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The Coastal Community Views on the Environmental Changes

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Abstract

This study aims to explore coastal community views on the environmental changes. Their views are covering four aspects, their awareness, the causes, the impacts and things they have done to absorb the impacts. The data were gained via three FGDs conducted with the coastal community at Kuala Besut, Tanjung Piai and Lumut. Based on the FGDs, it can be concluded the coastal community is aware of the changes and they claimed these changes are mainly caused by two sources – the human and the natural factors. The changes are predominantly impacting them in negative ways and require them to have some initiatives to apprehend the impacts. A number of recommendations are highlighted and hopefully, it can guide the concern parties in constructing related strategies that can assist the coastal community in lessening the impacts of the environmental changes.

Keywords: Coastal Community, Environmental Management, Community Development

Introduction

Malaysia is moving forward to 2020 – whereby by that time it aims to achieve the status of a developed country. Having this status denotes the obligation of the government to not merely focus on the country physical and economic development, but also to accentuate on the socio-economic aspects of its community. To ensure all community groups will have equal access to strengthen their socio-economic, all related obstructions need to be removed. The coastal community is one of the important groups in Malaysia and their roles, especially in ensuring the nation's food security and diversifying economic activities in the rural areas are vital. Similar to other community groups, coastal community are facing several problems that post a formidable challenge to their daily routine and one of it is the environmental changes. Understandably, as their reliance on the environment are high, such changes are producing a significant impact in their life.

The resulted negative impacts of the environmental changes on the socio-economic routine of the coastal community driven the needs for more related studies to be conducted. Understandably, this is important as the need to provide a depth understanding of this scenario is mounting. Although several studies were conducted out there, much of it is scientific in nature and less has been focused on the social aspects, which eventually left a huge gap to be filled by the social scientist. In response to this, the main aim of this study is to investigate the views of the coastal community on the things related to the environmental changes – their awareness, the impacts, the causes and things they have done to adapt to the changes.

This study is expected to produce a number of significances. First of all, it contributes to the existing literature by producing knowledge related to the views of the coastal community regarding the environmental changes. Second, it alerts on needed practices to assist the coastal fishermen to absorb the impacts of the environmental changes and third, it assists the concern parties in constructing related strategies to further reduce the impacts of the environmental changes that are in line with the need, ability and interests of the coastal community.

The coastal community in Malaysia

According to Mohd Ekhwan (2006), there is a total of 4,675 km of coastal areas in Malaysia of which a total of 2,068 km is in Peninsular Malaysia and 2,607 km is in East Malaysia and some portion of these areas are settled by the community. The coastal community are playing important roles in Malaysia, especially in ensuring the nation's food security as portions of them are working as a fisherman (Shaffril et al., 2015). In addition to fishing related activities, Shaffril et al. (2015) confirmed some of the coastal community is relying on agro-tourism activities such as the homestay industry, recreational fishing, boat rental and small medium enterprise activities (SME) as their additional income generating activities (Muhammad et al., 2012). Among the popular SME products produced by the coastal community are keropok lekor, satar – both are snacks made from fish, dried fish and cuttlefish and salted fish. In terms of demography, the majority of coastal-community members are 'senior' villagers (aged between 40 and 65 years old), who have lived in the areas for many years (between 15–30 years) (Muhammad et al., 2012; Shaffril et al., 2013). Although some of the coastal community is considered as the poor, however, a majority of them are the moderate income earners (Muhammad et al., 2012; Omar et al., 2013; Shaffril et al., 2013).

The impacts of environmental changes in the coastal community

The environmental changes in Malaysia can be caused either by the human factors or the natural factors (Wai et al., 2005; Tanggang, 2007; Md. Din and Mohd Omar, 2009; Wan Zawiyah et al; Kajikawa, 2012; Razali et al., 2010; Pontecorvo, 2008; Cho, 2012; Halfar and Fujita, 2007) and it posts a formidable challenge to the coastal community. In term of the impacts of natural factors, coastal community are most vulnerable towards extreme events such as strong wind and waves. The most obvious impacts of the extreme events are the damages it can produce to the coastal community physical infrastructure. The case in Pengkalan Atap, Kuala Besut and Sabak, Pengkalan Chepa for example, forced a number of families to move to a safer place as their houses were destroyed by coastal erosion and extreme waves. In Batu Pahat, Johor, the coastal areas kept eroding for 2m each year and affected agriculture productivity over there (Sinar Harian, 2012).

