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Analysis of the Causes of Destruction of Two British Pillboxes in Bachok, Kelantan

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Abstract. The pillbox is a robust defence mechanism designed to protect a region or country from enemy attacks during a war. The British built several obvious pillboxes along the coast of Bachok, Kelantan in Malaya prior to the outbreak of the Second World War on December 7, 1941. In total, 9 pillboxes were built with a range of 0.99 km to 1.44 km. The purpose of this research is to determine the types of destruction of such pillboxes and their causes. This will provide archaeological documentation evidence for the historical event of World War II in Malaysia. The research methodologies applied were field surveys, participant observation, and area mapping. The results of field surveys showed that the pillboxes were destroyed by coastal erosion and human activities such as vandalism. The erosion has caused some of the structures to collapse. Local people also use the pillboxes as cages for farm animals such as goats and for dumping garbage. Moreover, there are cracks on parts of the pillbox walls. This paper focuses on two pillboxes at Kampung Ger and Kampung Kubang Kawah in Bachok. Documenting the preservation of these pillboxes serves as a source of reference for education and research, especially for future generations, as well as being a potential source of heritage tourism.

1. Introduction

The strongholds or pillboxes located in Kelantan were built to prevent the Japanese troops from conquering Malaya during the Second World War. The prediction that the Japanese invasion would take place along the coast of Kelantan resulted in the British building several pillboxes in 1939, including along the coast of Bachok, Kota Bharu, Tumpat, Machang, Pasir Puteh, Kuala Krai, and Pasir Mas. There are believed to be more than 30 pillboxes from World War II in Kelantan [1].

However, these have become dilapidated despite having high value in terms of historical significance. The pillboxes have largely deteriorated as a result of erosion and are partly submerged in seawater. In Bachok, most of the pillboxes were built along the coast as the Japanese used the sea to land their troops [8]. This article focuses on two pillbox locations in former war zones, namely Kampung Ger and Kampung Kubang Kawah. The coordinates of the pillbox at Kampung Ger are N6.001235 ° E102.429801 ° while the pillbox at Kampung Kubang Kawah is located at N6.086114 °



E102.391715 ° (Figure 1). The pillboxes at Kampung Kubang Kawah and Kampung Ger are both located on the beach.

1.1 Literature Review

Most pillboxes are rectangular in shape and contain small holes in which to place weapons for shooting. They are estimated to be three metres high and six metres wide [1]. However, some have been dissolved by erosion of the waves (Figure 2).

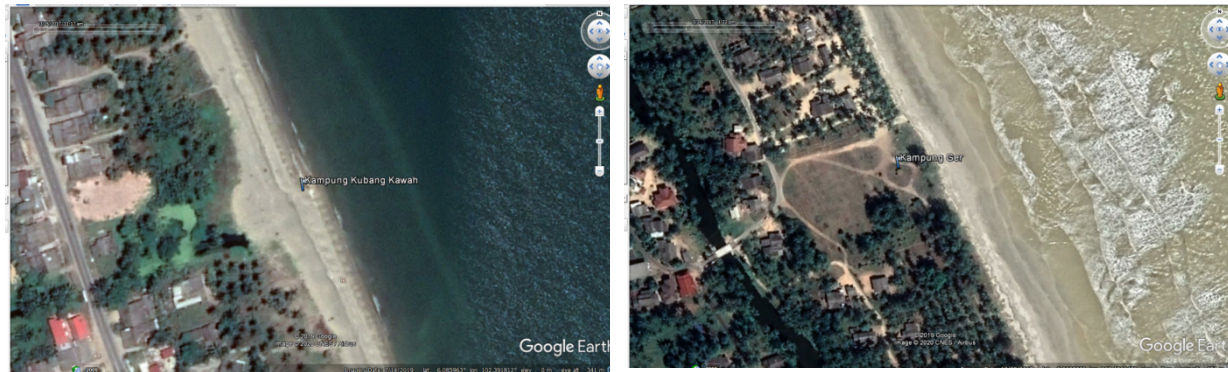


Figure 1. Location of pillboxes at *Kampung Kubang Kawah* (left) and *Kampung Ger* (right)



Figure 2. Pillboxes located on Bachok



Figure 3. Monument at Sabak Beach



Figure 4. A sunken pillbox on the shores of the Bachok coast.



Figure 5. Location of Pillboxes in Kampung Lalang Luas, Machang

Every pillbox is different in terms of its dimensions and is designed according to its geographical position. The structure of the pillboxes is also based on the type of weapons used to combat the enemy

[2]. The British-built battlefields were octagonal and constructed from steel and concrete to accommodate Gurkha and Punjabi soldiers repelling the Japanese invasion [3]. From 1939-1941, the British built stable and durable pillboxes along the road they predicted would be used by the Japanese military [7].

