

social (unemployment, lack of education, lack of support from men, high rates of separation after marriage) and institutional (debt, loans, reliance on subsidy and rations) factors, women are forced to take up part-time employment to support their household and supplement existing income (Anna 2012). With this plethora of issues plaguing the security in the fishing sector, livelihood diversification has become a feature of fishing communities globally (Matthews et. al 2012). But because diving for seaweed is not a primary source of income for the households and is practiced mostly in fishing villages, most studies, especially those in India, have discussed it only as a subset among other activities in fishing communities. In Chinnapalam, we will try to fill this gap with our field work.

Secondly, there is also a common trend worldwide of diving without gear and proper protection and wearing a mixture of traditional and modern clothing while diving (McCurry 2006). Literary sources such as *Diving and Subaquatic Medicine (2015)*, discuss the dangers of diving for these sea products- which range from poisoning, accidents and deaths, to long-term effects such as hearing loss, ocular disorders and pulmonary oedemas (Edmonds et. al 2015). There is even a pattern of an aging demographic, i.e., there is a generational decrease in those engaged in the harvest of these products. The practice of pearl diving carried out by the Japanese Amas, for example, is dying out due to the disinterest of the younger generation (McCurry 2006).

2.2. The Uses of Seaweed

The Seaweeds are a primitive type of plant that lack any true roots, stems or leaves- they are a kind of *macrophytic algae*. Most seaweed is one of three kinds: the *Chlorophyta* (green algae), the *Phaeophyta* (brown algae) and the *Rhodophyta* (red algae) (Mohammed). Seaweed is used in various ways, as food consumption, chemicals, medicines, textile dyes, liquid bio-fertiliser and cattle feed supplements (Ramachandran 2012).

Seaweeds have historically been a staple food in many parts of Asia, and especially in Japan and China. The green seaweed types *Enteromorpha*, *Ulva*, *Caulerpa* and *Codium* are utilized exclusively as food: they are used to make salads, are cooked as vegetables along with rice, and to flavour fish and meat dishes. Certain varieties, locally termed as ‘Nori’, ‘Kombu’ and ‘Wakame’ are used to make soups and accompaniments. Certain varieties, including the *Sargassum* species found in the Gulf of Munnar, have been used in China for the treatment of cancer. Certain species like *Undaria sp.* carry anti-viral compounds that inhibit the Herpes simplex virus, and reasearch is being carried on their uses for treating breast cancer and HIV.

Bone-replacement therapy and cardiovascular surgery are other places where they are useful (Mohammed).

Chemicals from brown seaweeds such as alginic acid, mannitol, and iodine, simply called alginates typically “absorb many times their own weight of water, have a wide range of viscosity, can readily form gels and are non-toxic” (Mohammed). They thus have numerous industrial uses in the pharmaceutical, cosmetic, paper and cardboard, and processed food value chains (Mohammed).

Primarily, red seaweed is used for production of Agar, Alginates & Carrageenan. Because they are extensively used in many industries, they are commercially valuable. Agar is a jelly-like substance most often used in the preparation of desserts throughout Asia, but is also used in the pharmaceutical industry as a laxative, and for making the outer cover of medicine capsules. Agar also serves as ‘agarose’ in modern molecular biology and genetic engineering. Carrageenans are generally used in the same way as gelatin, and serve to increase viscosity and stabilization in foods like ice cream, for example (Mohammed; Ramachandran 2012).

2.3. The Seaweed Trade in India

The question that arises from this growing trend in worldwide seaweed production, and the shift from harvesting/collection to farming, is of the industry within India. In India, seaweed is typically a cash crop and is thus exported as raw material (Ramachandran 2012). However, there has been a rise in domestic agar and algin extracting industries and processing facilities (Mohammed).

While we can attempt to structurally understand the seaweed trade in India, most of our sources that singularly study the seaweed trade only look at it from a larger economic perspective- and therefore study seaweed *farming*. We can see, for example, that the seaweed industry is projected to grow into a \$26-billion market in India by 2025 (Rajeshwari et. al, 2017), but we will not be able to study the existing and future trends in seaweed harvesting. A Central Marine Fisheries Research Institute (CMFRI) special bulletin states that information about seaweed collection in India is not systematic, and there is no official time-based statistical data on seaweed production (Krishnan, Narayankumar 2013). Essentially, there is a lack of organised reporting, research and literature on the occupation as an unorganised sector.

One of the most defining articles for our pre-field research, the *Social and economic dimensions of carrageenan seaweed farming (2013)*, is one of the few that expounds on the social dimensions- but looks at seaweed harvesting mostly to contextualise farming and cultivation. Nonetheless, the article provides valuable information on income, employment, family characteristics, age and education in the sample areas of Mandapam and Rameswaram. It also briefly introduces the history of the seaweed culture and government policy in India (Krishnan, Narayankumar 2013). But, it is one of the only articles to do so, which means that little is known on the history of the trade and policy action by the government, making it a gap in literature.

As written in the chapter titled “*A Sea of One’s Own! A Perspective on Gendered Political Ecology in Indian Mariculture*” from the GAF3 collection, Seaweed collection through diving was begun commercially by fisherwomen in the late 1960s, with women collecting the seaweed varieties of *Gelidiella spp*, *Gracilaria spp*, *Sargassum spp* and *Turbinaria spp* in the Gulf of Mannar region. With the introduction of red seaweeds like *Kappaphycus alverizii* by the Central Salt and Marine Chemicals Research Institute (CSMCRI)² and the company Pepsico³, the seaweed production gained traction, but through women-dominated cultivation instead of collection (Ramachandran 2012)

2.4. The Gulf of Munnar Biosphere Reserve

The Gulf of Munnar extends from Rameswaram Island in the north, to Kanyakumari in the south. It is important to mention that the Gulf of Munnar was declared as a Biosphere reserve (abbreviated as GOMMBRE) on 18th February 1989, jointly by the Government of India and the state of Tamil Nadu. This was done due to its rich biodiversity, and the fact that it provides a habitat for seaweeds, seagrasses, pearl, oysters, shell fishes, mangroves etc. It is home to essential coral ecosystems, as well as endemic and endangered species (Melkani et al 2006).

10,500 sq. km, including twenty one islands from Mandapam to Tuticorin, along 140 km of the called coastline, and their surrounding waters were relinquished to the State as reserved land (Melkani et al 2006; Panipilla and Marirajan, 2014). Each island lies only between 2 and 10 km from the mainland (Melkani et al 2006). This includes all the islands that people of

² A public-funded research organization which standardized its cultivation.

³ The Transnational Company which popularized its growth.

Chinnapalam used to frequent. The establishment of the National Park thus meant that people could no longer access them to fish or collect seaweed (Rajagopalan 2008).

2.5. Climate change and Seaweed

Ramya Rajagopalan, working in the International Collective in Support of Fishworkers Documentation Centre in Chennai, stated that seaweed harvest is diminishing- likely due to the increase in the surface temperature of the sea and also, notably, the overexploitation of seaweed. She also stated that there is no study on how climate change affects formation of seaweed (Senthilir 2019). This can be refuted, however, as literature actually reveals that the advent of climate change results in numerous changes in the ecosystems associated with seaweed habitats. Rising sea levels, rising average temperature and increasing salinity of the water all have a prominent impact on the productivity, distribution and overall composition of seaweed (Sunny 2017).

Drivers	Consequences
Temperature	Alter distribution and abundance Affect growth and seed germination
Tidal height	Affect light availability Limit photosynthesis
Salinity	Regulate distribution and abundance Fluctuation causes mortality due to extreme intake and nutrient imbalance
Sea level rise	Increase water depth and reduce sunlight penetration Reduce photosynthesis Reduce distribution and decrease productivity
Increasing CO ₂	Increase photosynthesis and growth Change species composition, nutrient cycling and decomposition
UV-B radiation	Inhibit photosynthetic activity Increase metabolic activity Increase resistance to herbivores and pathogens Decrease decomposition Carbon sequestration

(Sunny, 2017).

Interestingly, seaweed may present an opportunity to actually reduce climate stress. A report by the Intergovernmental Panel on Climate Change (IPCC) mentions the possibility of it being a potentially important factor in doing so. The report itself also concedes that for this: “Seaweed aquaculture warrants further research attention” (Kumar 2019).

Women seaweed divers are in this situation more vulnerable, as we can see from the paper Gender Perspective on Securing Livelihoods and Nutrition in Fish-dependent Coastal Communities (2012), by the Wildlife Conservation Society. It states that the impacts of climate are felt by everyone, but the severity of the impact is dependent on many factors, including

gender and economic status. A socio-cultural lens reveals that women and girls are more likely to be impacted by the direct and indirect effects of climate change. This holds true especially in the case of fishing communities, as such social groups often have distinct roles assigned according to gender. The existence of such obligations often hinders the ability of women to access resources and opportunities thereby making them more vulnerable to the imminent changes brought about by climate change (Matthews et. al 2012).

2.6. The Effects of the 2004 Tsunami

Their vulnerability also becomes apparent when they have to survive and make a living in the wake of natural disasters like tsunamis. The Indian Ocean Tsunami that occurred on 26 December 2004 was a devastating one, that killed 8,000 people in Tamil Nadu alone (Times of india 2019). It led to severe long-term damage, with villages, tourist resorts, farmland, and fishing grounds demolished or inundated with debris, bodies, and plant-killing salt water (Encyclopaedia Britannica 2020).

Monitoring done after the tsunami in January 2005, around the 21 islands of the Gulf of Munnar and in the Palk Bay regions has revealed the loss and damage to coral sea-beds, algae, seagrass and other aquatic life. The Tsunami thus refashioned the coastline (Kumarguru et. al 2005). Women seaweed harvesters have previously recounted that “waves have become stronger and sea levels have risen from after the tsunami” (Kumar 2019).

2.7. Tamil Nadu- Sri Lanka Border Dispute

To add this, within the Gulf of Munnar, fishing communities often face issues resulting from the defined and undefined borders between Tamil Nadu and Sri Lanka. Fishermen often stray into the other country’s territorial waters, becoming a source of conflict between India and Sri Lanka (Jaganath and Kumar 2017; Sivaramaganesh 2014).

Ritika Kapoor, Executive Director and Research Associate at the National Maritime Foundation stated in an interview with us that the agreement in 1976 which delineated the Gulf of Munnar waters was supposed to protect the rights of traditional fishermen, but fails to do so. In comparison to the massive modern fishing trawlers that cross borders illegally, the traditional fishermen, the less damaging of the two, are easier targets. Thus, when fishermen cross the borders, intentionally or unintentionally (water borders cannot be delineated physically as easily as land borders are), there have been instances where they have been

detained, arrested, beaten, shot at, and killed by the Sri Lankan Coast Guard and Navy (personal communication, 25 February, 2020).

Since it is mostly Indian fishermen that cross borders in the Gulf of Munnar, while the Sri Lankan fishers tend to so more near the Lakshadweep islands, the Gulf of Munnar waters have to in return be additionally monitored by the Indian Navy and Coast Guard to try and ensure Indian fishers do not trespass. Ritika Kapoor also mentions that there is often conflict between the Indian Coast Guard and the fishers: their presence, though it is partly meant to protect the fishers and India's territorial border, adds another dimension of tension to the lives of the people living there (personal communication, 25 February, 2020). The women in Chinnapalam, who too venture into the water, must face such conflict. But due to there being no literature available on this, we would like to fill this gap with information gathered from our field interviews.

