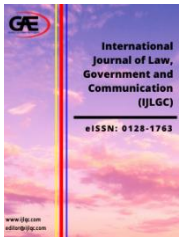
International Journal of Law, Government and Communication
EISSN : 0128-1763
IJLGC
Volume 9 Issue 37 (September 2024) PP. 352-374
DOI 10.35631/IJLGC.937029



INTERNATIONAL JOURNAL OF LAW, GOVERNMENT AND COMMUNICATION (IJLGC)
www.ijlgc.com

COMMUNITY PREPAREDNESS AND AWARENESS ON WATER RELATED DISASTERS IN RAUB, PAHANG

Norhazlina Fairuz Musa Kutty[1*], Iddi Kifla Mohd Taib[2], Nik Rasheed Ismail[3], Wan Farizatul Shima Wan Ahmad Fakuradzi[4]

[1] Department of Strategic Studies, Faculty of Defence Management Studies, National Defence University of Malaysia.
Email: nfairuz@upnm.edu.my
[2] Department of Strategic Studies, Faculty of Defence Management Studies, National Defence University of Malaysia.
Email: 3221606@alfateh.upnm.edu.my
[3] Department of Logistics Management & Business Administration, Faculty of Defence Management Studies, National Defence University of Malaysia.
Email: rashed@upnm.edu.my
[4] Community Health Unit, Faculty of Medicine and Defence Health, National Defence University of Malaysia.
Email: wanfarizatul@upnm.edu.my
[*] Corresponding Author

Article Info:

Article history:
Received date: 25.06.2024
Revised date: 17.07.2024
Accepted date: 15.08.2024
Published date: 30.09.2024

To cite this document:

Musa Kutty, N. F., Taib, I. K. M., Ismail, N. R., & Fakuradzi, W. F. S. W. A. (2024). Community Preparedness and Awareness on Water Related Disaster (WRD) in Raub Pahang. *International Journal of Law, Government and Communication, 9* (37), 352-374.

DOI: 10.35631/IJLGC.937029

Abstract:

Water is essential for all living things. But water also prone to the risk of water related disaster which is not a new phenomenon that happened worldwide including Malaysia. Despite disasters always associated with natural catastrophe, disaster can be classified into three categories namely natural, man-made and hybrid disasters. Notwithstanding the category of disasters, the impact of it would cause loss of lives, damage to property or the environment as well as affecting the daily activities of local community. Therefore, this research aims to identify the issues related to water related disaster among community in Raub, Pahang, examine the level of knowledge that affects community preparedness and awareness, community participation and empowerment of the community in creating resiliency towards water related disasters, and finally to propose a framework of community resiliency to water related disasters in Raub, Pahang. In achieving the objectives, qualitative research methods were adopted using face to face interview and qualitative online survey using semi structured interview protocols. This research found that past and present experience by the community had imparted a good understanding of water scarcity among the community in Raub. However, their preparedness level to be independent in dealing with the risk of water scarcity is still low as they had few constraints to establish a more structured water scarcity management system with less dependence on the government's assistance.

International Journal of Law, Government and Communication
EISSN : 0128-1763
Volume 9 Issue 37 (September 2024) PP. 352-374
DOI 10.35631/IJLGC.937029

Keywords:

Water Related Disaster (WRD), Community Based Resilience, Community Preparedness and Awareness

Introduction

About 71 percent of the Earth's surface is covered by water. Ocean water covers 97 percent of total water, whereas freshwater accounts for 3 percent. About 2/3 of the world's fresh water is in rivers, bogs, and lakes, with the remaining 1/3 in groundwater, icecaps, and glaciers. The total water volume is predicted to be 1,385 million cubic kilometers or 264 billion gallons (Grayman, 2011). The importance of water is immeasurable not only for human beings but to all living things. It was and is a major force in the formation of the face of the Earth as we know it today and as it evolves in the future. It is essential to every living organism too. Besides, water is a main catalyst in controlling our climate and weather.

From 2001 to 2018, over 5000 water-related disasters (WRDs) occurred globally, accounting for 73.9 percent of all-natural disasters (J. Lee et al., 2020a). Apart from water-related disasters caused by the natural variations, the influences of human's activities such as discharge to water, managing the water, and developing the area near to water, may results in WRD which consequently caused another calamity or a catastrophe.

Undeniably, due to globalization, more jobs, income, and, in general, more opportunities for a better life have resulted from recent increases in the production and supply of goods and services. Nevertheless, such growth and rapid development has also resulted in an increase in natural resource consumption and pollution which clearly reflected on water and other critical components of the whole world (Cosgrove & Loucks, 2015).

According to the World Health Organization (WHO), during the last decade of the last century about two billion people were victims of natural disasters, 85 percent of which were floods and droughts (Cosgrove & Loucks, 2015). Lee et al. (2020) also stated that WRDs such as floods, storms, landslides, and droughts have killed over 300,000 people and cost the global economy about USD 1.7 trillion. Floods and droughts, which account for roughly 60% of WRDs, also have had particularly severe economic consequences in recent years. WRDs and their associated consequences have become more common in the 21st century whereby from 2001 to 2018, over 600 billion USD was lost globally owing to around 2900 flood or 290 drought episodes. These events have also wreaked havoc on the health of 2.8 billion of global population (J. Lee et al., 2020b).

The United Nations (UN) Sustainable Development Goals (SDG) had outlined in their 6th Goal to ensure access to water and sanitation for all by the year 2030 (United Nations Sustainable Development Goals). The UN reported that worldwide, one in three people do not have access to safe drinking water, two in every five people do not have a basic hand-washing facility and more than 673 million people still practice open defecation.

In Pahang, Malaysia water related disasters including solid wastes problems and degradation of water quality and quantity is not a new phenomenon. Pahang has the longest river in Peninsular Malaysia and 4,000 million liters of the raw water Pahang River Basin is also being

International Journal of Law, Government and Communication
EISSN : 0128-1763
IJLGC
Volume 9 Issue 37 (September 2024) PP. 352-374
DOI 10.35631/IJLGC.937029

transferred to Selangor state daily through 44.6 kilometer of Pahang-Selangor Raw Water Transfer Tunnel (Pahang-Selangor ISRWT) project (Weng & Mokhtar, 2007). However, the state itself relentlessly encountered a series of water scarcity events. Among issues related to water scarcity in the state are water management inefficiency (Kamarudin et.al., 2014), solid wastes problem and degradation of water quality and quantity (Kok Weng & Mokhtar, 2009).

Generally, water scarcity is a situation of lack of water in relation to water requirements. There are various terms on water scarcity that have been used interchangeably by scholars and experts namely, water scarcity, water shortage and water stress (Tapela, 2012). The term 'water shortage' refers to an absolute shortage where the water availability does not meet the minimum requirements. The actual quantity that determines a per capita minimum may differ from place to place. On the other hand, 'water scarcity' is a more relative concept, which describes the relationship between demand of water and its availability. Such demand may differ significantly between countries and areas within a particular country. Meanwhile, 'water stress' is the impact of scarcity, which may manifest itself in a few ways, such as increasing conflict over sectoral usage, a decline in service levels, crop failure and food insecurity (Tapela, 2012). From the above explanation, this research had used the term water scarcity as it is more relevant and suits the research objectives.

In 2020, Pahang Menteri Besar, Datuk Seri Wan Rosdy Wan Ismail stated that the state government had allocated RM2.3 billion to overcome the water issues state-wide (The Star, 2022). The projects approved included the construction of pre-sedimentation tanks to overcome the issue of water disruption in Bilut, an area within Raub district in Pahang. The project was in consequence of repeated water scarcity crisis in the area whereby the water treatment plant had to be shut down because of the murkiness level of Bilut River went high. Bilut River is one of the water resources that come into the plant for the usage of the community in the area. Recent research in 2021 found that found that Raub did not encounter major natural hazards issue except water scarcity and poor water supply quality (Khairuddin, K.N. & Awang Besar, J., 2021).

Although the responsibility to provide safe water to the community often lies within the government of the state, with the rapid growth of population and drastic change of industrialization, the efficiency of the responsible agency in supplying appropriate amount of safe treated water to the community, it is timely for the community to look for counter measures that would lessen the consequences of water scarcity.

Problem Statement

The outbreak of COVID-19 pandemic demonstrated that community access to clean water is vital in preventing and containing the spread of the disease via appropriate sanitation and hygiene practices. Since decades, water scarcity issue in Malaysia dominated by most populated states like Selangor and Klang Valley, with less attention was made towards other state such as Pahang, especially in the district of Raub which had encountered hundreds of water supply disruption incidents over the years. In a year, Raub had went through numerous events of shortage of water supply and contaminated and murky water supply to the household. Water scarcity in Raub had not been effectively dealt with and therefore, the community had to live with the water scarcity for generations. They are facing numerous events of water shortage, murky water supply and low-pressure water supply which have disrupted their daily life routine. In the latest government effort to overcome the water scarcity issue in Raub, a

International Journal of Law, Government and Communication
EISSN : 0128-1763
Volume 9 Issue 37 (September 2024) PP. 352-374
DOI 10.35631/IJLGC.937029

RM18 million project was announced in 2020 to enhance water facilities in district of Raub in addressing the problem that has been going on for many years (Malay Mail, 2020).