The pillboxes at Sabak Beach are stronger than other pillboxes. This is because they were built to defend the Pengkalan Chepa airport, which is an essential British military logistic settlement. Sabak Beach was also chosen due to its strategic location near Thailand and Vietnam [6]. However, these pillboxes have dissolved as a result of coastal erosion, leaving only the monument of war shown in Figure 3.

Some of the pillboxes have been displaced from their original location due to erosion by the sand dune that occurs every year, as shown in Figure 4 [8]. One pillbox located in the Kampung Lalang Luas, Machang, has been abandoned in the bushes (Figure 5) and according to Hassan Mohd Noor, is believed to be the area in which the first aeroplane landed (2019).

2. Material and Methods

Field surveys of both pillboxes were carried out on 24.5.2017 to provide an initial overview of the location. This showed that these pillboxes are precarious for example, the pillbox located at Kampung Kubang Kawah has almost submerged into the sea (Figure 6). The site of the pillbox in Kampung Ger is located near to the local chalet. However, the beach is contaminated by debris which makes this area unattractive to tourists (Figure 7).



Figure 6. The pillbox at *Kampung Kubang Kawah*, Bachok



Figure 7. Environment at *Kampung Ger Pillboxes*, Bachok

The geological compass is an instrument used to measure the position of any elements of a geological structure. Its function is to determine the wind direction at the pillbox and the position of the erosion of the pillbox, as shown in Figure 8. In general, observation enables researchers to gain experience through practical work driven by curiosity. It can raise awareness of physical phenomena affected by human behaviour in the area. Using these methods, we determined the level of the pillbox by the changing colour of the sand. Figure 9 shows the colour changes at each water level. The change in sand colour begins with the water's edge labelled at Level 1, Level 2, Level 3, and so on. This method not only involves looking at changes in the sand, it also shows the destruction of the pillbox. This was marked to determine its type and causes, as shown in Figure 10.

To determine the position of the pillbox at sea level, area mapping was carried out using a pro-map gauge that provides an accurate high-quality signal to acquire the coordinates of a specific location (Figure 11). Initially, the datum point was defined as the starting point for performing area mapping. This was obtained by looking north of the pillbox and was also considered the end point of the mapping. Once the datum point was acquired, approximately four area coordinates of the pillbox area were retrieved and marked. The data was then analysed and the position of the pillbox at sea level became clear.



Figure 8. Geological Compass



Figure 9. Observation of a change in sand colour



Figure 10. Observation of damage to pillboxes



Figure 11. Determining the coordinates of the pillbox

3. Results and Discussion

The construction of war pillboxes around the shores was intended to protect the state of Kelantan from invasion by the Japanese via the South China Sea on December 7, 1941. The pillboxes around the Bachok area, especially in Kampung Kubang Kawah and Kampung Ger, were constructed of similar materials [9]. They were formed in the shape of a horseshoe with a 9-foot square. The top and wall of the pillbox was made of a mixture of cement and sand reinforced with iron bars. Its estimated thickness was 9 inches. The use of cement, sand, and gravels as the main ingredient in the construction of the pillboxes was to ensure their durability for a long period during the war. Each pillbox also had its own dimensions in terms of the openings at the wall, which varied according to the type of weapons used, such as MK-4 or MK-5 guns. The varying number of soldiers assigned to the pillbox also influenced its size. According to the Malaysian military officer, each pillbox usually housed five to 10 soldiers [8]. In addition, according to Mrs Wan Mahiran, who is the daughter of Wan Seman, founder of the Irama Beach Resort at Kampung Pulau Belongan, the pillbox in Kampung Kubang Kawah is slightly smaller than the pillbox in Kampung Ger [10]. The pillbox at Kampung Ger shown in Figure 12 (a) is still in good condition with only a little damage whereas the pillbox at Kampung Kubang Kawah shown in Figure 12(b) is half-ruined due to sand erosion.