Furthermore, environmental changes caused by human factors, such as excessive coastal development can damage the habitat of several marine species, for example, the mangrove. Consequently, it forces some species to move to another habitat, which means less productivity to those who rely on marine resources. In addition to this, activities such as bottom trawling and overfishing decrease the number marine resources (Pontecorvo, 2008; Cho, 2012). Badjeck et al. (2009) on the hand claimed climate change destabilized some of the environmental elements (e.g. ocean currents, rainfall, sea level rise, temperature, etc.) and eventually lessening the quality and the quantity of the several marine resources. In addition to this, this instability impacted the community livelihood on a wider scale.

The coastal community's health and safety are another two aspects that are threatened by the environmental changes. It is proven that the rising temperature can have effects on patient with heart problem, skin diseases, malaria, morbidity and it is also proven that unstable rain pattern has impacted on the number of dengue cases recorded (Confalonieri et al. 2007; Vandentorren and Empereur-Bissonnet 2005; Pinto et al., 2011). Furthermore, extreme events enhanced the risks to the coastal community. Loss of mangroves caused by human and natural factors, for example, resulted in the loss of coastal community natural 'defence' against the strong wind. Furthermore, for those who rely on fishing activities, especially those with a smaller vessel, extreme weather will enhance the risks associated with their fishing operation.

Methodology

This study is qualitative in nature whereby the data were collected through three FGDs. The FGDs were conducted at Lumut, Tanjung Piai and Kuala Besut. These places are selected as they are facing the environment change either caused by the human or natural factors. Lumut is a district in Perak whereby a number of mega projects are running over there – for example, the Lumut Power Station. Lumut also has a number of main fishermen's jetty such as on Pangkor Island that places hundreds of vessels that are equipped with several types of fishing tools inclusive of bottom trawling. Tanjung Piai is situated at Southern Johor and according to Awang and Abdul Hamid (2013) Tanjung Piai is one of the places that experience sea level rise. Furthermore, it is a dock for big ships and it is also a place where a number of mega projects are placed, for example, the Tanjung Bin Power Station. Kuala Besut especially at Kampung Pengkalan Atap is situated at Northern Terengganu and currently is facing serious coastal erosion. It is near (roughly about 3km) to the LKIM jetty, where the vessels, inclusive one that use bottom trawling are placed.

The first FGD was conducted at Kuala Besut with a total of four villagers and it lasted for an hour and three minutes. The second FGD was conducted at Tanjung Piai with a total of six villagers and it lasted for 56 minutes and the last FGD was conducted at Lumut, Perak with a total of three villagers and it lasted for 45 minutes.

All the FGDs started by the researchers have some ice-breaking with the informants. The researchers started slowly by introducing themselves and then informed the informants on the objective of the FGD. Then, the conversation move to the next stage as the researchers were asking some information about the informants' background. Subsequently, the FGD focused on four main questions that were designed to assist the researchers to achieve the determined objectives. The questions are 1) their awareness of the environmental changes; 2) Their views on the causes of such changes; 3) the impacts of the changes to the community and 4) Their responses towards the changes. Within the FGDs, the informants were allowed a degree of freedom and flexibility in their answers. To have suitable and appropriate

informants for the FGDs, the selection was made by village leaders, jetty leaders and the Presidents of Association of Small Scale Fishermen of Peninsular Malaysia. In general, questions related to the impacts of the changes to the community took the longest time in the FGDs. The data obtained were later transcribed verbatim and analysed using thematic analysis.

