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To Link this Article: <http://dx.doi.org/10.6007/IJARBSS/v8-i1/3817>

DOI:10.6007/IJARBSS/v8-i1/3817

Received: 02 Jan 2018, Revised: 26 Jan 2018, Accepted: 06 Feb 2018

Published Online: 10 Feb 2018

In-Text Citation: (Samah & Shaffril, 2018)

To Cite this Article: Samah, A. A., & Shaffril, H. A. M. (2018). Sustainable livelihood for a better Adaptation towards Climate Change among Small Scale Fishermen in Malaysia. *International Journal of Academic Research in Business and Social Sciences*, 8(1), 412–425.

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Vol. 8, No.1, January 2018, Pg. 412 – 425

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Sustainable livelihood for a better Adaptation towards Climate Change among Small Scale Fishermen in Malaysia

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Abstract

Adaptation towards climate change among the community has becoming a pressing issue, hence, effort to strengthen it has become a priority. It is recognized that not every adaptation strategy fit to every group of community, each of the groups have their own strength. In this study, the focus is placed on one of the important groups in Malaysia – the small scale fishermen whereby efforts are placed to strategize specific climate adaptation strategies via intensification of their livelihood assets. Initially, the paper looks on the background of fisheries industry in Malaysia, the small scale fishermen in Malaysia and the climate change scenario in Malaysia. Then, it gears the readers to the discussions on the impacts of climate change on the livelihood assets, the need to strengthen the assets, the relations between the assets and subsequently to the prime aim of the paper – the recommendations to strengthen the small scale fishermen climate adaptation via the intensification of their livelihood assets.

Keywords: Community Development, Adaptation Strategy, Sustainable Livelihood

Introduction

This paper demonstrates the conceptual understanding on the needs to strengthen the livelihood assets in order to assist the Small Scale Fishermen (SSFM) adapting towards the climate change phenomenon in Malaysia. This paper concentrates on the ability of five livelihood assets namely human capital, social capital, physical capital, natural capital and financial capital to strengthen climate change adaptation ability of SSFM. Specifically, it focuses on the need to strengthen the livelihood assets, the relations between the livelihood assets and subsequently to suggest recommendations to strengthen the SSFM climate adaptation via the intensification of their livelihood assets.

To come out with specific discussion, focus was first placed on the background of fisheries industry and the SSFM. Then, the discussion was geared towards the climate change scenario in Malaysia and finally turned to the impacts of climate change on each of the livelihood assets, the need to strengthen the assets, the relation between the assets and the recommendations to

further strengthen the assets. These discussions were based on analyses of document. At the first stage, a keyword search was performed using the search engines of Science Direct (<http://www.sciencedirect.com/>), Taylor & Francis (<http://www.tandfonline.com/>), Sage Publications (<http://www.sagepub.com/home.nav>) and Emerald Publishing (<http://www.emeraldinsight.com/>). Only article journals published from 2000 to 2017 were selected to be analysed. The selected articles were peer-reviewed literature on human capital, social capital, physical capital, natural capital, financial capital, livelihood assets impacts on SSFM adaptation ability climate change impacts on marine species and climate change impacts on the community. Analyses of documents were then conducted on the relevant articles.

The fisheries industry and the small scale fishermen in Malaysia

The Malaysian fisheries industry continues to play its significant roles in strengthening both – the economics of the country and the socio-economic status of the community. Within the scope of country economic, the industry has contributed a total RM7.98 billion (roughly equal to USD2.28 billion) of income and at the same time offered employment opportunities, especially to those in the rural areas (Department of Fisheries Malaysia, 2013). Up to date, the current statistics recorded a total of 144,019 registered fishermen with the biggest portion come from Sabah (Department of Fisheries Malaysia, 2013).

