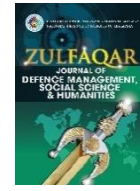




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### HUMANITARIAN LOGISTICS IN DISASTER PREPAREDNESS: A CASE STUDY OF MONSOON RELIEF DISTRIBUTION FOR PULAU REDANG, TERENGGANU

Ruzaidin Mohammed Zain<sup>a,\*</sup>, Haliza Mohd Zahari<sup>b</sup>, Nur Hidayah Azhar<sup>c</sup>, Puteri Asfarina Affendi Uthrapathe<sup>d</sup>

<sup>a,b,c,d</sup>Faculty of Defence Studies and Management, National Defence University of Malaysia, Kem Sungai Besi, 57000 Kuala Lumpur

\*Corresponding author: [3211439@alfateh.upnm.edu.my](mailto:3211439@alfateh.upnm.edu.my)

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#### ABSTRACT

*Logistical planning is essential to reducing disaster-related suffering. As aid is essential, it must be managed effectively to ensure that the impacted population receives accurate and timely assistance. Every year, from October to March, the Northeast Monsoon brings torrential rainfall to the east coast of Peninsular Malaysia, notably Terengganu, resulting in catastrophic floods. This situation presents a unique logistical challenge in the island area, where humanitarian supplies must be delivered well before the monsoon season starts since the islands will become inaccessible due to weather and sea conditions. This study explored measures and approaches implemented by the Department of Social Welfare Malaysia (DoSW), a government agency responsible for distributing aid to Pulau Redang, Terengganu, in preparation for the monsoon season. A qualitative inquiry methodology using a case study was used to complete this study by conducting interviews with key respondents from DoSW and Pulau Redang's local communities. The results showed that information gathering, pre-positioned supplies, good coordination among logistics agencies and local community involvement are essential strategies to ensure that disaster-affected communities get the supplies they need quickly and efficiently, especially in remote island areas.*

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#### Introduction

Humanitarian logistics is the process of planning, implementing, and regulating the efficient, cost-effective movement and storage of products and commodities, together with related information, from the point of origin to the site of consumption to fulfil the needs of the final beneficiary (Yáñez-Sandivari et al. 2021). Transportation of essential goods and services to disaster-affected communities is a crucial component of humanitarian logistics planning before a disaster. Humanitarian aid can be provided in physical supplies (food, medication, blankets, and water) or intangible services (maintenance and restoration of infrastructure). However, when isolated places such as islands are involved, the complexity of conducting humanitarian efforts increases. The authorities responsible for disaster management must meticulously plan and prepare for factors such as geographical position, climate, seasonal weather effects, and accessibility. The island area's geographical position, far from the mainland, makes it difficult or impossible to distribute disaster logistics assistance immediately after a disaster occurs. This is compounded by weather and sea conditions that depend on specific seasons, such as monsoons. This requires a different

strategy compared to the usual logistics setup. One technique guarantees effective logistics preparation by coordinating procedures and pre-positioning goods in advance at the relevant places.

## Literature Review

Disasters are defined by the Malaysian National Security Council (NSC) as "an emergency that results in the loss of life, damage to property and the environment, and an impediment to local, social, and economic activity." A disaster is an occurrence that severely impairs the functioning of a community or country, resulting in significant human, material, economic, or environmental losses and impacts that are greater than what the affected community or society can manage with its resources and require the mobilization of significant resources (National Security Council, 2013). In Malaysia, meteorological disasters, such as floods, are the most common. Floods are natural disasters influenced by human activities, particularly physical development. Malaysia's Department of Irrigation and Drainage (DID) classifies floods as either flash floods or monsoon floods. Flash floods are unexpected, unforeseen events that cause chaos in persons in motion and catch people off guard as they perform their daily routines. The northeast monsoon winds from November to March and the southwest monsoon winds from May to September, on the other hand, are what cause monsoon floods.



**Fig. 1: Disaster Management Phase**

The four phases involved in disaster management are depicted in Fig. 1. It is a prevalent misperception in disaster management that the disaster response phase is the only phase that matters. Simply because there have been no disasters, disaster management operations do not always come to an end. The disaster mitigation, preparedness, and recovery phases were included because they are all components of a comprehensive disaster response. Humanitarian actors must provide goods to affected people throughout each phase, which requires logistic support regardless of supplies' volume, variety, or urgency. Humanitarian actors must constantly be ready throughout the disaster management process to be prepared for disasters.

