

Addressing Livelihood Vulnerability: Coping strategies of small-scale marine fishermen in Kanyakumari, India

Benjamin Franklin S.¹, Dr. Ma. Velusamy²

ABSTRACT

Addressing livelihood vulnerability by small-scale marine fishermen of Kanyakumari district in India themselves is of the focus in this research article. Livelihood stressors faced by these fishermen lead to a lot of uncertainties while they are striving to meet their financial and social needs through fishing occupation. Therefore, an investigation was made to examine whether the fishermen cope with such occupational challenges and why some strategies are used as a mechanism by the fishermen to resist certain stressors. Problem-based coping is found to be helpful for fishermen when they need to change their situation by removing stressful thing or reducing the level of that stress from their fishing occupation. It is observed that younger fishermen (18-25 years of age) cope better than elder fishermen (26-45 years) and (46-60 years). It is also observed that fishermen with higher education are dealing better with the occupational problems (livelihood stress) than the fishermen with lower education. As the stress on fishermen due to livelihood issues increases, the coping strategies of fishermen do increase. It is the 'fishing efforts' of fishermen found to be the coping strategy, having highest statistical significance of all other coping strategies, used to counter the challenges posed by the livelihood stressors. Hence, marine fishermen of Kanyakumari are found with the abilities to resist the livelihood stressors than just remaining vulnerable to the occupational challenges.

Keywords: Livelihood Stressors, Coping Strategies, Fishing Effort, Fishing Management, Technological Adoption, Fishermen Collective, Human Capital

INTRODUCTION

“Healthy coping skills can be the key to getting through tough times. Coping skills help you tolerate, minimise, and deal with stressful situation in life”, says Amy Morin (Morin, July 2019). He further says coping can impact your ability to perform your best. According to him all coping skills are not equal. There are some strategies giving quick relief but creating

¹ Research Scholar, Department of Social Work, Alagappa University, Karaikudi

² Assistant Professor, DDE, Department of Social Work, Alagappa University, Karaikudi

bigger problems down the road. Healthy coping skills help get rid of those stressful situations encountered in life.

There are two main types of coping according to Morin; one is 'problem-based coping' while the other is 'emotion-based coping'. Problem-based coping is one's ability to develop a plan or an alternative to counter the situation and perform better whereas, emotion-based coping is referred by him as one's ability to change or minimise the effect of the stressful event (stressor) by involving in any likable engagement. The first one is coping the latter is defensive. Do the fishermen use problem-based coping strategies while fishing and how?

LITERATURE REVIEW

Problem-based coping skills are more often found used by the fishermen while facing stressful situations in the fishing occupation. Litman & Van Wijk add that coping with an environment that is perceived as taxing or exceeding one's resources are problem-focused coping (Litman, 2006); (Van, 2017). Fishermen try to find alternatives to minimize the effect of the stressors. They employ proactive and reactive strategies at individual and community levels to face frequent hurricanes, tides and several social, political and economic issues (Salas, Bjorkan, Bobadilla, & Cabrera, 2011). However, fishermen are able to face the high-stress occupation, the adversities and negative outcomes and persist in fishing by employing psychological defence mechanisms to minimise the subjective perception of threats (Pollnac & Poggie, 2008) such as denial of or minimising risks (Pollnac, Monnereau, Poggie, Ruiz, & Westwood, 2011). At the same time, they might also continue to fish because of the positive aspects of fishing that fishermen experience, also known as uplifts (Kanner, Coyne, Schaefer, & Lazarus, 1981). Uplifts are positive experiences that help reinforce one's sense of wellbeing (Kanner et al., 1981).

Fishermen face a range of environmental, socioeconomic and administrative challenges that affect the yield and viability of fishing occupation. Given this context, the fishermen cannot change the challenges but increase their ability in different forms of coping strategies to minimise the effect of these challenges. Thus, several forms of coping strategies the fishermen use, according to various authors, are reviewed further.

An alternative response to cope with the environmental, socioeconomic and administrative challenges is to develop strategies that are subject to restrictions on fishing effort and output (Morgan, 2013). He identified three environmental contexts which are in interaction while

developing the response by the fishermen to challenges. These contexts relate to attributes of the individual fisherman, the characteristics of their fishing and the environment within which they operate. Morgan further points out that the inherent uncertainty associated with harvesting a wild resource means that fishermen have historically diversified their fishing activity as conditions dictate (Morgan 2013). Diversification in fishing occurs by investing time and efforts into a series of activities, as a way of reducing overall risk by fishermen (Allison et al., 2001).