The Malaysian fishermen are categorized according to their catching areas. The Zone A fishermen are operating their fishing operation within the range of less than 5.0 miles nautical, The Zone B fishermen operating their fishing operation within the range of 5.1 to 12.0 miles nautical, The Zone C0 fishermen are operating their fishing operation within the range of 12.1 to 30.0 miles nautical while the Zone C2 fishermen are operating their fishing operation more than 30.0 miles nautical. The Zone A fishermen are also known as the SSFM while the other three groups the Zone B, C0 and C2 fishermen are known as the deep sea fishermen. Majority of these fishermen are using drift nets, trawl nets and fish purse seines as their main catching tools.

Although there are no official statistics, it has been proven consistently by a number of previous studies that a huge majority of the registered fishermen in Malaysia are constituted by the small scale fishermen (Shaffril et al., 2013; Ramli et al., 2013; Omar et al., 2012). Shaffril et al. (2013) for example found that 71.0% of fishermen in Malaysia are comprising of SSFM while Omar et al. (2012) in their studies have confirmed that the SSFM are constituting a total of 75.8% from the overall registered fishermen in Malaysia. The SSFM are characterized by a number of characteristics such as a smaller vessel (usually 22 feet and smaller) and a smaller boat engine capacity (40 horse power or smaller), operating their fishing operation between 3-8 hours, using traditional fishing tools such as bubu, rawai, net and seines and conducting a subsistence level of fishing operation (Shaffril et al., 2013; Omar et al., 2012; Bolong et al., 2012; Abu Samah et al., 2011). Due to these characteristics, the SSFM are vulnerable to two main threats, namely the poverty and climate change.

To alleviate poverty, the Malaysian government introduced monthly allowance worth RM300 (roughly equal to USD100) and petrol subsidy scheme which allow the SSFM to buy cheaper petrol for their boats. Number of local studies have proven on the success of these efforts to assist the fishermen to combat poverty. Shaffril et al. (2013) and Omar et al. (2012) have confirmed that more than one third of the SSFM afford to gain more than RM700 in month while Ramli et al. (2013) informed that on average SSFM able to get more than RM900 in month. With

regard to climate change threats however, the government are still thinking on the best way to minimise the impact of the phenomenon. Although the government has come out with National Policy on the Climate Change (NPCC), nevertheless, the policy focuses more on the adaptation at the general community which then resulted in a less focus placed on the specific group such as the SSFM. This scenario has led to lack of comprehensive understanding on the SSFM adaptation ability towards climate change and gears needs for more studies to be conducted. Despite the mounting need, much of the existing climate change studies such as by Kitada et al. (2006), Kwan et al. (2011), National Hydraulic Research Institute of Malaysia (NAHRIM) (2010), Md Din and Mohd Omar (2009), Department of Irrigation and Drainage (2006), Wan Azli (2010) and Razali et al. (2010) focus more on the scientific studies rather than social studies. Driven by this gap, this paper would like to contribute to existing literature by attempting to envisage its discussion on the ability of livelihood assets to intensify the SSFM adaptation ability towards climate change.

Climate Change in Malaysia

The world nowadays is facing the changing climate and a similar scenario can be seen in Malaysia. Although phenomena such as global warming, Madden Julian Oscillation (MJO), Indian Ocean Dipole (IOD) El-Nina/La-Nino-Southern Oscillation (ENSO) are proven to cause climate change across the globe, within the scope of Malaysia, the La Nina, El Nino and global warming are said to be the main causes. This part discusses on the impacts of these three phenomenon on weather elements such as temperature, sea level rise, rain pattern, wind and waves.

There are several local and international studies that have proven on the climatic changes in Malaysia. In term of temperature rise, Kitada et al. (2006) concluded an increase of 1.1°C at Johor Bharu in the last three decades. Kwan et al. (2011) in their studies predicted a warmer day at places such as Bayan Lepas, Ipoh, Setiawan and a warmer night at places such as Malacca, Miri and Bintulu. Intergovernmental Panel on Climate Change (IPCC) (2007) on the other hand predicted the temperature in Malaysia will continue to increase by between 0.6°C and 4.5°C by 2060.

