



Flood Risk Mitigation: Pressing Issues and Challenges

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ABSTRACT

The increase number of natural disasters that struck the world gives damaging impacts to the people and properties. This paper attempts to examine crucial pressing issues and challenges in mitigating flood losses and loss of lives in Malaysia. Only qualitative approach is used to address these pressing issues and challenges of natural disaster. Kelantan is one of the states in the east coast of Malaysia that experienced the highest loss of properties and infrastructure in 2014 massive flood. Semi-structured interview was designed and used to collect data from six government agencies in the state of Kelantan. These agencies were, Kelantan State Education Department, Kelantan State Department of Rescue and Fire Brigade, Kelantan State Health Department, Local Authority of Kuala Krai, Kelantan State Social and Welfare Department and Kelantan State Police Contingent. The finding of the study revealed that there were eight pressing issues and four challenges. The eight pressing issues are flood preparations, lack of rescuers, lack of awareness, communication difficulty, lack of assets for rescue, transportation issues, the absence of food supply, and other constraints. On the other hand, the challenges are lack of provisions, redevelopment, the social and economic situation, and trauma. These pressing issues and challenges need to be seriously addressed by the State and Federal level of Government of Malaysia so that future natural disaster like the 2014 flood can be managed in a much more prepared way or manner.

Keywords: Disaster Risk Reduction, Natural Disaster, Flood, National Security Council Directive 20, Malaysia, Pressing Issues, Challenges

JEL Classifications: F52, H84, Q54

1. INTRODUCTION

The word disaster was very familiar to us. This is because the world is always struck by this catastrophe. Disaster can be described as catastrophe events that hit vulnerable area resulting destruction of properties, infrastructure and death. Fischer (1998) defined disaster as actual or threatened accidental or uncontrollable events that cause serve danger to the social structure of the society and destruction to the properties. With a clear understanding of the meaning of disaster, the world needs the comprehensive approach and solution to overcome the impact of natural disaster.

The world constantly hit by the disaster that caused immense loss of property and lives. The Centre for Research on the Epidemiology of Disasters has been maintaining an Emergency

Events Database (EM-DAT). The EM-DAT contains relevant core data on the effects and occurrence of over 18,000 disasters in the world from 1900 to present (<http://www.emdat.be/>). This database is compiled from various sources, including UN agencies, non-governmental organizations, insurance companies, research institutes and press agencies (<http://www.emdat.be/>). Table 1 indicates the statistic of natural disaster that occur in the world from the 2010 to 2015.

Based on these statistics there should be some ways to cope with natural disaster. Malaysia is also affected by natural disaster. The most common natural disaster that is faced by the Malaysian is flood. The largest history of flood that hit the East Coast State of Malaysia (Kelantan, Pahang and Terengganu) was in November and December 2014 (thesundaily.my 29 December, 2014). In

this flood, the state of Kelantan recorded the most staggering lost of RM934.4 million, followed by the state of Pahang, RM610 million, and the state of Terengganu, RM304 million. The highest ever recorded of 160,000 people evacuated during the onset of the flood (reliefweb, 28th December, 2014). Miraculously only 10 people lost their life. Serious attention and measures should be taken by both federal and state government so that they are much more prepared for future natural disaster.

During the world conference on disaster risk reduction (DRR) held in Kobe, Hyogo, Japan, it is agreed that DRR as one of formula that can reduce the end effect of natural disaster. For this very reason, the United Nation Office for DRR (UNISDR) which is the world organization that have good standard practice of DRR which provides guidance to any country on eventuality of occurrence of natural disaster. Malaysia is one of the country which uses DRR framework in addressing natural disaster. This framework is adopted from Hyogo framework. However, the Malaysia government established its own framework in handling of natural disaster. This framework is popularly known as National Security Council (NSC) Directive 20. Although DRR framework exists, there is still concern over the severity of loss and management of natural disaster. What is not discuss is on the pressing issues and challenges of using DRR framework in the containment of loss (of life and infrastructure) and the management natural disaster itself. Recent studies only focused on the factors of disaster risk management, flood management, community preparedness and community awareness (Rahman, 2007; Katuk et al. 2009; Zainuddin et al. 2010; Raman et al. 2014; Zakaria and Mustaffa, 2014). Studies on the issues and challenges of DRR application particularly in Malaysia is still lacking. Hence, this paper attempts to focus on the pressing issues and challenges in the adoption DRR as a tool to prepare for natural disaster, specifically, flood.