Research shows that employees in high-stress occupations and high-risk settings are candidates for the weakening effects of stress (Pickett & Joeri, 2019). However, fishermen may not suffer from these stressors to the same extent as other employees (Riordan, Johnson, & Thomas, 1991). Undoubtedly, fishermen can and do cope these occupational stressors, for instance, by using coping mechanisms that have been adapted to suit their environment, they further observed (Riordan et al., 1991). In specific situations, even coping mechanisms that require minimal effort may be very adaptive to deal with stressors (Aldwin & Revenson, 1987).

Das et al. (2017) observed that in recent past, fishermen of Thoothoor-Colachal region are the major group engaged in deep-sea fishing activities mainly targeting sharks and large pelagic fishes like tunas and billfishes. The skill of these indigenous deep-sea fishermen can be their notable ability to cope with the stressors posed by environmental and biodiversity factors.

Kadfak draws two livelihood strategies; firstly, diversification as risk management and secondly diversification for accumulation (Kadfak, Aug 2019) where the first strategy is influenced by the vulnerability derived from Ellis' work on 'the process by which the rural families construct a diverse portfolio of activities. Allison and Ellis proceed their discussion in relation to fisheries that livelihood diversification is associated with the idea of risk management/reduction in order to survive where diversification reduces the risk of livelihood failure by spreading it across more than one (Allison et al., 2001). In other words diversification offers fishers buffer mechanisms to mitigate their risk (Kadfak, Aug 2019). The fishermen increase their ability to earn more income by diversified fishing operation.

While the accumulation activities also include the intensification of fishing gear, vessel size and engines in order to achieve higher return (Smith, Khoa, & Lorenzen, 2005). Daw et al., (2012) also observed that better fishing infrastructure keeps fishers in fishing because they

get better return after intensifying their operations (Daw, Clinner, McClanahan, & Maina, 2012). As multiplicity of fishing gears, enhanced fishing craft and engine attract huge investment the poor fishermen unlike the well-off fishermen prefer multiple ownership. Kedfak (2019) says there exists two types of ownership among fishermen; one is the total ownership and the other is shared ownership. The shared ownership could be seen as the fishermen's ability to mitigate the stressors they face in fishing operation. While discussing the risk management among the young and elder fishermen, Kedfak (2019) further observed that young fishermen adopt risk management as the diversification strategy by entering into a range of fisheries livelihoods while waiting for other jobs. But for many of them, uncertainty of getting such jobs is growing bigger over time and hence they treat fishing as their risk management strategy. Thus, many from the rural fishing communities involve in fishing as a livelihood option to manage their families and also they adopt accumulation strategy to mitigate certain stressors encountered during fishing operation. So, youth and adult fishers have been found to have employed both risk management and accumulation as diversification to mitigate the risks involved in fishing Kedfak (2019). Fishermen are also given options by scientists to choose 'mother ship' as a risk management strategy. Leela Edwin defines mother ships as fishing vessels at sea which supply fuel, provisions, fresh water and other consumables, transfer the catch from the vessels, process and preserve the fish, and render medical and social services to the crew (Edwin, n.d.).

As the numbers of fishermen and the sizes of vessels increase, the important concern is that the effect of fishing on the stock of fish has begun to nag. Moreover, with competitions, vessels started operating farther from the home port lead to the fear over the depletion of fish stocks (Iversen, 1996).

Fishermen, to cope with the labour issues, either provide or receive dividends from the sale of fish. The crew salary is calculated as a share of the 'net fisheries', which covers gross fisheries – landing costs (Davidse, et al., 1993). They further say that the labour system had and still has an important influence on the development of the fisheries. It keeps the number of crew on board rather low, lead to high income for the fishermen in many cases (Davidse, et al., 1993). It is from the profit the fishermen have their shares. For the profit sharing system, the owner or investor gets a 60% share and the crews get a 40% share of the profit of the fishing activity while the operational cost are jointly borne by both the owner and crews (Hendrik, Hamid, Alvionita, & Alfrendo, 2019). But, Kurien J. (1982) says that between 32

per cent and 75 per cent of the gross earnings go to remuneration of the crew (Kurien & Willmann, 1982). According to Guillen, et al., (2017) crew are paid through different shared remuneration system rather than a fixed wage. They found that wages can significantly increase when the economic performance of vessels improve, and consequently provide incentives to workers (Guillen, et al., 2017).

