

## Oil seepages at Kampung Minyak, Kudat Peninsula, Northern Sabah: Potential for geotourism development

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**Abstract**— Natural oil seepages occur at Kampung Minyak in the Kudat Peninsula, Northern Sabah. The oil seepages were discovered by the British Borneo Exploration Company in the early 20th century. The occurrence of the strange black liquid seeping out from the earth had astounded local community during the olden days and had turned the site into a sacred ground. Local belief and practices later evolved from this geological phenomenon. The oil seepages are the geoheritage resource of the area and have high scientific, recreational, cultural and historical values and high geotourism potential. The site provides an ideal field site for research and education in geology, environment and related fields. The site which is under private land could be damaged in the future due to vandalism, foot trampling and unregulated development. Presently, visitors under homestay programmes are brought to the oil seepages site mainly due to its recreational and cultural attractions. The tourism potential of the area could be enhanced if the geoscientific values could be imparted to the visitors so that they can appreciate the geoheritage value of the oil seepages. At the same time, local community would be encouraged to protect the site because of its economic benefits. For this purpose, appropriate interpretation and basic infrastructures should be provided. There should be a smart partnership among stakeholders (local community, tourism industry and local authority) to ensure a successful geoconservation and geotourism development through proper planning and management of the site.

**Keywords:** Kampung Minyak, Kudat, oil seepages, geoheritage, geotourism

### Tirisan minyak di Kampung Minyak, Semenanjung Kudat, Utara Sabah: Potensi untuk pembangunan geopelancongan

**Abstrak**— Tirisan minyak semulajadi wujud di Kampung Minyak di Semenanjung Kudat. Tirisan minyak itu ditemui oleh British Borneo Exploration Company pada awal kurun ke dua puluh. Kewujudan bendalir hitam yang meniris keluar dari perut bumi telah menakutkan masyarakat tempatan pada masa lampau dan telah menjadikan tempat itu sebagai tanah keramat. Kepercayaan dan amalan tempatan kemudian berkembang daripada fenomena geologi itu. Tirisan minyak itu merupakan sumber geowarisan dan mempunyai nilai saintifik, rekreasi, budaya dan sejarah serta potensi geopelancongan yang tinggi. Tempat itu menyediakan tapak yang sesuai bagi penyelidikan dan pembelajaran dalam geologi, alam sekitar dan bidang-bidang lain yang berkaitan. Tapak milik persendirian itu terdedah kepada kebinasaan pada masa akan datang akibat vandalisma, pijakan kaki dan pembangunan yang tidak teratur. Pada masa ini, pelawat di bawah program inap desa dibawa ke sana disebabkan nilai-nilai rekreasi dan budaya. Potensi pelancongan kawasan itu mampu ditingkatkan jika nilai-nilai geosaintifik dapat disampaikan kepada pelawat-pelawat agar mereka dapat menghargai nilai geowarisan tirisan minyak itu. Pada masa yang sama, masyarakat tempatan akan mendapat galakkan untuk memelihara tapak itu disebabkan oleh faedah ekonomi yang mereka akan perolehi. Bagi maksud ini, interpretasi yang sesuai dan infrastruktur asas perlu disediakan. Suatu perkongsian yang bijak perlu dijalinan dikalangan pihak berkepentingan (masyarakat tempatan, industri pelancongan dan pihak berkuasa tempatan) bagi memastikan pembangunan geopemuliharaan dan geopelancongan akan berjaya melalui perancangan dan pengurusan yang sesuai terhadap tapak itu.

**Kata kunci:** Kampung Minyak, Kudat, tirisan minyak, geowarisan, geopelancongan

#### INTRODUCTION

Kampung Minyak derived its name from the occurrence of natural oil seepages in the area. The village is mostly populated by the native Rungus and most of them earn their livings as farmers. The oil seepage is located on a private land at latitude 6° 52.478' N and longitude 116° 40.869' E in a tidal mangrove swamp (Figure 1). The village is

located along the Torongkong Road about 1 km from the main Kudat-Kota Kinabalu Road. The Torongkong Road junction is to the right of the main road if one is heading out of Kudat at km 26. At 1.3 km along the Torongkong Road, a road forks right and about 800 m away a trail on the right could be seen. The trail which passes through a mangrove swamp leads to the oil seepages, a distance of several hundred metres.