2. LITERATURE REVIEW

2.1. DRR

DRR can be define as the conceptual framework with elements to be considered on the possibilities of minimizing the vulnerabilities and disaster risks in the communities (The United Nations Office for DRR website). DRR further avoid (prevention) or limit (mitigation and preparedness) the adverse impacts of hazards, within the broader context of sustainable development (The United Nations Office for DRR website). This definition can also be summarized as the concept and practice of reducing disaster

risks through systematic efforts by analyzing and managing the causal factors of disasters which include through reduction of exposure to hazards, lessened the vulnerability of people and property, wise management of land and the environment, and improved preparedness for overcoming adverse events. DRR can also can be defined as the combination of disaster analysis, disaster prevention and mitigation, and disaster preparedness (Rottach, 2010). Figure 1 shows what constitutes DRR are the analysis, prevention and mitigation and preparedness of disaster (Rottach, 2010).

A disaster’s severity depends on how much impact a hazard has on both society and the environment. The scale of the impact in turn depends on the choices we can make for our lives and environment. These choices is related to on how we produce our food, where and how we build our homes, what kind of government we have, how our financial system works and even what we teach in schools and universities. Each decision and action makes can either make us more vulnerable to disasters or more resilient to them. UNISDR also stated that DRR is about choice. Beside that not only the government must act to prevent it but also the community. As such DRR is about the responsibility of all people living on earth, therefore everyone needs to instill a sense of awareness of natural disaster preparedness in order to live in.

2.2. DRR Framework in Malaysia

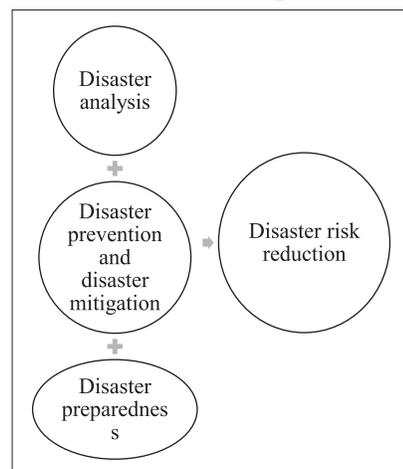
Malaysia stills lags behind the adoption of disaster management system in handling natural disaster. There should be strong emphasis as Malaysia is still new in the construction and implementation of disaster management. Besides the 2014 unexpected floods where the water level reached beyond the normal has caused an estimated loss of RM1 billion (USD250 million) in Kelantan alone (BH Online, 1st January 2015). On the other hand, the 2015 earthquake in East Malaysia also shock the country. This earthquake struck Kota Kinabalu with a death toll of 24 people (reliefweb, 28th December, 2014). It is crucial for the government to include all available parties in the management of disaster in Malaysia.

The National Security Division (NSD) in the Prime Minister’s Department is responsible for the organization and management

Table 1: Statistic of world natural disaster (2010-2015) (EM-DAT)

Year	Event	Total death	Total affected (injured, affected, homeless)	Total damage (0.000 dollar)
2010	435	329,998	260,483,654	132,194.096
2011	316	34,143	212,769,425	364,093.168
2012	370	11,526	111,288,005	156,480.867
2013	355	22,225	96,829,928	119,446.189
2014	344	19,882	141,926,230	98,447.407
2015	153	15,460	11,519,215	14,609.197
Total	2018	433,234	834,816,457	885,270.924

Figure 1: Disaster risk reduction components (Rottach, 2010)



of the activities related to disaster. The NSC Directive 20 delivered guidelines includes the responsibilities and functions of the various agencies. This Directive 20 is aims to outline the policy and a management mechanism comprehensively covers the stages of disaster before, during and after an event disaster on land. This directive also deliberate on the roles and government agency responsible, statutory bodies, private parties and bodies volunteer in disaster management (NSC, 1997).