From the observation of a few other researchers, it is found that enhanced fishing capacity of fishermen is harmful. They say it can be termed as excessive fishing which would lead to over exploitation and the depletion of many commercially important fish stocks (Greboval & Munro, 1999). Excess fishing capacity has been identified as one of the most pernicious problem affecting long-term sustainability and biodiversity of fishery resources and economic viability of fishing operations (Boopendranath, 2007). Myers A.R. assesses that the current trends in fisheries would lead to the world running out of wild capture seafood by the year 2048 (Myers, 2003).

According to IFAD (IFAD, 2001), technology is a physical infrastructure, machinery and equipment, and the associated knowledge and skills, and the capacity to organise and use all of these. The technology of fish exploitation under small scale fisheries is mainly characterised or known by the use of simple fishing gear and techniques (Ahmed & Tagogo, 2014). “Technological developments in various fields directly or indirectly related to fishing activities which are involved in traditional fishing communities influence boats and fishing gear development” says Salam (Salam, 2018). He further explains that such influence is pervasive, either through adoption and self-adaptation by fishermen or introduced by others such as government or fishing fleets from other regions with more advanced technology. Advance in technology allow fishermen for new access and extraction fish resource (Mgana, et al., 2019). Due to the advent of technology, especially the introduction of bottom trawl into fishing, the seabed and marine creature come into contact more often and thereby much deterioration to the seabed occurs. Therefore, development of technologies that are environment-friendly can play a key role to offer solutions to eliminate the destruction of the ecosystem through remodelling and alteration of the fishing gear so that the ecosystem can maintain its resilience and will also be able to adapt to the climate change scenario (Megwalu, Asare, Tchoundi, & Rahman, 2018).

Technology is a vital contribution to fishermen’s livelihood (Christopher, Nikolas, Mark, Siet, & Mahfuzudfin, 2003). Motorised fishing fleets have increased access to more raging

sections of coastal waters which were otherwise not very well accessed by traditional fleets. These motorised fleets have cut down travel time and energy due to propulsion than man-powered paddles. He says that one prominent application of technology to artisanal fisheries is the use of GSM phones. Fishermen use mobile phones to communicate with family, suppliers fishing gears, middlemen and merchants (Egesi, 2016). Introduction of mobile phones in Indian fisheries has brought about a tremendous change in terms of efficiency and profitability. As mobile phone service has spread across the fishing industry, it allows fishermen to land their catch in potential markets (Jensen, 2007).

Apart from mobile phones, ICT-enabled applications and devices are on use in Indian fishery to assess, capture and commercialize. Some are specialist applications namely sonar for locating fish. Others are GPS (Global Position System) used for navigation and location finding, mobile phones are for trading, information exchange and emergencies, and radio programming for web-based information and networking resources (FAO, 2007) Ugenyi points out that the income from fishing significantly differs between those adopted technology and non-technology adoptees (Ugenyi, 2004).

Institution and the collective action can play a vital role in poverty eradication. Cooperative sales-organisations help empower fishermen in their economic transactions throughout the value chain (Jentoft & Finstad, 2018). They further add that fishermen when organised collectively, their bargaining power is found improved and eventually they are able to break the bondage. Because, collectives help them bargain with buyers when fish price fall. The Gandhian mantra of 'production by the masses' for 'consumption by the masses' becomes a reality if such links between poorer small-scale fish producers and needy customers can be established – and this is not possible without collective action and organisation (Kurien, 2013).

There is one such notable collective action by SIFFS (South Indian Federation of Fishermen Societies) which represents a concerted effort by small-scale fishermen to organise themselves against the exploitative fish business entities, middlemen and merchants. Its impact is not just confined to 5000 members but has a spread effect that tends to spread the message of authentic collective action (Kumar K.G., 1998). The structure and membership of fishermen organisations may vary considerably, but a common theme is that they are formed of fishermen who work voluntarily to promote the interests of their members (Richard, 2013).