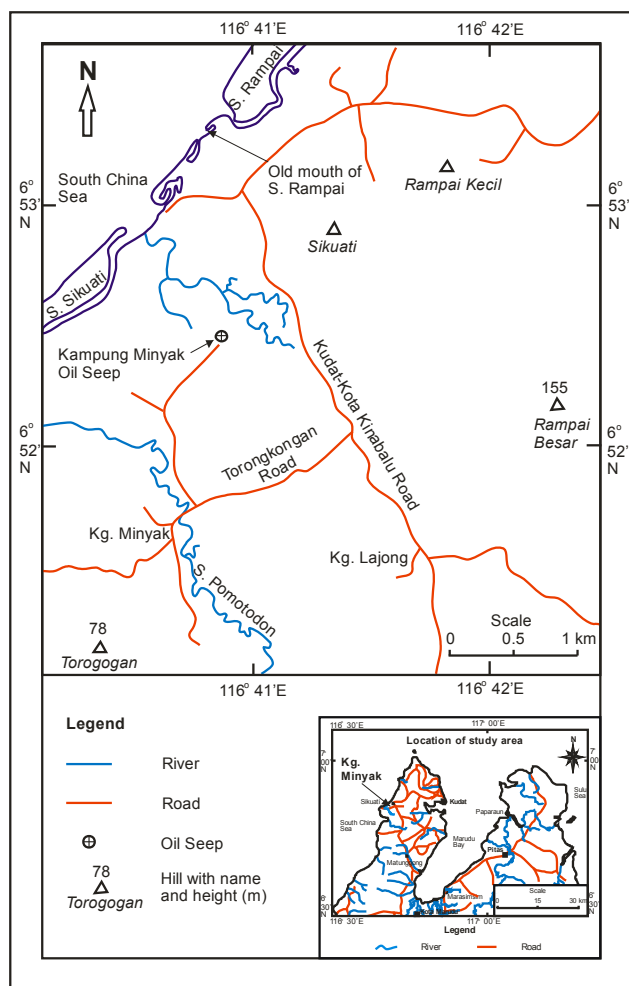


Figure 1: Location of the Kampung Minyak oil seepage at Kudat Peninsula, Sabah.

**GENERAL GEOLOGY**

Kudat Peninsula is mostly underlain by the Kudat Formation of Early Miocene age that was probably deposited in a shallow to deep water environment (Stephen, 1956). This formation is underlain by ophiolitic basement rocks of Cretaceous-Paleocene age. Tongkul (2006) informally divides the Kudat Formation into three lithological units namely, Lower Sandy Unit, Middle Muddy Unit and Upper Sandy Unit (Figure 2). The Lower Sandy Unit comprises mostly sandstone and mudstone with the sandstone predominating and occurs at the northern part of the Kudat Peninsula. This unit is also referred as the Tajau Member (Leichti *et al.*, 1960). The Middle Muddy Unit comprises sandstone and mudstone with the mudstone dominance. This unit occurs at the middle part of the Kudat Peninsula including the Kampung Minyak area and coincides with the Sikuati Member of Leichti *et al.* (1960). The Upper Sandy Unit which is also referred to as the Gomantong Member comprises sandstone and mudstone of various proportions and occurs at the southern part of the Kudat Peninsula.

Strike ridges trending in various directions occur at the Kudat Peninsula with the main direction trending NW-SE.

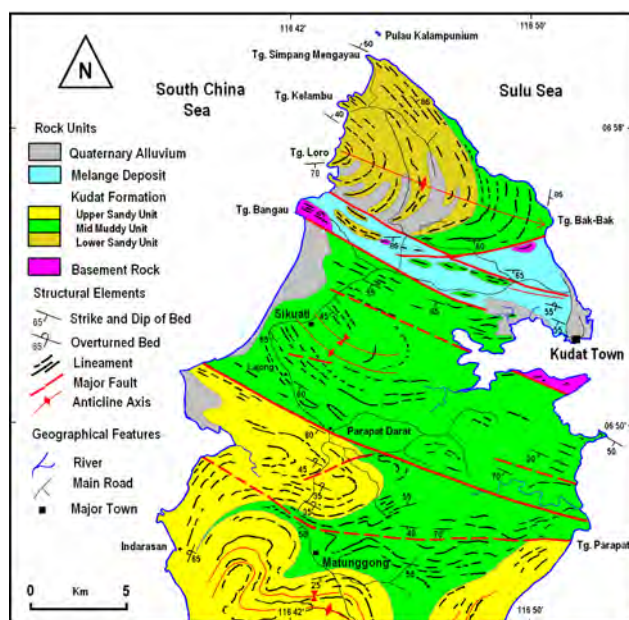


Figure 2: General geology of the Kudat Peninsula (Tongkul, 2006).