Sea level rise is another impact resulted from the changing climate. A local study done by National Hydraulic Research Institute of Malaysia (NAHRIM) (2010) confirmed on the sea level rise in areas such as Kota Kinabalu (0.44 cm/yr), Sandakan (0.41 cm/yr), Kukup (0.30 cm/yr), Penang (0.23 cm/yr), Chendering (0.22 cm/yr) and Langkawi Island (0.19 cm/yr). Another study carried by Culver et al. (2015) confirmed that area in Setiu indicates an increase in the rate of sea-level rise from 0.13 cm/yr. Md Din and Mohd Omar (2009) on the other hand confirmed that Kukup recorded an increase of .30 cm/yr of sea level rise.

Extreme waves prove to erode the coastal areas in Malaysia. A study by Department of Irrigation and Drainage (2006) claimed, 65 coastal areas in Malaysia are eroded while the same study found the east coast part of Peninsular Malaysia are experiencing more coastal erosion than west coast region. Wan Azli (2010) claimed the number of extreme rainfall events has exceeded the 90th percentile of total rainfall for the past 30 years while Razali et al. (2010) found that over a long-range period of time, more extreme wind speeds will be experienced at places such as Alor Star, Kuantan, Mersing and Kota Bharu.

The Livelihood Assets

In this part, the discussion will be on the conceptual definition of five capitals namely human capital, social capital, natural capital, physical capital and financial capital

Human Capital

Human capital refers to the skills, knowledge, and experiences besides the personal biophysical attribute of the community such as their health status, age and other physical abilities (Department for International Development, 1999). Human capital can be positively exploited to maintain a decent life especially in confronting changes and challenges. The process to gain this asset is not a battle between “those who have” and “those who have not” polemic. This is because this capital can be learned and acquired by individuals, which eventually develop the community capacity. Hence, it can be strengthened and accumulated. Community members who possessed this capacity are better of compare to those who do not attained it. Those who have these assets have more chance to adapt to the unexpected problems or predicted challenges such as climate change. Community comprised of young, energetic and healthy members has the advantage in term of physical strength. They have the potential to venture into new areas to earn their living. Moreover, those who are able to equip themselves with new skills and ‘the know-how’ knowledge are able to survive when facing new challenges. What makes the different is the level or the degree of initiative among them to acquire new skills, knowledge and experiences, beside the biophysical aspect that is difficult to manoeuvre. This aspect give rise to the issue of quantity and quality of community capacity, at the family or household level, as well as community level. As man are rational creatures, they will find way and means to adjust their capacity in order to adapt to the challenges.

Social Capital

Within the scope of sustainable livelihoods, social capital can be viewed as a form of social resources (Yassin et al., 2014). It takes in various forms such as social networks and associated norms which in many cases exist in many communities, at different level depending on the nature of community. In a closed and simple community, social network take place between members in a family or between families in a settlement. It is within this network member interact, cooperate and work together according to the accepted norms in their living system. This interaction bond them together horizontally, and this bonding is economically and socially functional. Likewise, in an opened and modern community, the social networks transpire in many forms and levels such as association, clubs, groups and organisation, in which the hierarchical structure is becoming obvious. A formal system of norm guides community members’ interaction, cooperation and negotiation within the vertical relationship with other parties.

Man are not only rational creatures but are also creative. To meet the current needs or to adapt to change in living environment, such as climate change, they can venture into new potential which demand them to seek assistance from others within their settlement or outside their community. As such, they have to learn to develop linking and bridging capacity to meet government agencies, extension agents, NGOs and others for guidance, assistance, credit support, etc. This capacity is even more important when assistance is much needed at times, when facing difficulties in life. Thus, social capital has economic function, in that it facilitates someone to get something or to benefit something from the relationship (network) with others.

To keep up and maintain the network, either within or between families, groups or association is crucial. In order to sustain the networks, trust, reciprocity and mutual exchange is the overriding norms to be practised and embraced among members in the community so as to ensure social resources is kept sustained.