Tanjung Piai	Occupation
KTP1	Labour/part time fisherman
KTP2	Factory worker
KTP3	Farmer
KTP4	Businessman
KTP5	Farmer
KTP6	Welder
Kuala Besut	Occupation
HT1	Housewife
HT2	Housewife
HT3	Housewife
HT4	Housewife
Lumut	Occupation
NP1	Retiree
NP2	Factory workers/part time fisherman
NP3	Businessman

Results and Discussions

1. The changing environment and the views of coastal community

This part views the informant awareness of the changing climate. Via the FGDs, a number of themes have emerged, namely the rising temperature, difficulties to predict the climate, unstable rain pattern and extreme waves.

1.1 Have they felt the changes?

When they were asked whether they felt the environmental changes occurring at their places, most of them admitted the changes and to have this is not surprising as a number of local studies have looked into these changes (Wai et al., 2005; Md. Din and Mohd Omar, 2009; Wan Zawiyah et al., 2010; Wan Azli, 2010; Kajikawa, 2012; Razali et al., 2010), one of the informants clarified

> *In 2000, the climate is still ok, suddenly, in 2002, I could feel the apparent environmental changes. (KTP 5)*

In addition to the environmental elements such as temperature, raining pattern, wind and waves, one of the housewife in Terengganu expressed her concern on degrading marine sources as his family are relying on such sources for their income generating. She stated

> *The fish is not much as my husband early days as a fisherman (HT 1)*

1.2 Difficulties to predict the climate

The coastal community is commonly associated with their ability to predict the weather via their indigenous knowledge. Indigenous prediction skills such as referring to the cloud, wind and stars are still practiced, nevertheless, due to the changing environment, predicting the climate is not an easy task anymore (Abu Samah et al., 201; Shaffril et al., 2013), a housewife in Terengganu stated

Yes, it is difficult to predict (the climate) (HT 1)

KTP 1 expressed his agreement with HT 1 and claimed, to this day, the weather is not certain. KTP 1 stated

We cannot 'read' it (the weather) any more, it has changed (KTP 1)

1.3 The rising temperature

Among the obvious environmental changes felt by the Malaysian coastal community is temperature rise. They stated the weather nowadays is hotter compared to the past. To have this is not surprising as a study by Wai et al. (2005) confirmed several places in the East Coast Region – such as Terengganu and the Southern Region – such as Johor are experiencing a hotter day and night. One of the informants stated

To weather is too hot (HT2)

What has been claimed by HT2 is supported by KTP3 and he tried to explain it by comparing the current temperature with the previous one.

In the past, this problem (rising temperature) is not too obvious, we can stand it, however, in this day, and I think it is too hot, it has passed 30 degree Celsius (KTP3)

1.4 Unstable rain pattern

The unstable rain pattern is another obvious environmental change experienced by the coastal community and local scholars such as Wan Zawiyah et al. (2010) and Wan Azli et al. (2010) confirmed on the unstable raining pattern in Malaysia, especially at the East Coast and the West Coast regions of Peninsular Malaysia. One of the informants clarified on a longer raining season at her place by stating

This year, it (the raining season), is a bit longer than the past, it continues from February, March, April, May and June (HT 4)

While informants in Terengganu expressed their concern a longer raining season, informants in Johor on the other hand were experiencing a contradict scenario. One of the informants stated

For me, it is better to have longer raining season, for this year, the rain comes rarely, we have never experienced this before... (KTP 3)

1.5 Extreme waves

Extreme waves is another change detected by the informants. According to them, the waves nowadays are too big and extreme. Mohd Ekhwan (2006) reported that extreme waves are one of the contributors for coastal erosion in Malaysia and within the scope of this study, places such as Pengkalan Atap Village and Tanjung Piai are facing serious coastal erosion. KTP 5 expressed

The waves – I cannot imagine it, it's too big and extreme (KTP 5)

2. What are the causes?

Having these changes are gearing us to the next query, what are the causes of these changes? The study's focus subsequently look into three emerging themes, namely the human factor, the natural factor and the spiritual factor.

2.1 Human Factor

Under this theme, further discussion with the informants managed to produce several sub-themes, namely infrastructure development, pollution, bottom trawling and overfishing.