To carry out the responsibilities of the Directive 20, NSC's Disaster Management and Relief Committee (DMRC) will have to play a major role in coordinating disasters at the three different levels (NSC, 1997). First level is at the districts, second level is at the States and the third Level is at the Federal. When a catastrophic event occurs, the DMRC will take the responsibility to start the following actions such as; evaluate the situation and determining the disaster level and scope, formulate action plan for managing disaster, determine capability in disaster management, determine the types of assistance required from higher or outside authorities and to surrender or take over the disaster management based upon evaluation of event.

Based on the study conducted by Zainuddin et al. (2010), it is identified that the level of disaster preparedness as one of the stand out issue that need to be addressed during any natural disaster. Rahman (2007) discovered similar finding encounter by agencies in the DMRC. These agencies need to have full knowledge and good practice on the Directive 20 as they are the only official body that take up total responsibility to the help community when disaster occur. Otherwise, the Directive 20 framework whose main priority to assist the community in the stage prevention, preparedness, response and recovery will not achieve its objective.

In Malaysia, there were numerous researcher who have conducted study on DRR. A recent study by Islam et al. (2016) discuss flood disaster risk, pre-post disaster program, emergency response and recovery and flood risk mitigation. In Malaysia, the role of NSC and various agencies such as Education Department, Department of Rescue and Fire Brigade, Health Department, Local Authority, Social and Welfare Department and Police Contingent.

Raman et al. (2014) has proposed framework for vulnerability community. Web-based Community Disaster Management and Awareness System (CEMAS) have been created also by Raman et al. (2014). This paper presents the functions inherent in a prototype DRR system that was developed for emergency management. What is interesting about this system is that the usefulness in creating awareness on emergency management was discovered. The system purpose of this created because of disaster in Selangor such as flood and landslide have proven that loss of life and property is unavoidable. This is because of population are unprepared for disaster and not have an emergency plan in place. They lack of solution to enhance disaster readiness.

The way CEMAS, the web-based information system works is that it enhance the aspects of disaster management for any organization. It can be placed to everyone quick information retrieval where solid structure and a clear of emergency information could be

established. As such it can be one of solution to mitigate losses come from disaster. Usually people are not prepared and do not have any idea of executing an emergency plan when disasters happen. Like in the 2014 flood, social network community of the flood affected area is severely or total affected and disabled. The approach of web-based community disaster management can provide the community with awareness, good knowledge and information. Thus, good planning and discussion between government and agencies through a perfected CEMAS will be addressed the issue of management of natural disaster.

The architecture of a web-based support system for agencies and flood response operation is vital in the process and data management towards providing prompt and effective response. However is often disrupted when huge natural disasters occur. This system is expected to improve the overall aspect of flood response operation through electronic features which facilitate the flood response process and data management (Katuk et al. 2009). This system also assist the flood management related agencies in managing and maintaining data related to floods by allowing them to monitor the current situation of flood-related matters. This kind of system offers better organization of data and allows faster data retrieval needed to make appropriate decisions (Katuk et al. 2009). Manual data recording process should not be used because it create problem such as error in documenting the data and delay in generating reports. CEMAS overcome this problem by giving more quick and well-organized during the flood response activities. Besides that, it's also providing effective and efficient relief to flood victims.

Zakaria and Mustaffa (2014) highlighted that the understanding of relationships among source credibility, risk communication and well-being in disaster management context are the disaster management information. These information focus towards feeding warning message before a disaster that link between source and receiver in area in which is a person living at risk. Good resources and communication are required to assist people in the risk area to obtain information and get response to disaster. Source credibility is an important aspect in disaster because people need to learn to evaluate information received. It works by listening, understanding, trust, verify and respond to a warning message and the campaign environment (Blanchard-Boehm and Cook, 2004). Disaster management information impact on the well-being of the population. However, the impact of flood disasters on the people living in areas at risk can be reduced by having effective warning messages. These messages containing information that might harm the people can be conveyed through emergency and evacuation orders (Fothergill and Peek, 2004).