2.8. The Women Seaweed Harvesters of Chinnapalam

For the women in Rameshwaram, "Seaweed harvesting is a traditional occupation passed on from mother to daughter through the generations in this region. For some single and destitute women, it is the only source of income" (Kumar, 2019). The women who depend on harvesting, and have depended on it for many years have observed the changes in the behaviour of the seas- its temperatures, weather, and climate. But they have also realized something about the role of human activity, even their own, in the changes that have taken place. At the same time, they need to make a living through these activities- their sources of income locked into the whole, complicated set of processes" (Kumar, 2019).

Recognising this, some fishing unions representing different villages, in partnership with NGOs had a joint meeting with the Forest department and the district administration (Mukherjee, 2019). The various fishing villages made different agreements with the forest department. The response of the women from Chinnapalam to these restrictions was unique, as they in particular formed a new subsection called the *Gulf of Mannar Seaweed Collectors' Association* within the *Ramnad Fisherworkers Trade Union* (Laxmi Murthy, personal communication, December 2020).

Laxmi Murthy, a former seaweed collector who was then the head of the Association, who is now an important figure in the village, has stated that while other villages have certain months in which women do not collect seaweed as they need to allow seaweed stock to replenish,

women in Chinnapalam are able to collect throughout the year (personal communication, December 2020). This is because the women's participation in the agreement negotiations resulted in the formation of sustainable collection practices particular to their village. The agreement stated that they would limit seaweed collection to 12 days in a lunar month, they would have a 45 day ban period from first April every year, and they would stop using metal tools to scrape seaweed (only hand plucking of the seaweed would be occur) (Panipilla & Marirajan, 2014).

However, even after this agreement, the harassment of people trying to access the Gulf of Mannar continued as the "rights of the community within the park area" have not yet been properly established. In 2016, the Ramnad Fisher's Union submitted a memorandum to the Fisheries Department requesting them to provide identity cards to people to recognise those with permission to travel to the islands and collect seaweed. However, the fisheries department instead distributed identity cards to all the womenfolk in the fishing community (Sethinar 2019).

2.9. Perceptions About The Trade

The seaweed collectors in Tamil Nadu, but most specifically the women seaweed collectors have gained some media recognition in recent years. Given the lack of academic research surrounding the women, a lot of the preliminary information about the lives of the women was found from the arguably less reliable online articles such as those from media houses like Times of India, the Hindu, India Today or archives. A fact to note is that in most articles, the women harvesters were represented by those in Chinnapalam.

News articles tended to create a narrative that largely romanticizes the practice of diving, as can be seen from the following quote from *Scoopwhoop*: "The dedication of these women, supporting themselves and their families, given the bare minimum resources they have, is eye opening. They are essentially winning the rough, tough and wild world, clad in their sarees for generations now, age no bar" (Arya 2019). Most articles portray the occupation as a dangerous one, which the women end up doing due a lack of alternate opportunities. They also imply that the occupation is a choice that the women make to support their families and uphold a standard of living. But this standard, as they describe it, is bare minimum. Nevertheless, they take a tone that indicates they see it as an empowering practice. They also lay emphasis on their clothing, as seen from these articles: "Unable To Afford Equipment, These Sari-Clad Divers Risk Lives

To Protect Family & The Coastline” (Scoopwhoop, Arya 2019) and “These saree-clad women divers may be the last of their kind” (Times of India, Balaji 2019).

A People’s Archive of Rural India (PARI) article however, contradicts this and states that collecting seaweed is not a choice that the women make but a decision forced upon them by circumstance. They quote a diver called Rakkamma, who says that: “Ours isn’t a tale of empowerment. We are just trying to make ends meet”. This particular article focuses on the everyday lives of the women, and tries to constructively bring out issues relevant to the women seaweed collectors. It describes a day in their lives, starting from when they set out for work in the morning. It also describes what they wear when they dive: a t-shirt on top of a saree tied like a *dhoti* with a large sack tied around their waist. It emphasizes their lack of protective diving gear. It also points out the impact of climate change on the trade. It also brings up several other issues prevalent in the community such as the regret surrounding the lack of opportunities for people there to receive an education and the impact of the establishment of climate change, and the Gulf of Mannar biosphere on the fishing and seaweed collecting grounds on the people of Rameshwaram (Kumar 2019).

Given that such articles are the only clear insights we have into the lives of the women harvesters, the above conflict in information and difference in narrative truly brings out the need for a structured study of the lives from the women’s own point of view.

2.10. Future Aspirations

We find that different articles from various sources provide different perspectives and opinions from women seaweed harvesters, especially in their relations with their sons and daughters.

In an article by the Indian Women Blog, Muthuvelu, a seaweed harvester, mentions that she does not wish for her daughter to follow her footsteps in continuing to dive, especially given the health hazards the occupation brings. Having survived a surgery because of the physical labour seaweed diving demands, Muthuvelu believes that education is the only escape for her daughter (). Even Laxmi Murthy, who has worked towards establishing a school in the area to provide younger girls with other opportunities, concurs with this ().

At the same time, another article by the Scroll shows that some women prefer to have their daughters marry, in order to leave the occupation behind, or to live in a different community

or a more affluent household- while at the same time preferring their sons to be educated (Shivaswamy, 2017).

Whether it is marriage or education, we can perhaps infer that the women are often against their daughters pursuing seaweed collection as a trade. It is also observed that many women invest their earnings in their children's education. But several articles have also mentioned how diving is a practice that is generationally taught, and have noted women sometimes taking their children along with them on the boats, especially if they would be staying on the islands to harvest seaweed (Senthalir, The scroll). This practice seems to contradict what they are saying. Therefore the women's expectations of the trade and its future with respect to succeeding generations are inconclusive, which we expect gain further insight through fieldwork.

2.11. The Shift From Harvest To Cultivation

There is a growing belief that seaweed collection and cultivation is an investment into the future and an avenue for women empowerment. Seaweed, with its richness in vitamins and minerals, trace elements and bioactive substances, is also being called the food of the Twenty First century or the future food (Mohammed). Due to this, the increasing demand for seaweed in the last fifty years has essentially exceeded the supply that can be obtained from natural stocks (McHugh, D. J., 2003). The industry as a whole is expected to grow more, and currently, to meet this rising demand, one can see that there has been a shift over time, not unintentional, towards the cultivation and farming of these products. This is a change that has been encouraged and incentivised by governments, NGOs and even the United Nations (Dhinakarasingam 2019; Mohammed; Mackinnon).

It is not just a shift from harvesting to farming, because more and more men and not just women, have been engaging in this harvest- such as in the case of Tanzania. In the 1990s, when the prices for the carrageenan variety of seaweed rose and it became a valuable international commodity, men had quickly displaced women as seaweed farmers (Porter et al. 2008). To avoid this, various countries such as the Philippines have more recently begun specific programmes that encourage and engage women in seaweed-related activities, thereby increasing their involvement in supply chains. The United Nations has also supported several initiatives and cooperatives in Indonesia to both preserve seaweed (recognising its importance to the ocean climate) and also encouraging its production along its entire value chain.

In Tamil Nadu too, the creation of self-help groups for seaweed cultivation through entrepreneurship training for the purpose of alternative income generation has been a prominent government initiative (Dhinakarasingam 2019). Clearly, our perception before our field research was that the state seemed to encourage seaweed cultivation far more than its collection.

Institutes such as the Central Salt and Marine Chemicals Research Institute also encourage cultivation far more. K Eswaran, a senior principal scientist at the Institute, said that the overexploitation of seaweed has been reported in the area since the 1970s. The *Gelidium* and *Gracilaira* types of seaweed are the only ones that have been harvested continuously without any interval in this region, which has led to a drastic fall in their availability. Madurai, where most factories and seaweed processing plants are located, at one point had 37 agar-agar industries, whereas now there are only seven. Thus, they are working with the National Fisheries Development Board in Hyderabad to encourage the seaweed collectors in Rameswaram to turn into cultivators instead- hoping to bring up the productivity levels of native seaweed above its current 40%. To set up the infrastructure, the government of Tamil Nadu is providing them with a 50% subsidy (Senthilir 2019).

Seaweed cultivation thus receives support from the State in terms of a subsidy (50% of the project cost but limited to USD 227 per person) as well as the capacity-building support. In the situation that there is an absence of leasing policies, it control the exercise by first making training for cultivation in a State-run institute compulsory, and also by restricting the cultivation to persons holding a food ration card for the Public Distribution System (Krishnan and Narayankumar 2013).

ANALYSIS



3.1. Setting the scene



A mere twenty minutes away from Pamban, the village of Chinnapalam sits along the Coromandel coast, looking out on Palm strait. Like any other fishing community of Tamil Nadu, the shores of Chinnapalam are home to numerous boats bobbing gently on the waves, discarded nets and baskets sticking out of the mud. This crowded beach is where the people of the village gather every morning and night to set off for the day's work.

A long tar road marks the end of shore, beyond which is the village itself. Thatched houses line the sides, home to the fishermen and women divers of the community. At one end is the village temple and playschool, while at the other is the seaweed weighing center.

Throughout the day, the village bustles with life. Men and women alike bring in the catch for the day, haul in the seaweed, and tend to their boats. Women collect water for the household from hand pumps while their children roam about.

3.2. About community

Chinnapalam is a Hindu dominant fishing village in the district of Ramanathapuram. As stated by the Sarpanch of the village, Murugesan, there are about 800 families residing in the village. Amongst these, he explains that the voting population consists of 950 people-

therefore indirectly numbering the adult population of the village. Further, he states that a majority of the people of this village belong to the Mutharaiyar community- a Backward Class community based out of the south of Tamil Nadu.⁴

Gayathri Usman, the stationhead of the fisherfolk's community radio, Kadal Osai, suggested that the people of Chinnapalam are "traditional, ancient people" and that they have been very "nature-friendly people" (Usman, personal communication, February 2020). They would stick to traditional methods of fishing and abstain from using modern, mechanised techniques that are damaging to the environment and sea animals.

As a coastal community almost all the people in the village are engaged in fishing or fishery-related activities. The women of this region have been dependent on the resources of the sea for a long time. Diving for seaweed is a relatively recent phenomenon. Earlier, women would enter the sea and catch fishes with their sarees. This was for subsistence purposes. Now they participate in seaweed collection as well as other fishery-related activities. The community makes use of shells to make garlands for decorative purposes, that they later sell in the market. However, we observed that shell garlands were used as curtains for their doors and windows. The walls of the temple in the village were lined with conch shells as well. It can be said that the sea is part of their identity. Maheshwari, a seaweed harvester said,

"The sea is pretty much my life." (Personal communication, February 2020)

Interviews with the seaweed harvesters indicate that the children also express an affinity towards being in the water. The younger generation seems to want to enter fishery-related trades, while the older generation would prefer it if they got educated and entered jobs outside the village. When harvester Maheshwari was asked about whether she would like her daughter to join the trade, she responded,

"No, actually. But what can I do? Because that's what she likes to do." (Personal communication, February 2020)

In Chinnapalam, a household would typically have five to seven people living in it. While the men of the household are predominantly occupied with fishing to earn the primary income of the family, women are involved in household chores as well as diving for seaweed

⁴ ("List of Backward Classes approved by the Government of Tamil Nadu", n.d.)

to bring in secondary income. Women also help their husbands with fishing on the days in which they don't dive.