According to Coglán and Pascoe enhanced human capital increase the fishing productivity. They say that the fish productivity improvement resulting from increased education and training could exceed those from increased technological adoption (Coglán & Pascoe, 2007). However, the traditional fishermen use their wisdom transferred from their ancestors, and they make use of their capability and capital in the community as clever strategies in order to make the fishing occupation viable (Tipyan & Mee-Undon, 2014). They further add that once these fishermen face problems caused by economy, society, politics, environment and climate change, they are able to cope with by the inherited knowledge. It is also investigated by them that family members are main mechanism deployed by the fishermen in the fishing activities. Because, fishing families often engage in diverse activities, which are found to be an important attribute in achieving livelihood security (Allison et al., 2001).

Thus, the key to sustainable fisheries management and development is to facilitate small scale fishermen to find their mechanisms out of poverty by building on their existing capital and capabilities (Allison et al., 2001).

METHODS AND MATERIALS

This research article focuses on the factors determining livelihood of the small-scale fishermen while they are striving to earn out of fishing. It strives to answer 1) what particular mechanism the fishermen use to cope and respond to those stressors/uncertainties while trying to meet various financial, economic and social needs. By adopting Explanatory Research Design, certain amount of possible relationships among some select variables was in focus and subsequently this study was directed to observe 'what', 'why' and 'how' the fishermen cope with the livelihood challenges thereby reduce their vulnerability. It also addresses who are the fishermen respond better to such livelihood stressors. The respondents for the study were chosen from the coastal villages of Kanyakumari district by using Multi-stage Cluster and Systematic Random Sampling methods. A sample unit consisting of 308 active fulltime marine fishermen were interviewed from 11 selected villages by using interview schedule as the research tool. Itemised Rating Scale technique was used to assess and find out the relationship between the determining factors like biophysical, ecological, government policies & norms, technological advancement and human interferences affecting the livelihood (threatening factors) and the fishermen; and fishing types, methods, techniques, materials, equipment; and various occupational, social and technological advancements (contributing factors) used in the small-scale fishery. Statistical tests such as Mean, Quartiles

and Stepwise multiple linear regression were applied by using SPSS (Statistical Package for Social Science)

RESULTS

There are two types of coping skills: problem-based coping and emotion-based coping, says Amy Morin (2019). Problem-based coping has been taken into consideration for this study since the fishermen deal with different types of stressors that affect their livelihood. Problem-based coping is helpful for fishermen when they need to change their situation by removing stressful thing or reducing the level of that stress from their fishing occupation. This section deals with fishermen, who are dealing better with the occupational problems (livelihood stress) and what type of strategies are used by them to cope with certain stressors.

Table 1: Coping by fishermen of different age groups

S. No.	Coping Strategies	Age Group	N	Mean	SD	F Ratio	Sig.
1	Total Coping	18 to 25	53	85.36	10.43	16.294	P<0.000 S
		26 to 45	155	84.86	12.29		
		46 to 60	100	76.32	13.72		
		Total	308	82.17	13.09		
2	Fishing Effort	18 to 25	53	15.58	4.49	16.751	P<0.000 S
		26 to 45	155	14.59	4.53		
		46 to 60	100	11.83	4.19		
		Total	308	13.87	4.64		
3	Fishing Management	18 to 25	53	18.55	2.74	10.871	P<0.000 S
		26 to 45	155	19.86	4.20		
		46 to 60	100	17.46	4.39		
		Total	308	18.86	4.18		
4	Adoption of Technology	18 to 25	53	20.68	5.27	19.910	P<0.000 S
		26 to 45	155	19.24	4.97		
		46 to 60	100	15.70	5.74		
		Total	308	18.34	5.60		
5	Fishermen Collective	18 to 25	53	14.30	4.03	6.735	P<0.001 S
		26 to 45	155	15.08	4.12		
		46 to 60	100	16.74	4.89		
		Total	308	15.48	4.45		
6	Human Capital	18 to 25	53	16.25	1.91	15.557	P<0.000 S
		26 to 45	155	16.08	1.84		
		46 to 60	100	14.59	2.94		
		Total	308	15.63	2.37		

One way ANOVA has been used to find the difference among the fishermen of different age in coping with stressors. By far, the fishermen of different age groups differed in coping with

livelihood stress. When the total coping of fishermen are taken into account, it is verified that the younger fishermen belonging to the age group of 18 to 25 years (85.36 ± 10.43) have lesser coping skills when compared to the elder fishermen and it is statistically significant as the F-ratio of 16.294 is significant at $P < 0.000$ level. The coping skills of the fishermen across different age groups can be further discussed by considering the sub-dimensions of coping one by one.

