

Strategic Adaption on Climate Shocks in Malleable Employment of Fishing Community by E – Skill Inventory: A Case of Southern Coast of Sri Lanka

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ABSTRACT

Changes of weather pattern and unpredictable occurrence of storms, rough sea and cyclone conditions have become a greater complication for fishing community in southern coast of Sri Lanka. Climatic differences created peak and off season for the fishing community in marine. The study was based on Southern coast where consist of long tradition of fishing, economical & social hotspot of fisheries & aims to investigate the responses of fishermen and women on climate shocks & strategic intervention for mitigate the risks. 90 value chain actors were used to in-depth analysis while majority didn't perform any productive activity to generate money or to mitigate the risks of climate shocks. The study identified that people who do nothing in off season cause to create social unrest. Female actors more malleable in labor than male while females are more vulnerable to climatic shocks. Only limited number of people with strong social bonds were able to manage the disaster burden engaging cottage fish processing & boat repairing. During a shock condition relying on past savings cause debt trap due to less current productivity. Strategic intervention by Decision support system with built skill inventory identified to mitigate the employment malleability. Further, it can be developed as an E-Employment bazaar where create a common platform, link potential employers and fishing community. Registered fishing community members will categorize under different skill levels which creates potential employment opportunities for both men and women. Development of E-Employment bazaar on mobile platform tend to more user friendly and attract more actors.

Key words: Climate shocks, Decision support system, Employment malleability, E-Employment bazaar, Skill inventory,

INTRODUCTION

Sri Lanka is a one of geographically iconic country located in Indian subcontinent which is surrounded by the Indian ocean. It consists of 517,00km sea area with abundant fish resource and 489,000 hectares of lagoons, estuaries and reservoirs. Inland fisheries and the marine fisheries are the two major sectors which provides the daily consumption needs of the local community. Marine fisheries contribute to the fisheries industry at a highest margin by providing large amount of fish harvest. fish production during the same period of the previous year. For such increase, the marine and inland sectors within the said period have contributed of 335,750 mt and 53,750 mt of fish production respectively (Progress report (2017) Ministry of Fisheries and Aquatic Resources Development). Fisheries industry in Sri Lanka shows an increasing trend in per capita consumption of fish while 44.5g per day is recorded in 2017. Marine fisheries industry provides a significant impact to the country in both social and economical aspects while engaging 827,480 household population (Ministry of Fisheries and Aquatic Resources Development). The main elements of climate change can be affected to the fisheries sector in long and short term by sea level raise in related to global warming, change in patterns of monsoons, extreme climatic events and water stress. The most notable and significant changes associated with climate change are the gradual rise of global mean temperature (Zwiers and Weaver, 2000). According to the (World Bank, 2000-01) Shock is an event that can trigger decline in well-being, which can affect individuals (illness, death), a community, a region, or even a nation (natural disaster, macroeconomic crisis). Shocks can be identified in several aspects. Health, Climate & Social demarcate the top categories of shocks occurrence the world. With the mass damages cause to the environment by mankind capable of achieving climate shocks at a prominent level. Coastal community is one of the highly climatic sensitive people due to effects can be sensitive for both economical status and the livelihood condition. Climatic conditions separated the year in to season and off-season with the predictable signs. But unpredictable changes in the climate has generated climate shocks in coastal areas. Effects of the climatic shocks directly influence the number of days that can be actively fishing in the sea and finally effects the household income of the marine fisheries community.

SIGNIFICANCE & JUSTIFICATION

Particular study basically aims to identify the effects of the climate changes and find out the possible solutions for the arising issues. South Asia provides home to 1.5 billion people while Sri Lanka responsible for 21.2 million of them (FAO, 2005). In Sri Lanka still, the agriculture based sociocultural system can be seen while the coastal areas prominent in fisheries sector. Fish has been an important part of the human diet in almost all countries of the world. It is highly nutritious; it can provide vital nutrients absent in typical starchy staples which dominate poor people's diets (FAO, 2005; FAO, 2007). Even though the globalization and open market mechanisms operates in Sri Lanka, the country capable of saved the position in top 50 poorest counties in the world (World Bank,2017). Besides the poverty the South Asian region is prone to the disasters such as floods, cyclones, storms and earthquakes. Global warming and the extreme events of climate plays the devastating role for fisheries industry (Fischer *et.al.* 2005). Majority of the southern coastal community depends on the marine fisheries industry and related value additions. Impacts occur from the climate changes directly influence the socioeconomic and livelihood conditions of the coastal community (Mohammed & Uraguchi,2013). Increasing in extreme weather conditions found to increase the prolonged droughts and flash floods (Eeswaran, 2017). This particular extreme weather condition