Although Pahang has the longest river in the Peninsular Malaysia and 4,000 million liters of the raw water from Pahang River Basin is being transferred to Selangor state daily, many areas within the state always encountered numerous water shortage incidents. Sustainable water management indeed requires urgent attention by the policy maker and policy executioner to ensure water demand is met and the community had been able to live with reasonable amount of water supply (K. E. Lee et al., 2018).

In reducing the impact of water scarcity, community participation is very important. Community no longer relies upon the government to overcome the problems. Notably, fostering community preparedness and raising awareness level in water related disaster within the affected communities had have multiple benefits too. Therefore, in addressing the research problem, a framework on community preparedness and awareness in dealing with water scarcity had been established.

Literature Review

Water Resource and Water Management in Pahang

Pahang is one of the states in Malaysia and the largest state in the Peninsular with 35,965-kilometre square areas which was further divided into eleven districts namely Pekan, Kuantan, Rompin, Maran, Bera, Jerantut, Temerloh, Raub, Bentong, Lipis dan Cameron Highlands. Total population in Pahang according to 2019 census are 1.67 million (Department of Statistic Malaysia, 2020). Pahang state is bordering with five other states within the Peninsular Malaysia, Kelantan and Terengganu at the upper north, Perak, Selangor and Negeri Sembilan to the west and Johore to the south. East part of the state is South China Sea. As the largest state in the Peninsular, Pahang has the highest mountain, Gunung Tahan and the longest river, Sungai Pahang.

In Malaysia, sstreams and rivers with and without impounding reservoirs contribute 98 percent of the total water use whilst the remainder is contributed by groundwater. Due to irregular river flow regimes, storage facilities were constructed to secure safe yield from surface water sources (Azhar, 2000). The Pahang River Basin (Figure 1), which is the largest river basin in Peninsular Malaysia with the catchment area of about 29,000 cubic kilometres, situated between the Titiwangsa Range in the west and Timur Range in the east. The region also experiences maximum rainfalls around the months of November to December, while the driest months are June and July. There are two main natural lakes in the Pahang River Basin namely the Lake Bera and the Lake Chini, which are the largest and second largest natural freshwater lakes in Malaysia.

International Journal of Law, Government and Communication
EISSN : 0128-1763
Volume 9 Issue 37 (September 2024) PP. 352-374
DOI 10.35631/IJLGC.937029

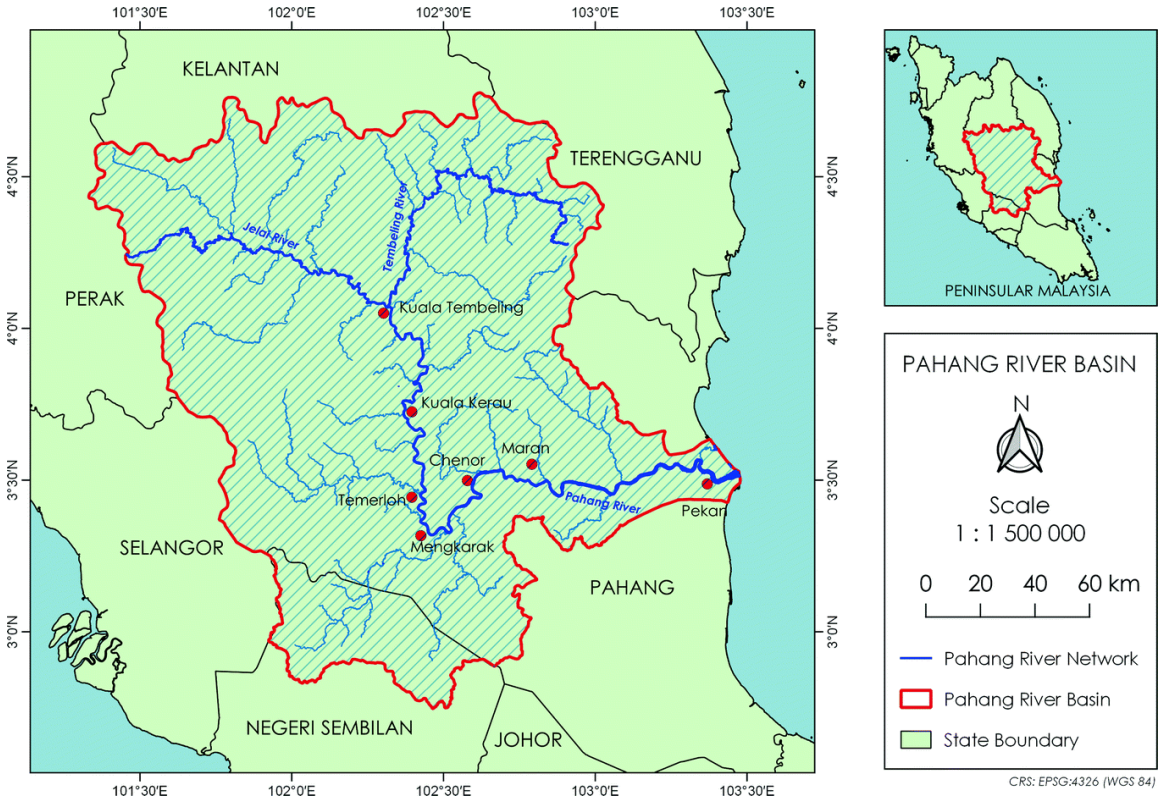


Figure 1: Pahang River Basin (Zainalfikry et al., 2020)

Notably, the Federal Constitution laid out that matters pertaining to natural resources such as land, mines, forest and water supply fall under the jurisdiction of the states (Azhar, 2000). The development and administration of water resources in Malaysia was fragmented through various government departments according to their functions and activities (Figure 2). In Pahang, water supply management is under the responsibility of Perbadanan Air Pahang Berhad (PAIP). The Waters Enactment No. 5 /2007 was formulated in Pahang state. This Enactment stipulates the authorities of State Authority, the rules for river management including transfer of raw water, land development along the river, prohibition of activities, penalties, and others.

International Journal of Law, Government and Communication
EISSN : 0128-1763
Volume 9 Issue 37 (September 2024) PP. 352-374
DOI 10.35631/IJLGC.937029

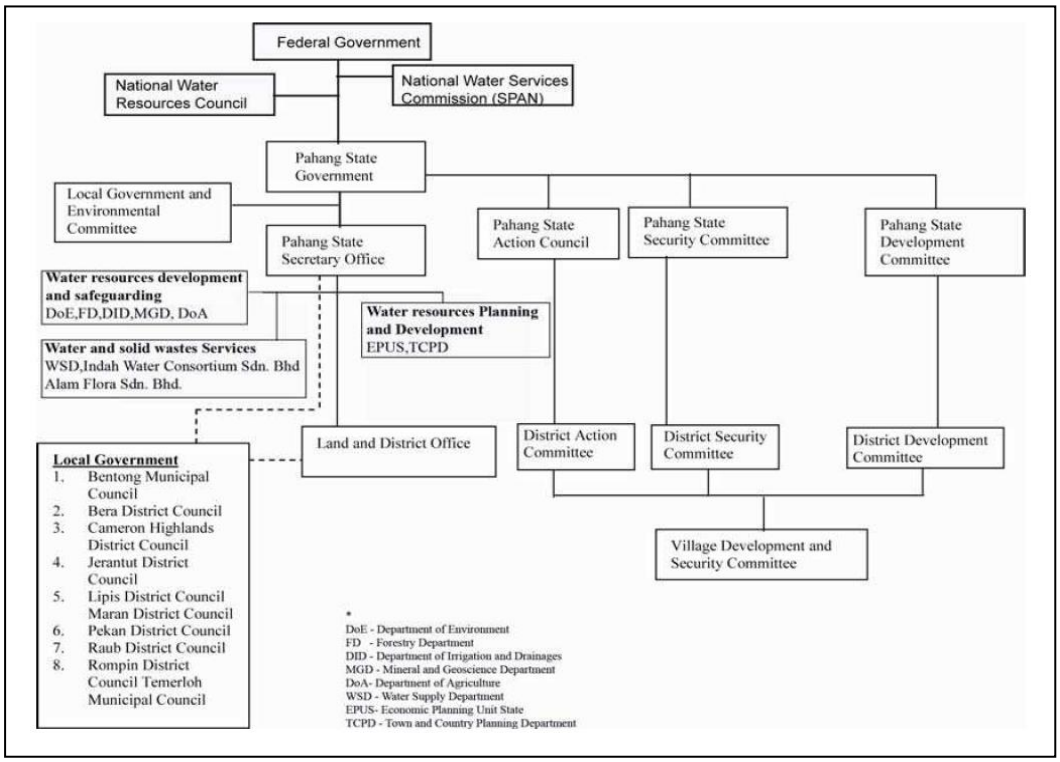


Figure 2 : Development Framework in Pahang (Kok Weng & Mokhtar, 2009)

In river basin management, the State Authority is responsible in defining the boundaries of the catchment areas and to specify the types of activities permitted within the defined catchment areas. Once the catchment areas are defined, the catchment areas are declared by the State Authority to be restricted and prohibited areas. Water that has been supplied to households will be treated at water treatment plant. There are 60 treatment plants in Pahang River Basin. Within Raub district, there are eight water treatment plants namely Bukit Fraser, Teras, Sungai Bilut, Sungai Klau, Sungai Kloi, Sungai Semantan, Kuala Medang and Ulu Sungai (JICA & JPS, 2011). The spread of water treatment plants in Pahang are as shown below in Figure 3.

