Land Resource Study

25 The land capability classification of Sabah Volume 2 The Sandakan Residency

Land Resources Division, Ministry of Overseas Development

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The land capability classification of Sabah

Volume 2

The Sandakan Residency

24575

Land Resources Division

The land capability classification of Sabah

Volume 2

The Sandakan Residency

P Thomas, F K C Lo and A J Hepburn

Land Resource Study 25

Land Resources Division, Ministry of Overseas Development
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List of volumes

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Volume 1	The Tawau Residency (with an Introduction and Summary for Volumes 1–4)
Volume 2	The Sandakan Residency
Volume 3	The West Coast and Kudat Residencies
Volume 4	The Interior Residency and Labuan

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Land capability classification, Sandakan Residency. Scale 1 : 250 000 (7 sheets)

50-6, 50-7, 50-10, 50-11, 50-12, 50-14, 50-15

Abstracts and keywords

ABSTRACT

This report contains a brief description of the physical and human environment of the Sandakan Residency (Sabah, Malaysia) which covers an area of 28 016 km^2 (10 817 mi^2). The various resource surveys carried out in the area are noted and the methodology of the land capability classification which is based on these surveys is briefly outlined. This classification is shown on the 1:250 000 scale land capability classification map sheets enclosed with the report. The various resources are then separately described in some detail in simplified terms. Development opportunities in relation to the various land resources are outlined and attention drawn to conflicting resource potentials. General opportunities for land development are discussed bearing in mind land tenure, present land use, population and accessibility. In conclusion, recommendations are made for further studies to assist development planning. The report shows that some 44% of the land is suited for agriculture and some 74% has a potential for commercial forestry.

RÉSUMÉ

Ce rapport contient une description succincte de l'environnement physique et humain de la Résidence de Sandakan (Sabah, Malaysia), qui couvre une aire de 28.016 km^2 (10.817 mi^2). Les diverses études relatives aux ressources effectuées dans la zone sont notées et un aperçu est donné de la méthodologie de la classification de la productivité potentielle qui est basée sur ces études. Les cartes de la productivité potentielle à l'échelle de 1:250.000 annexées au rapport montrent cette classification. Les diverses ressources sont ensuite décrites séparément de façon assez détaillée en termes simplifiés. Les possibilités d'exploitation par rapport aux diverses ressources terrestres sont esquissées et l'attention est attirée sur les potentiels contradictoires des ressources. Les possibilités d'exploitation des terres sont discutées en tenant compte du régime foncier, de l'usage actuel des terres, de la population et de l'accessibilité. En conclusion, des recommandations sont formulées en vue d'études ultérieures susceptibles de faciliter la planification de la mise en valeur. Le rapport indique que 44% des terres conviennent à l'agriculture et 74% à l'exploitation commerciale des forêts.

DESCRIPTORS FOR CO-ORDINATE INDEXING

Climate, geology, geomorphology, mineral resources, water resources, land capability, land resources, vegetation, forest resources, grassland, animal husbandry, game management, land tenure, demography, rural settlement, tourism, Sabah, Malaysia.

Glossaries

1. TECHNICAL TERMS

Alienated land	Land for which a title, lease or provisional lease has been issued
Annual licence	A licence to cut and extract timber from a specific area of land which is valid initially for a period of no longer than one year
Field register	A list of land titles maintained by the District Surveyor which have not yet been entered in the central land register
Gazettement	The publication of a notice in the Government Gazette in this case referring to specific use of land for official purposes
Lease	A form of title to land
Licence agreement	An agreement giving the right to cut and extract timber from a given area of forest reserve for a period in excess of ten years
Native title	A form of title to land which can only be held by a native of the State
Provisional lease	A form of provisional title to land which gives the holder the right to occupy the land
Settlement scheme	A form of land development scheme where people are encouraged to settle on and develop areas of land. In return for developing the land, settlers are given the title to a smallholding and in addition may receive other benefits both in cash and kind
Sheet lalang	An extensive area of virtually pure *lalang (Imperata cylindrica)*
Special licence	A licence to cut and extract timber from a specific area of land which may be valid for a period of from one to ten years

Tamu ground	A place where rural markets are held
Village reserve	Land reserved for use by native villagers for various purposes and gazetted as such

2. MALAY WORDS COMMONLY USED IN PLACE NAMES

Batu	rock	Laut	sea
Besar	large	Padang	field
Bukit	hill	Pantai	beach
Gunong	mountain	Pangkalan	landing place
Hutan	forest	Pulau	island
Kampong	village	Sungai	river
Kechil	small	Tamu	rural market
Kuala	river mouth	Tanjong	cape
Ladang	clearing	Trusan	channel
		Ulu	upper reaches of river