occurrences act as a threat to the fishermen's and women's lives. Due to the changes of the extreme climatic condition occurrence and climatic shocks the periods of actual fishing have been reduced. It directly affects the quantity of the collected harvest. In the case of marine fishery industry, off-season and the season can be clearly identified. Only a limited number of researches have focused on giving solution to the off-season income generation and the strategic approach for the labor malleability. Malleability of the fishing community generate the barrier to adoption of proper long-term and short-term solutions in a sustainable manner. Our approach is to provide a promising and sustainable solutions to southern coastal community to mitigate the adverse effects of climate shock.

OBJECTIVES

Main objective of the study is to identify the reaction and the response for the climatic shocks. Specific objectives were, to find out the vulnerabilities of the coastal communities and the strategic intervention for their labor malleability. Identification of promising alternative solutions for the fishermen and women during the of off-season and develop an online skill inventory while connecting the job seekers and job providers in a user-friendly manner.

CONCEPTUAL FRAMEWORK

Conceptual framework was designed accordance with the influence of research questions and objectives to study the major complications occurrence due to the adverse weather conditions and impact to the fishing community and their action to mitigate the risks. Identification of possible solutions to mitigate the risks occurrence by climate shocks and changes are the key objectives of the study.

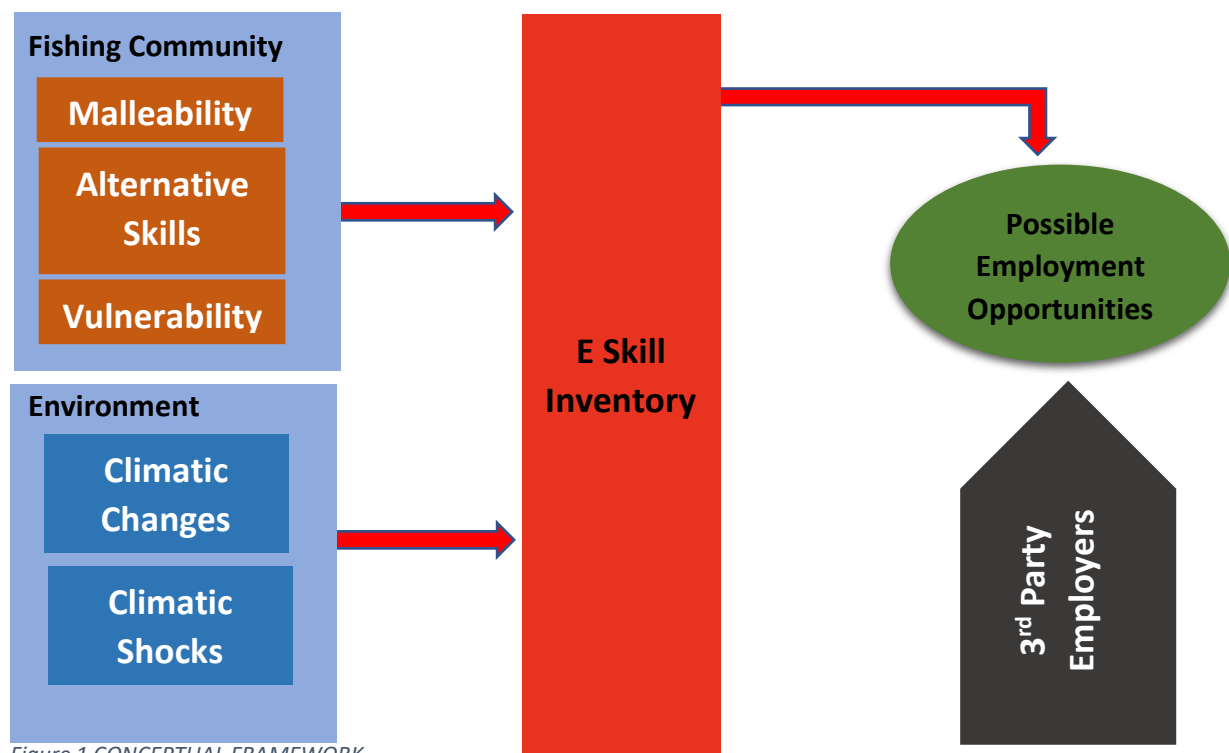


Figure 1 CONCEPTUAL FRAMEWORK

METHODOLOGY

Methodology was the guideline which used to collect the data for the study to generate the results and discussions. Both primary and secondary sources data were used for the study.

Study Location

The study was based on the southern coastal region including Galle, Matara, Kaluthara and Hambantota districts. Locations were selected due to frequent exposing for adverse climatic conditions and this region holds the busiest fisheries activities in the southern coast. Figure 02 shows the locations of the research. Figure 03 express the magnitude of the impact occurred to the southern coast in 2004 by the tsunami disaster. Figure 04 explains the importance of the locations selected for the study by the aspect of fish production.

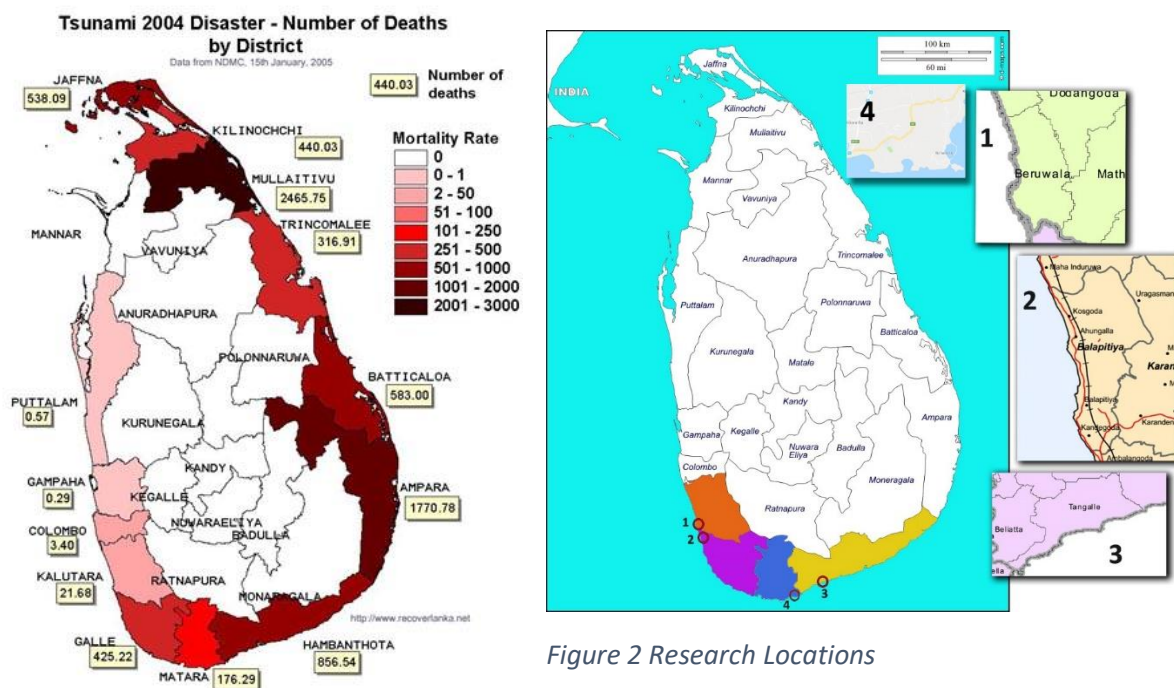


Figure 2 Research Locations

Figure 3 Number of Deaths by districts (Tsunami)