When a disaster occurs, humanitarian actors' most common obstacle is establishing the quickest way for humanitarian aid supplies and services to reach those in need (Mishra et al., 2020). For example, roadblocks or cut-offs on the way to a disaster area are one of the most common problems humanitarian actors face when doing their jobs (Mohamad et al. 2021). They will be unable to respond if they cannot reach the site of the disaster victims once the area has been deemed safe or if the place becomes inaccessible from the outside owing to safety hazards or threats. Therefore, an effective and efficient response to a natural disaster involves solid preparation, situational awareness, and excellent coordination among humanitarian organizations.

## Disaster Management in Island Area

Compared to the mainland, island areas face unique and distinct issues for disaster management. Geographical characteristics, terrain, location, accessibility, and environmental conditions are a few elements that impact disaster management planning in island areas. Islands that are geographically dispersed and of smaller size have several characteristics and attributes that increase their susceptibility to environmental, social, political, and economic disruption (Kusumartono & Rizal, 2019; Pathak et al.,

2021). Due to water scarcity, poor communications, transportation challenges, and a lack of local resources, as well as their predisposition to weather hazards, islands exhibited distinct vulnerabilities during the disaster and are mainly sensitive to the effects of climate change effects, sea and weather hazards (Betzold, 2015; Thomas et al. 2020). As a direct consequence, islands suffer the most severe consequences of natural disasters in the form of economic disruption and fatalities (Botzen et al. 2019).

Additionally, due to their isolation and size, islands face unique challenges, such as being far from large urban areas and resources and having few economic prospects (Connell et al., 2020; Petzold & Magnan, 2019). Accessibility is another significant issue on the island. The small size and remoteness of the island are critical considerations when considering island accessibility. Due to the island's scarcity of resources, island inhabitants rely on connections and supplies from the outside or cities on the mainland (Grydehøj & Casagrande, 2020). However, this accessibility may be compromised during particular seasons, such as the monsoon, due to rough sea conditions that make travelling by water unsafe. As a result, island inhabitants could not go to the mainland for daily necessities supplies, and aid from the mainland was also unable to be supplied to the island due to the disconnection.

Natural disasters can easily disrupt critical services on distant islands, preventing aid organizations from accessing them and delaying the area's rehabilitation. In disaster management operations for island areas, special considerations must be made to guarantee that relief efforts for island populations may be carried out efficiently during the disaster response phase and via proactive measures in the disaster preparedness phase.

### **Humanitarian Logistics Support**

Large-scale operations, unpredictable demand, and the development of unforeseen restrictions during disasters are characteristics of humanitarian logistics (Roh et al., 2022). The primary goal of humanitarian logistics is to ease the difficulties of the most exposed or disaster-affected populations (Abazari et al., 2021). The humanitarian logistics supply chain structure comprises many persons or organizations with no apparent or formal connection to one another. Nonetheless, all participating parties have the same objective: to enable impacted persons to survive after a tragedy. These humanitarian logistics activities also frequently occur in areas with unstable infrastructure circumstances, such as power outages and limited transit infrastructure (Dash et al. 2013; Roh et al. 2015). In addition, most natural disasters are unforeseen, resulting in an uncertain need for assistance supplies during these disasters (Abazari et al. 2021; Ye et al. 2020). Upon the occurrence of a disaster, the early reaction often entails delivering a massive quantity of supplies to the affected region.

Planning and precautions are implemented during the pre-disaster or preparedness phase to facilitate an efficient reaction and timely warning, i.e. developing effective communication strategies and pre-planning logistical operations (Lawrence et al. 2022). The appropriate agency/organization will identify and appoint suppliers to acquire or purchase disaster-related supplies. The stock acquisition might also come from donations made by numerous parties in preparation for a disaster. All supplies of these items will be transported to the main depot, which functions as a storage facility and the primary distribution hub. Stock will be delivered in advance or pre-positioned from the main depot to an intermediate storage and distribution point, a depot/mini-store where a disaster is generally predicted to occur. During a disaster, immediate action will be taken, such as evacuating victims to evacuation centres and distributing vital supplies, to lessen the impact of disasters on victims' finances and quality of life. During the post-disaster phase, attempts are made to reinstate the affected regions to their pre-disaster condition, including reconstructing damaged houses and public structures (Berger & Garyfalakis, 2013).