Natural Capital

Basically, natural capital is referred as natural resources – land (including forest, flora and fauna, etc), lakes, pool and oceans (and their living marine) that produce goods and services for people's consumption, directly or indirectly (Yassin et al., 2014). Some of this natural capital, or sometimes labelled as environmental assets are renewable, while some are not. Due to the climate change phenomenon, even some of these resources are in the process of extinction. Climate change has impacted many marines live such as coral reef, fishes, squid, shrimp and other marine species (Ottersen et al., 2009; Soto, 2002). Such depreciation of natural capital is a calamity for some communities, especially for the SSFM whose livelihood depend very much on natural capital. A small change in their environmental asset will affect their livelihood. A strong storm and extreme waves for example, hinder the SSFM to conduct their fishing routine and this affect their catch, and subsequently their income. How man adapt to this changing environment to ensure maintaining a decent life and to absorb the impact of such changes depends much on their ability to adopt some measures.

Physical Capital

Relying on the skills, knowledge and the resources from the surrounding environment alone is not a guarantee for a better quality of life. Similar to other groups, the SSFM needs other basic amenities or social infrastructures to support and equip themselves, socially and economically. A decent house provide shelter for the household, and a proper sanitation and clean water uphold a quality of health status. Transportation facilities on the other hand is important for them to transport their marine catches to the market place while electrical and water supply is fundamental in their processing activities. For sharing and dissemination of information, a reliable communication infrastructure is paramount for many people. Mobile phone and smart phone can assist SSFM to market their product. Information on price and demand from different areas obtained through certain website via a good transmission facilities benefit the SSFM. In short, accessibility to these infrastructure, i.e. physical capital, is somewhat mandatory for the SSFM. In many countries, many social infrastructures are public goods that can be used free or charged with a minimum rate. Without this capital the ingredients to improve the betterment of the people's livelihood is incomplete.

Financial Capital

Financial capital denotes the financial resources. It is an asset that people have and can be used to meet their livelihood. Within the scope of sustainable livelihood, financial capital includes the money possession, money flows as well as stocks that can be utilised for consumption as well as production (Department for International Development, 1999). Savings, are just like cash, is a form of financial capital that easily access for business expansion, to buy something or to be used during credit crisis. Those who owned adequate financial capital is in a better position to plan and execute diverse livelihood strategies. In many developing countries, some form of financial

capitals is being provided by government. This is known as credit support is given by the government through various programmes for different groups of people. This financial capital came in several forms, which can be broadly divide into two, namely as subsidies, and soft loan. Subsidies are meant to lessen the burden faced by community members in embarking their socioeconomic endeavour. Soft loan as assistance grant is to support, encourage and to leverage community member's entrepreneurship activity. To the needy, these type of financial capitals, is meaningful especially during the hard times.

The Impacts of Climate Change of SSFM Livelihood Assets and Things to be done

Within this section, discussions are placed on the impacts of the climate change on the livelihood assets of the SSFM. It also covers the discussions on the need to strengthen the assets, the relations between the assets and the recommendations to further strengthen the SSFM livelihood assets.

The Natural Capitals

The impacts of climate change on the natural capitals

Climate change potentially lead to the decline of marine productivity and compromise the livelihood of SSFM who rely heavily on marine resources. Ottersen et al. (2009) and Soto (2002) for example have clarified warmer temperature impacts on fish diet, egg incubation time and their spawning which result in a smaller size and reduced productivity of marine species. Consequently, lesser quality and quantity means lesser money for SSFM. Furthermore, Ottersen (2009) proven the impacts of warmer temperature on fish migration pattern and this means the SSFM need to invest more fuel and time to search for new fishing locations.

Why natural capitals need to be strengthened?

Doubtless, natural capital is severely affected by climate change, nevertheless, by protecting and enhancing the natural services that support livelihoods, vulnerable communities can maintain local safety nets and expand the range of options for coping with disruptive shocks and trends.