Sons studying in school also assist their fathers either in shops or at sea. While mothers are keen to send their children to school so as for them to get an education and find a job elsewhere, most boys do not take what their mothers want into consideration, and prefer to help their fathers at sea so as to bring money home and earn more for their families. Daughters typically take up housework and chores, as well as the child care of their siblings. Talking to us about the same, a seaweed harvester Rani said,

"I haven't married off my daughter yet, so she does the housework. She's nineteen years old, she's at home." (Personal communication, February 2020)

In the community, it appears that the women seaweed harvesters are more dependent on their daughters than they are on their sons. From the interviews, we noticed that the women perceive their sons to be unreliable. A diver named Nagalakshmi said, *"You can see my two sons standing outside over there. They don't care about me."* (personal communication, February 2020)

Another diver, Selvam, said that she was reluctant to ask her son to work because she was afraid he would run away. She said,

"Keeping in mind that he is like this and if I say something he might run away from home and so I don't send him anywhere." (personal communication, February 2020)

The teacher at the Balwadi, Kavita said that the girls are eager to learn and remain in school, however the boys tend to drop out after 8th grade. She says that the fishing trade allows them to earn money immediately rather than waiting till after completing their education. This attracts them away from school. These points were reiterated by George at the NGO PAD, and by Gayatri Usman from Kadal Osai. Based on our on-field observations, we saw that the boys appearing to be in the age group of 12-20, were visible around the village, sometimes playing sports, while there was a noticeable absence of the girls in these public spaces. During our interviews, we also noticed the girls of the family mostly engaged in domestic work and taking care of the younger children. When we asked the Sarpanch if we could interview any of the older boys in the village, he indicated that it wouldn't be fruitful to interview them and that they might not have useful responses. This perceived unreliability of the boys in the village could possibly be attributed to few factors like the failure of the education system in terms of student retention, or the easy availability of alcohol from the TASMAL stores.

Marriage in this village, especially for the women, is considered essential in Chinnapalam. On an average, the age at which most women get married fluctuates around the age of 20 to 25 years. Marriage further ensures the sharing of the financial load of day to day life, educating their children and making ends meet. Selvam, an ex-harvester said,

“My body doesn't feel very well after the sorrow of losing my husband. the thought of how I am going to take care of all my kids how am I going to get them a good life, it would be better if my son was also little older and all that.” (Personal communication, February 2020)

Talking about the importance of finding a husband for her daughter, she had said the death of her husband has affected her greatly. With two daughters married to people outside the community, she now wants to ensure the education of her third daughter. While speaking of her son, she says things have been tough on her since becoming the sole breadwinner of the family, with her son dropping out of school and helping her earn occasionally by doing odd-jobs around the village for a small sum of money.

The number of household members have decreased as compared to that of the generation before them. A house will typically have one to three children who either attend the nearby Balwadi playschool while their parents and siblings worked, or are left in the care of their neighbours. Men in the family generally work in the sea, leaving to fish and bring in income.

The profession of seaweed harvesting has been continued through at least three generations. Though some divers have married into the community and learnt from their in-laws, most of the women working in it today have been doing so from an early age. They have been taught by their parents at very young ages so as to earn for the large families they grew up in. As a result of this, most women who dive today could not receive an education in their youth. Parvati, a seaweed harvester said,

“Back then, it was very difficult for my parents. They couldn't afford to give us education or put us in a school.” (Personal communication, February 2020)

With seven siblings and an alcoholic father, her mother taught her the trade at the age of five so as to bring more money home. None of her siblings, with her included, had studied past third grade. This is reflected by many women who firmly believe that their children must get education in order to protect them from the occupational hazards involved in working at sea.

Rameshwaram is popularly known as a “temple town”. Being a pilgrimage center, it hosts a variety of important religious sites for Hindus. Chinnapalam, which is located just a few kilometers away from Rameshwaram, is also dominantly Hindu. The people of Chinnapalam worship the deities of Ganga Devi, Mariamman⁵ and Murugan⁶. The village of Chinnapalam has one temple that is dedicated to Lord Murugan. People in the village also visit the holy sites such as Rameshwaram and Thiruchendur for worship.

A deity mentioned in some of the interviews is “Ganga Devi”. She is specifically mentioned in context of the sea, such as when the women are talking about the risks that they face at sea, they invoke the name of this goddess stating that it is her will upon which they depend to have a safe return to shore. However, the deity most frequently mentioned in the interviews is Mariamman. The people of Chinnapalam celebrate this goddess through an annual festival in the month of January. Multiple accounts also refer to Mariamman as the “local god”.

The tsunami has also had an impact on the people’s religious worship in Chinnapalam. The following excerpt from an interview with the seaweed harvester Omaiamma attests to this. She stated that, “Since the tsunami struck, we have been performing Pongal⁷ for the ocean and praying to god. Like that it should not happen again, it made us suffer a lot, like this we pray to god every year”. Additionally, as seen from numerous interactions with the people of Chinnapalam, it can be inferred that they are very often fatalistic.

Rani, a seaweed harvester said,

⁵ “Maariamman is one of the most popular village goddesses of Tamil-Nadu. She is regarded as the guardian deity of the villagers. They pray to her for getting rain during proper seasons. In order to propitiate the Goddess, whose anger is supposed to be the cause of epidemics people sacrificed goats, sheep and cocks” (Hanumanthan, 1980).

⁶ Murugan, is one of the most persistent and popular Hindu gods of South India, whose main temples are confined in a very distinct territory : Tamil Nadu. Murugan has six main tirthas: Tiruttani (Thiruvallur District), Palani (Dindigul District), Tiruchendur (Toothukkudi District), Swamimalai (Thanjavur District), Palamudircholai and Tiruparankunram (Madurai District). Tamil people visit these temples all along the year, but especially during festivals” (Trouillet, 2007).

⁷ Pongal is a Harvest festival of Tamil Nadu; the main reason for the festival is to celebrate the return of the sun to the northern hemisphere.

“There are good things in the sea, as well as bad things. Today if we will go back and return home with our legs intact we can not tell. Even if we remain at home, we can not tell. We do not know for sure if we will remain alive. Whatever the Lord has planned, at home, or at sea: however it is supposed to happen, that is the way it will happen. They tell us that males kidnap females on their boats and kill them at sea, so we should not go to sea anymore. Even if we’re only inside the house, death is going to come to us. Even if we go to sea, we’ll die in some way. It’s all the same right? Two to three people have drowned to death, suddenly they get heart attacks. You can get heart attacks at home also. The one at home will die peacefully. What about the one at sea? Only the Lord can tell” (Personal communication, February 2020)

It can be said that the people of Chinnapalam rest their fate in the hands of the gods that they believe in. This ties into the findings of another study done in south India that found that fisherfolk in this region tend to

“seek systematic support from supernatural beliefs to cover the risk of great uncertainty in catch and the danger of environment. This also contributes to a certain degree of fatalism in their world-view and a tendency to view their profession in the spirit of a gambler.” (Salagrama & Koriya, 2008)

Another aspect that is observed from our interactions with the fisherfolk of the village is that they think of their work as divine and that it is the Lord’s blessing to them. They conduct their work with utmost devotion and dedication as they believe it to be god’s work. However, there seem to be no daily rituals that are followed by the people. We have been unable to find no accounts of the people even praying to a god or gods before they head to sea. However there is an account by a seaweed harvester, Nagarani, that states that,

“On days we don't get any fish we do a ritual”. (Personal communication, February 2020)

Yet it was observed that almost all houses have pictures or small idols of the gods.

The people of Chinnapalam depend on the sea for food. They retain some of the fish and crabs that they catch for consumption and then sell the rest of it for income. Thus it can be seen that fishing is partly for the purpose of subsistence and partly for economic

sustenance. Rice contributes to a large portion of their diet. Eateries like those that generally sell staple foods like Idli, Vada and Dosa throughout Tamil Nadu also exist in the village. Multiple accounts from the interviews also suggest that the people of Chinapalam habitually consume beverages such as tea and coffee. For instance, one of the seaweed harvesters Nagarani recounts that,

“I wake up at 5 O'clock. Then I do household chores, drink tea and send my kids to school.”
(Personal communication, February 2020)

Seaweed is not generally consumed by the women and their families. They strictly harvest seaweed for the purpose of generating an income. In extremely rare cases however, the women make “halwa” out of the seaweed. Halwa is a sweet dish made with seaweed, nuts and dal. This is not done on a regular basis as it involves having to buy *agar agar* from the factory.

The women of the village, when not diving, dress in sarees while the younger girls dress in blouses and long skirts. The men and the boys in the village were seen to be wearing t-shirts with the traditionally worn lungis. Most women wore ornaments like earrings, nose rings/studs and necklaces.

Our interviews with the women revealed that the Tsunami has had an impact on the clothes that they wear when they go diving. This can be seen from the following excerpt from our interview with the ex-diver Lakshmi Murthy.

“Before the tsunami we used to go in skirts and half-saree. After we got affected by the tsunami, naturally we didn't know. Morning we got together as usual and we went into the sea like we went everyday. There when we went, we took some seaweeds also. While going down. In the legs we felt some sort of itching due to sand. Generally only stones will come. That day only porous mud came. It felt like pulling using a syringe. What is this we thought. In fear, we took little less and were careful. On the tsunami day we took seaweed only till hip level, after some time water level rose. We knew swimming so we managed. When I came up and saw. The sea was so different. It was as though coming in a fury. Since we wore half saree one side we managed to hold and swim. We protected ourselves. Then only we thought we shouldn't go to sea like this, anytime it's dangerous. We thought It shouldn't be like this and started wearing pant shirts like you

or shorts and then tying the saree or skirt over it for our safety.” (Personal communication, February 2020).

The saree as a choice of clothing itself is a subject of contention. In an article for the frontline magazine, research scholar Aarthi Sridhar quotes,

“This image of saree-clad women in water makes for much curiosity about the conditions that lead to such incongruous behaviour. After all, the saree is an attire associated with words like “homely”, “traditional”, “womanly” and is apparently designed to fix the movements of women on land. Worn underwater, it appears to be a transgression. Worn with a man’s shirt, the contrasts within the image become stark.” (Sridhar, 2018).

An interview conducted with Sridhar pre-field actually shed light on the idea that the women wear the saree because they are bound by their customs. They can't stop wearing the sarees as they have to travel for long distances in this attire. Interviews with the members of the community of Chinnapalam such as the Sarpanch, Marivel (a local businessman) and the women themselves suggest that the women face harassment during their travels. Moreover, the women face apprehensions within the village itself. Marivel speaks specifically about the clothing and about how he doesn't feel comfortable when outsiders see the women in these clothing, especially since they are photographed and video graphed. Therefore, while the initial view into the women’s diving practices portrays the act of the women diving in their sarees as being empowering, the reality is that the women wear sarees because they must.

3.3 About Seaweed



Image 1: Type of seaweed

Seaweed looks like a clump of thin grass and comes in a variety of colours like brown, black, green and orange. There are over 1000 varieties of seaweed in India, of which 4 or 5 are commercially viable. The types of seaweed found in the region include *Sargassum*, *Turbonaria*, *Gracilaria*, *Caulerpa*, *Ulva* and *Codium*. There is also a species of seaweed known as *Kappaphycus* which has been cultivated in the Mandapam region since the year 2000. The type that is mainly collected by the women of Chinnapalam is the naturally occurring species locally known as *Marikozhunthu*, which was described by seaweed harvester Maheshwari as “the black one that looks like hair”.

From our interviews, we gathered that seaweed is used in a range of industries to manufacture products like baby formula, medicines, agarose thread (for stomach surgery), cosmetics, toothpaste, creams, organic fertilizer, dyes, halwa, sweets and jelly. It is mostly used in foods as food stabilisers, jelly agents and Carrageenan (thickening agent). Sathyam Bio, a

manufacturing company based out of Madurai produces organic fertilisers, using seaweed as a primary raw material. They said that seaweed can be used to make biofuel and animal feed. It also contains potassium salts which can be mixed with common salt in order to produce low sodium salt.