### **Humanitarian Relief Support in Malaysia**

There is a global increase in natural disasters, such as hurricanes, earthquakes, and floods (Guo & Kapucu, 2020). However, in Malaysia, flood is considered a high-frequency natural disaster hazard (Sidek et al. 2021; Wong et al. 2018). It has been recorded that floods in Malaysia comprise monsoon floods, flash floods, and mud floods (Jaafar et al. 2020; Sidek et al. 2021). Nearly 77 per cent of Malaysia's population (33 million) resides in urban areas, and over 3.5 million people reside on floodplains (Shah et al. 2017); and 23 per cent of all urban areas in Malaysia are susceptible to flooding (Khailani & Perera, 2013). Since the turn of the century, floods have impacted an area of 29,000 km<sup>2</sup>, more than 4.82 million people (22 per cent) and caused property damage of RM915 million in Malaysia (Ahmad et al. 2013). Modernization infringes on flood-prone locations due to land scarcity in urban areas (Ayog et al. 2005). Malaysia, with an average

yearly rainfall of 2500 mm, is one of the countries with the highest precipitation in the world (Ng et al., 2022).

The Northeast Monsoon, characterized by heavy rainfall from October towards the end of March every year, impacts the monsoon season on Peninsular Malaysia's east coast. As a result, between November and December, catastrophic floods affect the east coast states of Terengganu, Pahang, Kelantan, and Johor almost every year. The floods will cause many residents to be affected and evacuated to Temporary Evacuation Centres (TEC) located throughout the states.

The flood disaster that hit Malaysia from December 2021 to January 2022 affected nearly 90,000 people and caused 50 deaths (National Disaster Management Agency (NADMA), 2022). This flood disaster has adverse effects on humans, the economy, the environment, and other living things. Given the widespread impact of flood disasters, providing relief supplies to the affected population becomes a critical element of the disaster management cycle. During a disaster, many stocks of relief items are provided by the government, humanitarian organizations, and public donations. To help the people affected by the floods, relief supplies consisting of necessities and food will be channelled to all TEC and the residents stranded in their respective homes. The process of distributing relief goods involves the humanitarian supply chain and coordination between agencies which needs to be carried out in an orderly and thorough manner. However, there are challenges faced by logistics agencies in delivering the supplies to meet the needs of disaster victims that could affect the overall disaster relief operations, resulting in a delay or shortage of supplies to victims in flood-affected areas.

## **Methodology**

This study aimed to explore the measures and approaches implemented by the Department of Social Welfare Malaysia (DoSW), a government agency responsible for distributing aid to Pulau Redang, Terengganu, in preparation for the monsoon season. Therefore, the qualitative research approach has been chosen to explain the research phenomena further. This study selects an island, Pulau Redang, in the Terengganu state of Malaysia, as a single-case study. A case study has been widely utilized in the research of the humanitarian logistics field (Akhtar et al. 2012; Banomyong et al. 2019; Tatham et al. 2009) and enables researchers to investigate actual practices in authentic contexts. The method involves data collection by conducting semi-structured interviews with 12 respondents who participated in the disaster relief effort in Pulau Redang. These respondents include local community leaders, villagers, DoSW and Malaysia Civil Defence Department officials (MCDD).