2.1.1 Infrastructure Development

According to the informants, infrastructure development is among the main cause of the environmental changes at their places. They claimed the development forced several marine species to seek a new habitat

> *There are too many development projects, the navy project, the power generating project, so they (the fish) 'ran' away. (NP 1)*

What has been said by NP 1 was supported by KTP 2 who referred to infrastructure project as the cause for the environmental change. He further stated that this project affects the community's health.

> *It also can be caused by the new development, such as Tanjung Bin, it has changed the environment and some people (their health) are affected by these changes (KTP 2)*

2.1.2 Pollution

According to the informants, the development polluted the sea and this caused several species to seek a new habitat. To have this is not surprising as the impact of environmental pollution is more severe in developing countries (inclusive of Malaysia) and it is inevitable in places where development are taking place (Halfar and Fujita, 2007). NP 1 clarified

> *The number of fish is degrading, the sea is polluted by oil and other pollutants, that's why they (the fish) are moving to other locations (NP 1)*

KTP 1 clarified on the impacts of the dock at their places whereby he claimed the waste from the ships are polluting the sea. He further stated

> *The sea has been polluted, the waste from the ship (the oil) has polluted the ecosystem and eventually some species need to seek a new habitat (KTP 1*

2.1.3 Bottom trawling

Bottom trawling is a catching technique within the fishing industry that uses a large net with heavy weights dragged across the seafloor, scooping up almost all things in its path – from the targeted fish, their breeds, corals and other incidentally non-targeted species. This technique is one of the causes for degrading marine sources (Cho, 2012). In line with this fact, NP2 expressed their concern on the impacts

> *Unlike other catching techniques, the bottom trawling technique catches everything*

2.1.4 Overfishing

Overfishing is a global problem and has been constantly proven as one of the main factors for degrading marine resources in the world (Pontecorvo, 2008). Within the scope of this study,

the resulted findings are in line with the global trend and this can be based on the clarification of NP 2.

> *'There are too many fishermen nowadays, too many vessels, the catching technologies are becoming advances, all of these lead to overfishing, I'm afraid there is no more fish for our next generation'*

2.2 Natural causes – the changing climate

The findings of this study are in line with scientific studies done by Wai et al. (2005), Md. Din and Mohd Omar (2009), Wan Zawiyah et al. (2010), Kajikawa (2012) and Razali et al. (2010) who looked onto the impacts of climate change on our environment. One of the informants clarified on the impacts of climate change on the raining pattern

> *It is caused by the nature, if it is raining, it rains heavily (KTP 5)*

NP 3 on the other hand are looking at the impacts of climate change on the rising temperature in our country and he stated

> *The climate change and the global warming is causing our world to be hotter (NP 3)*

2.3 Spiritual related

Interestingly, one of the informants connected the changing environment with low spiritual aspect possessed by the community and he stated

> *The natural factor can be the cause, the human themselves can be the factor, when they managed to land a lot of fish, they are not being grateful to God, not thanking the God, that can also be the cause (for the environmental change)*

3. The impacts of the causes to the community

The next discussion focuses on the community views regarding the impacts of these changes to their daily life. From the FGDs conducted, a number of themes emerged, such as the impacts of these changes on the community aspects such as the nature, physical infrastructure, health, finances and safety. Furthermore, some positive aspects are highlighted.

3.1 Impacts to the nature

Under this theme, further discussion among the informants managed to produce another two sub-themes, namely the natural disaster and the coastal erosion.

3.1.1 Natural disaster

According to Tanggang (2007) most of the natural disaster in Malaysia is caused by the two main factors – the extreme weather and the poor planned development. In line with Tanggang (2007) claim, one of the informants stressed

> *This year we were struck by flood twice, there are too many developments over here, the drainage system is not too good and things are worsening due to extreme weather (HT 1)*

3.1.2 Coastal erosion

Mohd Ekhwan (2006) claimed that 29% of 4675 km coastal areas in Malaysia was eroded and among the serious affected area is the Pengkalan Atap Village. One of the informants stressed this problem by stating

Previously, the sea is far away from our home, but today, it gets nearer… (HT 1)

What has been stressed by HT1 is supported by HT2. HT2 tried to compare the current situation with her early days in the village

Previously, the erosion is not too serious, but today, the sea is getting nearer to our house.