By observing the coping strategies what the fishermen chose to solve the livelihood stress, it's the elder fishermen (46 to 60 years of age) have lesser coping skills in all the sub-dimensional coping strategies except a single strategy named 'fishermen collective'. While observing the younger fishermen, they put in place more fishing efforts, better fishing management, and use more new technologies and consolidation of human capital than the elder fishermen.

Elder fishermen associate themselves more with fishermen cooperatives and federations to reduce their livelihood stress. They are finding ways to improve their fishing performance by availing credit and other value added services from the fishermen cooperatives and thus enhance their ability to succeed in the occupation. Elder fishermen talking and discussing with others on what can be done to improve the performance will help them feel more confident about their ability to succeed go hand in hand with the findings of Amy Morin (2019). Hence, what is understood from such finding is that discussions and opening up of issues could sort out problems and release stress and, thus, fishermen could regroup themselves and resume their occupation.

Table 2: Coping Skills among Fishermen with Different Educational Background

S. No.	Coping Strategies	Educational level	N	Mean	SD	F Ratio	Sig.
1	Total Coping	Illiterate	22	79.59	13.61	3.133	P<0.026 S
		Primary	87	79.38	12.48		
		High	140	82.88	13.29		
		Higher	59	85.58	12.61		
		Total	308	82.17	13.09		
2	Fishing Effort	Illiterate	22	11.91	4.03	6.440	P<0.000 S
		Primary	87	12.69	4.30		
		High	140	14.18	4.54		
		Higher	59	15.59	4.93		
		Total	308	13.87	4.64		
3	Fishing Management	Illiterate	22	19.59	4.69	0.743	P<0.527 NS
		Primary	87	18.34	4.29		

		High	140	19.03	4.35		
		Higher	59	18.93	3.36		
		Total	308	18.86	4.18		
4	Adoption of Technology	Illiterate	22	15.64	5.49	7.290	P<0.000 S
		Primary	87	17.01	5.31		
		High	140	18.60	5.41		
		Higher	59	20.68	5.65		
		Total	308	18.34	5.60		
5	Fishermen Collective	Illiterate	22	16.23	3.94	3.905	P<0.009 S
		Primary	87	16.61	5.19		
		High	140	15.19	4.25		
		Higher	59	14.24	3.50		
		Total	308	15.48	4.45		
6	Human Capital	Illiterate	22	16.23	2.18	6.413	P<0.000 S
		Primary	87	14.72	2.87		
		High	140	15.88	2.14		
		Higher	59	16.14	1.78		
		Total	308	15.63	2.37		

The most distinguishable result found from this observation is that education has played a vital role in the coping skills of the fishermen. It's observed that fishermen, who had no education or primary level of education, have lesser coping skill than the fishermen, who had high and higher level of education. The illiterate fishermen (79.59 ± 13.61) differ in copying skills from fishermen who had higher education (85.58 ± 12.61) and it's statistically verified as the F-ratio of 3.133 is significant at $P<0.026$ level. Therefore, the hypothesis namely "Higher the education of fishermen, higher is their coping skill" is verified.

While verifying different sub-dimensional coping strategies picked up by the fishermen of different educational background, fishermen with higher education cope with the livelihood stress better than the fishermen with lesser or no education. However, it is found that the fishermen with lower or no education use fishermen collective more as an effective platform to cope with stress than the well-educated fishermen. Another observation is that the coping skill concerning the adoption of technology into fishing by fishermen with higher education (20.68 ± 5.65) differ very much in comparison with fishermen having no education (15.64 ± 5.49) and which is statistically significant as the F-ratio of 7.290 (highest F-ratio of all the sub-dimensional coping strategies that has significance) is significant at $P<0.000$ level.

Another fact observed in this analysis is that fishermen having different educational status do not differ with regard to coping strategies concerning fishing management. All these

fishermen use fishing management as a strategy with almost same intent while facing the livelihood stress.

