1
GEOLOGICAL HERITAGE OF MALAYSIAN DATABASE FOR CONSERVATION AND SUSTAINABLE USE

Ibrahim Komoo
Lim Choun Sian
Tanot Unjah
Marilah Sarman
Syafrina Ismail

Institute for Environment and Development (LESTARI)
Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor

SUMMARY

The Malaysian Geological Heritage database was developed using the Microsoft Assess software. This software was used as a database application for storing and processing information. The preliminary approach the geological heritage information was classified into three main components as follow:

- General Information – geodiversity code; label; locality map; name of geosite; geodiversity; locality (address); size of the area; state; town and coordinat of covered area.
- Heritage Characterization Information – diversity characterization; history; and heritage value.
- Geosite Managemant Information – type of heritage; status; heritage ranking; purpose development; accessablity; vulnerability; and references

This paper attempts to analyse elobrate the basic information definition and systematic characterization process in developing the geological heritage resources database and as a potential to be presented in a GIS format for wider and effective usage.

2

ROCK HERITAGE CHARACTERIZATION AND EVALUATION

Che Aziz Ali

School of Environmental Science and Natural Resources
Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor.

SUMMARY

Rock characterization and evaluation has long been practiced by human societies for various purposes. Characterization and evaluation of the rock material is normally carried out in order to know the suitability of the material for tool making, industry and construction. A different approach has to be made when dealing with characterization and evaluation of rocks for purposes of conservation, whereby both the physical characteristics and the hidden information of rock are procedures taken into account in accessing heritage value of rocks. This paper will discuss characterization and evaluation procedures that can be adopted by conservationist for purposes of conserving rocks.

3
FOSSIL HERITAGE CHARACTERISATION AND EVALUATION

Mohd Shafeea Leman

School of Environmental Science and Natural Resources
Universiti Kebangsaan Malaysia, Bangi

SUMMARY

Fossils are characterized based on various shapes and morphologies of hard parts preserved in sediments. Description is made on selected type specimens stored in and managed by natural history museums or other authorized keepers. Characterizing process started as early as the fossil search began and only finished when the fossil is successfully described. Scientifically, fossils are very important clues for positioning and correlating earth strata, for correlation of palaeocontinents, for interpretation of the ancient environment and the depth of the ocean, etc. Some fossils became personal collectors item and for this the aesthetic value depends on the type of fossils, degree of completeness, type of preservation and the preserving material. Fossils also have many socio-economic and socio-cultural values. Scientific value of fossiliferous locality relies more on its fossils while its aesthetic, socio-economic, socio-cultural and recreational values usually associated with host rocks, structures and landscapes.

4
CHARACTERISATION AND ASSESSMENT OF DIVERSITY OF GEOLOGICAL STRUCTURE

Tajul Anuar Jamaluddin

Geology Department
Universiti Malaya, 50603 Kuala Lumpur

SUMMARY

Geological structures are important elements in the diversity of geological treasures. The variety of geological structures is astonishing, due to variety in type (origin/genesis), scale, size, age, outcrop quality and their heritage values. Scientific characterisation of geological structures has been well developed since the past few decades along with the advancement of the field of structural geology itself. However, characterisation geological structures are too subjective and qualitative in nature due to human factors such as skill, precision, experience and interest. Every structure is characterised by physical and geometrical elements. Physical elements of geological structures include form, size, colour, age, quality of outcrop, etc. Meanwhile, geometrical elements are imaginary lines and surfaces, invisible but identifiable in the field (e.g. fold axial planes, fold axes). Combination of both physical and geometrical elements resulted in astonishing great diversity. It is almost impossible to find two exactly identical structures. Assessment of geoheritage value for geological structures is a difficult task because of lack of a standard scheme. Comparison of value is difficult too because it is depending so much on the expertise and experience of the evaluator in the field of structural geology. However, an approach based on a combination of scientific, aesthetic, recreational, cultural and commercial values as highlighted in this paper, might be adopted and then to be developed for the purpose of conservation and non-destructive utilisation of the geological structure heritage.