Over the years, the divers have noticed a fall in the availability of seaweed. They have attributed this to a range of possible reasons. Some say that it is because of an increase in the number of harvesters collecting seaweed. This can be backed by the fact that the price of seaweed has sharply increased, driven by an increase in demand for the various products that use seaweed. This has attracted more collectors to the trade and has thus led to a fall in the availability of seaweed. Most divers, however, attribute it to the tsunami that had devastated the coastal regions in 2004.

When questioned about the effect of the cultivated *Kappaphycus* species of seaweed on naturally occurring seaweed, the research head conceded that it may have negatively impacted the indigenous seaweed. The cultivation of this species was introduced by PepsiCo in 2000 and was encouraged by the Tamil Nadu government. They created a “family model cultivation program” based on which the husband and the wife of the family would cultivate seaweed on the seashore, supported by loans from the State Bank of India. According to Gayatri Usman, the *PepsiCo* seaweed (*Kappaphycus*) is damaging to the indigenous seaweed as it is an invasive species that absorbs the soil nutrients, leaving none for the indigenous seaweed. People in the village of Chinnapalam have been resistant to the cultivation of seaweed despite the financial prospects because of this. Gayatri said that there even is a myth amongst the community that the British dispersed seeds of this species before they left the country, because of which this invasive species colonised the seabed.

According to the research head of Sathyam Bio (a company that uses seaweed to produce organic fertilisers), the decrease in the yield of naturally occurring seaweed is due to the nitrogen and phosphorus containing effluents by surrounding industries. They also attribute the decrease in yield to the El Nino⁸ effect that has been intensified due to climate change. For seaweed to thrive, a certain level of salinity must be maintained. Climate change related changes in salinity have caused the death of seaweed.

⁸ The El Niño effect refers to the complex weather patterns linked to periodic warming in sea surface temperatures (NOAA, 2009).

3.4. About Trade

Seaweed harvesting practice is at least three generations old in the fishing village of Chinnapalam. The women recount that this work was being done in their family, by their mothers, grandmothers, and grandfathers. The Sarpanch of the village, Murugesan says that they have been native to this region, claiming that the islands along the coast belonged to the community before the formation of the Gulf of Mannar biosphere. This was until the forest department claimed them in 1986 to be declared as the Gulf of Mannar Marine National Park which was declared as a protected area as a Biosphere Reserve in 1989 (cite).

The women mention that out of the 21 islands in this reserve they are limited to visiting only 7 out of these. When they first started harvesting and selling seaweed, it was sold at as low as 25 paise/kg or 1 rs/kg. Murugesan who would harvest seaweed when he was young remembers that they would take hand-driven boats as opposed to engine operated boats seen now. He calls it their ancestral tradition; they would originally go harvesting as a couple (husband/wife) and stay overnight at the islands but it has been riskier since the regulations enforced by forest officials. Even now though, sometimes the men will drop off the women on the island where they can mend the nets and harvest seaweed.

According to Lakshmi Murthy, an ex-diver turned village councilor, there are around 400 families which harvest seaweed in the village and almost 250-300 of the harvesters are women. Marivel also mentions that 10% of the harvesters are men. Out of the women we interviewed, most started in the trade pretty young with some as young as 5 years, 6 years or 12 years of age. Earlier, because the trade wasn't as profitable, Lakshmi remembers that only about 50 to 60 women would harvest seaweed. The women have grown up alongside the sea, they have been swimming since they were kids. The women say that they were taught by their mothers how to swim as they would watch their parents and grandparents spreading nets, catching fish, collecting seashells and harvesting seaweed. From a young age, most of them would go over to the islands with their mothers or both parents and spend time playing and would eventually learn harvesting through observing the women who did it regularly. Lakshmi says that when she was young they would live in make-shift huts on these islands, mentioning the islands *Mannali*, *Mannaputti*, *Mayiltheevu*, *Mullitheevu*, and *Vazhatheevu*. Since these

islands would be too far they would bring over basic resources to cook and stay over for a couple of nights. Some women would look after their siblings since the mother would be at sea while they went out with them on the boat or the island. Rani, an ex-diver who makes a living off making shell garlands and collecting crabs and fish recounts

“I have four brothers. I had to take care of my youngest brother when he was little while my mother went to work. This is how we started - when I was taking care of my brothers, while my mother was working, I observed her and that is how I learned.” (personal communication, February 2020).

She eventually joined the trade at the age of 18 and continued working for 20 years after that but stopped going to sea due to deteriorating health. There are also women who are not originally from the village or those who have grown up in families which do not harvest seaweed. When these women get married into a seaweed harvesting family though some of them take up the practice by working with other family members. For example in Bagavati's instance she recounts when she was encouraged to take up harvesting after marriage.

“My sister in law was the one who took me on her small boat to sea and she encouraged me to take this up.” (personal communication, February 2020).

Women who join very young or women who are starting out in the trade, start out by harvesting seaweed in shallow waters. They carry a sack that holds the seaweed that is plucked from the surfaces of stones underwater. With more experience and older age, they learn to harvest by diving. Since the seaweed is usually found at the bottom, on the seabed, the women describe that they swim along the bed and collect as they move. After having removed the seaweed they put it in the sack on their back which is replaced as and when it's at full capacity as it weighs them down. Seaweed is much heavier when harvested and weighs down the harvesters underwater after it is put in sacks, due to the additional water content.

“I fear I may die from holding my breath. Sometimes I come back up halfway plucking them”, says Selvam who is used to holding her breath up to 10 minutes underwater. *“Many people have died. My sister died that way holding her breath. Sometimes I would even drop the sack that I have and come up for air”,* she continues. (personal communication,

If they don't dive underwater they can only harvest up to 5 to 6 kg of seaweed standing and harvesting. This is a considerable limitation for women who are not as experienced or cannot dive due to old age or health reasons. Most women go in bigger rented boats which are considered safer but are more expensive as it can cost from 20 to 100 rs/day, depending on the size and type of boat. Selvam is one of the few women who does not tie the cloth and rubber around her fingers as she has been plucking with her bare hands all her life. She confesses that she often injures her hand and may bleed as a result of these injuries, which are quite common during plucking seaweed, but she believes it to be the most efficient way for her.

The women say that they have only noticed a decrease in seaweed in the past decade. Omaiymma, a seaweed harvester, believes that especially during strike periods which may last up to 7 days, there is a stark decrease in the seaweed and the rocks become bare of seaweed as fishes eat it up. She also believes that it only flourishes if they regularly harvest it. Since the number of divers has only increased, the individual collection has significantly decreased for each harvester.

Nowadays, they dive for around 8-12 days in a month as opposed to diving for all 30 days in a month as they used to before they set up regulations for themselves with the help of village elders. They avoid going to sea on days when the wind is too strong or seas are too rough. On occasions of marriages or deaths, women strictly avoid going to sea. They take 6 days off every 10 days of harvesting. There are minimal restrictions on fishing as opposed to seaweed harvesting as there is only a 61 day long ban on fishing. Whereas for seaweed harvesting a strike period is enforced after the full moon and during the time of the strike, women aren't allowed to go to certain areas or to collect seaweed north of the bridge.

3.4.1. Occupational hazards

The practice of diving for sea weed, exposes the women to various health hazards. The practice itself includes going to the sea over five times a day. In such cases, over exposure to salt water causes dizziness and blood pressure problems. The salt content in the sea water stops their heart as they drown, making it difficult to save them. According to village officials, at least one or two women die at the sea every year from the practice.

The aftereffects of the tsunami also caused multiple health problems for the community. Women mention how they had to seek regular treatment after the Tsunami, as swallowing huge amounts of salt water had left lasting impacts on their bodies. According to the CRC Press journal on diving and subaquatic medicine, swallowing large amounts of sea water can cause problems of salt water aspiration syndrome and dysbarism disorders (Edmonds et.al, 2016). Many women mention the symptoms of these ailments such as dizziness and blood pressure.

The women often also get injured while diving. Under the sea, the women are susceptible to snake bites, poisonous urchins and animals such as *senegal*, *thumbi*, *Keluthu* and electric eels that can be detrimental to their lives. The women also mention the fear of *thirukkai*, a fish similar to a stingray or batoid, that bites into their hands as they pluck seaweed from the shallows. Its bite tends to dig into their bone, making it very dangerous. The sacks that they strap to their waists at times, might also get stuck among the coral and rocks and cause them to drown. The corals that grow alongside the seaweed, cut into their hands as they pluck the seaweed, these cuts don't heal well and so they get prone to infections. Moreover, their skin gets allergic reactions after being exposed to the algae for long periods of time and becomes itchy and begins to form blisters. To protect their fingers from blisters, some women tie strips of cloth and rubber on their fingers, before collecting seaweed from rocks.

One of the seaweed harvesters, Omaiamma recalls, *“Before, we didn’t do this, we just used our bare hands. After we collected everything, our hands were so badly wounded that we couldn’t even use them to eat. We can’t eat anything with gravy. We had to dip our hands in water and eat. Because our wounds would burn. Now, since we use the cloth for our hands, we don’t have any wounds on our hands.”* (Personal communication, February 2020).

According to the women divers, deep waters also get very cold, making it harder for them to hold their breath and collect seaweed for long periods of time. They often get dizzy from the pressure underwater and the extreme temperature. There have been multiple accounts of women dying from holding their breath for too long. Practicing this kind of hard labor over 5 times a day, every day for years together, wears their body out. Their limbs and backs suffer chronic pains, to a point that they can no longer even withstand the waves in the ocean. Rani, a ex- seaweed harvester mentions, *“I continued to go (diving for sea weed) for four years and then I could not do this anymore. I did not have the strength to stand in the water. My legs and hands would hurt. I could not stand against the waves and since I was very weak, I left the trade.”* (Personal Communication, February 2020)

The harsh winds and tides make the practice of seaweed collection very difficult. At times, the winds grow very humid making it difficult to breathe. The women face a lot of hardships while collecting the seaweed under such conditions as the tides make the pattern for collection vary. So, just as they are about to collect the weed, the tides pull them away.

The women's health has also seen to be deteriorating further as availability of clean drinking has become a problem for the entire community⁹. According to the Sarpanch, this decrease in water quality has caused problems like sugar and heart attacks to increase phenomenally. Because alcoholism is a common problem in the community, for many women, a chunk of their earnings goes into buying liquor by the men, affecting their savings and worsening their debts. This further makes them vulnerable to stress related psychological problems.

They have begun to wear pants and shirts under the gown to avoid discomfort, if a similar natural disaster was to occur in the future. The village head believes that if the government is able to provide the women with the 'scuba suit', it could protect them from the dangers underwater and make the women more comfortable.

Many women also work at crab manufacturing companies as an alternative source of income to seaweed harvesting. But even at the factories, the women are exposed to extremely cold temperatures. This affects their blood levels causing problems such as anaemia. But as the women are paid about 6000 annually, they continue to work under harsh conditions ignoring the dire health problems they may face in the long run. Women who suffer from ailments such as diabetes cannot continue to work under such conditions, hence, return to the practice of seaweed harvesting.