But, having verified that the role played by higher education in fisheries, promotion of education among fishermen can improve the adaptive capacity of fishermen in coastal communities, averting them from vulnerable conditions and hence it is also verified with the findings of Silvia Salas et al. (2010) that socio-economic conditions of fishermen influence the ways they develop coping strategies.

Table 3: Coping by married and unmarried fishermen

S. No.	Coping Strategies	Marital Status	N	Mean	SD	F Ratio	Sig.
1	Total Coping	Unmarried	68	86.71	10.77	9.182	P<0.003 S
		Married	231	81.33	13.41		
		Total	299	82.55	13.04		
2	Fishing Effort	Unmarried	68	16.07	4.37	18.894	P<0.000 S
		Married	231	13.38	4.52		
		Total	299	13.99	4.62		
3	Fishing Management	Unmarried	68	19.19	3.06	0.330	P<0.566 NS
		Married	231	18.86	4.50		
		Total	299	18.93	4.21		
4	Adoption of Technology	Unmarried	68	20.88	5.39	17.964	P<0.000 S
		Married	231	17.68	5.49		
		Total	299	18.41	5.62		
5	Fishermen Collective	Unmarried	68	14.24	3.90	7.511	P<0.007 S
		Married	231	15.90	4.55		
		Total	299	15.53	4.46		
6	Human Capital	Unmarried	68	16.32	1.79	6.487	P<0.011 S
		Married	231	15.50	2.47		
		Total	299	15.69	2.36		

Note: Nine fishermen with other categories of marital status have not been included here as they are too less a number

Same as the younger fishermen having higher coping skills, found in the section prior to the previous one, the unmarried fishermen (86.71 ± 10.77) have higher coping skills than the married fishermen (81.33 ± 13.41) as the *F*-ratio of 9.182 is significant at $P<0.003$ level. Moreover, the coping skills of unmarried fishermen are higher than married fishermen in strategies concerning fishing effort, adoption of technology and human capital. But, it is the other way in terms of strategies relating to fishermen collective where married fishermen outperform the younger fishermen. However, both the groups do not differ in their coping skills in terms of fishing management.

Livelihood stressors and coping strategies of fishermen

Further, an analysis has been carried out to find what relationship the livelihood stressors have with the sub-dimensions of coping strategies and what would be the strength of such association. The below table explains such association.

Table 4: Association between total livelihood stressors and sub-dimensions of coping strategies

S. No.	Coping Strategies	Correlation	Total Stressors
1	Total Coping Strategies	Pearson's r Sig.	0.349** 0.000
2	Fishing Efforts	Pearson's r Sig.	0.465** 0.000
3	Fishing Management	Pearson's r Sig.	0.317** 0.000
4	Adoption of Technology	Pearson's r Sig.	0.270** 0.000
5	Fishermen Collective	Pearson's r Sig.	-0.240** 0.000
6	Human Capital	Pearson's r Sig.	0.270** 0.000

* Correlation is significant at the 0.05 level

** Correlation is significant at the 0.01 level

It is observed from the above correlation and as stated in the previous section that the livelihood stressors have a positive relationship with coping strategies with a higher significance ($r=0.349$, $P<0.000$). While observing deeply into the relationship what the sub-dimensions of coping strategies have with the livelihood stressors, it's the fishing efforts ($r=0.465$, $P<0.000$), that the fishermen put in for making their livelihood sustainable, having the positive relationship with medium effect than that of all other coping strategies. Fishing management of fishermen have a positive relationship with livelihood stressors with medium effect ($r=0.317$, $P<0.000$) followed by coping strategies such as adoption of technology and human capital (talent management) with the same Pearson's r value of 0.270 ($P<0.000$).

However, it has been observed that the livelihood stressors and fishermen collective have a negative relationship between them ($r=-0.240$, $P<0.000$). It suggests that higher the livelihood stress, lesser the fishermen associated themselves with collectives. In other words, more the fishermen associate themselves with collectives, lesser became the livelihood stress.