5
AESTHETIC ASSESSMENT OF GEOLOGICAL LANDSCAPE: CASE STUDY OF LATA CHENAI, JELI, KELANTAN

Tanot Unjah
Ibrahim Komoo

Institute for Environment and Development (LESTARI)
Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor

SUMMARY

The aim of this study is to establish the methodology for identification and evaluation of geological landscape based on quantitative aesthetic evaluation. Aesthetic evaluation involves two types of evaluation, objective and subjective. Objective evaluation is based on the Leopold Method and Component Checklist, while subjective evaluation is based on the Bipolar Semantic Checklist. Based on the Geological Landscape of Lata Chenai, analysis and comparison have shown that the existing methodology as, in it current form, is marginally suitable to evaluate aesthetic value of geological landscape.

6
INTERESTING HOLES IN ROCKS – CAVES, POTHOLES AND TAFONI

Lee Chai Peng

Department of Geology,
University of Malaya,
50603 Kuala Lumpur,

SUMMARY

Three main groups of interesting holes excavated by water and wind in rocks are caves, potholes and tafoni. Flowing acidic water dissolving parts of limestone creates most caves. Less common are lava caves in basalts and caves created by faulting and the collapse of overhangs in bedded rocks. Caves vary in size from gigantic caverns to small narrow tunnels less than a few centimetres across. Geological structures such as joints or faults and variations in mineralogical compositions of the limestone bodies control their shapes by differential erosion. Interesting speleothems like stalactites, stalagmites, pillars, curtains and gaur pools are formed by secondary calcite deposits in caves. Potholes are vertical rounded or oval pits eroded into rocks by sediment bearing vortices in rivers. Etch marks in isolated potholes in the granite of Telaga Tujuh in Langkawi indicate that direct dissolution of minerals by water can be a major contributor to pothole formation. Tafoni ("cave-like" in Italian) are pits of various sizes and shapes developed in granular or crystalline rocks such as sandstones or granites. They range in size from a few centimetres to several metres across. Larger ones are found usually in desert areas. Tafoni are created by the formation of a resilient duricrust of cemented rock followed by the development of pits by selective chemical weathering. Tafoni are developed on coastal outcrops by salt crystals precipited from dessicated sea water in the pores of the rocks that wedge out the less strongly cemented grains in the duricrust forming pits. Selective weathering enlarges them to create the beautiful typical honeycomb structures.

7

THE IMPORTANCE OF EDUCATION AND AWARENESS TOWARDS G EO LOGICAL HERITAGE CONSERVATION IN MALAYSIA: FROM THE VIEWPOINT OF A NON-GEOLOGIST

Sharina Abdul Halim

Institute for Environment and Development (LESTARI)
Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor

SUMMARY

This paper attempts to address the importance of education and awareness towards conservation, particularly the non-biological aspects of nature, a field that has been neglected immensely. It is suggested that education would be able to create public awareness and appreciation by influencing attitudes and behavior towards geological heritage conservation. In Malaysia, the concept of geological conservation is a relatively recent phenomenon, not only for the general population but also for the earth scientists. Thus, influencing the interests group (i.e. politicians, planners, landowners, and developers) would be the first step before this initiative could be translated to the general population. The emphasis on the geological conservation should be targeted for the younger generation to create a long lasting awareness on the significance of geological heritage. A systematic approach, such as using interpretive planning technique, is needed to convince, communicate and promote the value of conserving geological heritage. These actions are crucial for sustainable resource utilization for the sake of our future generations.

8
WATERFALLS OF MALIAU BASIN, SABAH

Felix Tongkul

School of Science and Technology
Universiti Malaysia Sabah

SUMMARY

Maliau Basin hosted some of the most spectacular waterfalls in Malaysia. 29 waterfalls showing heights of more than 5 metres were recorded during this study. The high density of waterfalls here can be attributed to the right combination of rock types (hard sandstone and soft mudstone layers), geological structures (vertical fractures and gentle dipping layers) and morphology (saucer-like surface).

9
GEOTOURISM POTENTIAL IN BARIO HIGHLAND, SARAWAK: AN OVERVIEW

Askury Abd. Kadir

Department of Minerals and Geoscience Malaysia
Sarawak

SUMMARY

The word Bario means the 'wet wind' adopted from the Kelabit ethnic phrases to express its pleasant weather condition. Bario is located southeast of Miri on the Kelabit Highland Plateau about 1,060 m above sea level. The oval-shaped Bario basin is composed of unconsolidated sediment enclosed by steeply dipping massive sandstone with thin layers of shale of the Meligan Formation. The Gunung Murud (2423 m) is the highest mountain in Sarawak and the twin tower Batu Lawi (2043 m) are both located in the north of Bario are among popular recreational sites. The occurrences of natural salt springs are spotted at the eastern part of Bario. More than 50 salt springs are recorded within Lio Matu, Ba Kelalan and Taman Nasional Betung Kerihun, Kalimantan. The traditional method for salt processing by evaporating the salty water often impressed tourists. The occurrence of salt springs is probably related to salt dome formation underneath the basin. Bario which is a part of the Pulong Tau National Park has a great potential for geotourism based on several unique natural resources. The conservation of natural resources and geotourism could be promoted internationally through the E-Bario portal.

