

## LOCAL KNOWLEDGE OF FLOOD PREPAREDNESS: CURRENT PHENOMENA TO FUTURE ACTION

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### Graphical abstract



### Abstract

Understanding local knowledge towards isolated incidents is important as a means to the inclusion and participation of local people in disaster management and preparedness activities. Indeed, investigating how local people or communities in a particular area view and interact with their environment and its changes is crucial. In recent years, extreme weather phenomenon has caused havoc not only other parts of the world, but also in Malaysia with major destructions to most lives and properties. Much research and development has focused on these global phenomena. The situation is getting alarming in Malaysia, especially along the eastern coastal area. In light of the big flood of Kelantan in 2014, this study aimed to discover the local communities' knowledge on flood preparedness. Face-to-face interviews and a series of workshops were conducted with 15 respondents, from professionals, voluntaries, community leaders, and affected communities. The aftermath of the big flood showed that all forms of transportation were affected, lives, farm lands and properties were lost, and economic activities were grounded. Worst of all, these disasters are reported to be linked to human actions as the key cause. Thus, it is recommended that more efforts be taken to channel the information on flood preparedness from the affected communities, for future use. Besides, well-established and clear guidelines will help other relevant players like NGO, voluntaries, helpers, officers, and communities to play their roles in the most efficient way to face any disaster.

**Keywords:** Knowledge, local people, flood, preparedness, disaster natural hazards, physical vulnerabilities

### Abstrak

Memahami pengetahuan tempatan terhadap insiden terpencil adalah penting sebagai satu cara untuk kemasukan dan penyertaan rakyat tempatan dalam pengurusan bencana dan kesiapsiagaan aktiviti. Oleh itu, menyasat bagaimana orang tempatan atau komuniti memandang kawasan tertentu dan berinteraksi dengan persekitaran mereka dan perubahan adalah penting. Kebelakangan ini, fenomena cuaca yang melampau telah menyebabkan malapetaka bukan sahaja kawasan-kawasan lain di dunia, tetapi juga di Malaysia dengan kemusnahan yang besar kepada nyawa dan harta benda. Penyelidikan dan pembangunan banyak telah memberi tumpuan kepada fenomena global. Keadaan semakin membimbangkan di Malaysia, terutamanya di sepanjang kawasan pantai timur.

Memandangkan banjir besar Kelantan pada tahun 2014, kajian ini bertujuan untuk mencari pengetahuan masyarakat tempatan mengenai persiapan menghadapi banjir. Temu bual dan beberapa siri bengkel telah dijalankan dengan 15 responden, daripada profesional, sukarela, pemimpin masyarakat, dan masyarakat yang terjejas. Selepas kejadian banjir besar menunjukkan bahawa semua bentuk pengangkutan terjejas, yang hidup, tanah-tanah ladang dan harta telah hilang, dan aktiviti ekonomi telah musnah. Paling teruk sekali, bencana ini dilaporkan mempunyai kaitan dengan tindakan manusia sebagai punca utama. Oleh itu, ia adalah disyorkan bahawa lebih banyak usaha diambil untuk menyalurkan maklumat mengenai persediaan banjir dari masyarakat yang terjejas, untuk kegunaan masa depan. Selain itu, garis panduan yang mantap dan jelas akan membantu pihak lain yang terlibat seperti NGO, sukarela, pembantu, pegawai, dan masyarakat untuk memainkan peranan mereka dengan cara yang paling berkesan untuk menghadapi sebarang bencana.

*Kata kunci:* Pengetahuan, orang tempatan, banjir, kesiapsiagaan, bencana bencana alam, kelemahan fizikal

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## 1.0 INTRODUCTION

Floods and their devastating effects have become one of the most serious natural threats to sustainable development in human settlements [1]. Most of the analysts argue that environment is only responding to the abuses heaped on it by human's activities [2]. The main concern facing the world today is the possibility of extinction due to natural disasters. This could be prevented by taking immediate action, but the signs are being ignored [3].

Flood is a natural response of a river or stream or a mere drainage channel that has excessive amount of water to cope over its own capacity [4]. Flood occurs when water particularly from rainfall accumulates across an impermeable surface and cannot rapidly dissipate or evaporate [5]. The Australian Government explains floods as the covering of normally dry land by water that has escaped or been released from the normal confines of: any lake, or any river, creek or other natural watercourse, whether or not altered or modified; or any reservoir, canal, or dam [6]. Some scholars also explain floods as occurrences and reoccurrence of prolonged leave rain shows.