On the other hand, Billa et al. (2006) have come out with Comprehensive planning and the role of spatial decision support system (SDSS) in flood disaster management in Malaysia. SDSS was referred to SDSS which are based on five main components. These components are database management systems, analysis procedure in model base management system, a display generator, a report generator and user interface. The information provided in the system information is about a proposed comprehensive disaster management program for Malaysia which highlight the

role of SDSS in improving decision-making. It recognizes the strength SDSS in the collection and processing of information to speed up communication between the supporters of the disaster management program. A well-designed SDSS for flood disaster management should present a balance among capabilities of dialog, data and modeling. Besides that, SDSS is an interactive computer-based system designed to support the user or group of users in achieving a higher effectiveness of decision-making while solving a semi-structured spatial decision problem. It's more focus in decision making and indirectly help in flood management and mitigation process.

2.3. Approaches and Challenges in Flood Mitigation

This study employs qualitative approach. The data was collected through semi structured interview. Kelantan, one of the east coast state of Malaysia which accounted for almost billion ringgit loss of properties and infrastructures in 2014 flood was selected in the data collection (thesundaily.my 29th December, 2014). The DMRC are responsible to carried out the NSC's Directive 20 in case of natural disaster. The NSC that coordinated the natural disasters covers at the districts and state levels were handled by government agencies in the flood hit areas in that particular state. Only six of these agencies were selected for the study. These agencies were, Kelantan State Education Department, Kelantan State Department of Rescue and Fire Brigade, Kelantan State Health Department, Local Authority of Kuala Krai, Kelantan State Social and Welfare Department and Kelantan State Police Contingent.

The interviews were transcribed and analysed quantitatively using Atlas-ti software version 7. The output of the interview thematically analysed according to the pressing issues and challenges faced during the 2014 massive flood that swept across Kelantan, Malaysia.

2.4. Issues and Challenges in Mitigating Flood Losses

The interview conducted during this study revealed crucial pressing issues and challenges encountered by both the stakeholders of flood and the communities of the flood. After analyzing thematically the interviews, there were various pressing issues and challenges were comprehensively addressed.

The results of the analysis are divided into three parts. One analysis before disaster, the second is during disaster and the third part is after disaster. All issues and challenges faced by the six agencies were represented in Figure 2 which is the output of Atlas-ti.

There are 8 key pressing issues are faced by the stakeholders of flood hit area in Malaysia. These pressing issues are flood preparations, lack of staff and rescuers, lack of awareness of the flood, communication problems, lack of assets, transportation issues, the absence of food supplies, and other constraints.

All the agency representatives did not specify the problems they had before the flood. There were a number of problems, pressing issues and challenges encountered during the floods. Some of the pressing issues highlighted by the government agencies involved are.

2.4.1. Flood preparations

Although the majority of agencies had made careful preparations before the flood, the preparation was insufficient to meet the current needs of a large and exceptional flood. P 2: O2.docx - 2:13 (59:59) we did not make preparations for extraordinary flood last year. For example, in that particular year, we only prepared food for 150,000 victims but we received a total of 300,000 victims. When the number of victims beyond the original expectations, they have a problem where the food supply was insufficient. Suppliers were hard to find in a short period of time, limited transport service where in some occasion almost none was available to be used to send food. The flood situation as it is unexpected of all agencies because water covered the whole area that lead all operations stranded. P 3: O3.docx - 3:12 (53:53) although it had been prepared, the water that entered was out of expectation.