3. COMMON (MALAY) AND BOTANICAL NAMES OF TREES

Api Api	*Avicennia* spp.
Bakau	*Rhizophora mucronata*
Bangkita	*Rhizophora apiculata*
Belian	*Eusideroxylon zwageri*
Beus	*Bruguiera cylindrica*
Bintangor	*Calophyllum* spp.
Binuang	*Octomeles sumatrana*
Buta Buta	*Excoecaria agallocha*
Durian	*Durio* spp.
Gagil	*Hopea sangal*
Geriting	*Lumnitzera* spp.
Jelutong	*Dyera* spp.
Kapur	*Dryobalanops* spp.
Karai	*Meiogyne virgata* *Mezzetia leptopoda* *Sageraea lanceolata* also *Polyalthia* and other *Annonaceae*
Kayu malam	*Diospyros* spp.
Kedongdong	*Burseraceae* i.e. *Canarium* spp., *Dacryodes* spp., *Santiria* spp.
Kembang	*Heritiera simplicifolia* and other spp. of *Heritiera*
Keranji	*Dialium* spp.
Keruing	*Dipterocarpus* spp.
Laran	*Anthocephalus* *chinensis*
Layang layang	*Parishia insignis*
Limpaga	*Azadirachta excelsa* *Toona sureni* and other *Meliaceae*
Majau	*Shorea leptoclados*
Medang	*Lauraceae* spp. especially *Litsea*
Melapi	*Anthoshorea* section of *Shorea*
Mengaris	*Koompassia excelsa*
Merbau	*Intsia palembanica*
Nyatoh	*Sapotaceae* e.g. *Ganua,* *Madhuca, Palaquium,* *Payena* spp.
Obah suluk	*Shorea pauciflora*
Pengiran	*Anisoptera* spp.
Prepat	*Sonneratia alba*
Pulai	*Alstonia* spp.
Putat paya	*Planchonia valida*
Ranggu	*Koordersiodendron* *pinnatum*
Red seraya	*Rubroshorea* section of *Shorea*
Resak	*Vatica* or *Cotylelobium* spp.
Selangan batu	*Shorea* section of *Shorea*
Sengkuang	*Dracontomelon* *puberulum*
Sepetir	*Sindora* spp.
Serungan	*Cratoxylum* arborescens
Takalis	*Pentace* spp.
Tengar	*Ceriops tagal*
Urat mata	*Parashorea* spp.
Yellow seraya	*Richetia* section of *Shorea*

4. COMMON (ENGLISH OR MALAY) AND BOTANICAL NAMES OF GRASSES AND FORAGE PLANTS

African star grass	*Cynodon dactylon*	Lalang	*Imperata cylindrica*
Buffalo grass	*Paspalum conjugatum*	Lotonosis	*Lotonosis bainesii*
Carpet grass	*Axonopus compressus*	Para grass	*Brachiaria mutica*
Centipede grass	*Ischaemium barbatum*	Paspalum	*Paspalum dilatatum*
Centro	*Centrosema pubescens*	Signal grass	*Brachiaria decumbens*
Coast grass	*Cynodon plectostachyus*	Siratro	*Phaseolus atropurpurens*
Guinea grass	*Panicum maximum*	Stylo	*Stylosanthes gracilis*
Kazungulu	*Setaria sphacelata*		

Parts 1-6

Part 1

Preface

This report is the second of a series of four describing the land capability classification of the residencies of Sabah, Malaysia. This volume deals with the Sandakan Residency. It is published with the permission of the Government of Sabah to whom a draft was submitted in 1974.

Readers are referred to the introductory sections of Volume 1 for a history of the study, a description of the procedures used, the composition of the project team and a summary of findings.

Thanks are extended to the many persons and organisations who have helped in producing this volume; full acknowledgements are given in the introduction to Volume 1.

Part 2

Geographical background

LOCATION

The Sandakan Residency is situated in the north-eastern part of the State of Sabah (Text Map 2-1) and is bounded by latitudes 4° 30′ N and 6° 46′ N and longitudes 116° 30 E and 119° 20′ E. Included in the residency are various off-shore islands the largest of which is Jambongan at the northern-most point. The residency comprises the administrative districts of Sandakan, Kinabatangan, and Labuk and Sugut and has a total land area of approximately 2 801 767 ha (6 923 072 ac, 10 817 mi^2). Sandakan is the administrative centre and the only town in the residency. The administrative centres of the Kinabatangan and Labuk and Sugut Districts are respectively the settlements of Bukit Garam and Beluran.