10
GEOHERITAGE OF BAKO NATIONAL PARK, SARAWAK

Kamal Roslan Mohamed

Faculty of Science and Technology
Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor

Dana Badang
Askury Abd Kadir

Department of Minerals and Geoscience Kuching
Sarawak

SUMMARY

Bako National Park is the oldest national park in Sarawak established in 1957. This national park consists of the Plateau Sandstone Formation, dominated by gently dipping cross-bedded sandstone. Continuous erosion over millions of years has turned Bako into a picturesque landscape. The erosion caused by constant waves at the base of the cliffs had carved and created many of the rocks into sea cave, sea arches, sea stacks and other features. Beautiful sedimentary structures, stained sandstone formation and iron oxide of various patterns on the cliff faces can be seen along most of the coastline. Bako National Park is truly an ideal place for people to appreciate the natural heritage.

11
CHARACTERISATION AND ASSESSMENT ON GEOLOGICAL STRUCTURES OF HIGH SCIENTIFIC VALUE-SEVERAL EXAMPLES FROM TANJUNG BALAU, JOHOR

Tajul Anuar Jamaluddin
Mustaffa Kamal Shuib

Department Geology
Universiti Malaya, 50603 Kuala Lumpur

SUMMARY

Diversity of geological structures in the Tg. Balau area and their high heritage values have been widely addressed before. However none of the papers published had discussed in details nor given the rationale why these structures are of high scientific values. This paper attempts to give some examples of geological structures from the Tg. Balau area, which have been identified as highly scientific in values. The examples are: a) extensional crenulation cleavage, b) cleavage-transected fold, c) en-enchelon, right-stepping, clockwise-transected periclinal folds, d) refolded folds (hook folds), and e) folded boudinage. Most of the structures posses geoheritage values (scientific); such as well developed geometry, easily identifiable forms, easy accessibility, rarely found, beautiful and unique. All these criteria permits the area to be categorised as a geosite, which is very suitable for the purposes of teaching, learning and scientific research. In addition to the general criteria listed above, each one of the structures has its own uniqueness in scientific values. For example, the extensional crenulation cleavage, is very rarely discussed structure even in most of the well-known Structural Geology textbooks, probably because of not so many people aware about its existence and understand on its formation mechanism. A long debated cleavage-transected folds, only known amongst the European Structural Geologist in the late 1980's to 1990's. And the quest on its formation mechanisms still unrevealed because of lack of field evidence. With the finding of clockwise-transected fold and periclinal folds in Tg. Balau, it is a clear evidence that the clockwise-transected folds are formed under dextral transpressional deformation. The refolded folds found in this area are also clear evidence for non-coaxial, progressive deformation due to transpressional shears, so as the folded boudinage, which indicate that the deformation was extensional followed by compressional.

12
GEOLOGY AND POTENTIAL GEOTOURISM OF GUNUNG PANTI AND ITS SURROUNDINGS, KOTA TINGGI, JOHOR

Che Aziz Ali
Uyop Said

School of Environmental Science and Technology
Universiti Kebangsaan Malaysia
43600 Bangi, Selangor

SUMMARY

Gunung Panti is located in the eastern part of Johor State. Though the local people designated it as gunung, its elevation does not justifiable to be called a mountain. However, some unique features that occur in the area have attracted interests of the general public as well as miners and geoscientists. Gunung Panti is made of a sequence of clastic sediments sitting directly on a weathered granite body. The sediments comprise of intraformational conglomerate, cross-bedded sandstone, siltstone and mudstone. Two lignitic coal seams occur at the base of the sequence as observed at Utama Quarry.

13
UNIQUE GEOLOGICAL FEATURES BEHIND THE MYSTERY AND LEGENDS OF PULAU BESAR, MELAKA

Asminah Rajuli

Department of Minerals and Geoscience Malaysia
Seremban, Negeri Sembilan

SUMMARY

Pulau Besar, off the coast of Malacca, is a popular tourist destination endowed with many interesting natural geological features consisting of various shapes of granitic boulders, xenolith of fascinating forms and also some groundwater resources from shallow coastal aquifers. Myths of these geological features blended together with local cultures and beliefs enriched cultural heritages behind the beautiful natural landscape of the island.