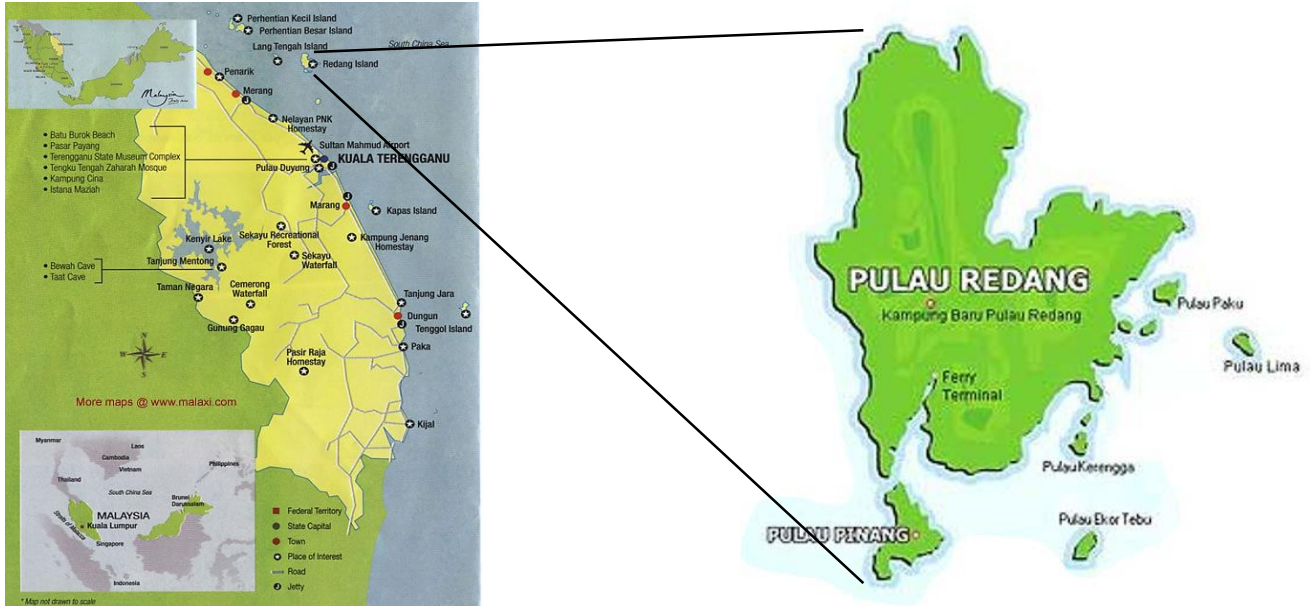
By conducting content analysis, the data collected from interviews were transformed into meaningful information to discover the common trends that helped to answer research questions. This analysis collected helpful information regarding the logistical deployment of humanitarian support in Pulau Redang in preparation for the monsoon season.

## **Study Area**

Pulau Redang is a Malaysian island in the Kuala Nerus District of Terengganu. Pulau Redang is one of nine islands forming a marine sanctuary park. It is one of the largest islands off Peninsular Malaysia's east coast and is well-known for its crystal-clear waters and white sand beaches. With a size of approximately 7 kilometres in length and 6 kilometres in width, Pulau Redang is the largest of the Marine Park's islands. The island is located 45 km offshore of Terengganu. The primary means of transportation connecting the island with the mainland is by boat and ferry; the journey takes about 1 hour from Taman Shahbandar Jetty, Kuala Terengganu. Pulau Redang is a home for a community of people who live in Kampung Baru Pulau Redang at the left bank of Sungai Redang estuary. This community comprises 232 houses and 450 families with a total population of 1700, with two distinct groups of residents: the young and the old. Young people account for 60 per cent of the workforce in the tourism industry. Furthermore, the elderly constitute 35 per cent of the fisherman, and another 5 per cent are doing small-scale business in the village.

The island is prone to flash floods during the Northeast Monsoon season from October to March. In 2017, the hefty rains forced residents to be evacuated to temporary evacuation centres (PPS) when the water overflowed as high as 1 meter due to the narrow drainage system and the collision with the tidal sea.

Due to its remote location and limited local resources, the community of Pulau Redang depends on the supply of necessities sourced from the mainland. However, during the monsoon season, they experienced a disconnection from the mainland due to adverse weather and rough sea conditions, which suspended travel by boat and ferry due to safety factors. As a result, this situation requires careful and unconventional planning where relief operations are carried out in the response phase after a disaster and proactive action in the preparedness stage, regardless of whether the disaster is happening.



**Fig. 2: Map of Terengganu (left) and Pulau Redang (right)**  
(Source: malaxi.com)

**Findings and Discussion**

Effective logistics management is critical in the whole level of disaster management. Providing and distributing basic aid such as food, clothing and other necessities to the disaster victims is crucial as it involves the lives and survival of the victims affected by the disaster. As a preparatory measure from the logistical aspect to face the flood disaster, the Malaysian Social Welfare Department (DoSW) is responsible for providing and distributing necessities and dried food for flood victims.

In line with National Security Council (NSC) Directive 20, DoSW plays a vital role as the Relief and Rehabilitation Agency responsible for providing and distributing food and necessities, registration and counselling services to disaster victims at evacuation centres, and rehabilitation assistance after the disaster. Based on Directive No. 20 (Revised): National Disaster Management Policy and Mechanism, DoSW has four (4) prominent roles and responsibilities, namely to provide and maintain evacuation centres for disaster victims; to provide and distribute food aid, clothing and other necessities to disaster victims (as depicted in Table 1); to carry out the registration of disaster victims for rehabilitation; and to provide guidance, advice/counselling to disaster victims.