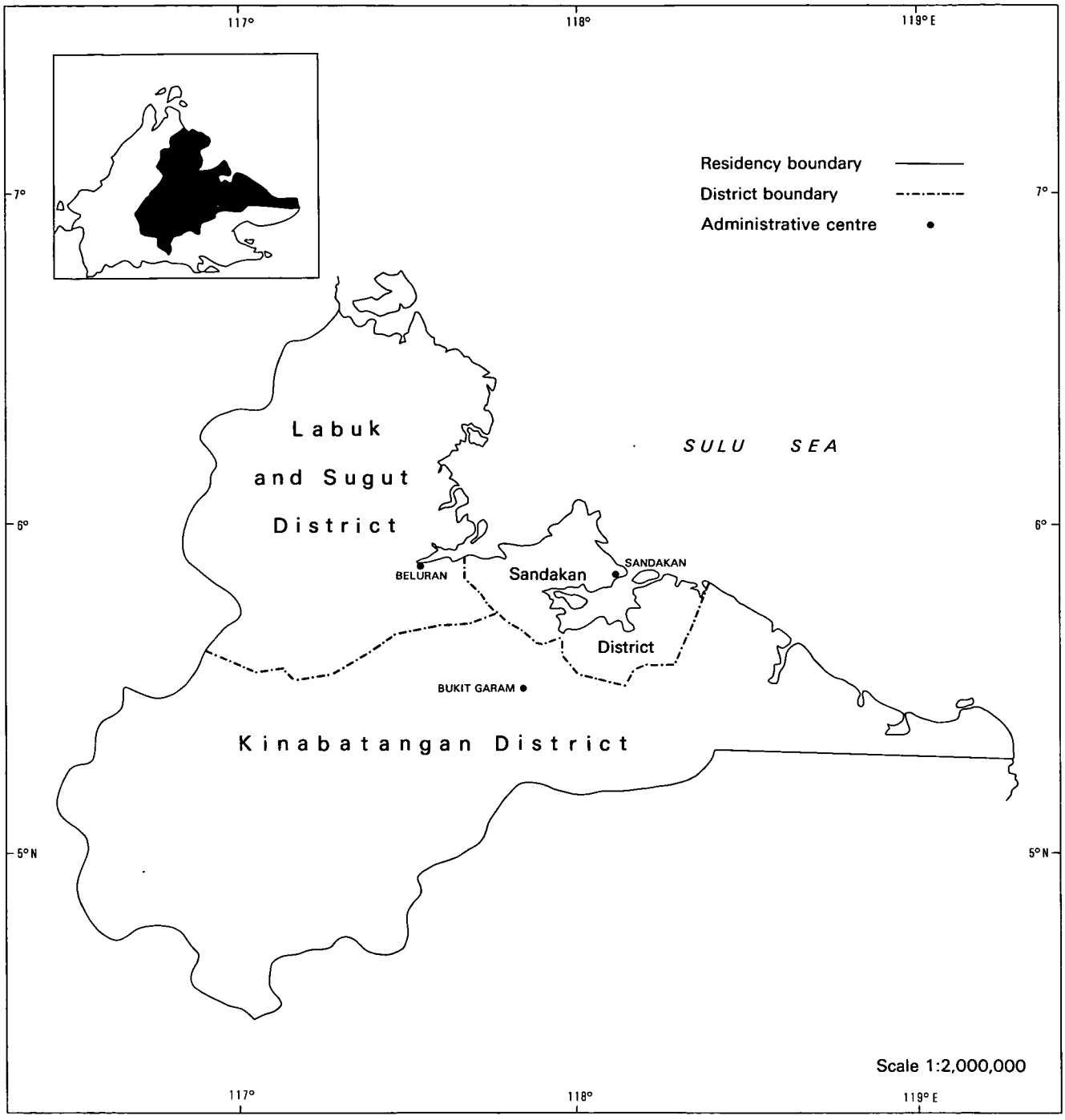
TOPOGRAPHY AND GEOLOGY

The topography of the residency is varied. Along the east coast there are extensive low-lying deltaic areas which in the central-southern part merge into the extensive flood plain of the Kinabatangan River where the land is generally flat and relief low. Elsewhere there is a zone of low hills and peneplains behind the deltas where maximum elevations seldom exceed 300 m (1 000 ft). Towards the interior the land rises with rugged mountainous country in the west and south-west. Collenette's *Physiographic Classification of North Borneo* (1963), provides a basis for a description of the topography and geology, and Text Map 2-2 shows the main units of that classification which fall in the residency.