Apart from having a large water basin in the state with total catchment area of 28,770 kilometres square, raw water is also transported from Pahang River to the Klang Valley under the (Pahang-Selangor ISRWT) project (Figure 4). One of the river sources that flow towards the stream is Sungai Klau in Raub which has 30 meters depth and 24 kilometre per square. The water tunnel's construction began in 2010 and completed by May 2014. The project was awarded to the Japanese companies Shimizu Corporation and Nishimatsu formed a joint venture (JV) with local companies IJM and UEM Builders to excavate the tunnel. Nevertheless, the project had intensified the local's disappointment on water management issue as some areas in the state are still suffering from disrupted water supply and poor quality of water supply to the household.

International Journal of Law, Government and Communication
EISSN : 0128-1763
Volume 9 Issue 37 (September 2024) PP. 352-374
DOI 10.35631/IJLGC.937029

Figure 3: Location of 65 Treatment Plants in Pahang River Basin (JICA & JPS, 2011)

International Journal of Law, Government and Communication
EISSN : 0128-1763
Volume 9 Issue 37 (September 2024) PP. 352-374
DOI 10.35631/IJLGC.937029

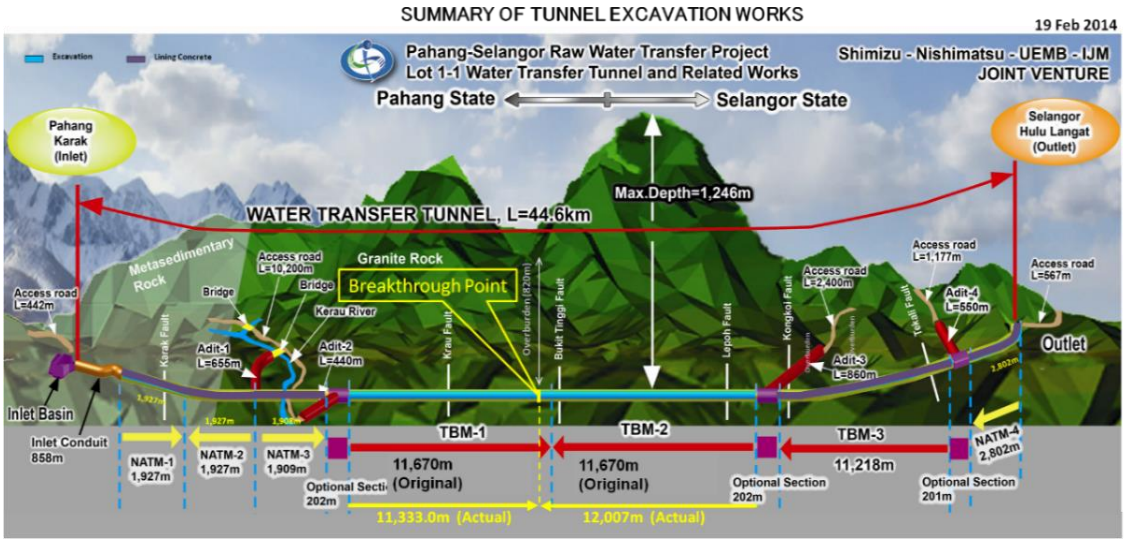


Figure 4: Pahang-Selangor Raw Water Transfer Project (Shimzu Corporation Malaysia, https://www.shimz-global.com/my/en/works/detail/index.html?id=476)

Raub district is a district located in the west Pahang, Malaysia, bordered with Lipis, Jerantut, Temerloh, Bentong and Hulu Selangor districts. In 2019, total population in Raub is 107,800 with 24,307 houses (Department of Statistic Malaysia, 2020) who lives within 2,269 square kilometres of the land area. In addition, there are nine Mukim and 47 Village Development and Security Committees (*Jawatankuasa Kemajuan dan Keselamatan Kampung – JKKK*) under the administration of Raub District and Land Office. In 1996, Pahang State Government had gazetted 305 rivers within the Raub district, second highest number of rivers among district in Pahang after Lipis which has 554 rivers (*Warta Kerajaan Negeri Pahang*, 1996).

In line with the increase of population, modernization of lifestyle and industrial development water demand for domestic and industrial water supply has been increasing, while irrigation water demand is expected to decrease due to decline of rise production. Despite vast forest area and hundreds of rivers in Pahang including in Raub, freshwater resources are still insufficient to meet domestic, economic growth, and environmental needs. As consequence, lack of adequate clean water to meet human drinking water and sanitation demands is a significant limitation on human health and productivity, as well as economic development and the preservation of a clean environment and healthy ecosystems (Cosgrove & Loucks, 2015). Nevertheless, increase of population, rapid development of climate change also should not hinder the state government's responsibility to ensure proper quality water supply to the people.

In regard to unavoidable population growth and rapid development, in coping with the demand for safe water supply, many countries still have a tendency to address water scarcity issues by boosting surface and groundwater storage and allocation, for example, by the construction of new infrastructure, desalination of salty or brackish water, wastewater reuse, or recharging aquifers (Cosgrove & Loucks, 2015). Cosgrove & Loucks (2015) also added that augmenting water supply to meet demand for water had prevailed over focusing on reducing water demand, such as stemming the losses in transport and distribution systems, implementing adequate tariff systems which seek to encourage lower water demand levels, changing water use technologies,

International Journal of Law, Government and Communication
EISSN : 0128-1763
Volume 9 Issue 37 (September 2024) PP. 352-374
DOI 10.35631/IJLGC.937029

and, increasing the efficiency of water use in domestic, industrial, and irrigation systems. Reducing water demand also lead to communities' dissatisfaction on their right to gain access to safe fresh water (Wijayanti et al., 2020).

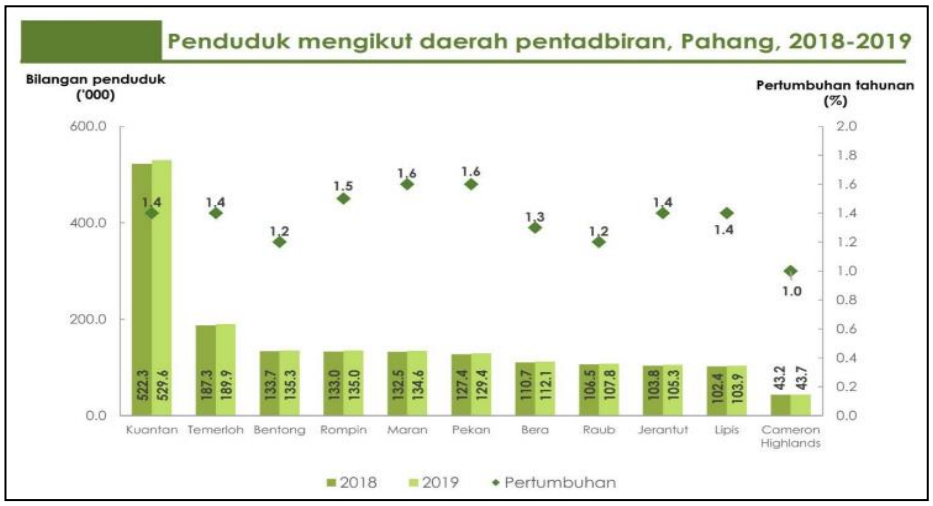


Figure 5 : Population in Pahang (Department of Statistic Malaysia, 2020)

In addressing today's water scarcity, an improvisation on water management is crucial. Wijayanti et al., (2020) in their research on water scarcity in Jogjakarta province in Indonesia suggested three approaches in dealing with sustainable water resources management namely, reduce water demand, increase water supply and replenish groundwater. In leveraging the water supply availability, they outlined three ways of increasing it namely, develop new dams, harvest rainwater and manage storm water (Wijayanti et al., 2020).