Therefore, it could be understood in the way that the fishermen associating themselves with the fishermen groups, association, federation, union, etc. and with the benefits and the

support they were getting, they could resist the livelihood stress or reduce the level of stress posed on them. On the other hand, whenever fishermen see different stressors intensively affecting their livelihood they have to equally intensify their strategies in areas of fishing efforts, management, adopting newer technology and maximum use of human capital. Further, the research hypothesis namely “*Higher the livelihood stress, higher is the coping strategies of fishermen*” is verified.

FUTURE RESEARCH DIRECTION

Various sub-dimensions of coping strategies that the fishermen follow can have their own association with different livelihood stressors and which could be analysed and observed further. This would give a better understanding on each dimension of coping strategies and its association with various livelihood stressors when they behave with each other. And, of course, the strength of such association can also be found with by applying Pearson's correlation coefficient.

BIBLIOGRAPHY

1. Ahmed, Y., & Tagogo, T. (2014). Effect of Mesh Size on Catch Efficiency of Modified Buzun Gura Traps in Lake Kainji. *The 29th Annual Conference of Fisheries Society of Nigeria*, (pp. 2-5). Makurdi.
2. Aldwin, C., & Revenson, T. (1987). Does coping help? A reexamination of the relation between coping and mental health. *Journal of Personality and Social Psychology*, 337-348.
3. Boopendranath, M. (2007). Fishing Capacity Management. *IFP Souvenir* (pp. 7-14). Cochin: National Institute of Postharvest and Training.
4. Christopher, C., Nikolas, W., Mark, W., Siet, M., & Mahfuzudfin, A. (2003). *The future of fish issues and trends to 2020. Fish for All*. IFPRI and World Fish Centre, P6.
5. Coglan, L., & Pascoe, S. (2007). Implications of human capital enhancement in fisheries. *Aquatic Living Resources*, 231-239.
6. Davidse, W., Cormack, K., Oakeshott, E., Frost, H., Jenssen, C., Rey, H., et al. (1993). *COST AND EARNINGS OF FISHING FLEETS IN FOUR EC COUNTRIES*. The Hague: Agricultural Economics Research Institute.
7. Daw, T., Clinker, J., McClanahan, T., & Maina, J. (2012). To fish or not to fish: Factors at multiple scales affecting artisanal fishers' readiness to exit a delining fishery. *Plos One*, e31460.

8. Edwin, L. (n.d.). *FAO Classification of Fishery Vessels types*. Cochin <http://drs.cift.res.in/bitstream/handle/123456789/907/FAO%20classification%20of%20fishery%20vessel%20types.pdf?sequence=1>: Central Institute of Fisheries Technology (CIFT).
9. Egesi, O. (2016). Artisanal Fishers and Adoption of Fishing Technology in Bayelsa State, Nigeria. *IJAR International Journal of Geography and Environmental Management*, 9-14.
10. FAO. (2007). *Information and Communication Technologies benefit fishing communities - New Direction in Fisheries, A Series of Policy Briefs on Development Issues, No.7*. Rome, PP 12: FAO.
11. Greboval, D., & Munro, G. (1999). *Corporate Document Repository Report: Over Capitalization and Excess Capacity in World Fisheries: Underlying Economics and Methods of Control*. Rome: Food and Agriculture Organisation.
12. Guillen, J., Boncoeur, J., Carvalho, N., Frangoudes, K., Guyader, O., Macher, C., et al. (2017). Remuneration system used in the fishing sector and their consequences on crew wages and labor rent creation. *Maritime Studies*.
13. Hendrik, H., Hamid, H., Alvionita, D., & Alfrendo, A. (2019). Wage System and Profit Sharing in Fish Catching Business Using Lift Net in Ocean Fishing Port of Belawan. *The 8th International and National Seminar on Fisheries and Marine Science*. Pekanbaru, Indonesia: IOP Conference Series: Earth and Environmental Science, Volume 340.
14. IFAD. (2001). *Rural Poverty Report - The Challenge of Ending Poverty*. International Fund for Agriculture Development.
15. Iversen, E. S. (1996). *Living Marine Resources*. New York: Chapman & Hall.
16. Jensen, R. (2007). The Digital Provide IT, Market Performance and Welfare in the South Indian Fisheries Sector. *Quarterly Journal of Economics*, 879-924.
17. Jentoft, S., & Finstad, B.-P. (2018). Building fisheries institutions through collective action in Norway. *Maritime Studies*, 13-25.
18. Kadfak, A. (Aug 2019). More than just Fishing: The Formation of Livelihood Strategies in an Urban Fishing Community in Mangaluru, India. *Journal of Development Studies*.
19. Kanner, A., Coyna, J., Schaefer, C., & Lazarus, R. (1981). Comparison of two modes of stress management: Daily hassles and uplifts versus major life events. *Journal of Behavioural Medicine*, 1-39.
20. Kumar K.G. (1998). Organising Fisherfolk Cooperatives in Kerala. *Economic and Political Weekly*, 578-581.