Most of the researchers and scholars agree that floods are one of the most widespread, disastrous and common natural hazards of the world [7]. The recent floods all over the world and its devastating effects have further strengthened their beliefs [8]. Floods are basically climatological in nature [9], but human activities have been observed to worsen the incidence and vulnerability of floods. Floods are a normal issue, especially during the rainy sessions in the United States of America [10]; Pakistan and India [11], Nepal [12], Nigeria [13], and even in Malaysia [14]. Floods have dangerous effects on living things and nature, and impacts on the social, economic, and political wellbeing of people.

For some countries, floods have become an annual disaster, the citizens continuously becoming victims to it. However, the preparedness for flood is still under par for certain countries [15]. Flood preparedness is the actions and efforts taken in

advance to effectively respond to the effect of hazards, viz proper and effective alarm and the temporary evacuation of people and property from threatened locations, and necessary assistance for potential victims [16].

## 2.0 LOCAL KNOWLEDGE

Discovering local knowledge is very important for efficient risk prevention and management [17]. A clear understanding on the concepts of local knowledge will lead to effective risk prevention and management practices. Local knowledge as knowledge generated from the observation and experience of the surrounding situation (environment) by a set of people, who are ultimately related to that particular situation. However the importance of local knowledge is not well understood by most of the people [18], and is mostly used for participation of local people in disaster management and preparedness activities. Local knowledge can be utilized as a key for promoting local people's participation with 'higher-level' institutions in the areas of disaster risk prevention and management for which they have a comparative advantage [19]. Participatory approaches to disaster management and preparedness often pre-suppose a basis in local knowledge and practices since communities in disaster-prone zones have hoarded a lot of valuable knowledge over time [20]. Discovering people's practices and beliefs is crucial to understanding local knowledge [21]. Understanding local knowledge, practices, and contexts helps the players in disaster management to tailor their actions and communication strategies in the most effective way [22, 23].

### 3.0 FLOOD HAZARDS IN MALAYSIA

The combined elements of Mother Nature and human actions are the reason behind frequent floods in Malaysia [24, 25]. From a historic point of view, Malaysians are riverine people with majority of their earlier settlements near to rivers in the peninsular [26]. Coupled with the natural factors such as heavy monsoon rainfall, intense convection rain storms, poor drainage and other local factors, floods have become a common feature in the lives of Malaysians [27]. Monsoon rains have a profound influence on many aspects of livelihood of the people in the eastern coast of Peninsular Malaysia.

Being located in the southernmost tip of the Asian mainland, the Peninsular Malaysia is directly in the path of the seasonal monsoon winds. In particular, the eastern coastal states of Kelantan, Terengganu, Pahang, and Johor are exposed to cold surges of north-easterly winds between November and March [27]. During these months the monsoon winds which originates from the Asian interior, brings heavy rains to the entire east coast as they are moisture-laden after crossing the South China Sea and the Gulf of Siam. The seasonal floods in the east coast are therefore a natural consequence of these heavy rains occurring over a short period of time. The total loss from floods in 2014 was estimated to about RM1 billion, mainly along the eastern coastal region. In the north-eastern states such as Kelantan, Terengganu, and Pahang, around 120,000 people were forced to flee their homes. Even though floods have become an annual catastrophe in Malaysia, the nation is far behind on flood preparedness. It has been observed that the decision and strategies made on flood preparedness have lesser impact on the rural communities. There is an immediate need to study the flood affected areas for their local knowledge. Thereby, this paper is focused on understanding the local knowledge on flood preparedness in Malaysia.

### 4.0 MATERIALS AND METHODS

This study extensively used primary and secondary data sources to fulfil its research objective. The sampling frame for this study was developed based on previous studies, and on the advice of the experts from various agencies. Fifteen floodplains and disaster-prone zones were identified and observed for the pattern and parameters of flood. The area most affected by flood was identified and finalized as the location for conducting this study. Kelantan River Basin was identified as the area for this study, due to its extensive damage from floods. According to the Malaysian National Security Council, the floods along the Kelantan river basin in 1967 caused a loss valued at RM199.3 million. Secondary data such as newspaper cuttings, reports and journal publications were used to support the objective of this study.

A qualitative approach was used to collect the primary data. Fifteen respondents were selected from professionals, officers, voluntaries, community leaders and affected communities, and in-depth interviews were carried out with these respondents. On an average, each interview consumed about 35 to 80 minutes to complete. A structured interview was conducted using standard pre-set questions, to get the respondents' viewpoint and opinion on each aspect. Furthermore, all the interviews were recorded and transcribed. Therein, thematic coding and semiotic analysis were carried out on the interview transcripts.