Government's Responsibility and Community Role in Water Related Disasters

Water related disasters are particularly acute in Asia continent. As population growth rapidly and urbanization rates in Asia rise progressively, the stress on the region's water resources is intensifying (Abedin et al., 2014). Climate change and global warming further deteriorates the situation significantly. *Water-related disasters* may be further categorized as floods, storms, waves, slides, droughts, epidemics, contamination and climate change (Grayman, 2011).

One of water related disaster is water scarcity. Water scarcity is described as a condition where water demand exceeds over available water supply. Water scarcity arises in situations where there is insufficient water to simultaneously support both human and ecosystem water needs. In discussing the severity of water scarcity, Payus et al., (2020) said that water scarcity is one of the most significant natural disaster affecting the society. Prior to that, Man et.al. (2014) stated that water crisis may lead to disaster affecting human beings and disrupting the economic activities.

Among factors led to severe water challenges and water scarcity are the detrimental effect from the nature and human intervention. Physical water scarcity may occur because of both natural phenomena such as drought as well as from human influences. Most often water scarcity has resulted from basic lack of water. However, it may also be resulted from lack of appropriate infrastructure to provide access to considerable available water resources, which is referred to as economic water scarcity. Apart from the negative effects of urbanisation, water scarcity is

International Journal of Law, Government and Communication
EISSN : 0128-1763
Volume 9 Issue 37 (September 2024) PP. 352-374
DOI 10.35631/IJLGC.937029

also due to limited water management capacity and unorganised management. In some extent, it may also cause by poor or no communication between users. In this regard, it is important to explain whether shortage of water supply is a crisis or a disaster.

In determining the criteria of disaster and crisis, Shaluf et al (2003) stated that a disaster does not carry the same definition as a crisis in the traditional meaning of the word. They said that a crisis is a situation which require important decisions to be made within short period of time. Whereas a disaster involved management procedures that must be maintained, and management problems coped with under conditions of major technical emergency. In earlier attempt to understand the nature of a disaster, Turner & Pidgeon (1997) concluded that there is no universal definition of disaster because it's definition depending on the different discipline using the term. However, Turner & Pidgeon highlighted that a disaster is:

> *"An event, concentrated in time and space, which threatens a society or a relatively self-sufficient subdivision of a society with major unwanted consequences as a result of the collapse of precautions which had hitherto been culturally accepted as adequate."*

With the evolution of disaster or risk management, more attempts were made to untangle the definition of disaster which often used interchangeably with crisis, and sometimes emergency. Al-Dahash et al (2016) in much later work reveals that the key features of a disaster are its sudden nature, unforeseen, causing loss and damage, coping capacity, system recovery, external assistance and involvement of multi stakeholders.

Similarly, there is also no universal definition of crisis that has been adopted across all fields (Shaluf et al., 2003). As mentioned earlier, some scholars tend to agree that crisis was perceived as negative situation and, in some circumstances, a crisis can destroy or affect the whole organisation. In finding the similarities of crisis derived from different scholars, Al-Dahash et al. (2016) again come out with key features of crisis namely, uniqueness, danger, being troublesome or causing damage, unexpected and usually emotional.

Disaster and crisis have many common features indicates that both are quite similar in nature although crisis often associated to small population compared to disaster which would affect more people with more devastating consequences (Al-Dahash et al., 2016). Despite the similarities and the interchangeable usage of the term, Al-Dahash et al., further stated that a crisis might develop into disaster if it is neglected or mismanaged. Therefore, in this research, water shortage which was always been regarded as water crisis may also be classified as a disaster due to the nature characteristics of the events which are uncontrollable, extraordinary and disrupting the system which can further be applied in developing the community preparedness and awareness model as one of the objectives in this research.

Often a disaster in a particular state is handled via various government's programs and strategies to mitigate the consequences of the disasters. In Malaysia, the National Security Council Directive No. 20 is a decree that provides guidelines on the management of land disasters including the responsibilities and functions of the various agencies under an integrated emergency management system (Said et al., 2011). The main goal of Directive No. 20 is to establish a comprehensive emergency management programme aims to mitigate the effects of any hazards, plan for measures that will save lives, reduce environmental damage, respond to

International Journal of Law, Government and Communication
EISSN : 0128-1763
Volume 9 Issue 37 (September 2024) PP. 352-374
DOI 10.35631/IJLGC.937029

emergencies and aid, and establish a recovery system to ensure that the affected community returns to normalcy as quickly as possible.

However, it is common that rural areas face different challenges pertaining to disaster risks and management compared to urban areas (Guo et al., 2021). Guo et. al added that less diversified economic sector with lesser financial resources, low population density and inadequate communication platform worsen the condition of rural communities in handling disaster risk, responding to disaster or recovery after disasters.

A disaster-resilient community is better able to cope adversity with less permanent impairment to social, economic, health, and security functions (Fitzpatrick, 2016). Developing community resiliency with preparedness and awareness based does not reduce the authorities' role and responsibilities in providing safe, clean and adequate water to the people and preserving a fair quality of life for all its citizens. But integrated water management at the community level would enhance the communities' appreciation through wise usage of the source and be prepared to deal with water scarcity.

Community Preparedness and Awareness and Community Resilience

In assessing and developing community preparedness and awareness during water supply crisis, it is crucial to include community into the process by not only preparing the community on the knowledge required in practicing sustainable water resources management but also the knowledge to deal with water supply crisis. Preparedness is defined as actions taken in advance of an emergency to develop operational capabilities and to facilitate an effective response in the event an emergency occurs (Said et.al., 2011). 'Community Based Disaster Preparedness' is a process of bringing people together within the same community to enable them to collectively address a common disaster risk and to collectively pursue common disaster preparedness. The community ability to survive during crisis reflects their resiliency in facing water related disaster.

Beginning 1970s, the study of resilience was picked up by both psychologists with focus on the resilience of individuals, sociologists which discussed on resilience of societies and ecologists focussing on the resilience of ecosystems (Jean Blair & Mabee, 2020). The concept of resilience has evolved in less than a decade from a term used within the disciplines of material sciences and environmental studies to become a concept used liberally and enthusiastically by policy makers, practitioners, and academics across a plethora of disciplines (Fitzpatrick, 2016). Although Fitzpatrick (2016) added that the term "resilience" takes on different meanings within disciplinary boundaries and is often not clearly defined or explained, Jean Blair & Mabee (2020) stated that resilience refers to the ability of social or ecological systems to recover from disturbance. This contention was similar to Berger (2017) which highlighted that resilience, is not simply the ability to revert to the origin and normal way of life or routine but it is a matter of incorporating trauma into their personal and collective narratives.

In the early development of community resilience, the concept was originally seen as capability of the community to endure sudden shocks from natural disasters such as hurricanes or earthquakes, or major economic failures (Jean Blair & Mabee, 2020). The connotation remains as Fan & Lyu (2021) concluded that during the last 20 years, community resilience research has been mainly connected with disaster. Community refers to a social unit consist of a group

International Journal of Law, Government and Communication
EISSN : 0128-1763
Volume 9 Issue 37 (September 2024) PP. 352-374
DOI 10.35631/IJLGC.937029

of people living in the same place with commonality, such as values, norms, customs, religion, or identity (Fan & Lyu, 2021). The evolution of community resilience concept later expands which include the capability of communities to prepare for anticipated hazards, adapt to and take advantage of changing conditions, and withstand and recover rapidly from disruptions brought about by globalization, climate change, technological advancement, or economic collapse (Jean Blair & Mabee, 2020).

The incorporation of resilience into processes of disaster risk reduction is articulated most significantly in the Hyogo Framework for Action 2005 - 2015 which was endorsed by 168 United Nations (UN) member states at the World Conference on Disaster Reduction in Kobe, Japan in 2005. The framework urged all countries to make major efforts to reduce their disaster risk by 2015 (Fitzpatrick, 2016). Despite consensus among member states to adopt the framework, there is still lack of universal indicators to measure and assess community resilience.