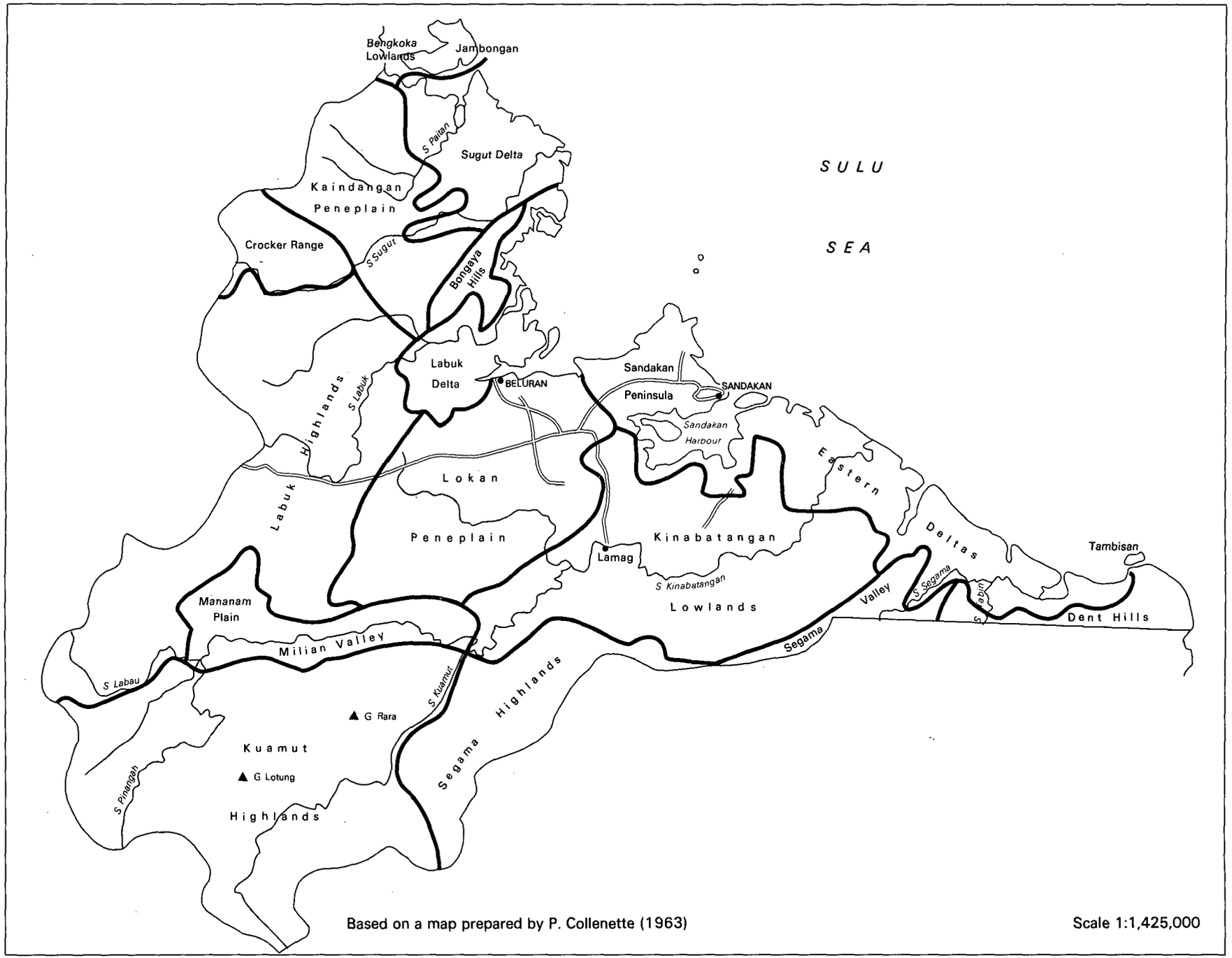
In the south-west of the residency the country is rugged and mountainous. This area forms the northern part of the Kuamut Highlands. In the centre of that area the topography is dominated by a series of sandstone cuestas culminating in Gunong Lotung, which rises to a height of more than 1 600 m (5 250 ft). To the east there are a number of basic to ultrabasic bodies, the most prominent of which is Gunong Rara, 1 706 m (5 600 ft).

Further eastwards is another area of rugged country, the north-western part of the Segama Highlands. Here the country has a general east-west trend with peaks seldom exceeding 900 m (3 000 ft). Geologically the area is complex, with Cretaceous to Eocene sedimentary and igneous rocks of the Chert-Spilite Formation.

Immediately to the north of the Kuamut Highlands are the upper reaches of the Kinabatangan River, the Milian Valley. This is a broad trough which separates the Kuamut and Labuk Highlands. At the western end it broadens out into the dissected Mananam Plain which overlies sandstones and shales of the Crocker Formation, while to the east of this it is narrowed by a ridge from the Labuk Highlands. The western part of the residency is in the main formed by the steep irregular hills of the eastern



TEXT MAP 2-1 Location of the Sandakan Residency and its administrative districts



TEXT MAP 2-2 Physiography

Prepared by the Directorate of Overseas Surveys 1976

part of the Labuk Highlands, with the highest peaks in excess of 1 300 m (4 300 ft). These hills are built of basic intrusive and extrusive and ultrabasic rocks of Eocene or Oligocene Age.

The low-lying country of the Kinabatangan Valley, the Kinabatangan Lowlands, forms the central-southern part of the residency. The area is generally flat, and liable to flood in the middle and lower reaches of the Kinabatangan River, with occasional low hills and limestone outcrops. The sedimentary formations are mainly sandstones, mudstones and shales of Eocene and Quarternary age. Further east along the southern boundary are the lower reaches of the Segama Valley. The area is generally low-lying with some small hills. The Chert-Spilite Formation is found along the river valley together with more recent alluvial deposits. Eastwards the mudstones and slump breccias of the Segama Group occur with the Ayer Formation predominant.

The eastern extremity of the residency is formed by the northern part of the Dent Hills. In the south-west the land reaches a height of nearly 300 m (1 000 ft) while in the east it is lower and flatter with little relief. The rocks are sedimentary formations of Upper Miocene to Quarternary age with the Ganduman and Togopi Formations predominant.

Along the eastern seaboard are the Eastern Deltas, areas of low-lying swampy land formed by the Kinabatangan, Segama and other smaller rivers. The Sandakan Peninsula is bounded to the west by the Samawang and Garinono Rivers.

The southern part is hilly and terminates in a number of spectacular escarpments facing Sandakan Bay which are built of sandstone of the Tajong Formation and rise to a height of some 240 m (800 ft). In the north and west the country is flat or undulating.