### 5.0 RESULTS AND DISCUSSION

The results were mainly focused on the four pillar of local knowledge on disaster preparedness, namely observation, anticipation, adjustment, and communication (Baumwoll, 2008). The four pillars were formed based on thematic analysis.

#### 5.1 Observation

Local knowledge on flood preparedness among Kelantanese people was gained through observations of natural hazards, and from their daily experiences in their local surroundings. They were well informed on the nature of natural hazards, explained by the velocity of rain flow and difference in rain types. Local communities also have a great grasp on the history of floods in their region. Most of them knew about the location, time, duration, frequency, intensity, and certainty of previous flood disasters, and were aware of the social and physical liabilities from floods. Furthermore, the local communities explained the losses they faced on property, land and livestock due to floods, and the difficulties faced post-floods.

#### 5.2 Anticipation

The respondents anticipated floods by close monitoring the local weather indicators, signs of environmental hazards, changes in animal behaviour and vegetation patterns, and early warning systems. They save precious time by recognizing the signs of occurrence of floods, and make escape routes and safe places for their family, communities, and livestock. They also focused on advanced storing of food, and the transfer of important valuables. The local communities tend to know the safest and faster routes to escape, and keep a tab on their people for emergency evacuation.

#### 5.3 Adjustments

Kelantanese people have their own strategies developed based on the trial and error methods. Their strategies on flood preparedness are purely

based on previous experiences from past disasters. Their capacity to adjust is based on their access to assets (or people's strengths, or capital endowments including human, sociocultural, institutional, financial, economic, political, physical, and natural aspects), but some strategies are not sustainable nor suitable for the long term.

#### 5.4 Communication

Kelantanese local knowledge on flood preparedness also related to the communication strategies among community members and between generations. Basically, communication refers to the sharing of information related to past and imminent flood disasters. In Kelantan, most of the knowledge transfer took place orally. Their informal education and religion aspect played a vital role in the communication and transfer of knowledge. They used mosques as an important place for transfer of knowledge and as an informal education institution [24, 25].

The results of the interviews held to extract 18 causes (factors) behind the occurrence of floods (Table 1). However, each respondent had his/her own personal opinion on the major causes to floods. Generally, drainage was agreed on as the main factor to occurrence of floods in the area. The blockage of canals, dirty drainage channels, illegal channelization of drains, and inadequate drainage channel were basically water-flow based causes. The local communities and volunteers felt that proper drainage systems and channels might reduce the impact of flood disasters.

**Table 1** Causes of Flood

No	Causes
1	Blockage of canals
2	Constructions and reconstructions
3	Deforestation
4	Dirty drainage channels
5	Farming along flood plains
6	Global warming and climate change
7	Government policies and programmes
8	Heavy rain
9	Illegal channelization of drains
10	Inadequate drainage channel
11	Land reclamation
12	Nature of terrain
13	Negligence
14	Non-sustainable agriculture practices
15	Non-compliance with regulations
16	Ocean surge
17	Poor weather forecast
18	Poor physical planning

The uncontrolled action of human beings such as deforestation and dirty drainage channels, farming along flood plains, land reclamation, negligence, non-sustainable agriculture practices, non-compliance with regulations, and constructions and

reconstructions have resulted in global warming, climate change, and subsequently disasters like floods. Most of the factors are a result of the greediness of human beings, due to selfish actions and narrowed outlook.

## 6.0 CONCLUSION AND RECOMMENDATION

The benefits of local knowledge should be realized by every player in flood management, and event disaster management. It will increase the success rate, while minimizing risk taking. Solutions in resource management, development, and disaster management need to go beyond the dichotomy between local versus state management levels and integrate cross-scale institutional linkages. Understanding local knowledge and practices can help identify what is needed and acceptable locally and how people's participation can be solicited to ensure their support for external actions. An in-depth understanding on local knowledge will help to develop an effective and efficient relationship among the players during emergency.

The utilization of local knowledge related to flood preparedness includes four major steps, namely understanding the nature of local knowledge, discover how it worked for local communities (victims), the mechanism behind the four pillars of local knowledge on flood preparedness, and lastly to understand the border perspective on relationship of local knowledge, flood management, sustainable development and betterment of livelihoods. It is highly recommended that understanding of local knowledge should be included in flood preparedness in Kelantan, so that every strategy will be effectively implemented with minimal risk. For every organization, the consumer is given the ultimate priority. The same goes here, the local communities are the end consumer for flood preparedness protocol. If the policy makers can include the understanding of local knowledge in flood preparedness, it will become more valuable and a real life saver for potential victims of floods.

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