The ability to handle disaster (Jean Blair & Mabee, 2020) and the ability of a particular country and its communities to prepare for anticipated events is important to the development of resilient systems (Raikes et al., 2019). Community resilience is defined as the community ability to survive and mitigate the stress came from a disaster (Ridzuan et al., 2017). Berger (2017) describes a "resilient community" as one that "has the organizational flexibility and the resources with which they can grow and flourish with time". The first 72 hours during disaster is most critical for an individual to be self-sufficient and self-reliant to save themselves (Noor Diyana et al., 2020). In assessing community resiliency, Berger (2017) outlined four elements to establish a resilient community namely, acceptance, awareness, enhancement and promotion. The details are as illustrated in Figure 6 below: -

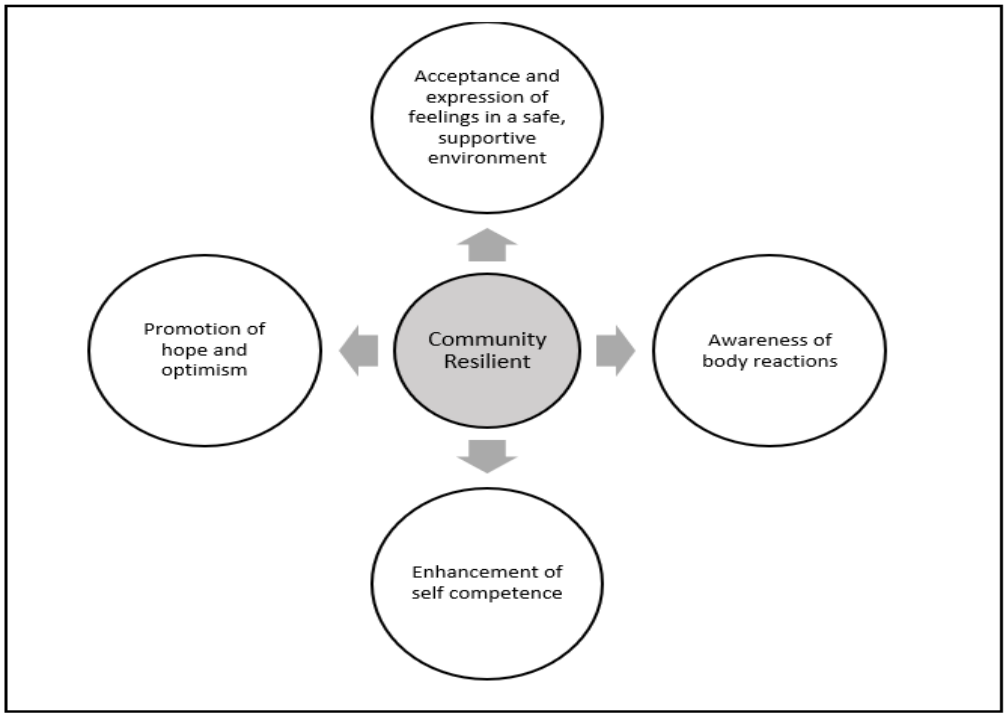


Figure 6: Four Elements In Assessing Community Resiliency (Berger, 2017)

International Journal of Law, Government and Communication
EISSN : 0128-1763
Volume 9 Issue 37 (September 2024) PP. 352-374
DOI 10.35631/IJLGC.937029

In general, individual with previous disaster experiences would be better prepared compared to those who had not experienced it. However, individuals who had not experienced any disaster would have different reaction towards disaster based on their exposure to other forms of disaster with applicable transferable knowledge, access and participation in drills related to disaster preparedness, as well as communication channels (Guo et al., 2021). Isahak (2017) stated that experience and trust are two important factors that would determine risk perception and preparedness for action.

The concept of disaster resilience has been adopted by municipalities and urban planners looking for targeted ways to limit the impact of increasingly frequent natural disasters; this may include efforts to flood-proof cities, safeguard critical infrastructure for energy, water, communications, and sewage, and plans to support and reconnect residents is the wake of disaster (Jean Blair & Mabee, 2020). According to Guo et.al, (2021), disaster preparedness is a behaviour, which could reduce the risk of injury and damage, and facilitate a capability for coping with the temporary disruption associated with hazard activity. Disaster preparedness plays a critical role in mitigating the adverse effects of disaster. Disaster preparedness can be further categorised into different levels such as community, institutional, household and individual.

In understanding the community-based water resiliency, it is vital to further understand the context of community preparedness and awareness in handling water supply or water disruption crisis. Preparedness is defined as actions taken in advance of an emergency to develop operational capabilities and to facilitate an effective response in the event an emergency occurs (Said et al, 2011). Preparedness efforts range from individual-level activities such as first aid training, to household actions such as stockpiling of equipment and supplies, community efforts like training and field exercises, and governmental strategies including early warning systems, contingency plans, evacuation routes, and public information dissemination. Communities can exert considerable influence on the behaviours of individuals, which include behaviours adopted to be prepared for disasters. Usually, the more residents are engaged in their communities and neighbourhood, the more they prepare for hazards.

In a comprehensive preparedness strategies in facing future disaster, planning, resource identification, warning system, training, risk communication, public awareness and education, and exercising are examples of anticipatory efforts that are done to increase the safety and effectiveness of a community's reaction to a disaster (Said et al., 2011). Population knowledge and standard practices would influence the risk perception and preparedness for action (Isahak, 2017). In recent study on community preparedness, two main factors were found affecting community disaster preparedness namely the personal factors (attitude, risk perception and intention to prepare) and societal factors (sense of community and trust in agencies) (Noor Diyana et al., 2020). Noor Diyana et al., (2020) highlighted that, trust in agencies or government agencies in is referred to a situation where the community acknowledged threat exists and reduces the uncertainty creating a form of understanding when dealing with unfamiliar hazards. Prior to that, similar study conducted in 2017 found that community level of education, engagement and leadership have a great influence on community disaster preparedness (Ridzuan et al., 2017).

International Journal of Law, Government and Communication
EISSN : 0128-1763
Volume 9 Issue 37 (September 2024) PP. 352-374
DOI 10.35631/IJLGC.937029

On the other hand, awareness is knowledge created by interaction between an agent and its environment, a setting bounded in space and time which involves level of knowledge as well as dynamic process of perception and action (Parkash, 2013). Awareness is a very crucial element for a society to effectively adapt to a potential hazard (Glago, 2019). Assessing community awareness on the risk emanated from water related disaster is crucial elements to mitigate the planning to draft and execute the disaster's emergency plan strategies. Awareness would include awareness on the impact of disaster and awareness to prepare for future disaster (Islam et al., 2021). Community awareness level would assist the government agencies and relevant community building efforts to understand and further develop a more compatible strategies for the community (Islam et al., 2021).

The capacity to cope with the disasters, by raising the awareness of all components, all individuals and communities in line with this common cause. Disaster risk awareness, which denotes the extent of common knowledge about disaster risks, and the factors that lead to disasters, influence the actions that could be taken individually or collectively to address exposure and vulnerability to hazards. An aware, informed and prepared community will be better able to avert and cope with the disaster risks than otherwise (Parkash, 2013)

Methodology

Research methodology is the research design developed by the researcher in answering the research questions and achieving the research objectives and subsequently presenting the findings obtained the research period. Taylor et al. (2016) refers the term methodology as the technique in approaching the problem and finding answers to the problem. Research methods, meanwhile, are rules and procedures that can be seen as a tool or ways of proceeding to solve the problems. Based on the brief explanation on research methodology, this chapter is explanation of more details on research design and research methodology including the methods and data sources such as primary and secondary data that has been adopted by the researcher throughout the research process.

According to Merriam (2012), research is a process of investigating a phenomena or inquiring answer to a problem in a systematic manner. This was supported by Sekaran and Bougie (2016), where they explained that research is a process of finding solutions to a problem through thorough study and analysis of the situational factors. In finding answer to the research problems, a researcher must identify the research methodology that be used in the research. In selecting the research methodology, it is important to ascertain the type of research that will be conducted by the researcher. There are two types of research namely applied and basic research. Sekaran and Bougie (2016) stated that applied research is taken to improve current practice which need a timely solution. Therefore, applied research is used to find solution in solving current specific problems. On the other hand, basic research is used to generate knowledge by trying to comprehend how specific problems that occur in the organisation can be solved. It is also known as fundamental and pure research where the research is done mainly to contribute to existing knowledge or as an extension to current knowledge (Merriam, 2012). The primary purpose for basic research is to generate more knowledge and understanding of the phenomena of interest and to build theories based on the research results. Hence, based on these two characteristics, this research adopted basic research approach where researcher will eventually contribute to current knowledge and establish a framework on community resiliency in dealing with water crisis. In addition to types of research, there are two types of research methods which are qualitative research method and quantitative research method. Cresswell (2013)

International Journal of Law, Government and Communication
EISSN : 0128-1763
Volume 9 Issue 37 (September 2024) PP. 352-374
DOI 10.35631/IJLGC.937029

described qualitative research method as research which begins with assumptions and the use of interpretive or theoretical frameworks that inform the study of research problems addressing the meaning individuals or groups ascribe to a social or human problem. The common characteristics of qualitative research method are research conducted in the natural setting which is the fieldwork will be at the participants' place; researcher as key instrument; data is collected via multiple instruments such as examining documents, observing behaviour and interview participants; and data is organise inductively to reach a comprehensive set of themes (Cresswell, 2013).