**Table 1: Disaster Aid/Item provided by DoSW**  
(Source: Department of Social Welfare Malaysia, 2018)

Category	Disaster Aid/Item
Basic Essential Needs	Mat, Blanket, Sarong, Towels, Comforter, Hygiene Kit, Refreshment Kit
Food	Rice, Granulated Sugar, Cooking Oil, Dried Fish/Anchovies, Eggs, Coffee/Tea, Salt, Canned Food, Flour, Mineral Water, Vermicelli, Biscuits, Condensed Milk, Sardines
Additional Necessities (For Special Needs)	Foam Mat, Wheelchair, T-Shirt, Track Suit, Diapers, Women's Sanitary Needs, Inner Wears, Pillows, Candles, Powder Milk, Mattress

### Pre-Disaster Information Gathering

Careful planning and implementation are essential at every stage of disaster management, especially in the preparedness phase. In the case of Pulau Redang, the District Social Welfare Office (DWO) of Kuala Nerus will work with the District Office, Local Authorities and relevant Departments/Agencies to provide basic information on the residents of the island. The basic information required includes the name of the head of household, number and information of families, house address, and contact number.

This information is to be verified by the local community leader and needed to identify the number of families, households and groups in need to facilitate the registration process as well as the expected needs of food supplies and necessities. This directory of basic population information will be constantly updated from time to time. The information and data obtained will help DoSW to make projections for the procurement of essential goods.



**BORANG MAKLUMAT ASAS PENDUDUK**

**A. MAKLUMAT ASAS**

1. Negeri : \_\_\_\_\_ 2. Daerah : \_\_\_\_\_  
 3. Parlimen : \_\_\_\_\_ 4. Dun : \_\_\_\_\_  
 5. Kampung : \_\_\_\_\_ 6. Mukim : \_\_\_\_\_

**B. MAKLUMAT ISI RUMAH**

1. Nama Ketua Keluarga (Mengikut Kad Pengesatan) : \_\_\_\_\_  
 (Hanya satu (1) bagi satu (1) rumah)

2. No K/P :

3. Umur :  Tahun 4. Jantina  Lelaki  Perempuan  
 5. Pekerjaan : \_\_\_\_\_

6. No Telefon : \_\_\_\_\_  
 7. Alamat : \_\_\_\_\_  
 Poskod : \_\_\_\_\_

**Senarai Ahli Keluarga**

Bil	Nama	Jantina (L/P)	No.KPPBS	Umur	Hubungan	Pekerjaan / Sekolah	Catatan
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							

**C. MAKLUMAT TAMBAHAN**

Kategori	L	P	Jumlah
Warga Emas (60 tahun ke atas)			
Dewasa (18 tahun ke atas)			
Kanak-Kanak (bawah hingga 17 tahun)			
Bayi (bawah 2 tahun)			
OKU			

Pengesahan Penghulu/Ketua Kampung/  
 Pemimpin Komuniti Tempatan

Tandatangan  
 Nama : \_\_\_\_\_  
 No. K/P : \_\_\_\_\_  
 Tarikh : \_\_\_\_\_

**Fig. 3: Basic Resident Details Form**  
 (Source: Jabatan Kebajikan Masyarakat Malaysia, 2018)

### Forward Base Approach

DoSW disaster relief storage facility is a place to store necessities such as food and other needs at various levels consisting of a central/state depot, mini depot, forward base, evacuation centre supply store and other related facilities. These necessities are stored before the floods and are enough to cater to disaster victims' needs for a certain period. The Forward Base approach is a storage place for food supplies and necessities for remote flood-prone areas. The Forward Base facility needs to be developed so that food aid and goods can be distributed immediately to areas often disconnected due to floods. For the state of Terengganu, there are 152 Forward Bases located throughout the state, including in the island areas. For Pulau Redang, the Forward Base has been established at a local Community Hall in Kampung Baru Pulau Redang.



**Fig. 4: DoSW's Forward Base in Kampung Baru Pulau Redang**  
(Source: Author)

### Humanitarian Relief Operation for Pulau Redang Residence

In September each year, before the start of the monsoon season, Terengganu State Social Welfare Office and DWO Kuala Nerus will ensure the stock of necessities and dried food supplies in all central depots mini depots is increased to the optimum level. To ensure the efficiency of disaster logistics support operations, DWO Kuala Nerus will select and appoint suppliers and constantly update the suppliers' contact information so that immediate needs can be obtained quickly and promptly. Suppliers whom the DWO has listed will deliver disaster necessities to the state's main depot in Marang for storage purposes before they are distributed to mini depots in the districts as well as forward bases throughout the state of Terengganu in preparation for the floods hit.