Relation with other capitals and its benefits

A better natural capital can play a vital part in constructing a better financial and physical capital which eventually strengthen the community adaptation towards climate change. A sustainable supply of marine flora and fauna is a fundamental of natural capital in assisting the SSFM to face the climate change. A sustainable marine resources for example will provide income opportunities for SSFM while coral reef can provide habitat for lot of marine species. In addition, the natural capital can be a natural defence for the community and their assets. For example, the mangroves areas can offer protection to the SSFM physical capitals such as jetty, houses, vessels, markets and others infrastructures by absorbing the impacts produced by extreme wind and waves. This eventually will lessen the risks associated with the extreme events.

Recommendations to further strengthen the natural capital for the SSFM

It has been mentioned earlier that the quality and quantity of marine flora and fauna are adversely affected by changes in temperature, as well as extreme waves and winds (Razali et al., 2010; Department of Irrigation and Drainage, 2006), nevertheless, if conservation measures are

taken into account, then it will not only preserve the environment but also provide supports to improve the SSFM adaptability. Such conservation effort can be taken by concerned parties such as community based organization. Several great examples can be obtained to demonstrate the ability of community-based organizations to manage coastal resources – In India for example, efforts have been taken to conserve the reef-based fisheries for creating new marine habitat while in Malaysia there are several efforts to replant mangrove such as one by IM4U and Institut Rimbawan Malaysia (IRIM) who replanted a total of 20,200 mangrove seedlings at Langkawi Island. In addition to the roles of concern parties and community based organization, the strength of social capital possessed by the SSFM should be used to strengthen the natural capital. The spirit of gotong-royong (mutual cooperative) should be utilized to protect their nature via a number of conservation activities such as mangrove re-planting.

The Physical Capital

The impacts of climate change on the physical capital

The climate change potentially damage the SSFM's productive and non-productive assets. Hurricanes for example can damage SSFM's jetty and fishing tools. As most of SSFM's houses are built by wood or a mix of wood and concrete, it increases its vulnerability towards extreme wind and waves (Mohd Ekhwan, 2006). In 2012, for example, a total of 41 families in Pengkalan Atap village in Kuala Besut, Terengganu were transferred to a safer area as their houses were threatened by extreme waves. In addition to their houses, other public facilities such as community hall, electricity supply, clean water supply and road are also affected by the climate change. Understandably, the recovery process usually takes a longer time as most of them are still living under a poverty (Shaffril et al., 2013; Omar et al., 2012; Bolong et al., 2012).

Why physical capital need to be strengthened?

To have a productive live, SSFM require physical capital, namely assets such as land, other forms of infrastructure, livestock, cash/savings and machinery. To have and to ensure all physical facilities are in a good shape are vital in strengthening the SSFM adaptability. Infrastructure such as jetty, fishing tools, fishing vessels, warning siren and communication line for example, are vital in SSFM fishing operation. Jetty, fishing tools and smaller vessels are vulnerable towards extreme events. Damage on these facilities affect SSFM fishing routine and enhance the risks associated with extreme events.

Relation with other capitals and its benefits

Physical capital and social capital are inter-related to each other. Physical capital strengthen the SSFM social capital as infrastructures such as waqf, community hall and communication line would enable the SSFM to gather and conduct social activities such as repairing nets and playing checkers. Furthermore, physical capital is related to SSFM financial capital. Infrastructure such as jetty and fishermen market are the places where SSFM will meet their middlemen and potential buyers while communication line enable them to share information on potential fishing locations and the best place that offer the best price for their catches. Physical capital preserves the natural capital. Artificial reefs for example will provide habitat for tonnes of potential marine catches for SSFM while infrastructure such as breakwaters offer protection from extreme waves.

Recommendations to further strengthen the physical capital for SSFM

Doubtlessly, strengthening the physical capital can offer much help for SSFM to build a stronger adaptation towards climate change. Effort to reinforce the coastal infrastructure are crucial. SSFM's house for example can be reinforced whereby a fully concrete-based construction of houses should be built. It is also vital for the concerned parties to activate planning controls in preventing development and settlement in highly risky areas.