14
PETASIH SERPENTINITE BODY IN NEGERI SEMBILAN : AN IDEAL STRUCTURAL GEOLOGICAL HERITAGE

Jatmika Setiawan[1, 2]
Ibrahim Abdullah[1]

[1]School of Environmental Science and Natural Science
Universiti Kebangsaan Malaysia

[2]Jurusan Teknik Geologi
Universitas Pembangunan Nasional "Veteran"
Yogyakarta, Indonesia

SUMMARY

A serpentinite body in Petasih, Negeri Sembilan that aligned in northwest direction is in contact with Pilah Schist. This lenticular shape outcrop, sized about 5x15 meters show various interesting features. This serpentinite body is well foliated with general strike and dip is N260oE/40o, oriented as same as the foliation in the schist that covers this rock body. Furthermore, this rock body has been cut and displaced by at least four generations of faults or shear zones and tension joint. The serpentinite body found at this location is one of the outcrops within the Bentong-Raub Serpentinite Belt (Huthison 1977), oriented in almost north-south direction and representing the boundary between the Western and the Eastern Belts of the Peninsular Malaysia. It is considered that this serpentinite outcrop has very high scientific values in terms of geological structures and tectonic. Faults that sliced this serpentinite body record the movement that have been suffered by the rock situated along the boundary between the Western and the Eastern Belts of the Peninsular Malaysia. It is interpreted that this serpentinite body represent one of a series of serpentinite bodies situated within the paleo-subduction zone which is known as Bentong Suture.

15
GEOHERITAGE OF THE PANCHING LIMESTONE, PAHANG

Kamal Roslan Mohamed
Che Aziz Ali

School of Environmental Science and Natural Resoures
Universiti Kebangsaan Malaysia
43600 Bangi, Malaysia

SUMMARY

The Carboniferous Panching Limestone Formation exposed at four limestone hills, namely as Bukit Panching (southernmost), Bukit Charas, Bukit Sagu and Bukit Tenggek (northernmost), characterized by beautiful karst landscape with steep cliffs and caves. The formation consists of massive limestone, partly have been recrystallised and partly highly fossiliferous. A variety of limestone facies, well-preserved fossils and beautiful karst landscapes can be found in the Pan ching Limestone area and these are our natural heritages. Because of the economic demands, the limestone is being quarried for road and building material and for cement product. Bukit Panching has totally disappeared today because the whole limestone hill was quarried out. Bukit Sagu and Bukit Tenggek are now become smaller and one day will disappear from the earth surface as the Bukit Panching did. Our geoheritage will disappear one day. Bukit Charas seems the only limestone hill in the Panching Limestone, which is free from destructive human activity, and should be protected for our next generation.

16
FAULT FEATURES OF THE BENTA MIGMATITE COMPLEX AT JERAM BESU, PAHANG

Ibrahim Abdullah[1]
Jatmika Setiawan [1,2]

[1] School of Enviromental Science and Natural Resources
Universiti Kebangsaan Malaysia
43600 Bangi, Selangor

[2] Jurusan Teknik Geologi
Universitas Pembangunan Nasional 'Veteran'
Yogyakarta, Indonesia

SUMMARY

The rocks of the Jurassic-Cretaceous Benta Migmatite Complex are outcroped at Jeram Besu, about 3 kilometers west of Benta Town. The beauties of the rapid as a main recreation as well as a place for water sports centre in Kuala Lipis District attracts many visitors. From geological point of view, there are verieties of relatively fresh rocks of igneous and metamorphic origin can be found in this area. The boundaries between the rock types are of various nature, either intusive, inclusion or fault boundaries. On the southern bank, downstream of the rapid, a number of faults with good slickensides and striations can be found. The faults are aligned in several directions with dip varies from very gentle to very steep most of them are classified as reverse-dextral slip faults. Some ofthefaults represent the boundaries between the rock types. Other faults displace the rock boundaries and others are filled with feldspar and quartz from late phase magma. Stress system responsible in the formation of faults came from southeast to south-southeast direction. It is believed that this stress system was responsible in the formation of well-developed foliation in the porphyritic orthoclase-hornblend-biotite syenite. With the characteristics as mention above, the fault features found in the rocks of Benta Migmatite Complex are considered as having ideal scientific values to represent the fault and stress system, operating during the post Jurassic-Cretaceous time in the Central Belt of the Peninsular Malaysia. Futhermore, the faults system here are also play very important role in controlling the formation of the rapid in this area to produce a very interesting phanoramic view that contribute to the esthatic values of this area. The beauties of this area attract many visitors that give very high recreational values of the area.