Source - NCMC

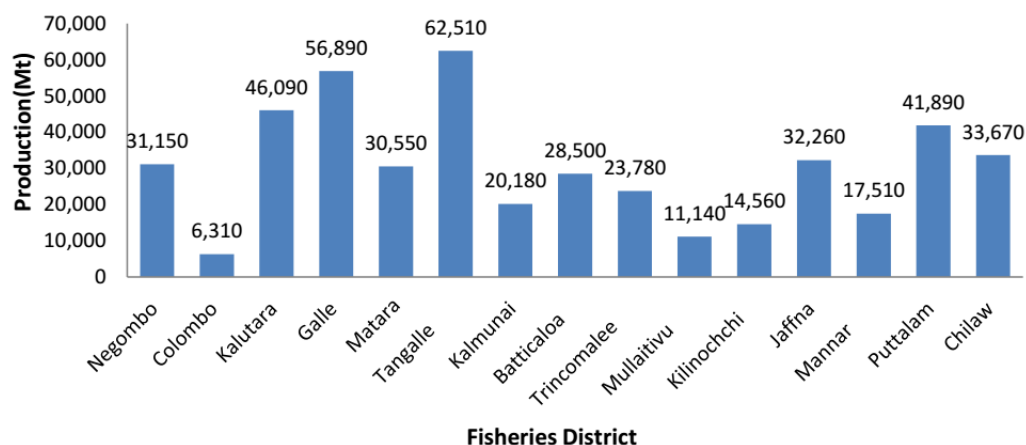


Figure 4 Marine Fish Production by Districts 2016

Source Ministry of Fisheries and Aquatic Resources Development

Sample and Sampling Technique

The study was designed in qualitative approach and case study strategy was used to obtain the required amount of data in different aspects. Throughout the collection of data, two type of data collection methods were used. Purposive sampling method was used to identify the people who are trying to mitigate the risks and impacts of the climate conditions and shocks. Snowball sampling was used to identify all the value chain members in the marine fisheries industry. Following table explains the sample profile.

Table 1 Sample Profile

Sample Profile	Gender	Age (Years)	Education Level
Producers/Processors (30)	50% Male 75% Female	25-70	Primary or up to O/L
Fishermen/ Women (30)	50% Female 50% Male	28-65	Primary or up to O/L
Traders (30)	80% Male 25% Female	22-65	Up to O/L or A/L

Data collection Techniques

Primary data were collected by meeting value chain actors directly. Key informant interviews, interviewer-administered questionnaires and focus group discussions were used as key primary data collection Techniques. Variety of secondary data sources were used for the study and government statistics, department of agriculture, ministry of fisheries and aquatic resources development and published journal and reports were the prominent.

Key informant interviews were taken with industry experts, experienced fishermen and women, government officials who plays the key roles in southern coastal marine fisheries sector. Interviews were highly focused on collecting data of present industry over view as well as the pattern of occurrence of the climatic shocks in the region.

Interviewer-Administered Questionnaires were used in all 4 districts to gather the general information regarding the industry and the behavior of the system. Both open and structured questions were included to skim out all the required data. Focus group discussion mainly consisted with the objectives of identification of existing issues due to labor malleability. Identification of possible alternative solutions were considered during the study. 8 -10 people were attended for the particular focus group discussions arranged in Kudawella and Balapitiya. Field observations enables the researchers to share the real essence of the situations and to get a broad knowledge on the study. Four field observations were conducted through the research. One field visit was organized to identify the potentials in Cinnamon industry in the aspects of jobs availability. Dassanayake Walauwa Plantation in Urugaha was selected as the location. Rest of the field observations were arranged in Kudawella, Balapitiya and Beruwala harbors.

RESULTS AND DISCUSSIONS





Study identified that climate shocks, sudden occurrence of adverse weather conditions manipulate the normal practices of the fishing community in coastal areas. Majority (78%) of the respondents expressed that the occurrence of adverse climatic events are now unpredictable and cause huge amount of loss for the household economy. Value chain members in the fisheries industry explained that frequency of the climatic shock occurrence has increased in the past decade of time. Rough sea, wind hazards and sudden occurrence of cyclones act as the major devastating events for the fisheries community. Only the 4% of the sample capable of



taking actions to mitigate the impacts of climate shocks by moving in to the alternative fields while rest of the (96%) sample do nothing. Figure 4 explains the scenario, the mechanism of funding the people who do not adopt any strategies to mitigate the risks and finally how it leads to the social unrest. Mortgaging, micro finance options, available savings and borrowings were the major sources of income for the people do not adopt any mitigating actions. Ultimate results were long term tapping in debts, moving through the debt traps which badly effects on communities in both socially and economically.