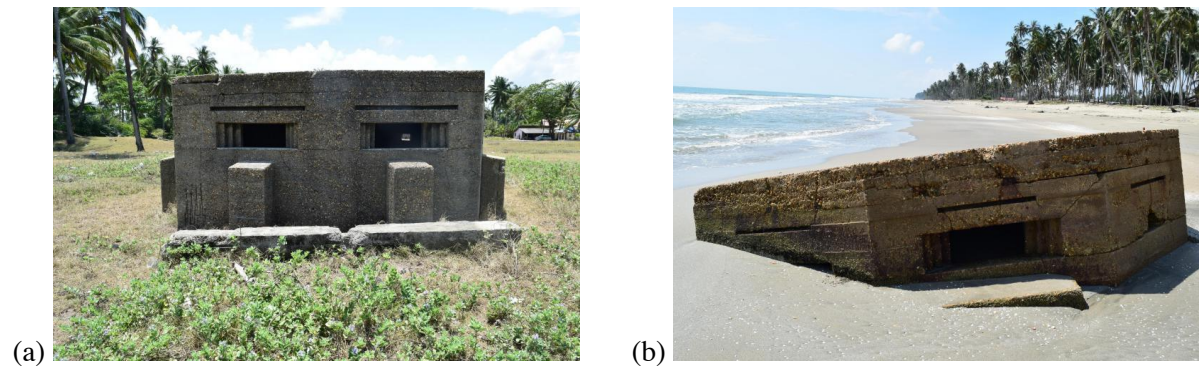


Figure 12 (a) and 12 (b). Recent state of war camps in *Kampung Ger* and *Kampung Kubang Kawah*

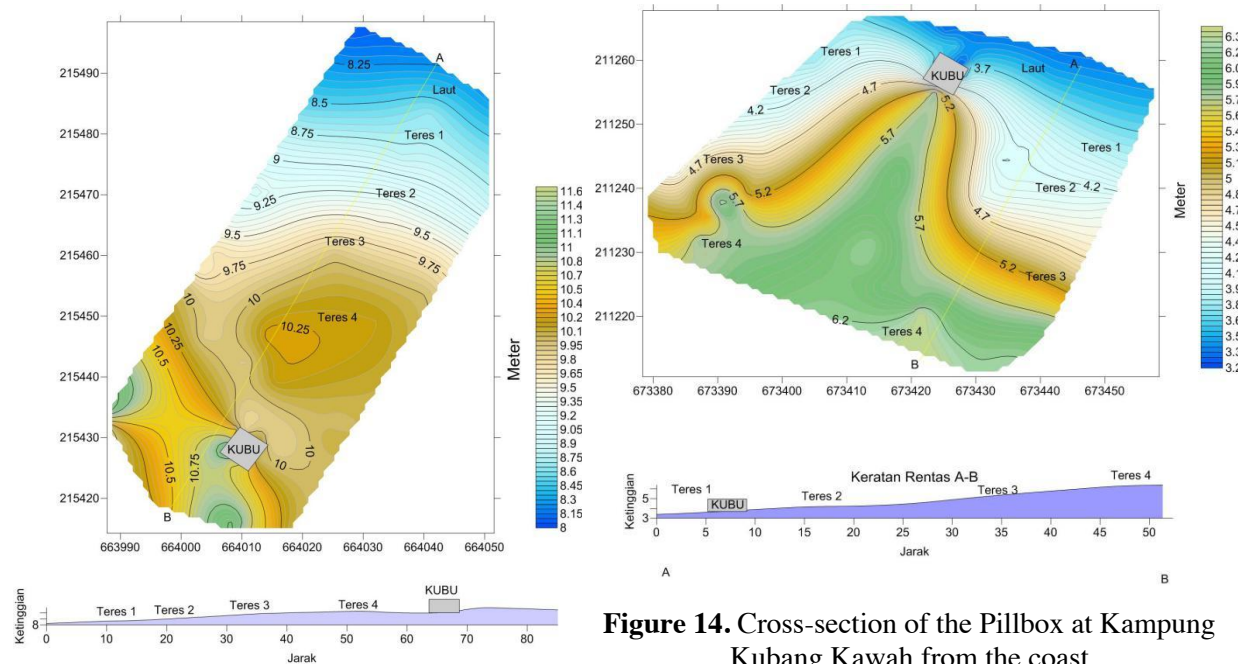


Figure 13. Cross-section of the Pillbox at *Kampung Ger* from the coast

Figure 14. Cross-section of the Pillbox at *Kampung Kubang Kawah* from the coast






As shown in the cross-section in Figure 13, the pillbox in *Kampung Ger* is still inland, and the distance to the coast or the tides is approximately 60-70 metres from the 4th terrace at a height of 10.7 metres from the coast. The pillbox at *Kampung Kubang Kawah* is 5-10 metres from the beach from the first and second terraces which are at a height of 3 to 5 metres (Figure 14). When the tides hit the pillboxes, causing the dunes to overflow, sedimentation occurs. This deposition process has caused the pillbox at *Kampung Kubang Kawah* to sink deeper into the sea and has made its historic preservation difficult.

Each pillbox structure was marked with codes A, B, C, D, E, F, G, H, I, J, K. The analysis identified six types of destruction for both pillboxes. These were as follows:

- [D1] Moss
- [D2] Cracks
- [D3] Treatment
- [D4] Deposition
- [D5] Erosion
- [D6] Termite attack

These have affected the structure of the pillboxes as they are unmaintained and no preservation has been carried out by the relevant authorities. The damage situation in Kampung Ger is summarised in Table 1.