17

THE EVOLUTION OF KARST IN KINTA VALLEY, PERAK

Ros Fatihah Muhammad
Ibrahim Komoo

Institute for Environment and Development (LESTARI)
Universiti Kebangsaan Malaysia
43600 Bangi, Selangor

SUMMARY

Karst in the Kinta Valley is believed to have gone through lengthy processes of dissolution or karstification. The dissolution processes in this area are believed to have started after it was uncovered at about Middle Tertiary and continues until present. There are some factors controlling the karst development in this area. Using these factors, the evolution of karst development from Middle Tertiary to Recent is reconstructed.

18
ACCELERATED SHORELINE GROWTH AND LANDSCAPE DEVELOPMENT OF SUNGAI MUDA COASTAL PLAIN, KEDAH

Tjia Hong Djin

Institute for Environment and Development (LESTARI)
Universiti Kebangsaan Malaysia
43600 Bangi, Selangor

SUMMARY

Since the mid-Holocene, coastal plains of Kedah, Seberang Perai and Perak have grown at average annual rates of 4 metres and, even of 11 metres in the vicinity of river mouths. These coastal plains host linear beach ridge sets parallel to the current shoreline, where frontal beach ridge sets rarely exceed 1.5 m high. Each of these beach ridge sets represents a period of still stand of the prograding coastline. In the past the still stands may have been caused by a combination of changing rates of natural processes, but since the 1700s these processes had also anthropogenic input. The plains between beach ridge sets were former shallow sea-beds or that of lagoons and their existence mark periods of more rapidly prograding shorelines.

18

COLD-WATER BRACHIOPODS OF SUNGAI ITAU AND KILIM, LANGKAWI AND THEIR HERITAGE VALUES

Mohd Shafeea Leman

School of Environmental Science and Natural Resources
Universiti Kebangsaan Malaysia
43600 Bangi, Selangor

SUMMARY

Rich and well-preserved brachiopod faunas were discovered in quarry exposures at Kampung Sungai Itau and Kampung Kilim, Langkawi. Several species of brachiopod were identified from these beds, dominated by cold-water spiriferid genera of *Spirelytha* with heavily spinosed shells and *Sulciplica* with large thick shells. These faunal assemblages are best assigned to the upper part of the *Arctitreta – Bandoproductus* assemblage Zone of Early Permian (Early Sakmarian). The Sungai Itau and Kilim brachiopod faunas exhibit strong palaeobiogeographic correlation with other peri-Gondwanan brachiopod faunas. These well-preserved fossils, with very high scientific values should be regarded as prestigous fossil heritages, which need to be carefully curated and protected for future references.

20
GEOHERITAGE CONSERVATION AND ITS POTENTIAL FOR GEOPARK DEVELOPMENT IN ASIA – OCEANIA

Ibrahim Komoo

Institute for Environment and Development (LESTARI)
Universiti Kebangsaan Malaysia
43600 Bangi, Malaysia

ABSTRACT

Until recently, in many parts of the World, including Asia – Oceania, the conservation of some geological features arose mainly from the need to protect heritage resources that were already recognized by the general public, particularly by naturalists. For most part, they were conserved in the context of preserving the landscape beauty, for recreation or outstanding natural heritage. The idea of conservation for geological heritage that has recently been developed through systematic classification according to geodiversity, geoheritage and geosite elements has brought about a new movement toward integrated nature conservation where geological heritage resources are considered a part and parcel of overall conservation. Countries like Australia, New Zealand, China and Malaysia are actively pursuing this endeavour. To bring the geoconservation effort a step further, there is a need to emplace appropriate legal and administrative instruments, including laws, and institutional and management support system, for successful implementation of conservation activities. Ultimately the concept of Geopark needs to be introduced to promote a more flexible and integrated approach toward conservation and sustainable use of geoheritage, particularly for tourism purposes. This presentation will highlight the development of the geoheritage conservation concept and how some countries in Asia – Oceania have moved forward in triggering this conservation movement.