Figure 5 Reactions for Climatic Manipulations

A vulnerability ranking index (VRI) was developed accordance with the variables used in Ebert *et al.*, (2008) and Duriyapong and Nakhapakorn (2011). VRI has generated a clear picture of vulnerabilities and identify the space for the comparison with available alternative resources.

Vulnerability Indices	Districts			
	Kaluthara	Galle	Matara	Hambanthota
				
Number of available landing sites	1374 ⁴	2,024 ³	2,664 ¹	2,391 ²
Land Used amount for fishing (Km2)	1,576 ³	1,617 ²	1270 ⁴	2,496 ¹
Availability of major markets (m2)	652 ³	1590 ¹	295.5 ⁴	939 ²
Number of active fishermen	6,270 ⁴	10,710 ³	11,820 ¹	11,160 ²
Total Ethnicities (Cultural Heritage)				
Sinhala	928,914	934,751	716,974	510,965
SL Tamil	12,665	11,079	5,161	1,869
IN Tamil	28,895	9,275	16,672	424
SL Moor	93,293	34,688	22,133	5,646
Burgher	836	208	179	88
Malay	973	178	87	7,255
Other	663	308	308	167

Rankings - 4 3 2 1

Figure 6 Vulnerability Ranking Map

Fisheries Industry in southern coast undergo with adverse climatic conditions during the period of May to September, usual off season or Warakan period. Due to the adverse climatic conditions; rough seas, heavy monsoons, thundering, cyclones, etc. majority of the people been restricted themselves for fishing. Study identified during this period the availability of manpower remains at a highest level which can be utilized for income generation activity. Identifying off season income generation activities, link fishermen with available opportunities is essential for the communities to manage their daily household necessities and avoid trapping them debt cycle and alcohol/drug addiction. Cinnamon is one of the prominent exports' crops in Sri Lanka and the leading Cinnamon growing areas were Galle, Matara, Kaluthra, Hambantota which represent the vulnerable fishing communities during off fishing season. Meanwhile one of the critical issues of the cinnamon industry were shortage of processing labor during the peak processing period and processing commence in all the plantations in same period. The situation has created possible employment opportunities which facilitate to generate a considerable income for the fishery households. Further, some of the fishermen identified in Galle district were already practicing this and able to manage their income disparities during the off season. Identifying the available opportunities, provide the necessary training and capacity building for the employment opportunities were vital requirement. Figure 6 explains the alternative solution for the off-peak season.