Another type of research methods as mentioned above is the quantitative research method. According to Swanson and Holton (2005), quantitative methodology is considered as the foundation of modern science, where the researcher uses the scientific method quantitively measure and analyse based on established research procedures. Findings in quantitative methods often presented in correlation and regression form. Therefore, as the nature of the problems in this research needs to be explored, researcher has decided to adopt qualitative approach to effectively understand the research problem, answering the research questions and to achieve the research objectives.

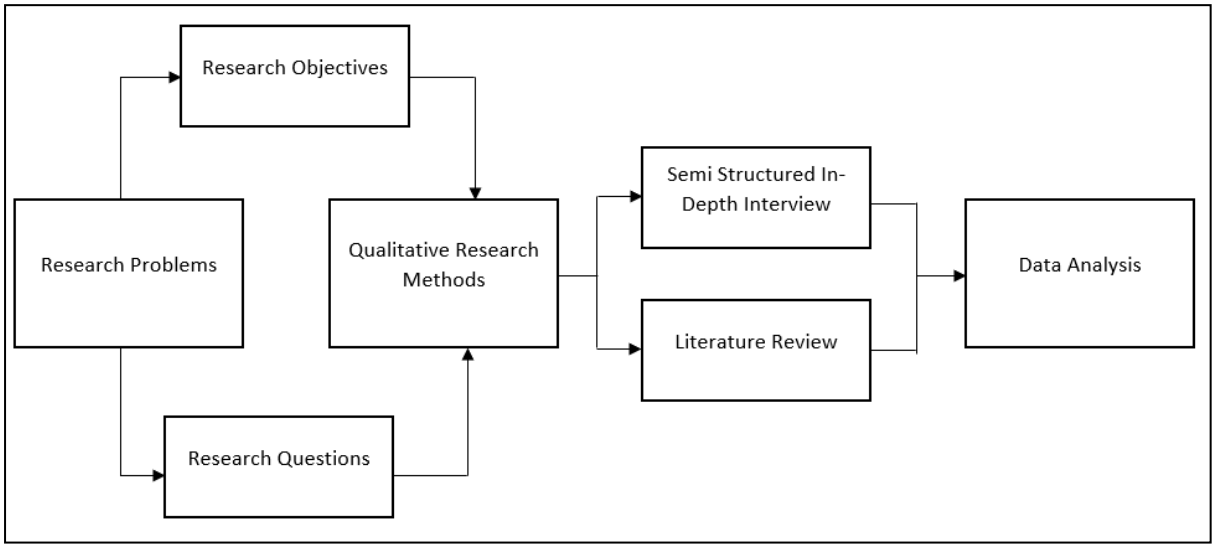


Figure 7: Proposed Research Design (Constructed by researcher)

As illustrated in Figure 8, at the beginning of the research phase, researcher has identified the research problems and derive the research objectives and research questions from the research problems. After the research objectives and research questions is listed, researcher identify the best research methods to obtain the relevant data and information in answering the research questions and achieving the research objectives. There are three methods that has been adopted in conducting this research during data collection phase namely semi-structured interview with the government officials, qualitative survey using pre-developed scalable and descriptive questions with the community and the community leaders from nine Mukim within Raub district, as they require little time and few interview skills. For this research, questions on scales, yes/no or agree/disagreement types of questions, and frequently determined next prompt question to be asked. In addition, data had also been gathered from previous literature review on the issue of water related disaster in Pahang in general and in Raub specifically.

International Journal of Law, Government and Communication
EISSN : 0128-1763
Volume 9 Issue 37 (September 2024) PP. 352-374
DOI 10.35631/IJLGC.937029

In achieving the objectives of this research, a qualitative approach has been adopted with primary data collection through am focus group discussion and in-depth interview whereas, secondary data is collected from the official report of the relevant government agencies as well as the official statement given by the relevant government officials dealing with the community affected by water related disasters in Raub, Pahang. Subsequently, all data collected from both primary and secondary sources has been analysed and triangulated.

Primary Sources

In answering the research questions, data from the primary sources will be collected from semi-structured interview. In selecting the participants, purposive sampling method had been adopted where researcher had to identify the research participants before conducting the data collection (Merriam, 2012). Purposeful sampling means researcher will select participants and research site for the research because the participants can purposefully inform an understanding of the research problem and central phenomenon of the study (Cresswell, 2013).

In this research, the participants in semi-structured interview have been categorised into three, the experts from government agencies, community leaders and community from the selected research areas. Expert from government agencies that chosen are based on their expertise in water crisis issue and having experiences in communicating or aiding the community in the event of water crisis. The Subject Matter Expertise (SME) interview is a common method of qualitative empirical research, designed to explore expert knowledge which has been developed considerably since the early 1990s (Döringer, 2021). The interview session in this research focused on the existing workflow and government's response towards water related disasters in assisting the community. Their view on whether the community in Raub is prepared to handle water crisis with minimal supervision or assistance from the government also been explored as this information is crucially important in measuring community preparedness and resiliency toward WRD. The list of participants that had been interviewed were government officials from the agencies below: -

1. Raub District Office.
2. Pahang Water Management Berhad (PAIP); and
3. Raub District Department of Irrigation and Drainage.

Next, after collecting data from the government officials, researcher had explored further into the level of community preparedness and awareness via semi structured interview with the community. There were two categories of local population that had been interviewed. Firstly, researcher had been using purposive sampling method with the community leader where Penghulu from nine Mukim in Raub district had been interviewed in assessing the community awareness and preparedness to handle water crisis in Raub. All Penghulu had be invited as participants in this research to ensure equal and balance coverage representing the people in Raub. The nine Mukim are as listed below: -

1. Mukim Gali 1
2. Mukim Gali 2
3. Mukim Tras
4. Mukim Batu Talam
5. Mukim Semantan Ulu

International Journal of Law, Government and Communication
EISSN : 0128-1763
Volume 9 Issue 37 (September 2024) PP. 352-374
DOI 10.35631/IJLGC.937029

6. Mukim Dong
7. Mukim Ulu Dong
8. Mukim Sega 1
9. Mukim Sega 2

Subsequently, to ascertain a more rich and valuable data for this study, researcher had extended the interview to local population in selected area in Raub. In this regard, random sampling technique had been used with specific selection of the participants are adult age 18 years old and above according to Malaysian law, Age of Majority Act 1971.

Since the data collection from primary sources would involve government officials and the community in Raub, Pahang, researcher had collected data according to the research ethics outlined by the National Defence University of Malaysia (NDUM). Prior consent had been obtained from the participants where researcher is required to brief the participants on the background and objective of the research and to inform the participants on the audio recording throughout the interview session. All data collected had been kept with confidentiality where any printed data had been kept in a locked drawer in a researcher's workspace and computerised data had been protected with password where only researcher has access. In the final report, the name of participants, agencies and Mukim had not been disclosed and had been replaced with code. This is to protect the confidentiality of the participants' information and interest while respecting their privacy.

Secondary Sources

In complementing the data from primary sources, data has also been collected from the secondary sources, which are the documents and records. In document analysis, content from previous relevant scholarly literature and documents from the library as well as the internet had been taken to understand the background of the research and answer the research question. This is made to understand the trends of the water related disasters and the community response since the past decades. At this stage, the official statement and report from the government officials related to the water related disaster in Raub, Pahang has also been analysed.

In this research, thematic analysis method has been adopted in analysing the data. Thematic analysis is the process of identifying patterns or themes within qualitative data. After all data were collected, the audio recording transcribed to facilitate analysis. Cross check had been made with the field notes as and when needed. Once the transcription is complete, the transcription been read through while listening to the recording and every details checked such as spelling or other errors; anonymise the transcript so that the participant cannot be identified from anything that is said (e.g., names, places, significant events); insert notations for pauses, laughter, looks of discomfort; insert any punctuation, such as commas and full stops and include any other contextual information that might have affected the participant (e.g., temperature or comfort of the room) (Sutton & Austin, 2015).

Once all the research interviews and focus group discussion have been transcribed and checked, the data had been processed to the next phase, which is coding. Coding refers to the identification of topics, issues, similarities, and differences that are revealed through the participants' narratives and interpreted by the researcher. This process enables the researcher to begin to understand the world from each participant's perspective. Coding can be done by hand on a hard copy of the transcript, by making notes in the margin or by highlighting and

International Journal of Law, Government and Communication
EISSN : 0128-1763
IJLGC
Volume 9 Issue 37 (September 2024) PP. 352-374
DOI 10.35631/IJLGC.937029

naming sections of text. Field notes compiled during an interview can be a useful complementary source of information to facilitate this process, as the gap in time between an interview, transcribing, and coding can result in memory bias regarding nonverbal or environmental context issues that may affect interpretation of data (Sutton & Austin, 2015).