Figure 3: Three outlets of the oil seepages at Kampung Minyak aligned in straight line indicating a fault-controlled structure.

This is due to the occurrence of folds and major NW-SE trending faults (Tongkul, 2006). It is envisaged that early regional N-S deformation produces several E-W trending thrust-fold slices that affects the rocks of the Kudat Peninsula.

**OIL SEEPAGES**

The prominent geoheritage resource is the occurrence of natural oil seepages in the area. The oil seepages were discovered by the British Borneo Exploration Company in the early 20th century. The oil seepages are located in a tidal mangrove swamp and surrounded by green primary and secondary vegetation. The oil in the area seeps out through three outlets and collects in pools (Figure 3) while the air in the vicinity is filled with smell of oil. The largest outlet has dried out and a layer of hard bitumen was formed (Figure 4). During high tide, the oil seepage site is completely under water but oil films and gas bubbles could be observed on surface of water (Figure 5).

## EVALUATION OF OIL SEEPAGES AS GEOHERITAGE RESOURCE

Heritage value is defined as ‘having scientific, aesthetic, recreational and cultural values’ (Ibrahim Komoo, 2000). The occurrence of oil seepages are rare and they have scientific value as they hold record of the paleogeographic history of the area. In term of aesthetic value, the black oil gives a rare sight. The oil seepages have recreational value as the site is suitable for recreational activities such as photographic activity and experiencing smell of natural oil in the wild.

The oil seepages have high cultural values as they are related to local belief and practices and have long history of oil exploration. Oil seepage was first discovered in the old mouth of Sungai Kurima (also known as Sungai Rampai) by F.X. Wittl (Stephens, 1956). On the recommendation of Wittl, it was examined in 1881 by Frank Hatton, a mineral explorer of the British North Borneo Chartered Company. A second oil seepage was discovered by Frank Hatton in a tributary of Sungai Sikuati (Figure 6). He sank an exploration pit 12 m deep and analysed a sample of oil which gave 82 % carbon, 10 % hydrogen and 8 % oxygen. The history of oil exploration activities in the area by various exploration companies is summarised below:

- 1881 - British North Borneo Chartered Company
- 1902 - British Borneo Syndicate
- 1912 - Nederlandsche Koloniale Petroleum Maatschappij
- 1920 - Kuhara Mining Company of Osaka, Japan
- 1935 - Royal Dutch/Shell Group

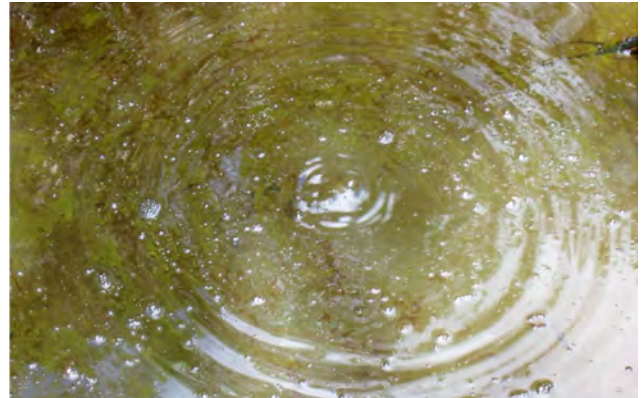
During the olden days, the strange black liquid seeping out from the earth had astounded villagers. The geological phenomenon that the locals observed had turned the site into a sacred ground (Figure 7). The site at the present oil seepage was a sacred site for villagers before the coming of religions into the district. According to villagers, village elders used to offer animal sacrifices for various reasons such as for healing from illness and for protection from diseases and other calamities. One-month old newborns were also brought to the area for anointing on the forehead with the black liquid. During those days, anyone visiting the site had to sacrifice a chicken and consumed it there. The practices have since stopped when the last Bobohizan (a priestess) died in 1994.

During the various oil exploration works in the area since the early 20th century, several Iban, Japanese and European workmen died mysteriously. The villagers believed these were due to the foreign intrusion into the sacred ground. Villagers also claimed that the site was a Japanese stronghold during the Second World War. A depression could still be seen which villagers claimed to be a Japanese military bunker.