For health care, the women mention that the government holds regular free check ups for them every month. There are also numerous smaller clinics near to the village, but they cost anywhere from 500-1000 for a single check-up. Therefore, at times of ailment, the women go

⁹ According to a study done by SpringerLink on the deterioration of coastal groundwater quality in the district of Ramanathapuram, greater than 80% of the water sampled across the district were found to have exceeded the recommended level of Total Dissolved Solids (TDS), Methylene compound (CH), Electrical Conductivity (EC) and Chloride as set by the World Health Organisation. The signature of sea salt water intrusions was also observed, and a proper management plan to cater potable water to the immediate needs of people was envisaged. (Sivsankar et. al, 2013).

to the government hospital to get free treatment. In case, the treatment requires money, they approach the union for the same.

3.4.2. A typical day as a seaweed harvester

The women come to the shore to go out to sea at around 6 or 7 am and then go to the sea by 8 am. Starting from the first day of harvesting, they go out half an hour later than the day before, till the last day where they may leave at around 9:30 am. Marivel, the local businessman whose family acts as one of the middlemen in this trade and who pays the women, says that the women usually go out in the morning and stay out for roughly 5 hours. Generally, they return at 12 pm or 1 pm and on later days by 4 pm.

A typical day in the life of a seaweed harvester may begin as early as 3 am. The time after waking up is spent in doing household chores and preparing their children for school. Depending on the woman's preferences, accounts also mention drinking tea or coffee and eating leftover food from the previous day before going out. Although most women specify that they do not eat much in the mornings. At around 6am, the women leave their house to go to work.

Having left the village at 6am, they travel in groups of 8 to 10 for about an hour to reach the islands from which they harvest seaweed. The time from 7am up till 12 to 1 pm is spent in the collection of seaweed. The women return to Chinnapalam with their harvest by 2 pm and spend approximately half an hour to forty-five minutes cleaning the seaweed that they have collected that day. After the seaweed has been cleaned and spread out to dry along the coastline, the women head home. Sometimes the women may add previous days' harvest to that day's if it is leftover. This indicates that there is an obvious inconsistency in the day to day supply of seaweed which points to an inconsistency in daily earnings for the women. If the women are not collecting seaweed, they go fishing or catch crabs in this span of time.

Once at home, the women need to first bathe in order to clean up after being in saltwater for extended periods of time. At home the women spend their time threading garlands, collecting shells and doing housework. The housework involves cooking, cleaning, washing clothes and other such work. One of the divers specifically mentioned that they eat only twice a day; lunch and dinner. This time is also spent by the women performing repair work on their boats and cleaning and untangling the nets used to catch fish and crabs.

By five pm the women return to collect their dried seaweed and then proceed to get it measured and sold to the middlemen. Following this, the women return to doing their housework up until the time of dinner. While some women mention that they indulge in leisure activities like watching television at this time, most are so burdened with work that they do not get time to cook. Some accounts even mention that they might accompany their husbands to go fishing in the evening or at night. The day ends at around 10 to 11 pm.

3.4.2. *Harvesting and Processing Seaweed*

The process of separating and sorting the seaweed involves separating sand particles, stones and unwanted seaweed from the seaweed which will finally be kept for drying. After drying the seaweed, the women take it to the middlemen's shops, which is a small cement building, usually consisting of one room, a few meters away from where the women sort and dry the seaweed. Here, the seaweed is measured on a scale and a price is decided by the middleman who later loads it in his truck and pays the women. It is sold at a lower price if it is deemed to be not cleaned properly or of lower quality by the middlemen. Dried seaweed reduces to half or more than half the size of the wet harvested seaweed, hence 3 kg may reduce to 1 kg dried seaweed when sold to the middlemen and that is the weight according to which it is bought at as well. This may take from 1/2 an hour up to an hour. In Marivel's family, his father would collect seaweed and now they also sell it. He transports the seaweed to Madurai or Kerala.

The seaweed collected is sent to factories where they are processed into *agar agar* (also known as *jigarthanda*). As the divers harvest seaweed only for 12 days in a month, the processing unit collects it from them during these days and spends the remaining 18 days on processing, bagging and transporting the finished product. Here, the seaweed is washed, cleaned with chemicals and heated in a vessel over a boiler. After this, the seaweed is collected on trays. A white substance forms around it and hardens. Twenty such trays are stacked and placed in a cooling room at -17.5 degrees celsius. Every hour they are removed and deep washed to remove the ice that forms in the cooling room, after which they are returned to the cooling room. Through the freezing process the agar sheet is separated from a liquid substrate. After 18 hours, they are removed and layed out in the sun for 4 to 5 days. The heat of the sun evaporates the remaining ice. It is then washed with bleaching powder and clean water after which it is left out to dry again. Once it dries, it is bagged and sent out to different industries. Next, this dried and sorted seaweed is sent to a small factory where it will get cleaned thoroughly. It is then sent to bigger factories in Mumbai which process it into powder (*agar-agar*) as they don't make it in Madurai.

Nagendran, one of the middlemen we interviewed, therefore gets to decide the price for seaweed and buys it for around 50 rs/kg. At the agar-agar producing factory in Madurai, Selvam, a small-scale factory owner in Madurai. started out by selling one mat of agar-agar

for 250 rupees, the raw seaweed for which he would procure for 3 rs/kg, with the transport price being 1900 rupees. The seaweed *marikozhundu*, Selvam says it is sold to his factory at a price of 80 rs/kg excluding the transportation price. He sells one sheet of this for 2000 rupees. Sathyam bio, the manufacturing company in Madurai buys seaweed from the middlemen at around 65/70 rs/kg from May to August.

3.4.3. Income and Alternative Sources of Income

Marikozhunthu, the seaweed most commonly harvested in Chinnapalam is sold at 50-60 rs/kg. On the other hand, if the seaweed has not undergone the process of drying after collection, the price of the seaweed drops to approximately 20 rupees per kilo. From our interviews, we gathered that the seaweed quality north of the bridge was superior to the one found south of the bridge which was, as a result, sold at a cheaper price by 30 rs/kg. The variation in income depends on how much seaweed is collected on a particular day. According to one of the accounts the average quantity of seaweed harvested is about 5 to 10 kilos. However certain divers who own their own boat or are more experienced collectors can harvest up to 20 to 30 kilos a day. Selvam, suggested that the place of the collection too plays a role in how much the women can earn from the trade. If the harvesting is done on the shore, meaning if the women leave and come back the same day with the harvest, they can earn anywhere between 50 to 500 rupees a day. But if they risk staying over at the island then they can earn up to 1000 to 3000 rupees daily. Selvam mentions that she depends on her children to get the right price for the seaweed as she cannot calculate and trusts the middlemen to pay them the right amount.

The women of Chinnapalam engage in multiple activities to earn income. The primary source of livelihood for most is seaweed harvesting. The popular media articles tend to focus on the narrative of seaweed harvesting being a practice limited to women diving. There is a hint of romanticization by showing the trade as an empowering practice for the women from most articles specific to the trade. But contrary to this notion, seaweed harvesting in Chinnapalam is undertaken by both women and men, to some extent. Although it can be seen that the number of women that partake in this trade far outweighs the number of men.

It is observable here that the income earned from the trade of seaweed collection is substantially above the minimum wage in India today. According to the International Labour Organisation (ILO), Fisheries as an industry fall under the category of food processing

industries. As per the government of Tamil nadu, the minimum wage to be paid for workers in the food processing industry is Rs. 198.23 (WageIndicator, 2020). The women on average earn about 400-500 a day. But this has not always been the case. According to the women, in recent years there has been a surge in the demand for seaweed and its by-products like agar agar. This has led to the prices of seaweed rising from around 1 rupee per kilo a few years ago to 50-60 rupees per kilo today. This high demand has however caused a rise in the number of seaweed harvesters in the village which has also resulted in lower harvest per person. It must be noted however, that this rise in the price of seaweed is accompanied by a general surge in prices in the economy due to inflation.

When this income is compared to the minimum wage, it is evident that the women earn a substantial amount more through harvesting. Which may look like an advantage yet the women harvesters still have very low disposable income. While the women earn around 400 to 500 rupees a day, they have to pay between 60 to 100 rupees as rent for the boats that they use to travel to the islands. This is because most women don't own their own boats and have to depend on other members of the community who own large boats to ferry them to and from the islands. Some of the women like Selvam and Chellamma own boats that act as supplementary income for them. Boats are very expensive to buy. An account by Chellamma states,

"I bought a boat for three lakhs. That's the one we have running till now." (Personal communication, February 2020).

Maintaining the boats themselves is an expensive and tedious affair. Repairing any damage to the boat can cost heavy sums as large as 5000 rupees. This is very expensive for the owners as the income from the boats fluctuates enormously. A medium to large size boat can carry roughly 8 to 10 people, each of whom pays a rent of 60-100 rupees per day. However, the income from this must pay for the fuel for the boat. Thus while maintenance of the boat is expensive, the income from the boats for the women can be limited.

Furthermore what we encountered is that most women have heavy debts that they have to work daily towards paying off. The debt may be in the form of loans from the bank or the union. The Sarpanch of the village detailed the breakdown of the women's expenditure as, "The women earn about 500-600 in a day, the women spend about 200 and they pay back loans, pay subscriptions, and invest in chit funds." (Personal communication, February 2020).

Additional information from other interviews with the women themselves (Rani) suggests that if their diving gear such as the goggles breaks, they have to spend an additional amount of 200 rupees to get new ones. Thus at the end of the day, the woman would be left with very little money that they can save for their children's future.

The woman's income is supplemented by the income of their alternative jobs and that of their other household members like daughters, husbands, sons and in some cases extended family members like their in-laws. The women can only harvest seaweed for 12 days a month and must engage in several other jobs to make a living. According to Maheshwari, a seaweed harvester,

"Women in this village go fishing and do almost all the activities that men do. But you won't see this in any other villages. It's because we are such a big community." (personal communication, February 2020)

Chinnapalam being the largest village that engages in the practice of seaweed harvesting provides the women with multiple opportunities for income. The chief alternative to seaweed harvesting is fishing and catching crabs. Oftentimes women accompany their husbands out to sea who primarily engage in these trades. The income for a woman may go down considerably when shifting from seaweed harvesting to catching fish and crabs or other alternative occupations, as was the case with Rani after she discontinued harvesting.

The practice of fishing is also associated with some amount of uncertainty. An instance from an interview attests to this, "If we catch fish then its 500 rupees or so otherwise, we come back empty-handed". Additionally, the rates at which different species of fish sell for varies on a day to day basis. Although like the seaweed harvesting, the overall price of the fish market has increased. As recounted by one of the divers Rani, "Before in those days, we would sell and buy fish for very little. One, two, three? Now, three fish have to be one hundred rupees". Moreover, different fishes require different nets. The problem, however, is that these nets are extremely expensive and hard to acquire. If the fisherman gets into a conflict with the coastal guards, they can confiscate these nets which leads to heavy debt among the families of Chinnapalam.

The women also engage in the trade of weaving shell garlands. Multiple accounts by the women suggest that

“When we are idle, we thread garlands, collect shells and conchs. We collect all the products from the sea.” (Omaiamma, personal communication, February 2020).

These garlands are then bought in bulk by the sellers who provide the women with the strings and equipment needed to drill holes in the shell. The women then sell these garlands by the dozen for a rate of 120 rupees.

Omaiamma recounts that many villagers went to the receded sea bed (before the tsunami) to collect the small sea shells they use to make garlands. These garlands were then sold as an alternative source of income. But the tsunami struck just as they were collecting these sea shells. The interviewee remembers the sudden floods that washed over the entire village. Drowning all of their belongings on the shore submerging their village.