Wall can be built to protect the community from the threats of big waves and coastal erosion while warning system using the siren can be placed in risk areas to provide an early warning system. Understandably, having all these can reduce exposure while at the same time increase adaptive capacity by assisting the SSFM to assess potential risks, reduce lost or unproductive fishing days, and ultimately reduce deaths due to weather-related event. Furthermore, to have buildings such as schools building and community hall or suitable non-coastal areas are vital as it can be used as temporary evacuation centre during natural disaster while the concerned parties should ensure basic supplies such as electricity and clean water are sufficient.. Supporting facilities to temporary evacuation centres such as transport, tar roads and communication lines must be kept in perfect condition. Understandably, among the related agencies that able to take these roles are Public Works Department (JKR), Department of Irrigation and Drainage (JPS), corporate companies (via their CSR) and interested NGOs.

Financial Capital

The impacts of climate change on the financial capital

The impacts of climate change on the financial capital are usually resulted from the impacts of climate change on other capitals. The impacts of climate change on the natural capital for example will result in less quality and quantity of marine fauna. Extreme events results in less income as it obstructs SSFM from conducting their fishing operations while recovery process due to the damage on SSFM's physical assets (e.g. fishing tools, vessels, houses) are usually costly.

Why financial capital need to be strengthened?

Understandably, financial capital holds the key role to strengthen the SSFM adaptation. As poverty is highly associated with climate change vulnerability, to enhance people financial power is seen as a great effort. At the individual level, efforts to strengthen other capitals such as human, natural and physical can either directly or indirectly strengthen the financial capital. Human capital allows SSFM to have a diverse skills and able to increase their productivity and income while a better natural capital allow SSFM to sustain their fishing activity while at the same time act as the natural defences for them against any threats from the climate change. A better financial power strengthen SSFM adaptation as it allows them to have enough savings or investments for emergency funds and to buy anything which are needed for pre-disaster, during-disaster and post-disaster preparation.

Relation with other capitals and its benefits

A better possession of financial capital can strengthen SSFM's physical capital. With a better financial ability, the SSFM are able to buy a quality fishing equipments and vessels that are more durable to the changing climate. Furthermore, it allows them to build houses that can stands the climate change impacts. A stronger financial capital expedite SSFM's recovery process from the

climate change impacts as they can immediately repair all damaged assets either productive or non-productive while a reverse scenario can be seen among the SSFM with a weaker financial resources.

Recommendations to further strengthen the physical capital for SSFM

Despite strengthening the financial capital via their human, natural and physical capitals, their financial capital can also be strengthened if they are given greater access to financial assistance or loans. Concerned parties and related financial institutions should play a key role in this regard. In addition, financial assistance or loans to be granted should involve minimal bureaucracies as according to Ahmad Faiz et al. (2010) one of the reasons why agriculture communities refuse to apply for financial aid or loan is due to too much 'forms'. Among the agencies that capable to provide loan with less bureaucracy to SSFM is the Agro-Bank and PNK.

Human Capital

The impacts of climate change on human capital

To cope with the climate change impacts, the SSFM need to diversify their sources of income as depending on the marine natural resources might be too risky and offer unstable income for them. Such scenario will post difficulties for those who rely on their fishing skills as their only income-generating skill. Apart from this, for those with education disadvantage and the older SSFM, to learn new skill and to get a new job might post a great challenge to them.

Why human capital need to be strengthened?

As the climate change nowadays results in weather instability, it reduces the number of SSFM fishing operation days – lesser days mean lesser income for them. Such situation is bad for SSFM who solely rely on fishing as their money making activities, however, for those who have a better human capital are expected to steadily cope with the impacts. SSFM with multiple skills vary their livelihood options and enhance adaptive capacity.

Relation with other capitals and its benefits

Having a greater possession of human capital will offer opportunity for SSFM to have a greater possession of financial capital. With alternative skills (other than climate-related activities) will offer a stable alternative income for SSFM while their ability to use multiple fishing tools will enable them to diversify their marine catches, hence able to assist them in increasing their productivity. This vary skills and income sources accelerate their recovery process from any socio-economic destruction caused by the climate change.