21. Kurien, J. (2013). Collective action and organisations in small-scale fisheries. *Strengthening organisations and collective action in fisheries* (pp. 41-104). Rome: FAO.
22. Kurien, J., & Willmann, R. (1982). *ECONOMICS OF ARTISANAL AND MECHANISED FISHERIES IN KERALA: A study on cost and earnings of fishing units*. Madras: FAO & UNDP.
23. Litman, J. (2006). The COPE Inventory: Dimensionality and relationships with approach and avoidance-motives and positive traits. *Personality and Individual Differences*, 273-284.
24. Megwalu, F., Asare, O., Tchoundi, A., & Rahman, A. (2018). Environmentally friendly fishing technologies: An adaptation tactic to climate change to the inland fisheries of developing countries. *Australian Journal of Science and Technology*, 143-149.
25. Mgana, H., Kraemer, B., O'Reilly, C., Staerhr, P., Kimirei, I., Apse, C., et al. (2019). Adoption and Consequences of new-light fishing technology (LEDs) on Lake Tanganyika, East Africa. *PLOS ONE*.
26. Morgan, R. D. (2013). *Exploring how fishermen respond to the challenges facing the fishing industry*. Portsmouth: University of Portsmouth.
27. Morin, A. (July 2019). *40 Healthy Coping Skills for Dealing with Uncomfortable Emotions*. Verywell Mind.
28. Myers, A. (2003). Rapid worldwide depletion of predatory fish communities. *Nature*, 280-283.
29. Pickett, J., & Joeri, H. (2019). Stressors, Coping Mechanisms and Uplifts of Commercial Fishing in Alaska: A Qualitative Approach to Factors Affecting Human Performance in Extreme Environments. *Journal of Human Performance in Extreme Environments*.
30. Pollnac, R., & Poggie, J. (2008). Happiness, well-being and psychocultural adaptation to the stresses associated with marine fishing. *Human Ecology Review*, 194-200.
31. Pollnac, R., Monnereau, I., Poggie, J., Ruiz, V., & Westwood, A. (2011). Stress and the occupation of fishing. In E. Edward, *Handbook of stress in the occupation* (pp. 309-321). Northampton: MA.
32. Richard, D. (2013). *Exploring how fishermen respond to the challenges facing in the fishing industry*. Portsmouth: University of Portsmouth.
33. Riordan, C., Johnson, G., & Thomas, J. (1991). Personality and Stress at Sea. *Journal of Social Behaviour and Personality*, 391-409.

34. Salam, A. (2018). Technological adaptaion in traditional fisheries: ways to survive. *IOP Conference Series: Earth and Environmental Science*. IOP Science.
35. Salas, S., Bjorkan, M., Bobadilla, F., & Cabrera, M. (2011). Addressing Vulnerability: Coping Strategies of Fishing Communities in Yucatan, Mexico. In S. Jentoft, & A. Eide, *Poverty Mosaics: Realities and Prospects in Small-Scale Fisheries* (pp. 195-220). London: Springer Science+Business Media.
36. Smith, L., Khoa, S., & Lorenzen, K. (2005). Livelihood functions of inland fisheries. *Water Policy*, 7 (4), 359-383.
37. Tipyan, C., & Mee-Undon, F. (2014). Dinamic livilihood strategies of fishery communities in Ban Don bay, Suratthani, Thailand. *International Journal of Asian Social Science*, 1126-1138.
38. Ugenyi, O. (2004). *The Impact of Fishing Technology on the Livelihood of Artisanal Fishers in Baylesa State*. University of Ibadan, Nigeria.
39. Van, W. (2017). Coping in context: Dispositional and situational coping on navy divers and submariners. *Journal of Human Performance in Extreme Environements*, 7-12.