Next, data has been analysed via commonly used computer software, Atlas.ti to identify the major themes arriving from the focus group discussion and in-depth interviews conducted. Data has been categorised according to thematic fields and then codified in accordance with the research questions. Toward developing a comprehensive understanding of the research, all data collected from the focus group discussion, interviews and literature review analysed using triangulation method. Both triangulation of data sources and methods has been adopted in this research.

Result and Discussion

Data collected from research participants were divided into two categories, the authorities, and the community. This research found that there are several initiatives that have been executed by the government to improve the water supply in Raub. In ascertaining the community's level of preparedness and awareness on water related disasters, this research discovered that the community was well equipped with knowledge on water related disasters in their area.

Water Related Disaster in Raub

The community in Raub revealed that there are two types of water related disaster in Raub, namely water scarcity and flash floods. This was based on their experience living in the area for generations. Of the total of 37 answers collected, 36 agreed that water scarcity as the common water related disasters happened in Raub while another five (5) answers added that flash floods also one of water related disasters in Raub. In this regard, this research explored the community preparedness and awareness in dealing with the water scarcity situation in Raub. Water scarcities do not only affect rural areas but are also prevalent in urban areas. The situation worsened during festive seasons.

High occurrence of water scarcity incidents has made the community live with the risk of water scarcity for generations. The community in Raub agreed that water scarcity is an issue that affects their daily routine, businesses and forces them to mitigate the risks at their own cost to minimise the impact of shortage of water at their residences. The counter measure to minimize the adverse impact of water scarcity had incurred additional cost to the community. They must install additional water tanks, buy pails to store water, install water pumps and buy mineral water for cooking and drinking purposes. Additionally, some would leave their home temporarily to another place including check into homestay or went to their relatives' houses that was not affected by water scarcity incidents. The average cost that the community had to bear is between RM1,000.00 to RM2,500.00.

To understand the severity of water scarcity impact, it is vital to explore the factors which contributed to the issue. Based on the interview with the authorities, factors contributed to the water scarcity incidents in Raub are increase in population, limited capacity of the water treatment plants, outdated reticulation system and old piping systems throughout the district causing the pipelines regularly broken. Different authorities' jurisdiction on raw water sources, water theft and budget constrained due to low water tariff also contributed to the limitation to improve the water supply to the community.

International Journal of Law, Government and Communication
EISSN : 0128-1763
Volume 9 Issue 37 (September 2024) PP. 352-374
DOI 10.35631/IJLGC.937029

Community Knowledge in Dealing with the Risk of Water Scarcity

The experiences and lessons learned from the high occurrence of shortage of water supply incidents become the main catalyst to the level of knowledge among community in dealing with the water scarcity. All participants expressed that the experience they had endured every time water scarcity incidents have made them able to do preparations beforehand. Moreover, all participants also agreed that preparedness and awareness are main component to minimise the impact of water scarcity as illustrated in **Figure 1**. All participants also strongly agreed that water conservation practices will reduce the impact of water supply disruption. However, many participants do not practice water conservation at their residence.

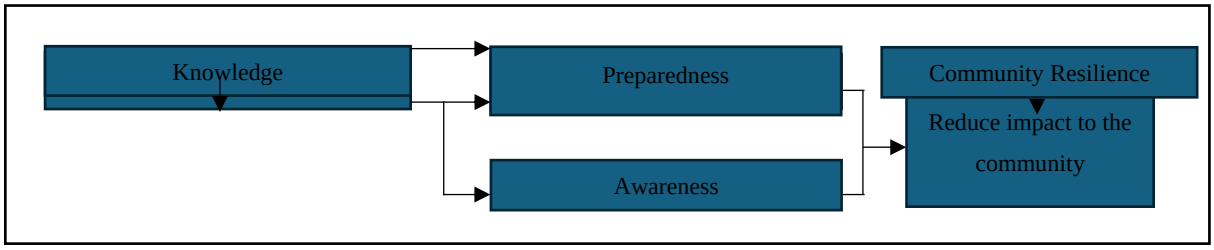


Figure 8: Preliminary Framework of Community Preparedness and Awareness.

Community Level of Preparedness and Awareness in Facing the Risk of Shortage of Water Supply

As the community has the know-how to deal with water related disasters, most of them had taken self-initiatives at family level to minimize the impact of water scarcity. All participants agreed that community awareness plays a crucial role in addressing this issue. By raising awareness of the importance of water conservation and management, communities can take steps to reduce their water usage and protect local water resources.

Apart from that, all participants agreed that one way to raise community awareness is through education and outreach programs. But the awareness program must be organized by the government. These programs can provide more detailed information on water conservation techniques, such as using water-efficient appliances and practices, as well as the impacts of over-extraction of water resources. Community members can also be educated on the importance of protecting and preserving local water sources, such as rivers, lakes, and wetlands.

Overall, raising community awareness and preparedness in dealing with the risk of shortage water supply is an essential part of addressing water scarcity in Raub. By working together and taking action to conserve and protect water resources, communities can help to ensure that there is enough water for current and future generations.

Community Readiness To Participate In A More Structured Disaster Management Plan At The Community Level

International Journal of Law, Government and Communication
EISSN : 0128-1763
Volume 9 Issue 37 (September 2024) PP. 352-374
DOI 10.35631/IJLGC.937029

Another way to raise community awareness is through community-based initiatives. All participants agreed that community members can work together to monitor and maintain local water sources, and to implement conservation practices at their homes and businesses. This can be done through community groups, such as neighborhood associations, or through partnerships with water management agencies. In one of the research areas, Kampung Kundang Patah located in Mukim Semantan Ulu, the community has implemented a water boring project which benefited around 100 households and the school adjacent to the water boring site. Additionally, the government can also play a role in raising awareness by providing resources and support for community-based water conservation initiatives. This can include funding for research and education programs, as well as technical assistance for community groups working on water conservation projects.

Conclusion

This research showed that water scarcity is the most common water related disasters issues faced by the community in Raub, and flash floods are the other water related disaster. The water related disasters happened in Raub are not a new phenomenon. This research also established that knowledge is the main element that drives the community to the next course of action to be taken in minimizing the impact of water scarcity. Their action is governed by the level of knowledge that they have based on their experiences. Next, the data collected from the research participants are vital in researcher's next step to develop the framework of community resiliency to water related disaster in Raub, Pahang. This research provides a significant contribution to the body of knowledge whereby there are still limited studies that have been conducted in Raub specifically to measure the preparedness and awareness of the community in dealing with water related disasters.

Acknowledgement

This research is self-funded by the researcher.

References

Abedin, M. A., Habiba, U., & Shaw, R. (2014). Community Perception and Adaptation to Safe Drinking Water Scarcity: Salinity, Arsenic, and Drought Risks in Coastal Bangladesh. International Journal of Disaster Risk Science, 5(2), 110–124. https://doi.org/10.1007/s13753-014-0021-6

Agency, J. I. C. (JICA), & Drainage, D. of I. and. (2011). The Preparatory Survey for Integrated River Basin Management incorporating Integrated Flood Management with Adaptation of Climate Change (Vol. 3, Issue January).

Al-Dahash, H., Thayaparan, M., & Kulatunga, U. (2016). Understanding the Terminologies: Disaster, Crisis and Emergency. Proceedings of the 32nd Annual ARCOM Conference, 1191–1200.

Azhar, M. G. (2000). Managing Malaysian Water Resources Development. Jurnal Kesihatan Masyarakat, 6(Special Edition), 40–58.

Berger, R. (2017). An ecological-systemic approach to resilience: A view from the trenches. Traumatology, 23(1), 35–42. https://doi.org/10.1037/TRM0000074

Cresswell, W. J. (2013). Qualitative Inquiry and Research Design Choosing Among Five Approaches (L. Habib, K. Koscielak, B. Bauhaus, & M. Masson (Eds.); 3rd ed.). SAGE Publications, Inc.

International Journal of Law, Government and Communication
EISSN : 0128-1763
Volume 9 Issue 37 (September 2024) PP. 352-374
DOI 10.35631/IJLGC.937029
Cosgrove, W. J., & Loucks, D. P. (2015). Water Management: Current and Future Challenges and Research Directions. Water Management Research Challenges, 44, 4823–4839. https://doi.org/10.1002/2014WR016869. Received

Department of Statistic Malaysia. (2020). Kependudukan Negeri Pahang. In DOSM (Vol. 53, Issue 9).