3.2 Impacts to physical infrastructure

Those who settle in the coastal areas, their physical infrastructure are vulnerable to extreme weather such as strong wind and waves. Their vulnerability level is expected to be higher as Mohd Ekhwan (2006) claimed most of the houses built in the coastal areas in Malaysia are fully built or semi-fully built from wood. One of the informants stated

Two houses have been hit by strong wind and waves, in the coastal area (HT1)

3.3 Impacts to health

The changing environment, especially the rising temperature is affecting the community's health, especially their skin and previous scientific studies by Confalonieri et al. (2007) and Vandentorren and Empereur-Bissonnet (2005) confirmed the impacts of rising temperature on human skin. One of the informants stated

When the weather is hot, my skin gets itchy (HT2)

HT 3 added the effects of the rising temperature are more severe on their kids and also older people, he further stated

Most of them are kids, there are also older people (HT3)

3.4 Impacts to their financial aspects

Under these themes, two sub-themes emerged, namely lower productivity and decreasing income. The next part of this study focused on these two sub-themes

3.4.1 Lower productivity

The informants claimed the changing environment is affecting the marine resources and to have such findings is in line with a study done by Badjeck et al. (2009) who claimed on the degrading marine resources due to unstable climate. HT1 explained on the lower productivity nowadays by stating

Compared to the past, the number of fish is reducing

HT1 further added *'the anglers, they only managed to catch small fishes'*

Another informant expressed his agreement on the impacts on the changing environment on his agriculture productivity

The palm oil, it needs more water, when their water supply for the palm tree is inadequate, it reduces its size and quantity. (KTP 3)

3.4.2 Decreased income

As there are lower agriculture and marine related productivity, it results in a lower income for the community, especially those who rely on the environment for generating their income. HT2 has stated

Our income has reduced

HT3 on the other hand touched on the reducing income of those who rely on tourism related activities whereby she stated during the monsoon season, most of them have to temporarily stop their boat rental activity for almost three months

Here, In Kuala Besut, some of them are conducting tourism activities (boat rental), during the monsoon, they have to stop it for almost three months.

KTP 6 in his view stressed the rising temperature affects the quality and the quantity of the palm tree productivity and consequently, it reduced the selling price

It affects the price, if the productivity (palm oil) is reduced in its size and quantity, so it also affects our income

3.5 Impacts to their safety

Under this theme, further discussion with the informants managed to produce three other sub-themes, namely increased risks, trauma and increase pressure to explore new catching areas.

3.5.1 Increased risks

The changing climate caused several extreme weather cases in the country and the similar thing goes to the informants areas. Strong wind and waves seem to be the common extreme weather that struck the informant areas and for those with a smaller vessel, they are highly vulnerable. One of them has stated

The waves are too big and it is too dangerous for small vessels (HT 4)

KTP 5 added some information on the increased risks by stating

We call it as the 'West Wind', it is very strong and dangerous for us (KTP 5)

3.5.2 Trauma

Extreme weather caused trauma for the locals, some of the informants who have experience being struck by the extreme weather clarified this by stating

We cannot sleep (HT 2)

HT4 agreed with HT 2 and she stated strong wind and thunderstorm caused trauma among them

If there is a strong wind or a thunderstorm, most of us cannot sleep

3.5.3 Increase pressure to explore new catching areas

As the climate change and human actions (e.g. bottom trawling and overfishing) reduced the marine resources, the informants claimed the fishermen in their areas have to explore new catching areas and it is far from their dock. One of them stated

Previously, we just catch fish around here, just two miles nautical from the dock, now, no more, we have to catch at other places, 15 miles nautical from the dock (KTP 5)

Some of them who previously worked as a fisherman informed reducing marine resources has forced him to operate his fishing routine at the international border (which still has plenty of marine resources), and for that he was caught three times by the authorities. He stated