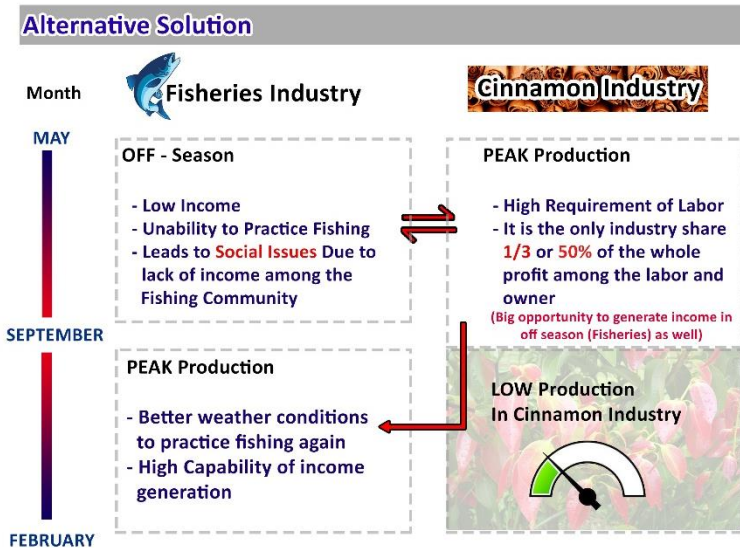


Figure 7 Alternative Solution for Off-peak Season

Value chain members in the fishing community consists with multiple capabilities and talents which can be used for income generation in off-peak season and the period of adverse climate is active. Boat repairing, carpentering, construction and fish processing were the prominent skills which exist in the value chain actors. But the research has discovered the knowledge gap and limited accessibility to the labor market prevents the opportunity to be employed during the off-season even though the high amount of jobs available in the market. Final objective of the study eyeing to develop an online skill inventory system which can be used as an E-Employment bazaar. It bridges the gap and act as a platform where link the all possible job seekers and providers. Study identified that the major reason for the malleability in fisheries industry is non-availability of loyal source to find jobs and the large amount of time taken to find a job in the normal procedure. Since the system categorized the people according to skills the job providers capable of identifying the possible employees for their works. System

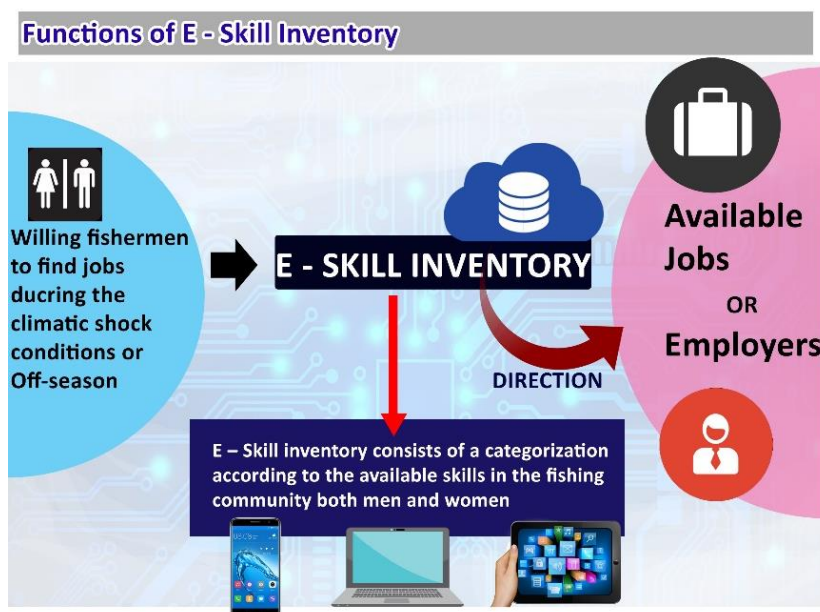


Figure 3 functions of online skill inventory system

provides all short, mid and long-term jobs which helps to create long-term sustainability. This system runs on an online cloud platform which is capable of real time data synchronizing ability. Compatibility in both mobile and web platforms helps to increase the user friendliness and the number of users. Figure 7 explains the functions of online skill inventory system.

CONCLUSION

According to the results of the fishing communities in south coast of Sri Lanka, frequently affect by the unpredictable climate conditions were common during the past decade with an increasing trend. Unfortunately, communities ill prepared for the off-season income generation and mitigate the bad weather scenarios. Majority (96%) of them were not undergo any strategies to overcome the negative effects. Further, study has identified mismatch between the available resources with the resources required to develop mitigation measures.

Only a limited number of capable people adopt some strategies to mitigate the risks such as fish processing, cinnamon peeling and tourism. Due to the adverse weather conditions the time engaged in the fishing activities has been reduced. The amount of idle time accordingly has been increased. Even though the idling time has increased the effective use for income

generation is not considered. It is a one considerable cause to the social unrest in the southern coastal area. Weak or poor social networks, relationships and away from rest of the communities were negatively affected and act as a barrier to find jobs for off season. Meanwhile the Cinnamon industry provides numerous amounts of jobs which highly paid for the labor in the same region at the off season of the fishing industry.

This E-Employment System will create the linkages with job seekers and job providers which increase the potential to be employed. Ability to run in multiple platforms creates the advantage of penetration the system in the coastal community. It runs in an online platform and provided the 24/7 accessibility to the system where bridge the gap to enter into the labor market. Further as recommendations, the system can be improved as a smart warning system where capable of alerting all the community by one message. Early warning systems helps fishermen to find out the possible days for fishing and engage new jobs when the climatic shocks are active.

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