21
LANGKAWI GEOPARK: DEVELOPMENT CONCEPT, STRATEGIC PLANNING AND IMPLEMENTATION APPROACH

Anwar Abd Rahman[1]
Mazlan Othman[2]
Ibrahim Komoo[2]

[1]Langkawi Development Authority
Langkawi, Malaysia

[2]Institute for Environment and Development (LESTARI)
Universiti Kebangsaan Malaysia
43600 Bangi, Malaysia

ABSTRACT

Langkawi, known as a premier tourist destination of Malaysia, is developed under the coordination of the Langkawi Development Authority. The philosophy of development takes into account its potential in terms of unique environment, the beauty of natural landscape and the richness of local socio-cultural aspects. In order to enhance all these elements, five main objectives guide its overall development: integration of social, economic and physical development; a development scenario that is aligned with local unique characteristics; enhancement as an international tourist destination; augmentation of high productivity sectors; and encouragement of investment based on tourism-related resource and products. As Langkawi possesses outstanding geological heritage resources that are diverse and unique, these natural resources can be utilized as the foundation for the islands' development. The Geopark concept is introduced as a development policy tool that could ensure a balance between three main components, namely, conservation of heritage resources; development of infrastructure based on tourism and local needs; and tourism and recreational programmes. This paper illustrates the Langkawi Geopark concept in the context of content, planning strategy and implementation approach.

22

GEO-FOREST PARK: AN INNOVATIVE APPROACH TOWARDS GEOLOGICAL HERITAGE CONSERVATION WITHIN PERMANENT RESERVED FORESTS OF MALAYSIA

Shaharuddin Mohamad Ismail[1]
Ibrahim Komoo[2]
Mohd Shafeea Leman[2]

[1]Forestry Department Peninsular Malaysia
Kuala Lumpur, MALAYSIA

[2]Institute for Environment and Development (LESTARI)
Universiti Kebangsaan Malaysia
43600 Bangi, MALAYSIA

ABSTRACT

Malaysia is well endowed with some of the world's richest forests, a richness not only in the numbers and uniqueness of species but also in diversity of habitats and ecosystems. The forested area in Malaysia is currently about 60% (19.54 million hectares) of its total land area, 44% (14.45 million hectares) of which are within Permanent Reserved Forests. Malaysia also reserved 2.30 million hectares of conservation areas, which are totally protected by legislation including several national parks, wildlife reserves, nature parks, bird sanctuaries and marine parks. Malaysia has also established a network of forest recreational areas throughout the country for amenity and educational purposes. Efforts are being undertaken to establish geo-forest parks within the permanent reserved forests that have unique geological formations. The establishment of geo-forest parks would provide an opportunity for researchers, general public and children to appreciate the beauty and the association of forest vegetation and geological formations. Currently, the Forestry Department of Peninsular Malaysia is proposing to establish three geo-forest parks in Langkawi islands, namely the Machinchang Cambrian, Kilim Karst and Dayang Bunting Marble.

23

KINABALU PLATEAU: A GEOLOGICAL MONUMENT WITHIN A NATURAL WORLD HERITAGE SITE

Lamri Ali[1]
Jamili Nais[1]
Ibrahim Komoo[2]

[1]Sabah Parks
Kota Kinabalu, Sabah, Malaysia

[2]Institute for Environment and Development (LESTARI)
Universiti Kebangsaan Malaysia
43600 Bangi, Malaysia

ABSTRACT

The Kinabalu Plateau, an elevated flat area with several isolated peaks at a height exceeding 3500m, represents a unique geological (landscape) heritage that is different from other elevated plateaus in the wet tropics. This plateau is made up of fresh igneous rock that has been smoothened and polished by glacial erosion. Glacial features displayed on this plateau include U-shaped gullies and valleys, hanging valleys, cirques, roche moutonnees, polished surface, crescentic gauges and fractures, plucking, grooves and striations. These are evidences of an ancient glacier existing 35,000 to 5,000 years ago that once covered the peak of Mount Kinabalu. The world's average temperature, which has become warmer since several thousand years ago, did not allow the glacier to remain on the plateau and to continue its erosion work. The existing high montane ecosystem is also host to rare and endemic animal and plant species. The landscape of Kinabalu Plateau is a unique fossil landform left over from the process of crafting by an ancient glacier within the tropical region. This outstanding landscape heritage should be regarded as a world treasure, a geological monument within the Kinabalu World Heritage.