Recommendations to further strengthen the human capital for SSFM

To incorporate alternative skills should be the primary means for the SSFM to increase their occupational mobility which eventually will assist them to reduce the risk and cope with future uncertainty (Shaffril et al., 2013). Shaffril et al. (2013) and Shaffril et al. (2017) claimed that alternative skills for SSFM should not be in form of agriculture and tourism related as both are also affected by the climate change. Among the skills suggested by Shaffril et al. (2013) and Shaffril et al. (2017) are vocational (especially for the young one) such as motorcycle or mobile phone repair and entrepreneurship related such as Small Medium Enterprises activity (for both

– the young and seniors). A number of agencies are available to offer the mentioned skills – Majlis Amanah Rakyat (MARA) for example through their institutions such as vocational and technical division and entrepreneurship sector are offering a number of vocational and entrepreneurship trainings while SME corps are offering a number of programs such as SME Soft Loans, SME Mentoring Program, Enrichment and Enhancement Program and Business Accelerator Program (BAP).

Furthermore, diversification of fishing tools, marine catches, and changing to a stronger and more durable vessel are significant efforts that can strengthen SSFM adaptation ability. Ability to use multiple type of fishing gears and targeting multiple species may help to reduce sensitivity to the impacts of climate change. The east coast SSFM who rely on fish or cuttlefish for example are restricted to go to the sea during the monsoon, however, for those who target certain prawn species as their prime target, they are not much affected by the weather as they activities are focusing much on the coastal zone which are less vulnerable to extreme weathers. A stronger and more durable vessel on the other hand are capable to withstand the impacts of extreme waves and wind which then allow the SSFM to explore new fishing location which might results in a higher productivity for them. Having all these – multiple fishing tools, diverse marine catches, and a stronger and more durable vessel can results in a bigger productivity and offer support for poverty reduction initiatives. Due to their huge influences and vast experiences in the fishing activity, individuals such skippers, jetty leaders and experienced SSFM can play their roles in educating other SSFM to enhance their fishing skills either in formal or informal way.

Social Capital

The impacts of climate change on the social capital

Climate change hinder people from conducting their social activities which then might lessen their social relationship strength. Extreme events such as strong wind and waves, thunderstorm, monsoon and flood for example will reduce SSFM activities at the Waqf. Community activities organized by agencies might also be re-scheduled if the places are expected to be hit by extreme events.

Why social capital need to be strengthened?

To strengthen their livelihood strategies, people, groups, communities and families are relying on the available resources around them, through their association with others, clubs, networks and affiliations. A better possession of social capital among the SSFM is a great advantage for them in term of climate change adaptation. Social capital such as relations of trust, reciprocity, and exchange; the evolution of common rules; and the role of networks for example offer much help to further strengthen SSFM adaptation. A stronger relationship among SSFM for example can drive to a better mutual cooperation. This mutual cooperation is crucial in their preparation against the impacts of climate change (pre-preparation), during the impacts and after the impacts (post-preparation). Shaffril et al. (2014) accentuated on the unique social culture of the SSFM – evening gathering at waqf – here is where active information sharing and dissemination processes occurred and this activity offers informal education process which alert SSFM on the disastrous impacts of climate change.