More or less in the centre of the residency is the Lokan Peneplain which covers an area of more than 2 600 km^2 (1 000 mi^2). It is built of sandstones and mudstones of Eocene age and is dissected by the Lokan and other rivers. In the east the land is gently undulating but in the west relief is severe, with steep slopes and amplitudes up to 300 m (1 000 ft).

At the mouth of the Labuk River is a low lying swampy area, the Labuk Delta formed by the Labuk and other smaller rivers. To the north-west of the Labuk Delta between the Bongaya River and the Kaindangan Peneplain are the Bongaya Hills, an elongated ridge rising to about 180 m (600 ft). They are built of Upper Miocene sandstones of the Bongaya Formation.

On the northernmost sector of the coastline, north of the Bongaya Hills, is another low-lying swampy deltaic area, the Sugut Delta, formed by the Sugut, Kaindangan and other smaller rivers. To the west of this area lies the Kaindangan Peneplain, which can be recognised as such by the accordance of the ridge tops. The area, the greater part of which falls in the residency, is composed of sandstone and shale of the Crocker Formation of Eocene age and has been deeply dissected by various rivers including the Kaindangan. On the western boundary of the residency the land rises to between 300 and 600 m (1 000 and 2 000 ft) and from here it slopes south-eastwards.

To the south-west of the Kaindangan Peneplain on the western boundary of the residency is an area of rugged mountainous country which forms part of the Crocker Range. The rocks are sedimentary formations, mainly sandstone of Eocene age with peaks exceeding 900 m (3 000 ft).

Jambongan Island at the northern tip of the residency is part of the Bengkoka Lowlands. It is formed of sandstones and shales of the Bongaya Formation with alluvial deposits along the coast. The terrain is generally flat or undulating.

CLIMATE

The climate of the residency may be generally described as hot and wet. The mean daily maximum temperature is approximately 32°C (90°F) and the mean daily minimum about 22°C (72°F) with an average of 27°C (81°F). The mean annual rainfall is about 3 120 mm (123 in).

It is considered that the climate throughout the residency may be classified as the Tropical Rainy Climate (Af) according to Koppen's system (Trewartha, 1954).