Fitzpatrick, T. (2016). Community Disaster Resilience. In Disasters and Public Health (pp. 57–85). Butterworth-Heinemann. https://doi.org/10.1016/B978-0-12-801980-1.00003-9

Döringer, S. (2021). 'The problem-centred expert interview'. Combining qualitative interviewing approaches for investigating implicit expert knowledge. International Journal of Social Research Methodology, 24(3), 265–278. https://doi.org/10.1080/13645579.2020.1766777

Fan, Y., & Lyu, X. (2021). Exploring two decades of research in community resilience: A content analysis across the international literature. Psychology Research and Behavior Management, 14, 1643–1654. https://doi.org/10.2147/PRBM.S329829

Glago, F. J. (2019). Household disaster awareness and preparedness: A case study of flood hazards in Asamankese in the West Akim Municipality of Ghana. Jamba: Journal of Disaster Risk Studies, 11(1), 1–11. https://doi.org/10.4102/JAMBA.V11I1.789

Grayman, W. M. (2011). Water-related disasters : A review and commentary. Frontiers of Earth Science, 5(4), 371–377. https://doi.org/10.1007/s11707-011-0205-y

Guo, C., Sim, T., & Su, G. (2021). Individual disaster preparedness in drought-and-flood-prone villages in Northwest China: Impact of place, out-migration and community. International Journal of Environmental Research and Public Health, 18(4), 1–14. https://doi.org/10.3390/ijerph18041649

Isahak, A. (2017). Engaging Local Communities Through Local Knowledge of Flood Disaster Management in the Pahang River Basin, Malaysia. In MIT-UTM Malaysia Sustainable Cities Program.

Islam, M. M., Amir, A. A., & Begum, R. A. (2021). Community Awareness Towards Coastal Hazard and Adaptation Strategies in Pahang Coast of Malaysia. Natural Hazards, 107(2), 1593–1620. https://doi.org/10.1007/s11069-021-04648-2

Jean Blair, M., & Mabee, W. E. (2020). Resilience. International Encyclopedia of Human Geography, 11, 451–456. https://doi.org/10.1016/B978-0-08-102295-5.10754-1

Kamarudin, N., Ismail, W. R., & Abd Kader, N. H. (2014). Menilai Kecekapan Dan Keberkesanan Perkhidmatan Bekalan Air Di Malaysia: Satu Pendekatan Analisis Penyampulan Data. Journal of Quality Measurement and Analysis, 10(2), 1–13. http://journalarticle.ukm.my/8603/1/jqma-10-2-paper1.pdf

Khairuddin, K.N.; & Awang Besar, J. (2021). Tingkah Laku Pengundi Luar Di Kawasan Dun Tras, Raub, Pahang. Jurnal Wacana Sarjana, 5(1), 1–17.

Kok Weng, T., & Bin Mokhtar, M. (2009). An Appropriate Institutional Framework Towards Integrated Water Resources Management in Pahang River Basin, Malaysia. European Journal of Scientific Research, 27(4), 536–547. http://www.eurojournals.com/ejsr.htm

Lee, J., Perera, D., Glickman, T., & Taing, L. (2020a). Water-related disasters and their health impacts : A global review. Progress in Disaster Science, 17. https://doi.org/10.1016/j.pdisas.2020.100123

Lee, J., Perera, D., Glickman, T., & Taing, L. (2020b). Water-related disasters and their health impacts : A global review. Progress in Disaster Science, 17. https://doi.org/10.1016/j.pdisas.2020.100123

Lee, K. E., Shahabudin, S. M., Mokhtar, M., Choy, Y. K., Goh, T. L., & Simon, N. (2018). Sustainable water resources management and potential development of multi-purpose

International Journal of Law, Government and Communication
EISSN : 0128-1763
Volume 9 Issue 37 (September 2024) PP. 352-374
DOI 10.35631/IJLGC.937029
dam: The case of Malaysia. Applied Ecology and Environmental Research, 16(3), 2323–2347. https://doi.org/10.15666/aeer/1603_23232347

Man, S., Md Hashim, N., Hj Ahmad, A., Khin, M. T., & Sidek, N. S. (2014). Kebolehupayaan Sistem Penuaian Hujan Sebagai Bekalan Air Alternatif di Malaysia: Suatu Penelitian Awal. Geografia: Malaysian Journal of Society and Space, 10(6), 97–104.

Mohd Taib, Z., Jaharuddin, N. S., & Mansor, Z. (2016). A Review of Flood Disaster and Disaster Management in Malaysia. International Journal of Accounting, Business and Management, 4(2), 97–105.

Merriam, S. B. (2012). Qualitative Research (A Guide to Design and Implementation). Jossey-Bass.

Noor Diyana, F. A., Fakhru'L-Razi, A., Aini, M. S., Ahmad Azan, R., & Mohd Muhaimin, R. W. (2020). Community Preparedness to Flood Disaster in Johor, Malaysia. IOP Conference Series: Earth and Environmental Science, 479(1), 1–7. https://doi.org/10.1088/1755-1315/479/1/012015

Pahang govt to open tenders for RM18m project to overcome water woes in Raub. (2020). Malay Mail. https://www.malaymail.com/news/malaysia/2020/09/10/pahang-govt-to-open-tenders-for-rm18m-project-to-overcome-water-woes-in-rau/1901979

Pahang to Resolve 90% of Water Woes in Five Years, says MB. (2022). The Star. https://www.thestar.com.my/news/nation/2022/08/02/pahang-to-resolve-90-of-water-woes-in-five-years-says-mb

Parkash, S. (2013). Awareness and Preparedness Strategies for Community Based Disaster Risk Management with Particular Reference to Landslides. Landslide Science and Practice, 7, 265–270. https://doi.org/10.1007/978-3-642-31313-4

Payus, C., Huey, L. A., Adnan, F., Rimba, A. B., Mohan, G., Chapagain, S. K., Roder, G., Gasparatos, A., & Fukushi, K. (2020). Impact of extreme drought climate on water security in North Borneo: Case study of Sabah. Water (Switzerland), 12(4), 1–19. https://doi.org/10.3390/W12041135

Raikes, J., Smith, T. F., Jacobson, C., & Baldwin, C. (2019). Pre-disaster planning and preparedness for floods and droughts: A systematic review. International Journal of Disaster Risk Reduction, 38(May), 101207. https://doi.org/10.1016/j.ijdrr.2019.101207

Ridzuan, A. A., Kadir, M. J. H., Yaacob, S., Oktari, R. S., Zainol, N. A. M., & Zain, M. M. (2017). Community Resilience Elements and Community Preparedness at Bukit Antarabangsa. AIP Conference Proceedings, 1857(June 2018), 1–7. https://doi.org/10.1063/1.4987122

Said, A. M., Ahmadun, F. R., Mahmud, A. R., & Abas, F. (2011). Community Preparedness for Tsunami Disaster: A Case Study. Disaster Prevention and Management: An International Journal, 20(3), 266–280. https://doi.org/10.1108/09653561111141718

Sekaran, U., & Bougie, R. (2016). Research Methods in Business. In Wiley (7th ed.). John Wiley & Sons Ltd.

Shaluf, I. M., Ahmadun, F., & Mat Said, A. (2003). A Review of Disaster and Crisis. Disaster Prevention and Management, 12(1), 24–32. https://doi.org/10.1108/09653560310463829

Sutton, J., & Austin, Z. (2015). Qualitative research: Data collection, analysis, and management. Canadian Journal of Hospital Pharmacy, 68(3), 226–231. https://doi.org/10.4212/cjhp.v68i3.1456

Tapela, B. N. (2012). Social Water Scarcity and Water Use.

Taylor, S. J., Bogdan, R., & Marjorie L. DeVault. (2016). Introduction to Qualitative Research Methods A Guidebook and Resource (4th ed.). John Wiley & Sons Ltd.

International Journal of Law, Government and Communication
EISSN : 0128-1763
IJLGC
Volume 9 Issue 37 (September 2024) PP. 352-374
DOI 10.35631/IJLGC.937029

Turner, B., & Pidgeon, N. (1997). Man-Made Disasters (Second).

Warta Kerajaan Negeri Pahang, (1996).

Water and Sanitation - United Nations Sustainable Development Goals. (n.d.). United Nations. Retrieved June 16, 2022, from https://www.un.org/sustainabledevelopment/water-and-sanitation/

Weng, T. K., & Mokhtar, M. Bin. (2007). Implementation of Integrated Water Resources Management in Malaysia: Some Issues and Challenges. 1st Asia Pacific Water Summit: International Forum on Water Environmental Governance in Asia, Figure 1, 1–7.

Wijayanti, Y., Fittkow, M., Budihardjo, K., Purwadi, & Setyandito, O. (2020). Sustainable water management: A review study on integrated water supply (case study on special district of Yogyakarta). IOP Conference Series: Earth and Environmental Science, 426(1). https://doi.org/10.1088/1755-1315/426/1/012056

Zainalfikry, M. K., Ab Ghani, A., Zakaria, N. A., & Chan, N. W. (2020). HEC-RAS One-Dimensional Hydrodynamic Modelling for Recent Major Flood Events in Pahang River. Lecture Notes in Civil Engineering, 53(October 2021), 1099–1115. https://doi.org/10.1007/978-3-030-32816-0_83