Relation with other capitals and its benefits

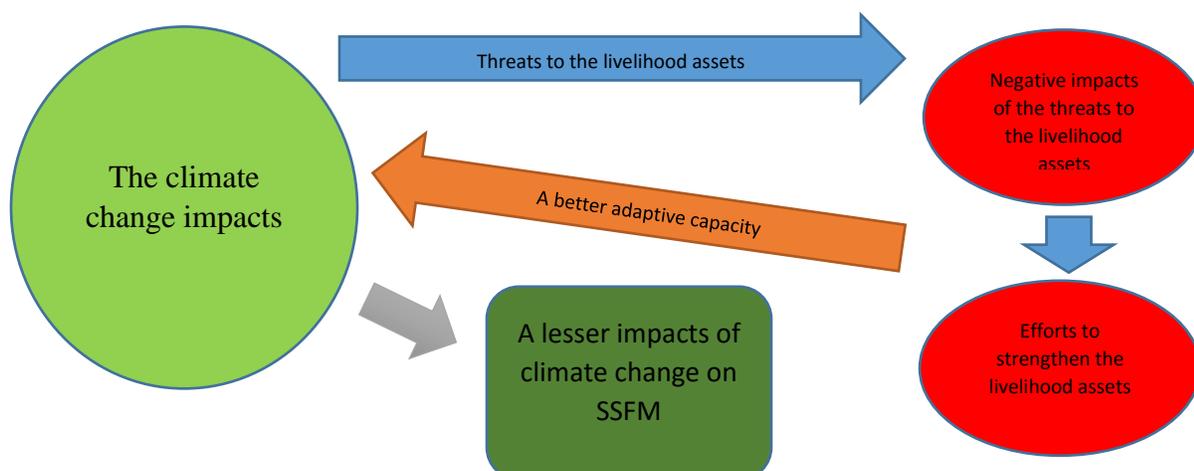
The strength in the social capital can either directly or indirectly synergize human capital, physical capital, natural capital and financial capital. Mutual cooperation and a higher level of trust for example can strengthen the physical capital as more infrastructure (e.g. jetty, waqf, breakwaters) can be constructed, reinforced and beautified. In addition to this, social capital strength can be utilized to strengthen the natural capital whereby the SSFM and the community can work together to conduct more conservation activities. Gathering at waqf is one of important daily routine where informal education and information sharing on the best method to land the fish, potential fishing location, weather and new technology usually take place (Shaffril et al. 2013). Accordingly, having this type of information can contribute towards a better human and financial capitals.

Recommendations to further Strengthen the Social Capital for SSFM

There are various ways to strengthen the social capital, one of it is to encourage community participation in the activities such as mutual cooperation, Sukan Rakyat events (community sports events), merewang (local calls for mutual cooperation during wedding events) and other activities. Agencies such as municipals, corporate companies and the NGOs can play their roles in conducting these social activities. What has been done by Takaful Ikhlas in 2014 should be exemplified whereby their humanity programs for fishermen community in Tok Bali Kelantan are providing much economic assistance while at the same time able to strengthen their social relationship. In addition to the municipals and NGOs roles, more waqf should be built as it is the main gathering place for fishermen to conduct their social activities (e.g. information sharing, repairing nets, play checkers and chatting).

Conclusion

Doubtlessly, climate change has posted a formidable challenge to SSFM livelihood. The impacts of climate change has altered the climate stability and result in reducing marine sources and destruction of marine habitat which eventually concerned with the social and economic life of SSFM. Understandably, having a strengthened livelihood assets are able to intensify SSFM adaptation against the climate change impacts. Based on the authors understanding of the reviews, the produced model can offer a simple explanation on how the climate change affects the livelihood assets, nevertheless, the intensification of the assets on the other hand can offer much help in lessening the impacts of the climate change.



Understanding what makes the SSFM vulnerable to threats of climate change is a crucial task for scholars, governments, donors and civil society. Within the scope of this paper, we present a comprehensive discussions on the importance of livelihood assets to assist SSFM in facing the impacts of climate change. We plotted on how the impacts of five capitals namely human, social, physical, natural and financial or also known as Pentagon on SSFM adaptability while at the same time provide several suggestions regarding efforts to further strengthen the capitals. In general, this paper conclude that a diverse skills, a healthier social relationship, a richer marine resources, a systematic physical development and a stronger financial resources are among the key to strengthen the SSFM adaptability towards the climate change.

Prominently, differing levels of capitals possessed by SSFM may trigger a different adaptation strategies. For example, a different adaptation strategies are needed for the SSFM in the east coast of Peninsular Malaysia compared to the west coast as they are possessing a lower financial capital, facing a serious coastal erosion and are affected by the monsoon (Shaffril et al., 2013). Albeit the discussion are associated with the impacts of livelihood assets on the adaptability of SSFM, this approach however, provides a framework on how other community groups should use the livelihood assets in facing the impacts of the changing climate.

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