I've been caught for three times

KTP 3 also stated some of the fishermen at his areas are forced to find a new catching area as there is a lack of marine resources such as fish and prawn in their areas. He further stated

For now, the fishermen are the one that needed to search other places as the fish and the prawn are hardly found over here

3.6 Positive impacts

Although the changing environment was found to produce many negative impacts, some of the informants stated the changing environment is also beneficial for the community especially for the SME entrepreneurs. One of them has clarified

The keropok lekor (fish snack) and dried cuttlefish, it dries very quickly (due to the hot temperature) and the entrepreneurs save much time in the drying process (HT 1)

4. What they have done in response?

As the changing environment are affecting their nature, physical infrastructure, health, financial aspects and safety, some of them have taken some initiatives to reduce the impacts. Two themes had emerged, namely the usage of technology and increasing their alertness.

4.1 Usage of technology

One of the informant stated that the community at their places, especially those who are involved in the fisheries activity started to use technology such as GPS to reduce the risks associated with their fishing activities. Referring to Osman et al. (2014), GPS offers superior navigation functions for the fishermen and is able to navigate them accurately and safely to the dock during bad weather. One of them stated

During the haze, for example, the visibility is poor, luckily they have a GPS and were able to return to the dock safely (KTP 5)

4.2 Enhance their alertness

To further reduce the impacts of the changing environment, the informants strengthen their alertness, especially on any changing climate in their places, some of them are still practising their indigenous knowledge, although they know that it is not an easy task. One of them clarified

If the cloud gets darker and there is lightning, we know that a thunderstorm is approaching and most of us are staying at home. (KTP 3)

NP 1 agreed with KTP 3 and he further added

If there is any sign of lightning at sea, it would be better for us, especially the fishermen to cancel their fishing operation and stay at home (NP 1)

Recommendations

Although some of the informants clarified their efforts to absorb the impacts of the environmental changes, however, more efforts are needed to further strengthen their adaptation ability. A number of additional efforts related to conservation awareness, early warning system and frequent monitoring are discussed.

Conservation awareness

The environmental changes geared a need for more conservation awareness activities among the coastal community. This is vital as it can further enhance their awareness on the importance of environmental sustainability. Periodical campaign and talks can be conducted by the related agencies, while the coastal community needs to establish cooperation with NGOs, universities, private companies, government agencies for in conducting conservation awareness activities for the purpose of conserving the environment. Among potential conservation activities that can be conducted are mangroves replanting and placing artificial reef at the identified potential catching areas.

Early warning system

Early warning system strengthens community preparation against threats resulted by the environmental changes. It communicates threat information and early warnings while at the same time increase community awareness and strengthen their response capabilities. Among early warning system technologies that are capable to assist in coastal communities are siren, mobile phone technology, forecasting and modelling technology, satellite communication technology, crisis mapping and ICTs for crowdsourcing.

In addition to this, there is a need to enhance community readiness towards any impacts of the environmental changes, especially the extreme weather. Courses should be conducted and it should instil strategies that are proactive and reactive in nature. Proactive denotes the needs for the coastal community to know the preparation in facing the disaster while reactive denotes the reactions of the community during the disaster - they already knew whom to contact, where to go and things that should be avoided. Such courses can be conducted by several agencies that have vast experiences in managing natural disaster such as MERCY and JPAM.

Frequent monitoring

Frequent monitoring is needed to further reduce the number of illegal bottom trawling activities. Although monitoring activities are currently conducted by a number of related agencies, nevertheless, the number is still inadequate and need to be added. A program similar to Rakan Cop – a Malaysian community police corps, which was launched by the Royal Malaysian Police - can be established between the coastal communities, whereby any illegal activities that might harm the environment can be reported to the authorities.

Conclusion

Based on the findings, the coastal community is aware of the changes occurred in their places. They claimed the changes are caused by human factors such as infrastructure development, pollution, overfishing and bottom trawling. Moreover, the changes are affecting their nature, their financial aspects, their health and their safety. To absorb these impacts, they stressed on need to enhance their alertness while some are using the technology. Some additional

recommendations are included in the study such as conservation awareness, early warning system and frequent monitoring.

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