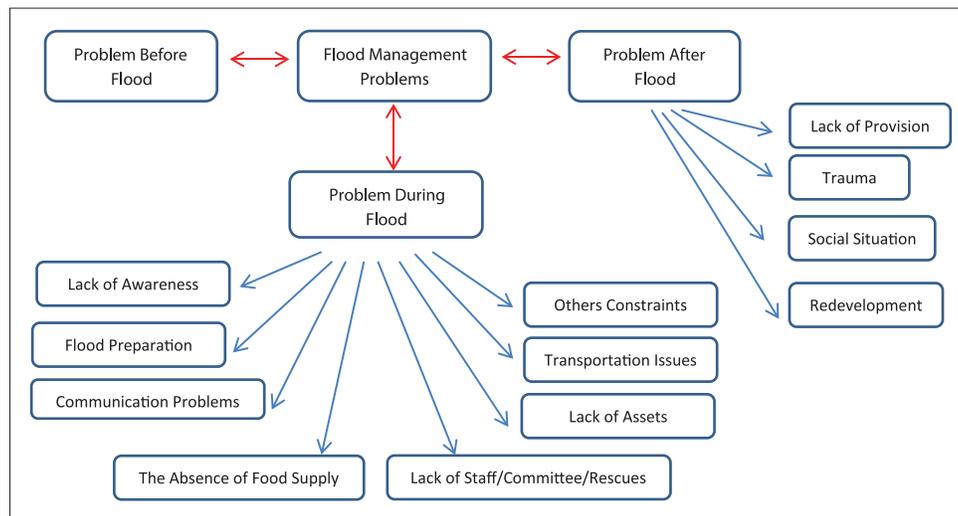
Preparations in terms of the evacuation area were also problematic because of the heavy flood causing many places to be flooded by water and many people were affected. Therefore, the centers could not accommodate large numbers of victims. As a result, many victims were forced to go to other places that were not authorized as evacuation centers. P 5: O5.docx - 5:8 (68:68) the hall provided as evacuation centers was too small and could not accommodate the large number of victims. For example, about 600 people had to stay in the Sri Gucil hall with an area <100 square feet. But some of them did not stay in the authorized evacuation center.

2.4.2. Lack of rescuers

During the flood of 2014, they were short of rescuers (staffs and committee) because of the floods affecting too many people. P 7: O7.docx - 7:3 (52:52) our staffs were not enough and we had to move and work without sleep for 24 h. Since the flood was unexpected, many officers who had been appointed as the committee could not do their jobs because they themselves were the victims of the flood. P 4: O4.docx - 4:48 (57:57) staff who should be on duty could not do their job because they themselves were the victims of the flood. Besides that, rescue team from outside cannot enter to the flood area and this make it worst because they need to work without any assistance. P 5: O5.docx - 5:9 (70:70) there was no help from the outside. There were only armies and local agencies here, no assistance from outside.

2.4.3. Lack of awareness

The other pressing issues of the people in flood affected areas are the lack of awareness of the standard operating procedure that they need to abide to when natural disaster occurs. They were cases where people refused to move even though orders were given. This situation complicated the rescue mission and evacuation process became even more difficult. P 2: O2.docx - 2:16 (65:65) they were too obsessed with the idea of historical floods that the older generation faced years ago for example the area they lived in was never flooded with water. P 6: O6.docx - 6:8 (56:56) we also faced difficulties to order people to move. Before the water reached dangerous level, we did go from house to house to give them command but we were ignored because they claimed that the water would not rise. P 6: O6.docx - 6: 9 (58:58). Indeed, we had informed the residents. We went from house to house to tell

Figure 2: Pressing issues and challenges of 2014 flood in Malaysia

them the water was rising. People here ignored and some treated it as it was a water festival.

In addition, there were also cases where people who were not affected by the flood registered themselves as victims just because they wanted to receive food aid and consolation money from the government. This situation caused difficulty to the government authorities in ensuring the aid to be distributed to actual victims of the flood. P 6: O6.docx - 6:9 (58:58) there were people who unaffected by floods but registered themselves at the evacuation centers because they wanted food aid and consolation money from the government.