Some other accounts by the women shed light on other job opportunities available for the people in the village. If not engaged in jobs with direct involvement in the sea, most people work at a crab factory. This has its own health risks as it involves working in extremely cold temperatures for extended periods of time which is why a lot of women are reluctant to pursue it. Certain other accounts by the women state jobs like labor work, supplying firewood and cleaning nets as the alternate jobs available in the village.

An issue that must be highlighted here is the lack of jobs available to future generations. A recurring trend that can be seen is that women often take loans and incur heavy debt to get their children, specifically their daughters, educated. There are however no jobs available to even the educated girls. Therefore even when they staunchly believe that their children must not engage in these trades most of them have no other alternative but to come back.

3.4.4. Perceptions of the trade

When asked about whether they can afford the seaweed for themselves and if they use it in their daily lives or cooking, Omaiamma, a harvester tells us that when she first started diving most of them did not know where it was used. Upon asking her mother, she found out that it was used in the preparation of halwa. Yet, the women themselves do not use it in their daily lives or in their cooking. This is because seaweed needs to be further processed via the mechanized processes of washing, drying, separating, which finally turns it into agar-agar, which comes in powder form. This finished product is finally only available in the commercial market for sale and hence not bought by most inhabitants in Chinnapalam. Selvam says that

since her husband used to work with the middlemen, he would procure processed seaweed for free from the businessmen to make halwa but this has not been possible since his death.

Some women say that they continue in this occupation because they like it, but most state that they wouldn't know which other occupations they could possibly do if not for harvesting. They also state that the government did offer alternative options as occupations, such as goat herding or keeping chickens. It seems that most households do depend on these as additional income sources. This was substantiated by our on-field observations where we saw that it was common for each house to rear chickens and goats.

Yet, they reveal that even if the government says that they don't have to collect seaweed, they would be satisfied only if they worked in the sea.

Omaiamma, a harvester explains:

“The government has told us, we will give you another job, you don't have to collect seaweed. But even if the government gives us another job to do, only if we do this work of collecting seaweed will we be satisfied somewhat. For us, only if we do our work, our minds will be at peace. They said things like goat herding, we'll give chickens, you keep them. But that will not be right for us. For us, only if we do this work, it will be right for us and our food. So we said we did not want it.” (personal communication, February 2020).

In most of our interviews the narrative remained constant that because the women say that they have been born next to the sea, this is what they have known. This, the sea, is what their children have known and seeing other women and children go to sea encourages them to want to join them.

Namithai, a harvester, speaks of when she would have to beg on the streets of Madurai to pay for her brother in the hospital, but it wasn't sufficient. Since that day she resolved her mind to never beg and she depends completely on the sea for her life. *“As long as we have the ocean, we do not have any problems.”*, says Nambithai (personal communication, February 2020).

One of the women seaweed harvesters, Omaiamma, recounts her experience of how sudden and devastating the Tsunami in 2004. There was a point of time when during the

flooding, the women tied their *dhavani* to make a chain in order to protect themselves from the current.

She mentions that the entire seabed was visible from the low tide as the sea had receded before the tsunami. Many villagers went to the receded seabed to collect the small sea shells they use to make garlands. These garlands were then sold as an alternative source of income. But the tsunami struck just as they were collecting these sea shells. The interviewee remembers the sudden floods that washed over the entire village. Drowning all of their belongings on the shore submerging their village.

Despite this, the women believe that staying at home is pointless, as no matter how dangerous the sea is as they may be prey to death anywhere whether at home or at sea and hence despite the risks, they choose to go to sea. In a lot of instances, the women and other fisherfolk we spoke to compare their dependency to the sea to a farmer's dependency on their land. They seemed to say that regardless of whether they may claim to like or dislike the work, as a fishing community these are their only options, and they must continue to do them as tradition.

3.4.5. Relationship with Government and Union

In understanding the seaweed harvesting trade, we asked questions pertaining to the government's involvement. The fisherfolk also have Self-Help Groups (SHGs) and Unions for the harvesters and the larger fishing community who are supposed to work towards bettering the women's stake in this trade practice. The union also supports them in organizing strikes and provides the community a platform to voice out their concerns regarding the trade. For example, through the union and with the help of other villages of Kilakarai and Yervadi, they decided to increase the price at which they sold the seaweed. The union helped them organize a strike for the same that went on for a whole year, in the end they were successful in increasing the price of the seaweed by 10 rupees.

One of the Union in the community is named "Bharati Mastu Meenavar Sangam", according to Marivel, concerns voiced through this union can directly reach Delhi. While describing the influence of the union, he says,

“if they raise their voice from the union, even the central minister would respond to it.”
(personal communication, February 2020).

Many women also talk about the inefficiency of the union when it comes to their work. One such female diver quotes, “All the union does is gather to discuss issues but they don’t come up with anything that would be of help to us.”. The women also mention how the fishermen union and other smaller unions in the community do not have enough savings to build a seaweed processing unit or agar agar industry in the village itself. Thus are unable to take on big projects that can bring concrete changes in the community.

Many women also mention how the Union does lend them money in times of need, but repaying them pushes them further into debt. One of the women diver Rani says,

“They say they will give us loans. But if we take the loan, we will not be able to eat until we pay it all back.” (personal communication, February 2020).

According to the women, they have to pay back the entire amount they borrowed from the union within 10-15 days only. Hence, after getting the loan from the union they end up exhausting their income in paying it back at once. Many times, they have to borrow money from other moneylenders to pay off their debts to the union. Thus, not improving their debt situation in any manner. Therefore, many people from the community do not affiliate themselves with the union as they are already heavily indebted to it.

The women and other inhabitants are generally greatly dissatisfied with the lack of government involvement and the treatment by forest officials. They complain about how the women are harassed by the forest officials if they're on the island and if they stay overnight. They may be arrested or fined by these officials and these matters are then taken up through the Union. Murugesan says that the women are often mocked while they are at sea, that even the forest officials take part in this, passing comments on the women's clothing by verbally harassing them or chasing them on the island. Despite them having raised complaints, Murugesan reveals that no action has been taken to address this. The women describe having to escape from the forest officials to collect seaweed when they are around. Chellamma, an ex-diver aged around 70 years of age now, reveals that if their son takes a boat to the island when the coast guard is around,

“They will chase them, take their fish, and beat them up. We cannot go to the islands and catch fish. We can’t collect seaweed. The women who go to collect seaweed, the forest department harasses them a lot. They have to escape them and collect their seaweed. For that then we have to go see our collector, our SP (Superintendent of Police), where are they?”
(personal communication, February 2020)

The women would also go to the islands to pluck coconuts and sell them which would act as supplementary income, but with the arrival of the forest department that has been reduced as well. The women also mention how the forest department tried digging canals at the islands, but the digging caused seawater to seep into the soil, hence, destroying all the coconut saplings. Nambithai, a seaweed harvester, mentions how fearful they are of the forest department's actions against them, she speaks how they no longer fish, collect conchs or shells at the island. They are so afraid of the repercussions, that they even avoid collecting firewood on the island. The government planned to convert one of these 21 islands into a tourist attraction, with a glass boat ride to take the tourists around the island. But if the island is turned into a tourist site, the women would no longer be able to catch fish or collect seaweed there. Hence, would not really solve the problem at the local level.

To counter the restrictions on seaweed harvesting the government has tried to provide the women with job alternatives like goat and chicken herding. But even with the provision of schemes for the same, there has been no proper training given to the villagers beforehand, hence they remain reluctant to accept these new practices. Marivel mentions how the people from the community take loans from the government and small finance companies to overcome the problem of debts. He also believes that the government will continue to support the practice of seaweed harvesting as the practice itself is the only source of income for many families in the village.

According to the village head, the community had to protest and struggle to have their barricade wall rebuild, as the first one collapsed. The construction of the previous wall was done through bribes and the wall itself was made of more sand than cement. The government was also supposed to provide them with old age pensions and fishing cages, but as of now the community has not received either.

After the tsunami in 2004, the women and the village officials complained how the Government relief was insufficient. The government only provided them with 4000-5000 a year and established a Tsunami housing project, as many had lost their houses in the floods. But it nowhere near accounted for the monetary repercussions the calamity had on the community.

According to a woman diver named Nambithai, the government also provided them with two kilos of rice, a bowl, a stove, post the tsunami. The women grieve over that fact of how disproportionate the compensation post the tsunami actually was. Each family regardless of the number of members was given the same meagre amount. One of the women quotes,

"For the damaged community of fishermen here, what compensation should be given? For how many days can we eat? Maybe one person can live for three days with that. Our family has ten people in it." (Rani, personal communication, February 2020).

She recounts another incident where out of 16 people who were supposed to be compensated, only one received help from the government. Nambithai mentions,

"We have told them this so many times, but nothing happens. They say, 'Shout what you want, we'll do what we want'. This is what they (forest department) say. They say they're doing everything for the fishermen. Everyone comes to Chinnapalam only. They gave us a few things, like a small stove, a mat, a bowl to make gravy, two ladles, two cups, two and a half kilos of rice in a sack. Is this enough? Can we eat? For how long can a family eat two kilos of rice? You tell me." (personal communication, February 2020).

The village head complains that the community has already submitted a petition for a rations shop in the village to the collector but have gotten no response. He further mentions that there have been no benefits or subsidies provided by the government for the fishing community either. It was the fisheries department that built an *anganwadi* and fishing net shade for the people.

The sarpanch mentions that many people from the community avail the NREGA scheme, where they get 100 days of employment and get paid 120 for each day. But due to its limited intake, it has only helped a small part of the community. Thus, has not been very impactful.

The village head mentions that the government declares a person dead only when he/she doesn't return to the village for 7 years. As there is no support from the government to the families of the deceased, they continue to suffer. While the Kanyakumari government pays about Rs. 15,000 to the family of the deceased immediately, in their case, the fisheries do not provide them with the money allocated for the dead at the ramanathapuram district. Rather, they are told that there is no fund allocated for them at all. The sarpanch wishes the government to provide old age pensions for the senior citizens in the community, so that they do not have to depend on their children for basic amenities. Similar problems with the inconsistency of government schemes and policies can be seen in the case of the women also.

According to one of the women divers named Rani, the government provided them with monetary funding during the strike, they would be provided with 800 rupees then, and now during strikes are provided with 2000 rupees. The government also provides them 5000 rupees per family during Diwali. Some mention that the government also provides them with coupons worth about 2000 per year. Gayatri, mentions that the people expect more monetary funding from the government.

In terms of gear required for harvesting, the government fails to supply them with any adequate equipment, the basic goggles, sacks and flippers (owned by few) are all purchased from their own expense. Due to the equipment not being too affordable, the women treat them with the utmost care, knowing all too well that damaged equipment would mean additional repair costs since most divers are unwilling to share equipment even amongst their own families due to scarcity and how expensive they are. They expect the government to supply them with basic diving and harvesting gear.

Even the establishment of a school was done by the village by themselves without the help of the government, the sarpanch quotes,

“The school has been governed by us and the land has been purchased by us for them. The village community has tried to create funds and collect them across and purchased a land for 6 lakhs very recently for the betterment of the children” (personal communication, February 2020).

Most educated women in the village resort to seaweed harvesting as taking other jobs such as working at crab manufacturing companies requires them to pay lots of bribes. Similar

problems arise in case of the women who go to college and try applying for government jobs. They don't find other sufficing jobs and getting a government job again involves paying bribes, hence, they return to seaweed harvesting.