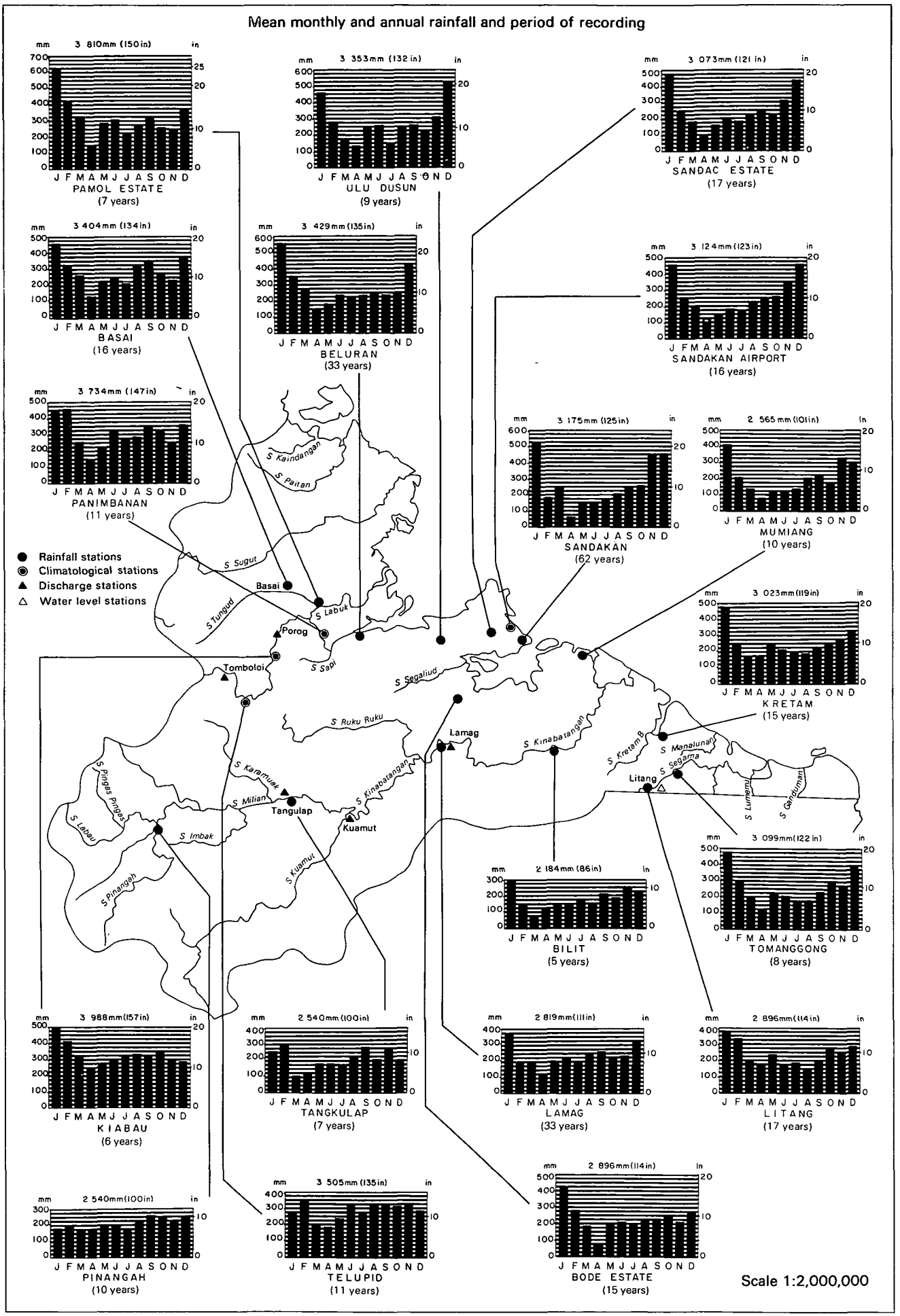
Temperature

Table 1 gives the mean daily maximum and minimum temperatures monthly and annually for the four climatological stations in the residency, the locations of which are shown on Text Map 2-3.

TABLE 1 Mean daily temperatures in °C (°F)

Station	Mean daily temp.	Month												Annual average
		J	F	M	A	M	J	J	A	S	O	N	D	
Kiabau (1964-68)	Max.	30.7 (87.2)	30.2 (86.4)	31.6 (88.8)	33.8 (92.8)	33.9 (93.1)	33.8 (92.8)	33.5 (92.3)	33.6 (92.5)	33.3 (92.0)	32.9 (91.2)	32.4 (90.3)	31.3 (88.3)	32.5 (90.5)
	Min.	21.1 (69.9)	21.0 (69.8)	21.8 (71.2)	22.2 (72.0)	22.3 (72.2)	21.8 (71.2)	21.4 (70.5)	21.4 (70.5)	21.6 (70.8)	21.3 (70.3)	21.7 (71.0)	21.4 (70.6)	21.7 (71.0)
Panimbanan (1964-73)	Max.	30.6 (87.1)	30.7 (87.3)	31.7 (89.1)	33.5 (92.3)	34.0 (93.2)	33.4 (92.1)	33.2 (91.7)	33.1 (91.5)	32.8 (91.0)	32.8 (91.0)	32.1 (89.8)	31.9 (88.4)	32.4 (90.4)
	Min.	20.2 (68.3)	20.3 (68.6)	20.6 (69.0)	21.2 (70.0)	21.4 (70.6)	21.1 (69.9)	20.8 (69.4)	20.6 (69.1)	20.9 (69.6)	20.9 (69.6)	20.8 (69.5)	20.6 (69.0)	20.8 (69.4)
Sandakan (1964-73) (incomplete)	Max.	29.3 (84.8)	29.7 (85.5)	30.4 (86.7)	31.5 (88.7)	32.4 (90.4)	32.1 (89.8)	32.1 (89.8)	32.2 (89.9)	32.1 (89.8)	31.5 (88.7)	30.7 (87.2)	30.0 (86.0)	31.2 (88.1)
	Min.	22.6 (72.7)	22.9 (73.2)	23.1 (73.5)	23.2 (73.8)	23.3 (74.0)	22.9 (73.3)	22.7 (72.8)	22.6 (72.7)	22.9 (73.2)	22.8 (73.1)	22.8 (73.1)	23.2 (73.7)	22.9 (73.3)
Telupid (1964-73)	Max.	30.9 (87.7)	30.9 (87.7)	32.4 (90.3)	34.3 (93.7)	34.3 (93.8)	33.8 (92.9)	33.6 (92.5)	33.6 (92.4)	33.3 (92.0)	32.9 (91.3)	32.3 (90.2)	31.7 (89.1)	32.8 (91.1)
	Min.	20.6 (69.0)	20.7 (69.3)	20.8 (69.5)	21.3 (70.4)	21.2 (70.1)	20.9 (69.7)	20.2 (68.4)	20.3 (68.6)	20.4 (68.8)	20.4 (68.8)	20.6 (69.1)	20.6 (69.1)	20.7 (69.2)
Mean for the 4 stations	Max.	30.4 (86.7)	30.4 (86.7)	31.5 (88.7)	33.3 (91.9)	33.7 (92.6)	33.3 (91.9)	33.1 (91.6)	33.1 (91.6)	32.9 (91.2)	32.6 (90.6)	31.9 (89.4)	31.1 (88.0)	32.3 (90.1)
	Min.	21.1 (69.9)	21.2 (70.2)	21.6 (70.8)	22.0 (71.6)	22.1 (71.7)	21.7 (71.0)	21.3 (70.3)	21.2 (70.2)	21.4 (70.6)	21.4 (70.5)	21.5 (70.7)	21.4 (70.6)	21.4 (70.6)

It will be noted from Table 1 that the diurnal variation in temperature ranges from about 7°C (12°F) during the coolest months of the year (January and February) to about 11°C (20°F) during the hottest months, with an overall average of about 10°C (18°F). The diurnal variation is much greater than the annual variation in mean maximum and minimum temperatures which average approximately 3°C (6°F) and 1°C (2°F) respectively. The Sandakan figures show rather below average mean maximum temperatures and rather above average mean minimum temperatures, resulting in a less than average diurnal variation. Proximity to the sea undoubtedly accounts for this.