Table 1. Types of damage identified in the pillbox at Kampung Ger

Damage Section	Type of damage	Damage Section	Type of damage
<p>Section B</p> 	<p>The serious growth of [D1] moss in part B caused the surface of the wall to turn black.</p>	<p>Section G</p> 	<p>[D3] Iron deposition is occurring on the lower part of the G wall due to environmental change.</p>
<p>Section E</p> 	<p>There is a [D2] crack on the E. wall.</p>	<p>Section G</p> 	<p>An extremely serious crack at the top of the wall has occurred in Section G [D2].</p>
<p>The interior of the pillbox</p> 	<p>The occurrence of [D2] cracks in the inner columns of the pillboxes is serious.</p>		






As presented in Table 1, the analysis showed that Part B is exhibiting a severe growth of [D1] moss, which has caused the walls to turn black. [D1] Moss is a type of parasitic organism capable of eroding the barriers of a pillbox when humic acid forms during its growth process. This growth is caused by several key factors, such as light, temperature, and humidity. The location of the pillboxes on the shoreline caused the moss to grow rapidly as it was exposed to light, heat, and moisture, thus affecting the structure of the pillboxes. The condition of the unarmed pillboxes also caused the growth

of the moss to become more serious, resulting in a black strike that caused the structure of the pillboxes to become unstable.

There were both fine and medium [D2] cracks on the wall surfaces of sections E and G. Section E had a 50cm soft fracture while the upper part of G had a 73cm rough fracture. This is due to the acceleration and expansion of battlefield structures exposed to unpredictable weather. Erosion is also affecting the pillbox structures due to their position on the coast.

[D3] iron deposition is also taking place on the lower wall of G due to the presence of water and air. The erosion of the pillboxes on the shores has destroyed the concrete walls and led to the formation of steel reinforcements. When exposed to air and saltwater, these further accelerate the healing process and cause the pillbox to become unstable, leading to further damage such as fractures. A severe crack (D2) on the concrete pillar of the interior of the pillbox caused by the pole almost led to its collapse. This is because an influx of seawater and strong winds has contributed to the destruction of the structure of the pole.

Table 2. Types of damage identified in the pillbox at Kampung Kubang Kawah

Damage Section	Type of Damage	Damage Section	Type of Damage
Section B 	Occurs [D3] on the wall of part B.	Section E 	There is a [D2] crack of 64 cm along the wall of E.
Section C 	[D4] serious deposition occurs due to the coastal location of the <i>pillboxes</i> .	Section E, F, G & H 	Parts E, F, G, and H have suffered [D4] serious deposition due to erosion.
The interior of the <i>pillboxes</i> 	Evidence of [D6] termite attacks and moss growth [D1] on the inner wall structure of the <i>pillboxes</i> .		

As shown in Table 2, section B has experienced [D2] 30 cm thickening on the steel reinforcement due to corrosion that has destroyed the concrete coating of the pillbox wall. Consequently, there was severe deposition on the wall of Section C. This deposition occurred due to the location of the pillbox off the coast. There was an obvious 63cm crack in the E side of the wall. This fracture is caused by environmental factors such as deposition and erosion. This has resulted in the structure of the pillbox becoming unstable and led to the destruction of the wall surface. If left unattended, violent fractures may occur that can destroy the pillbox structure at any time.

Sections E, F, G, and H of the pillbox in Kampung Kubang Kawah have experienced [D4] dangerous deposition each year due to coastal erosion. When the tides hit the pillbox, the dunes overflow and sedimentation occurs. This deposition has caused these sections, to subside into sand off the coast. This has also substantially impacted the structure of the pillboxes.

The interior of the pillboxes at Kampung Kubang Kawah has also experienced [D1] moss growth and [D6] termite attacks. As described in Table 4.2, the growth of moss is due to temperature, light, and humidity factors. The internal conditions of the enclosed pillbox and near the shores have led to air dampness. This moisture has accelerated the growth of moss and caused mechanical damage. Termite attacks have also weakened the structure of the pillboxes. Subterranean termites usually build their nests in damp and wet places because they require a substantial amount of water to survive. As shown in Table 2, termites have built their nests on the inner walls of the pillbox and caused severe damage, such as holes in the walls. This is also contributing to the destruction of the pillbox.

4 Conclusion

Pillboxes are a crucial and powerful mechanism with which to defend an area or country from enemy attacks. The preservation of these pillboxes should be ensured as soon as possible as they are a vital historical precursor and should not be left to ruin or used as a dumping ground. Preservation is vital for heritage and history as a source of reference for education and research, and as a heritage tourism destination.

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