2.4.4. Communication difficulty

One of the most obvious pressing issues during flood is communication difficulty. When this happened contact with between many parties was lost and situation became chaotic. Therefore, matters related to flood management became more difficult and tedious. P 3: O3.docx - 3:19 (67:67) we also had difficulty in getting reinforcements from other agencies. It was related to communication problems as we were unable to contact others to help us. P 3: O3.docx - 3:22 (71:71) it was a bit chaotic at that time because we lost communication. Communication was very important in viewing the coordination of all agencies involved. Our agency could not work systematically because of communication problems. We can say that communication is the most important factor that without it any type rescue operation will be disabled. P 4: O4.docx - 4:53 (68:68) the flood occurred was beyond our expectations, chaos and interrupted communication and there were many other reasons why it could not be implemented as planned.

2.4.5. Lack of assets

The fourth pressing issue is the lack of assets like boats and helicopters. The result is the delayed to be mobilized to help flood victims who got stuck in areas which were inaccessible to any road transport. The government agencies themselves also acknowledged that the assets were not enough to move the flood victims. Even though preparations were made, some assets provided could not

be used during the flood. P 6: O6.docx - 6:6 (50:50) the boat that we had did not have a high-powered engine to get through the reckless current. If we still used it, it would jeopardize safety of the rescue team members. Besides that, P 6: O6.docx - 6:11 (62:62) the capabilities of existing assets were so bad. The boats used for rescue were not in good condition and all assets were used to its maximum level without any maintenance done.

2.4.6. Transportation problems

The other key pressing issues is transportation. The agencies also expressed about the transportation problems that they faced. Since there is lost in connection with the flood-affected areas, they were unable to request any back-up vehicles needed to carry out rescue mission smoothly. P 6: O6.docx - 6:10 (60:60) the need was already there but the process of sending it could not start. We lost contact with the target area, no helicopter landing pad to send food. We had to throw the food from air. The poor working condition of some of the available boats for example also did not allow them to continue their rescue efforts. P 7: O7.docx - 7:6 (60:60) there were also boats at the agency that were not suitable for the rescue. I think these needs to be emphasized and there should be a specific boat for the rescue operation. This is very important because the boat and hovercraft are the needed transport when the road is closed.

2.4.7. The lack of the food supply

The lack of food supply during needy time is the real pressing issues during the 2014 flood. The agencies stated that there are instances where the lack and sometimes the absence of food supply was one of the major problems they rescuers had to face during the flood. Reason is although the food although was available, it could not be reached to flood victims as there is lost of communication and that there were no transport available to reach to the flood victims. P 5: O5.docx - 5: 6 (66:66) the place where I stayed, there was indeed lack of food supply. We had to ration the food supply so that it would be enough for everyone. Food aid from outside did not reach the place that I stayed. There have been cases where the flood victims who had to drink rain water and did not get any food supply for more than 2 days. P 5: O5.docx - 5:8 (68:68) there

were many victims and we could not get food supply for 2 days and only drink the rain water.

2.4.8. Other constraints

Apart from the pressing issues mentioned earlier, some of the agencies stated that they were not familiar with the route to the flood affected villages. They had to go through a greater distance to get to the destination. As a result, they took some time to save the victims. P 6: O6.docx - 6:7 (52:52) we did encounter a lot of difficulties to rescue as we were not so familiar with the route of the existing village and the water was too high and we were not able to make the correct estimation about the routes. Time used to go for rescue was quite long. There were some instances, the rescue team had a problem to deal with situations involving political differences in food and supplies distribution. Thus, it made it difficult for them to manage the food supplies and clothing to the victim because of the difference in the political affiliation among the flood victims.

The eight pressing issues raised and four major challenges raised by the agencies that need to be ironed out and attention of the DRMC and the head of the National Disaster Council. Below are the four challenges:

2.4.9. Lack of provisions

According to the agencies, there would be no provision of equipment available for flood in the future. This is because all the provisions were used for restoration after the floods. Even so, the costs incurred were very high, reaching many millions of ringgit. P 4: O4.docx - 4:52 (65:65) indeed, the effects that we suffer were very high, which covers all damages such as broken fans, doors, bathrooms, clogged and everything. If we were to follow the estimation that we made, it reached millions of ringgit.