TEXT MAP 2-3 Selected rainfall, climatological and hydrometric stations

Figures for extreme maximum temperatures show that temperatures in the region of 35°C (95°F) are not uncommon and occasionally will reach nearly 38°C (100°F). At the other end of the scale extreme minimum temperatures of about 18°C (65°F) are quite often recorded and very occasionally temperatures as low as 16°C (60°F).

Rainfall

The histograms of rainfall at the various recording stations depicted on Text Map 2-3 show that rainfall is not evenly distributed throughout the year. October to February, when the north-east monsoon is usually blowing, is the wettest period in the year, with the heaviest rainfall usually in January. On average and at nearly all stations, April is the driest month. The south-west monsoon which usually occurs from May to August does not normally bring especially wet weather.

While the average annual rainfall is about 3 120 mm (123 in), there is considerable variation between recording stations, from about 2 184 mm (86 in) at Bilit on the Kinabatangan to over 3 988 mm (157 in) at Kiabau on the Labuk River. It may be noted that all recording stations in the Labuk Valley show a higher rainfall than the average for the residency. It is thought that the reason for this may be that the valley acts as a sort of funnel into which rain and rain-clouds tend to be drawn. An important factor is that by its geographical position it receives the full force of the north-east monsoon which will blow more or less up the valley. On the other hand the stations in the Kinabatangan Valley and flood plain show a lower than average rainfall. The reason for this may well be that the area escapes the full force of the monsoon rains. It is of some interest to note that the most westerly recording station at Pinangah, in the centre of Sabah, shows a rather different rainfall pattern from the other stations in the residency. Here the wettest period of the year is August to December, with January one of the driest months.

VEGETATION

The natural climax vegetation is tropical rainforest and much of this is lowland dipterocarp forest. Within the lowland dipterocarp forest different forest types can be recognised and by far the most important of these in the Sandakan Residency is the *Parashorea tomentella/Eusideroxylon zwageri* type, (Fox, 1972). This, with minor variations covers the greater part of the residency, the main exceptions being the mountainous land in the south-west, in the Gunong Rara Forest Reserve, and the hills formed of igneous rocks in the Labuk Valley. In this type some 20% of the larger trees, (i.e. those with a girth of 6 ft or more), belong to the genus *Parashorea* with *P. tomentella* much the most common species. *Eusideroxylon zwageri* is present in the main storey though its abundance varies considerably. Principal associates are *Shorea leptoclados, Dryobalanops lanceolata* and *Dipterocarpus caudiferus.* These three species together with *Parashorea* generally account for 40% or more of the larger trees. Other species of *Rubroshorea* are present and the other three groups of *Shorea* are also represented. On the more hilly land *selangan batu* and species of the Richetia section of *Shorea* become more common while species of the Anthoshorea section are generally scarce. This type of forest is a very important component of the permanent forest estate. The *Parashorea malaanonan/Dryobalanops lanceolata* forest type (Fox, 1972) occurs in the foothills of the mountainous area in the south-west and on the hills formed by ultrabasic rocks in the Labuk Valley. The main associates of the two named species are various species of the Rubroshorea section of *Shorea.* On the steeper and higher land in these areas this type gives way to *selangan batu* forest in which *Parashorea malaanonan* and *Dryobalanops lanceolata* are scarce and species of *selangan batu* more common.

Apart from the lowland dipterocarp forest the other main forest types are tidal mangrove forests along the coast and freshwater swamp forest. In the mangrove forests the most important species are *Rhizophora mucronata* and *R. apiculata* while other species present include *Ceriops tagal, Sonneratia alba, Excoecaria agallocha* and various species of *Lumnitzera, Bruguiera* and *Avicennia.* The swamp forests are often characterised by the presence of *Myristicaceae* (Fox, 1972) while other species which locally form important constituents are, *Alstonia spathulata, Nauclea* spp., *Terminalia copelandii, Campnosperma coriacea* and *Lophopetalum multinervium.*

Secondary forest following shifting cultivation occurs mainly in the western and north-western parts of the residency while montane forest is found on some of the higher land in the west and south-west but is not extensive.

On sandstone hills and escarpments, particularly in the Sandakan area, heath or *kerangas* forest occurs. In this forest the canopy is generally low and the trees small to medium in size. Various species of *Eugenia* are common and some Dipterocarps are present. *Tristania clementis* occurs in pure stands as a low tree of small girth.

At present some 97% of the land area is still covered by forest, though of this some 12.6% has been disturbed by exploitation. The remaining land is mainly used for agriculture, with oil palm and rubber the most important crops.

SETTLEMENT AND POPULATION

The settlement and distribution of the population in the Sandakan Residency is reflected in the high proportion of the land area still covered by forest. With an average population density of 4.1 persons per km^2 (10.5 per mi^2) it is not surprising that there are very large areas without human habitation.

There is only one town in the whole residency and that is Sandakan. With a population of over 42 000 at the 1970 census (Sabah, Malaysia, Dept of Statistics, 1973) it is the largest town in the state. The town and the country immediately surrounding it has been the main centre of settlement for the non-indigenous population, in particular the large Chinese community. The town and district of Sandakan has also been a centre of settlement for a relatively large indigenous population. To date agricultural development and associated settlement has been concentrated in the Sandakan District and more especially in the Sandakan Peninsula as far as the forest reserve boundary at mile 39 on the Labuk Road.