On one hand, the government chides the community for sending their children into the trade of seaweed harvesting, but on the other hand they are not helping the women leave the practice either. Most of the job opportunities apart from seaweed diving require bribes, and there is the problem of unsustainability with the policies and schemes that are introduced for the women and the community. They remain reluctant to adopt newer practices introduced by the government as they do not provide any training to familiarize the people with the practices. Rikita, the executive director at the National Maritime Institute, raises the question of how to ask the traditional fishermen to learn this new technique. She states,

“The government schemes and policies look good on paper and try to follow the international standards, but they have failed to consider the domestic implications of the social problems of the cultural shock faced by the community.” (personal communication, February 2020).

Marivel believes that the only way to bring changes in the government schemes for the village and the community is to have at least five people from each village to take an active part in decision making by bridging the gap between the local politician and the higher officials.

3.4.6. Self Help Groups and TASMAL Shops

A study on fisherwomen SHG's in Tamil Nadu by the department of fisheries resources and economics research institute, showed that the eradication of alcoholism was one of the main aims of the self-help groups in fishing communities. The study conducted on the SHGs in the coastal districts of Tirunelveli and Thoothukudi showed there were significant successes on the part of SHG in reducing alcoholism in the areas. Due to the intervention of the SHGs the sale of alcohol in their localities reduced significantly (Saravanan et.al, 2011). In the village of Chinnapalam also, the women of the fishing community also have their own SHGs. With the help of these self-help groups they have tried protesting against the TASMAL shop in Chinnapalam, to reduce the problem of alcoholism in their community.

On the drive to the village itself, we noticed two TASMAL shops within the immediate vicinity of the village. During our field visit, we observed several inebriated men. According to the book by Svein Jentoft and Arne Eide, on the causes of poverty in fishing communities, alcoholism is again a prominent factor. Where, consumption of alcohol has become a part of cultural behaviour of fishing communities and is habitually learned through observation from one generation to the other (Jentoft, 2014). One of the divers said that her son broke one of their boats while driving it drunk. In fact, while we were on-field, a fight broke out in the middle of the day amongst two men who were inebriated. We also noticed baskets and jute bags piled with piles of empty liquor bottles.



Image 2: Alcohol bottles in jute bag

A large portion of the household income is spent at these stores, forcing the women to work in unsafe domestic environments in order to support their families. But the shops are run by the government which has repeatedly ignored this problem to a large extent and fails to do anything about it. The Sarpanch, Murugesan said that the prices of essential commodities keep rising, however the same is not reflected in alcohol prices. Even after protesting the TASMAL shop through their self-help groups, the government only increased the liquor prices by 10 rupees.

Murugesan also says that the women face a lot of psychological hardships because of their husband's alcoholism. According to a research article on the psychological problems experienced by women in such an environment, they experience low quality of life and are constantly subjected to verbal abuse, communication difficulties and issues of low self-esteem,

which affects their behaviour and personalities. The study reveals that wives of alcohol dependent patients had high levels of perceived stress (Raja Sankar, 2013). Given the sensitivity of the topic, during our interviews on field, the women refrained from speaking explicitly about alcoholism in their domestic spheres or any violence associated with it. But from our observations after speaking to village officials, it was clear that alcoholism was indeed a problem in the community.

The following table also shows that the fishermen were found to have a maximum prevalence of 91% for alcohol drinking, as opposed to a 78.4% prevalence in Non-fishermen.

Personal habits	Fishermen		Non-fishermen		Total	
	No	%	No	%	No	%
Smoking	136	94.4	126	82.4	262	88.2
Alcohol	131	91.0	120	78.4	251	84.5
Gulka	45	31.3	33	21.6	78	26.3
Pan	56	38.9	30	19.6	86	29.0
Tobacco	15	10.4	10	6.5	25	8.4

Table 2: Levels of Alcohol consumption among Fishermen (Saravanan et.al, 2011)

A paper that discusses tackling alcoholism and domestic violence in fisheries, spoke of the women seaweed harvesters particularly. It explains that along the gulf of Mannar, 45% of interviewees reported exposure to alcoholism, and 30% had experienced (physical) domestic violence in fishing communities. Even in cases where there wasn't alcohol based violence involved, the majority of interviewees describe the drain that alcohol purchases cause on already limited household budgets, with many women relying on grown-up children or extended family for additional financial support (Coulthard et.al, 2019). The village head believes that the only way to tackle the problem of alcoholism is to close down the TASMAC shop near the village and increase the rates of liquor phenomenally.

3.5. Education

In an interview with a representative from the People's Action for Development (PAD), a NGO that aims at helping the people belonging to the Scheduled Caste, Scheduled Tribes and Backward Caste categories of Rameshwaram, George (a member of PAD) explains that the RTE, or the Right To Education Act of children having to study until the eighth grade mandatorily have helped the children of the area to be more engaged in receiving an education.

Due to the incentivization of the midday meal scheme, most parents are also willing to let their children go to school. However, he says, since the Tamil Nadu government had proposed a public exam in the eighth and ninth grades while simultaneously carrying on the tenth and twelfth ones, more and more children have opted to drop out of school to earn for their families.

One of the major reasons for the increasing number of school dropouts may be due to the increase in competition across schools to perform well in the tenth-grade board exams. Because they come from relatively poorer families as compared to peers across the state of the same age, they consider themselves to be at a disadvantage, says Mr. George.

“A lot of children study until 5th grade and 8th grade government, for a while, wanted to make public exams for 5th and 8th grade mandatory. When this kind of competition emerges, the people (of this community) are at a disadvantage.” (personal communication, February 2020).

While they may not be able to afford private tuition on their own, PAD offers evening classes, children’s clubs and creative learning centres. They also undertake some remedial measures so as to help the children cope with the increasingly difficult syllabus of their school. Traditionally, he recalls, it is the boys and men who are involved with the fishing trade. However, owing to the persuasive educational measures undertaken by the government, there are fewer men below the eighth grade joining their fathers at sea.

This is a common thread between the children who study in the Balwadi as well, says *palasevika* Kavitha, a teacher at the school who takes care of the children from nine in the morning to five in the evening for five days a week. She firmly believes that people cannot be dependent on the sea solely as working at sea is full of hardships which consists of its own dangers (while referring to unforeseen flooding and tsunamis). She strongly believes the community must educate their children so as for them to seek work elsewhere. This, according to her, is to provide a more consistent source of income which may act as a safety net to the work of the fisherfolk.

While girls are more eager to learn, boys settle for the money they receive while they help their fathers fish at sea. While she sees that there is a slow change in the trend in the last five years, she hopes it will continue, as many people interviewed agree education is the only way to advancement. Once they have been educated on a primary and secondary level, Kavitha suggests that the government help with scholarships for the students who are good in the fields that they study in and wish to pursue their tertiary education. There have been multiple people

who have left Chinnapalam to further their education. An instance of this can be seen when one of the divers Nagarani says that one of her daughters studied at Rameshwaram evening college. In her interview, Kavitha tells us about her relative from Chinnapalam who finished college to pursue a career in teaching at the Vivekananda Kendra Vidyalaya school, she quotes:

“My cousin-brother's son finished college and he now works in Vivekananda school as a teacher. Then there is another girl - she was holding evening tuitions at a government school and recently she has been going there full-time. There is also another girl who has studied but stays at home. She earned her degree, but she did not go out to work.” (persona communication, February 2020).

Interestingly, while most of the current women divers agree on hoping their children will not have to continue the profession, the village sarpanch Murugesan as well as several other divers understand that their children will have to engage in this profession. Although there have been women who left the village in order to study further, with their parents having taken out loans in order to fund them, they had to come back home in order to earn money as they weren't being given jobs outside the village despite their qualifications. These claims were substantiated by our interviews with the women.

Diver Nagalaxmi, when asked about the same, said, *“To get my daughter married, we made her study, and she completed two degrees. After that, she didn't get a job. She was just working locally and earning some salary. She is 26. She finished her MBA and B.Com. That was our dream to marry off an educated daughter. It was very difficult to get her an education. We took out a lot of loans and had to pay off interest. Every day I had to cry and cry and pay her fees. Even after this, my daughter couldn't get married to an educated man. It's tough. This bothers me everyday.”* (personal communication, February 2020).

In her interview, ex-diver Lakshmi Murthy addresses this and says the profession would inevitably continue. Although the government promotes the education of children till the twelfth grade, it does not open up opportunities to government job positions to people from the village or fund their further education.

CONCLUSION



Contrary to secondary literature, we found that both men and women engage in the practice of seaweed harvesting in the fishing community of Chinnapalam. However, there is a disparity in the ratio between them. Although men harvest, they are more dominant in other levels of the supply chain such as that of middlemen and factory workers. The women who harvest also have supplementary sources of income, however these are restricted to occupations that are dependent on the sea and within the village. Many respondents indicated a degree of fatalism in their approach to their lives and occupation. This is reflected in the normalisation of the occupational hazards that they face on a day-to-day basis.

Media articles portray a romanticised view of the trade which appears to understate the occupational hardships faced by the women. They present a narrative of willing participation in the trade as a form of empowerment. However our research suggests that the women see no alternative, viable source of income and are compelled to collect seaweed because of their economic situations.

From our research, we realised that the community harbours a sense of dissatisfaction with the government. Most government policies fail to address pressing issues faced by the people, especially regarding tsunami compensation and relief. In addition to this, there is a lack of proper implementation of the policies, like NREGA. We observed that the union is another source of contention for the people. Their stringent repayment policies, that often plunge people further into debt, make people reluctant to join the union.

Through our research we also came across the problem of alcoholism that plagues the community, further secondary research indicated that this problem of alcoholism in the fishing community can be observed in multiple villages along the entirety of the gulf of mannar. Similar problems of alcoholism could also be found along the west coast as well. Hence, alcoholism almost appears as a recurring theme among fishing communities along the Indian peninsular that could have its roots into larger structural problems in the society. The unavailability of job opportunities post education, rampant alcoholism and problems with the education system further ensure that the practice of seaweed harvesting continues for future generations.

As our research was limited by factors such as time and language-constraints, there is wide scope for future research on this topic. From our research, we found it difficult to trace the history of the practice of seaweed harvesting. With a larger sample size, it would be possible

for researchers to conduct an in depth study of the origins of the practice. Additionally, we primarily focused on the women harvesters, so we could not delve into what happens to the seaweed after they sell it. Hence, there could be a study that looks into the supply chain of seaweed, which would be insightful as literature has indicated that there is a recent boom in the seaweed industry. Our study revealed that people in the community had varied cultural beliefs and rituals that they practice. Further studies could be conducted purely on the cultural practices in the community, which details aspects such as religion, food, caste and intersectionalities within the same. Furthermore, our study was focused on the village Chinnapalam, which has the largest number of seaweed harvesters. However, there are numerous other villages in which this practice is undertaken so there could be a comparative study between the villages to understand if there are any sociocultural differences and if these factors affect the way in which the practice is conducted.

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APPENDIX: SURVEY TOOLS

PARTICIPANT INFORMATION STATEMENT AND CONSENT FORM

FLAME University

Discover India Program

Using secondary data on seaweed harvesting in Chinnapalam to further understand its process

Interviewer:

Date:

Village:

Participation Information Statement

Note: Reading this to each interviewee before conduction of interviews is mandatory

My name is ----- I am a student at FLAME University in Pune. We are a group of 15 students studying the practice of seaweed harvesting for our research in Chinnapalam. We would like to ask you some questions about your experience with seaweed harvesting. The questions can take around 15-45 mins of your time.

These questions will be about the history of the practice, government policies around it and your daily activities/experiences with seaweed harvesting. We are also interested in learning more about your lives in terms of the kind of food you eat, clothing, and other rituals you may practice.