2.4.10. Redevelopment

Redevelopment of areas damaged or destroyed by the flood is an uphill battle. Indeed, it is the biggest challenge for most agencies to rebuild and repair the damage caused by the floods. P 3: O3.docx - 3:20 (69:69) what has been a challenge to us is to mend all the damage of the hospitals and clinics that were affected during the flood. For your information, some clinics are still operating in a tent because the new clinic is not completely ready. This is worrying particularly if flood happened again in the near future. Although redevelopment or rebuilding project was given a large allocation, but the lack of time, difficulty in suitable location for development for flood affected victims have been a management problem resulting in delay in the redevelopment process. Not only that, the cleaning process has also been another cause of immense problem because of the lack of water. P 3: O3.docx - 3:21 (69:69) we do not experience provision problem but we have lack of time and place to build new clinics. Apart from the problems of reconstruction, we also have problems to do the cleaning process because the mud is very deep and we have no water to do the cleaning job.

The lack of water supply resulted in the difficulty in cleaning up flood affected areas. P 4: O4.docx - 4:58 (74:74) the problem faced was to clean up the affected areas to its original state where many properties were damaged. The recovery period would be

long it requires a lot of labor to clean up the place flooded with thick mud. In addition, difficulty of getting water are among the main obstacles to the recovery process, P 7: O7.docx - 7:11 (70:70) there was no water so the cleaning activity was delayed. There were many who came to help, all the equipment were sufficient but there was no water.

2.4.11. The social and economic situation

Another issue that worries many people is the existence of opportunists who took advantage in the situation after flood. For example, traders increase the prices of goods, P 4: O4.docx - 4:55 (72:72) many victims started to go to the store to buy groceries, but the grocers began to take advantage by raising the prices. Besides that, all banks and facilities in Kelantan were not working and could not be used at least for some time. P 4: O4.docx - 4:56 (72:72) the situation became chaotic, victims started heading to the nearest town which was Jerneh, Besut to go to the bank because all facilities in Kelantan were not working and could not be used. Not only was that, robberies became rampant in flood affected areas. P 4: O4.docx - 4:57 (72:72) even a warehouse had been robbed. It happened because some people were forced to do it and some were simply doing it.

2.4.12. Trauma

After the flood, many victims have been under undue pressure or stress which causes them to be in a state of trauma. P 4: O4.docx - 4:60 (78:78) recently, there were eighty-seven percent of students in Kuala Krai who were traumatized by the disaster. This is very high because they lost their homes, staying in a tent or hut, waiting for the proposed house to be ready yet the process to complete took quite some time.

3. CONCLUSION

There are various frameworks DRR to address pressing issues and challenges of natural disaster. The world has recognized that the best approach to achieve sustainable community in facing natural disaster is by adopting and executing the DRR framework. However, to ensure the DRR framework is successfully implemented, the pressing issues and challenges need to be addressed correctly by the nation's NSC. These issues and challenges emerged from the worst 2014 flood have to be studied seriously by the NSC so that they can be appropriately managed during future disaster. Most importantly, unavoidable mistakes that happened in the previous disaster should not be repeated and that the nation and the communities should be well prepared in any kind of upcoming natural disaster.

The findings of this study revealed that there are eight pressing issues and four challenges that need to be addressed. Under no circumstances if and unless these issues and challenges are aptly managed, then the disaster management team or the DRCM will not be able to overcome future similar pressing issues and challenges. If we divide natural disaster into three phases, then the phase before the disaster struck clearly shows we do not have any kind of issues and challenges. Only then during and after disaster, many pressing issues and challenges crop up that need to be faced by the nation's disaster management team.

The pressing issues and the challenges emerged from this study need to be given right and immediate attention by the government of Malaysia's NSC so that the approach that is going to be adopted by the disaster management team can be continuously improved. Thus, such pro-active action can prevent heavy loss of life and property during future natural disasters. The damage can be kept to the minimum and that the recovery of the stakeholders of natural disaster would be speeded up. The direction of further study is necessarily crucial in order to establish a comprehensive DRR framework that fits in any type of natural disaster that might befall upon Malaysia in the future.

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