Outside the Sandakan District the indigenous population is found mainly in relatively small villages scattered along the major rivers, in particular the Kinabatangan and its upper reaches, the Milian, and the Labuk and Sugut. Here the people practise shifting subsistence agriculture with the result that many of the settlements move periodically, though some of the larger ones are permanent and have schools, medical facilities, etc. The development of the timber industry in recent years has provided opportunities for more permanent employment for the inhabitants of these villages. Other small indigenous communities occur round the coast, particularly in the Labuk Bay area where the people obtain a livelihood from fishing.

Mixed communities have grown up round the larger timber camps most of which are situated on major rivers, especially the Kinabatangan. Such communities are not however permanent and as the timber is worked out so the camps and associated communities will move elsewhere.

Major agricultural development in the Lower Labuk area has given rise to considerable permanent settlement, likewise to a lesser extent on the Lower Segama.

The centres for Government administration outside Sandakan are Bukit Garam on the Kinabatangan River and Beluran at the mouth of the Labuk River. The population of both places is relatively small and there has been little associated settlement.

The population of the residency according to the 1970 census was 113 791. Table 2 gives a breakdown of this population by districts and major community groups.

It can be seen from Table 2 that though the total population is almost equally divided between indigenous and non-indigenous groups this does not apply within the individual districts. In the Sandakan District only 31.8% of the population is indigenous while 51.0% belongs to the Chinese community group and of that group 55% are Hakka. In the town of Sandakan the predominance of non-indigenous groups, in particular the Chinese, is even more pronounced; with the latter accounting for 64.5% of the population. In the Kinabatangan, and Labuk and Sugut Districts indigenous groups form respectively 85.3% and 77.8% of the population.

TABLE 2 Population by districts and community groups

Community group	Districts			Residency	
	Sandakan	Kinabatangan	Labuk & Sugut	Total	%
Kadazan	2 852	462	8 379	11 693	10.3
Bajau	2 900	55	1 448	4 403	3.9
Malay	3 159	12	1 194	4 365	3.8
Tambunuo	55	2	3 789	3 846	3.4
Suluk	4 933	297	593	5 823	5.1
Orang Sungei	3 567	8 324	2 385	14 276	12.5
Brunei	2 763	43	538	3 344	2.9
Tidong	1 091	7	1 511	2 609	2.3
Other indigenous	1 869	2 893	1 025	5 787	5.1
Total indigenous	23 189	12 095	20 862	56 146	49.3
Chinese	37 147	402	992	38 541	33.9
Indonesian	6 226	1 061	2 126	9 413	8.3
Filipino	4 060	255	1 040	5 355	4.7
Others	2 206	364	1 766	4 336	3.8
Total	72 828	14 177	26 786	113 791	100.0

The Orang Sungei and Kadazan are the two most important indigenous community groups. The former account for 12.5% of the total population and 58.7% of the Kinabatangan District, while the latter make up 10.3% of total population and 31.3% in the Labuk and Sugut District. Of the non-indigenous groups other than Chinese the Indonesians are most numerous accounting for 8.3% of total population.

COMMUNICATIONS

The major features of the communications system are shown in Text Map 2-4. The road network is not extensive and internal communication depends very much on water transport. Air, sea and land transport provide external links.

Road

There are an estimated 365 km (228 mi) of all-weather trunk-roads maintained by the Public Works Department. These link Sandakan with the administrative centres of Bukit Garam and Beluran and with the Interior and West Coast Residencies via the East-West Highway. There are other publicly maintained roads which provide access to the agricultural development areas in the Sandakan Peninsula. There are also a number of road networks built and maintained by timber companies for the purpose of log extraction. However, most of these networks are isolated and do not link up with the public road system, and thus are of little use for the purpose of communication. Considerable stretches of the East-West Highway are sealed but all other roads except those in and around Sandakan Town are only gravelled.

TEXT MAP 2-4 Communications

Water

Because of the lack of a suitable road network the sea, inland waterways and rivers play an important part in internal communications. Water communications are vital to the timber industry as floating is the easiest and cheapest method of moving timber. All logs shipped from Sandakan reach the port by water.

Sandakan is the only deep water port with wharf facilities in the residency. These are at present somewhat limited but will be much improved when the new port, at present under construction, is completed. Sandakan Harbour, where logs are loaded onto ocean-going freighters, can provide a safe and secure anchorage for many ships.

There is a regular general shipping service from Sandakan to Singapore and Port Klang in Peninsula Malaysia. Timber carriers regularly sail to Japan, Korea, Taiwan and other places. Smaller boats transport goods round the coast and supply timber camps and estates. There are bulk fuel oil and palm oil terminals at Sandakan for the discharge and loading of oil.

Air

From Sandakan airport there are regular air services to other towns in the State, also to Tomanggong Estate on the Segama River and Pamol Estate on the Labuk River using small aircraft. Helicopters and small fixed wing aircraft are available on charter at