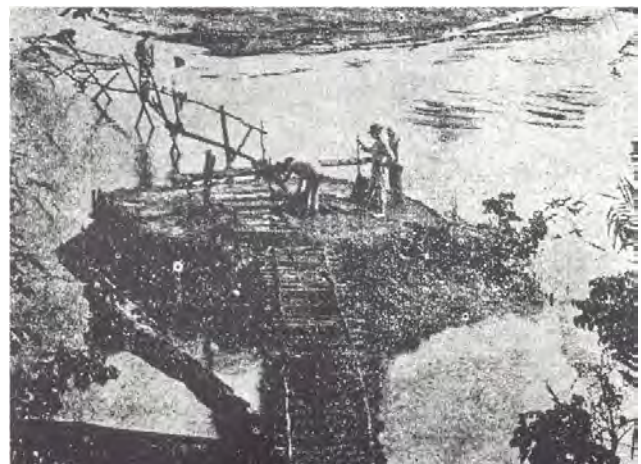
The oil seepages at Kampung Minyak are significant as they have high scientific values as they record the depositional, environmental and geological history of the area and region in general. Besides, they also have high aesthetic, recreational and cultural values. Therefore, the oil seepages at Kampung Minyak have high geoh heritage values of national significance and should be protected.



**Figure 4:** A layer of hard bitumen formed at Oil Seepage No.3 which has dried up.



**Figure 5:** Bubbles of oil and gas seeping out during high tide.



**Figure 6:** Oil exploration at the mouth of the Kurima River in the early 20th century (Photo: Johan M. Padasian, 1981).



**Figure 7:** Remains of the sacred ground beside the oil seepages.

## GEOTOURISM POTENTIAL

The geoheritage resource in the area has high geotourism potential and proposed for geotourism development. The geotourism potential focuses on educational and recreational tourism. The oil seepages have high educational values as they could be used as tools to understand the geological history of the area, the process of formation and migration of oil, the extraction and uses of oil and to understand the early oil exploration history in Sabah. The area as a whole is suitable for various recreational activities such as sightseeing, photographic activity, nature walk, landscape painting and experiencing cultural and historical values.

## GEOTOURISM DEVELOPMENT PROPOSAL

In order for the geotourism development to be realised, there should be a smart partnership among stakeholders (local community, tourism industry and local authority) to ensure a successful geotourism development through proper planning and management of the site. Basic infrastructure such as visitor centre, observation huts, information panels and directional signage are to be built and the associated informative materials (booklets, leaflets and maps) to be produced. Geoheritage and geotourism information needs to be disseminated to all relevant stakeholders. Management personnel and tour guides should be trained on various aspects of geotourism.

This new geotourism product could be promoted as a new niche tourism product and it should be promoted together with other geoheritage resources in the Kudat Peninsula. This could be done by introducing a geotrail which links one geoheritage site with another. Presently, visitors under homestay programme are brought to the site mainly due to its recreational and cultural attractions. The geotourism development could be enhanced by combination with other attractions such as exploring the scenic landscape of the village, a walk along a hanging bridge across the Sikuati River, exploring mangrove forest and experiencing local cultures. The geotourism development will directly benefit the local communities as well as the tourism industry in the State in general. The benefits include the sale of local products and new employment and business opportunities.

The oil seepages are under threats due to vandalism, foot trampling and unregulated development and should be protected. Geoconservation measures include erecting warning signs, creating awareness and granting legal protection under the National Heritage Act 2005. In order to raise awareness on the importance of geoheritage resources, seminars and awareness talks could be conducted for tourist guides, tour operators, relevant government agencies and the

local communities. These programmes could be carried out jointly by the Minerals and Geoscience Department, Sabah Tourism Promotion Board and Universiti Malaysia Sabah.

## CONCLUSION

The oil seepages of Kampung Minyak have high geoheritage values of national significance and should be given legal protection. They also have high geotourism potential and proposed for geotourism development. The geotourism development proposal includes setting up of a visitor centre, observation huts and information panels and production of associated informative materials such as leaflets and maps. This new tourism product will directly benefit the local communities as well as the tourism industry in the State in general. In order for the geotourism development to be sustained, the local community needs to be highly involved. The local community would protect the site if they could gain economic benefits from the tourism development and have a sense of pride of the heritage in the area. It also instils awareness on the local community and the public in general on the needs to conserve and protect the environment. In order for the geotourism development to be realised, there should be a smart partnership among stakeholders (local community, tourism industry and local authority) to ensure a successful geoconservation and geotourism development through proper planning and management of the site.

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