Subsequently, by October each year before the start of the northeast monsoon season, relief supplies will be sent to Pulau Redang by sea transportation. In order to assure the self-reliance and sustenance of the island's community, the supplies are stored at the island's forward base storage facility and can accommodate at least seven days of use. This approach ensures that the supplies are sufficient for distribution to local communities and can meet the needs when the area is cut off from the mainland during the monsoon. In 2021, four metric tonnes of food supplies were sent to Pulau Redang in preparation for the monsoon season. DWO also cooperates with the District Office and relevant departments/agencies to deliver relief supplies at the forward base before the monsoon season. To ensure that it meets the requirements set out, which are: two (2) months in advance for basic needs items; and one (1) month in advance for dry foods items.



**Fig. 5: Delivering (left) and unloading (right) of relief supplies to Pulau Redang**  
(Source: Author)

## **Community Involvement and Empowerment**

Village Development and Security Committee (VDSC) Pulau Redang serves as the administrative body responsible at the Pulau Redang local community level. The direct involvement of the local community plays an essential role in ensuring a successful humanitarian logistics operation. The VDSC has information such as the number of people in their community areas and a list of residents who require special attention, such as the disabled, the elderly, infants and pregnant women, that DoSW needs to plan more accurate and sufficient logistical requirements (Halizahari et al. 2021). Cooperation and assistance from local leaders are required to work together with the relevant government agencies in channelling the necessary information and assistance.

It was observed that the cooperation and sense of belonging between the villagers in Pulau Redang were excellent when they volunteered to help unload the relief supplies from the ship to the truck and then to the storage facility at the forward base. The involvement of village youths in voluntary bodies such as MCDD is also very encouraging, where they play an active role in helping this DoSW relief distribution mission. DoSW also empowered the community by delegating the responsibility to VDSC to plan and distribute relief supplies to the villagers. Usually, the villagers sit together and repack the goods received into small packs according to the number of recipients' families. Subsequently, the assigned parties will distribute the goods to the villagers' houses. More interestingly, these tasks are usually performed by the village women, who indirectly reflect the ability and empowerment of these groups in serving the needs of their local community.

## **Inter-agency Coordination**

Sending relief supplies to the island area presents challenges, especially logistical aspects. As an agency with limited assets and human resources, DOSW needs support and coordination with other agencies to execute the task. For instance, marine assets owned by agencies such as the Malaysia Maritime Enforcement Agency (MMEA) or Fisheries Development Authority of Malaysia (FDAM), such as ships and jetties, will be used for transportation to Pulau Redang. Meanwhile, coordination with agencies, for example, Malaysia Civil Defence Department (MCDD) and Malaysia Volunteers Corps Department (MVCD), will be utilized to lift and unload relief supplies.

## **Conclusion**

Disaster response and management plans for remote islands must consider the islands' unique characteristics to be effective. Provision and distribution of basic aid such as food, clothing, and other necessities is critical because it directly affects the victims' lives and survival. DoSW is the government agency responsible for the task in line with its role as a Relief and Rehabilitation Agency for disaster victims in Malaysia. In the response phase, these relief activities consider when a flood has occurred. In contrast, in the preparedness phase, meticulous planning and preparation are carried out before a disaster strikes. The initial collection of information and data on the residents of Pulau Redang allows DoSW to make projections and plan the procurement of supplies before the monsoon season begins.

Furthermore, pre-positioning supplies through the forward base approach can ensure that assistance can be provided immediately to the island's community when the monsoon season begins or in the event of floods. Experience reveals the critical importance of collaboration and coordination among relevant agencies, community leaders and the local community. Coordination between agencies can be seen clearly in the delivery and transportation of supplies to the island, where the constraints of assets and resources faced by DoSW have been overcome with assistance from other capable agencies. The effectiveness of relief operations can be further enhanced by involving the local community in the solution for relief and recovery efforts. The community of Pulau Redang has demonstrated a high commitment to assisting DoSW in the distribution process of relief supplies. The involvement of all villagers, including women and youths, and dedication from local leaders through VDSC Pulau Redang have enabled the relief operation to be conducted efficiently and indirectly, empowering the local community. Nevertheless, continuous study and improvement on policies, directives, implementation procedures and coordination with other agencies are essential to ensure the management of humanitarian logistical assistance can be implemented successfully for the islands area and throughout the country.



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