We will not record your personal information without your approval, and you may choose to stop or leave at any point in the interview if you do not want to continue. If you wish for us to, we will maintain your anonymity completely. You can back out from this process at any point of time. If you are uncomfortable being filmed on camera, we will not record your interview. We would like to audio record this interview for the purpose of transcribing it as accurately as possible, however, we will not do so if you are uncomfortable with it.

Since this is a student-led research, the report stays with our university and even otherwise complete anonymity of any sensitive data would be maintained.

Informed Consent

The interviewer has taken oral/written consent from the participant/(s).

All relevant information about the research has been conveyed to the participant and they have agreed upon the interview.

Student Signature

Date

INTERVIEW GUIDES

PARTICIPANT: Seaweed Harvester

1. What is your name?
2. How old are you?
3. Are you married?
 - If yes, do you live with your in-laws?
 - If no, where do you live?
 - Who do you live with?
4. Do you have children?
 - If yes, how many children do you have?
 - How old are they?
 - Do they go to school here? If yes, how far is it from where you live?
 - Do they take an active part in seaweed harvesting? (Do they get paid for it?)
 - If no, have they ever accompanied you when you work? Or helped you out in any activity involved in your work? What do they do when you are diving?
 - Do you wish for your daughter to follow in your footsteps and practice seaweed diving?
 - Do you expect your daughter in law to practice seaweed harvesting after marriage?
5. When did you start diving for seaweed? (How old were you?)
6. How did you start? (passed down through the family or otherwise? How did you learn to harvest? Who taught you how to swim?)
 - if yes, do you know how long your family has been engaged in seaweed harvesting? Do you know why they started harvesting seaweed?
7. Were you working since before or after you got married? (if married)
8. Can you tell me more about the clothing you wear for diving? (mention saree/tee shirt, cloth for fingers, rubbers for feet and goggles, etc)
9. Can you tell me about your cuisine? What are some core foods in your everyday meals?
10. Who cooks in your family?

11. Do you use seaweed in your own cooking?
 - If yes, what do you use it for?
 - How often do you use it?
 - How much do you buy it for?
12. Do you find seaweed accessible financially or otherwise?
13. Do you find that there are any occupational or health hazards that have resulted due to the seaweed occupation? Can you describe it? (eel bites, animal attacks)
14. Is there any period where you don't harvest seaweed and when not to? How do you determine when to harvest seaweed and when not to?
15. What is your alternate source of income in the offseason/ What do you do during the offseason? What do the other women in your family do? (mother, grandmother, sister, sister in law, daughter) What do other women in the village do?
 - How do you spend your time when you're not harvesting seaweed?
 - Have you considered cultivating seaweed?
 - Do you help your husband (if any) or the men of the village in processing the fish he catches or in any other way in the fishing industry)
 - Has the government provided any alternative employment options? Can you avail NREGA facilities?

If yes (having an alternate income)

 - Which one do you prefer?
 - Which one is more secure for you?
 - Does it provide a better income?
 - Would you consider making it a permanent job if you had an option?
 - If so, why are you still pursuing sea diving?
16. Have you heard about the union?
 - If yes, how was the union formed?
 - Who is a part of the union?
 - Has it helped make diving for the seaweed easier? If so, how? (How has forming the union helped with sustainable practices?)
 - How much agency do you have in the running of the union?
 - How does it work as a part of the Ramnad Trade Fishers Union?
 - Is there any way the union and its regulations have been a hindrance in the diving?

17. What are the tools you use for harvesting?
 - Do you own them?
 - If no, do you rent them? And for what price and from whom
18. Have you noticed any changes in the harvest over the last few years?
 - If yes, do you know about climate change?
 - If yes, do you think the change in the harvest has anything to do with climate change?
 - How are you coping with this change?
 - If no, have you noticed any changes in the rainfall pattern/ season? Have you been experiencing more extreme weather events for example hotter summers/ colder winters?
 - Has there been any change in your offseason? Has this affected the overall trade? Has this affected your lifestyle?
19. What religion do you practice, if any?
20. Is there a religious significance to seaweed diving?
21. Are there any rituals you practice that can be associated with harvesting, maybe daily, before and/or after or just in general throughout the year?
22. Whom do you sell the seaweed to? (On what basis did you decide to sell to them? Did the buyer influence your decision to start seaweed diving?)
23. Who sets the price?
24. Do you know what the seaweed is used for after you sell it?)
25. What kinds of seaweed are there in the area?
 - Which ones are the most profitable and which is the most common?
26. Do you keep some of the seaweed for personal use or do you sell all of it?
27. Are you aware of anyone else who buys seaweed?
28. Do you have autonomy in how you spend the money you earn?
 - If yes, what do you spend it on?
29. What would you consider to be a major expense to your household?
30. Do you have any responsibilities pertaining to the household?
 - If yes, what do they include?
31. Aside from your work and household responsibilities/duties (if any) do you have any hobbies or interests?

32. How do you travel to collect seaweed?
 - Do you own the boats?
 - If no, do you rent them, or pay for the fare?
33. Do you collect anything else apart from seaweed?
34. How far do you go into the ocean to collect seaweed?
35. Do you go to any of the nearby islands? How much time do you spend there? Do you stay there overnight?

PARTICIPANT: Household Members

1. What is your name?
2. What is your relationship with W (insert name of woman harvester- signified by W here on)?
3. What do you do in a day? What is your profession? Do you have a second job?
4. Can you tell us about the kind of food you eat every day? What's your favourite dish?
5. What kind of clothes does W wear (during seaweed diving)?
6. Does your family have a history with seaweed harvesting?
7. What/How do you feel about W working as a seaweed harvester? (economic security/safety of W)
8. What are your thoughts on seaweed harvesting as opposed to fishing?
9. Do you wish for W to continue harvesting for seaweed or do you wish for her to discontinue it? Why?
10. Does it add to your household income? How substantially?
11. Does it help you share the load of earning for the household and if yes, to what extent?
12. What part do you have in making spending decisions for the household?
13. What is the money W earns allocated for usually?
14. Have you ever felt that the practice is unsafe or have there been instances (elaborate if willing) when W's safety has been compromised during the work?
15. Do you feel that W is monetarily compensated fairly? If not, why is the case and what are ways you think it can be more fairly done?
16. Do you wish for the children/ next generation to continue this practice? (ask two separate questions like: what do you wish for your son's/daughter's future in terms of occupation and life in general)
17. Do your children go to school? How far do you want them to study?
18. What are alternate occupations W you would prefer W to work in?
19. Does W working as a harvester and being outside the house for major chunks of the day affect the household in any way or is it usually manageable? (probe if they feel dissatisfied with W not being able to live and give all time *looking after household*)
20. Have you heard about the union?
If yes, how was the union formed?
 - Who is a part of the union?
 - Are you a part of the union?

If yes

- Has it helped make harvesting for seaweed easier? If so, how?(How has forming the union helped with sustainable practices?)
 - How actively do you participate in the union?
 - How does it work as a part of the Ramnad Trade Fishers Union?
21. How is this different than fishing/ harvesting sea cucumbers (whatever occupation they practice)?
 22. Is there a strain in terms of finances during *off-seasons/when W isn't harvesting seaweed*? How do you manage finances and daily living expenses then?
 23. Do you feel that climate change has had an impact on your occupation as well?
 24. Why do only women dive for seaweed?
 25. Are you availing any government schemes (like MNREGA)? (if the person in question does but W does not probe further)
 26. What religion do you practice? (probe if religion is diff than that of W and what that changes?)
 27. Do you consider W to also be a bread earner in this family?

PARTICIPANT: Educator

1. What's your name?
2. How long have you been a teacher for?
What does your job entail? How is this separate from school?
3. What is the age group (range) of the kids you teach?
How many children from Chinnapalam attend this tuition?
4. Does the tuition centre get any aid from the government?
5. How much does it cost to study here? How many of the children in Chinnapalam do you think can afford this?
6. What schools do the children visiting the centre come from?
7. What subjects do you teach?
8. What subjects are the kids most interested in?
9. Which ones do they find hard to follow?
11. What is the curriculum followed but the students? Is there any part of the curriculum you would like to change?
12. Are the students regular in attending the centre? If not, why?
13. What are higher education opportunities available to kids in the area?
14. How many kids avail these opportunities (if any)?
15. Are there more girls or boys coming to the centre?
16. Is there any notable difference between girls and boys in their interest in education?
17. What jobs can and do the students avail after they graduate?
18. Do you take any measures to reduce the dropout rate?

PARTICIPANT: Seaweed Factory Worker

1. How long ago did you start the factory?
2. How many seaweed processing units do you think there are in Madurai?
3. Does this industry need water to a great extent?
4. At what price do you buy the seaweed?
5. How do you process the seaweed?
6. How many people work in this factory?
7. What kind of products do you make?
8. At what price do you sell your finished product at?
9. Where do you buy the seaweed from?

PARTICIPANT: Kadal Osai

1. Since when have you been running the radio?
2. How did the radio begin?
3. What kind of news is generally highlighted?
4. What kind of music is generally played on air?
5. Have you ever gotten feedback about the on-air programs?
 - If yes, was it positive or negative?
6. Has the radio had any effect on the community's relationship? (has it brought people closer etc.)
7. Has the radio helped the community in any way?
 - If so, how?

PARTICIPANT: PAD

1. What do you do?
2. How long have you been working here?
3. What does PAD do? What are its aims/objectives?
4. How did the organization form and when?
5. What impact has it had on the community?
6. What do you think are the major problems being faced by the community and the women diving for seaweed specifically?
7. What do you think can be done that is not being done?
8. What are your plans for the future of this organisation?
9. What is the government's role in seaweed harvesting?
10. How has the government been helping with the harvesting trade and the women themselves? (schemes, other occupations available)
11. Do you believe that the union has helped its active members? How?
12. What would your suggestions be in terms of how the state and local bodies should aid the women?
13. Do you believe that women should go on with this occupation?
14. If we're tracking the progression of the trade, has it improved and grown or otherwise?
15. Do you have programs or educational sessions with the women to provide them with more information about the environmental impacts on seaweed and harvesting?
16. Are there other NGOs or organisations working with the women other than PAD?
17. Are there any formal education schemes for the women and their families (particularly children)?
18. What kind of research do you believe is most needed in this area?
19. Are there any impacts of the religion or traditions of the fishing community that shape the trade?
20. What are some forms of discrimination acc. to you that the women have to face and how may they be overcome?
21. How are the women perceived in the larger fishing community and what is their position (ex. Respectable, agency, authority, role) in society?
22. How does harvesting in chinnapalam differ as compared to other villages along the gulf?

PARTICIPANT: Sathyam Bio

1. Does your seaweed come from Chinnapalam?
2. Where else do you get your seaweed from?
3. Do you know if the seaweed you buy is harvested or cultivated?
4. What is its cost price?
5. Has the price risen over the years?
6. Has there been a reduction in seaweed supplies coming from the village(s)? Has it become more difficult to procure? (Impact of climate change on seaweed?)
7. Do you only procure through middlemen? How many middlemen are there?
8. Are there any direct sellers?
9. How much do you sell the seaweed (or the seaweed product) for?
10. How many more factories do you think are there other than yours in this Rameshwaram (and other regions)?
11. Is there a lot of competition amongst factories in obtaining supplies?
12. Is there any seaweed (or seaweed product) that gets exported? If yes to which countries?
13. Generally, what kind of products are in demand in India? And abroad?

