

**LAND TYPES, LAND USE/COVER, SECONDARY  
SALINIZATION IN THE AREA EAST OF  
LAM SIEO YAI TUNG KULA RONGHAI**

**BY.**

**MONTRI LIENGSAKUL and W.P. THOMPSON**

---

**Soil Survey and Classification Division  
Department of Land Development  
Ministry of Agriculture and Cooperative**

**Technical Bulletin No. 67  
January 1987**

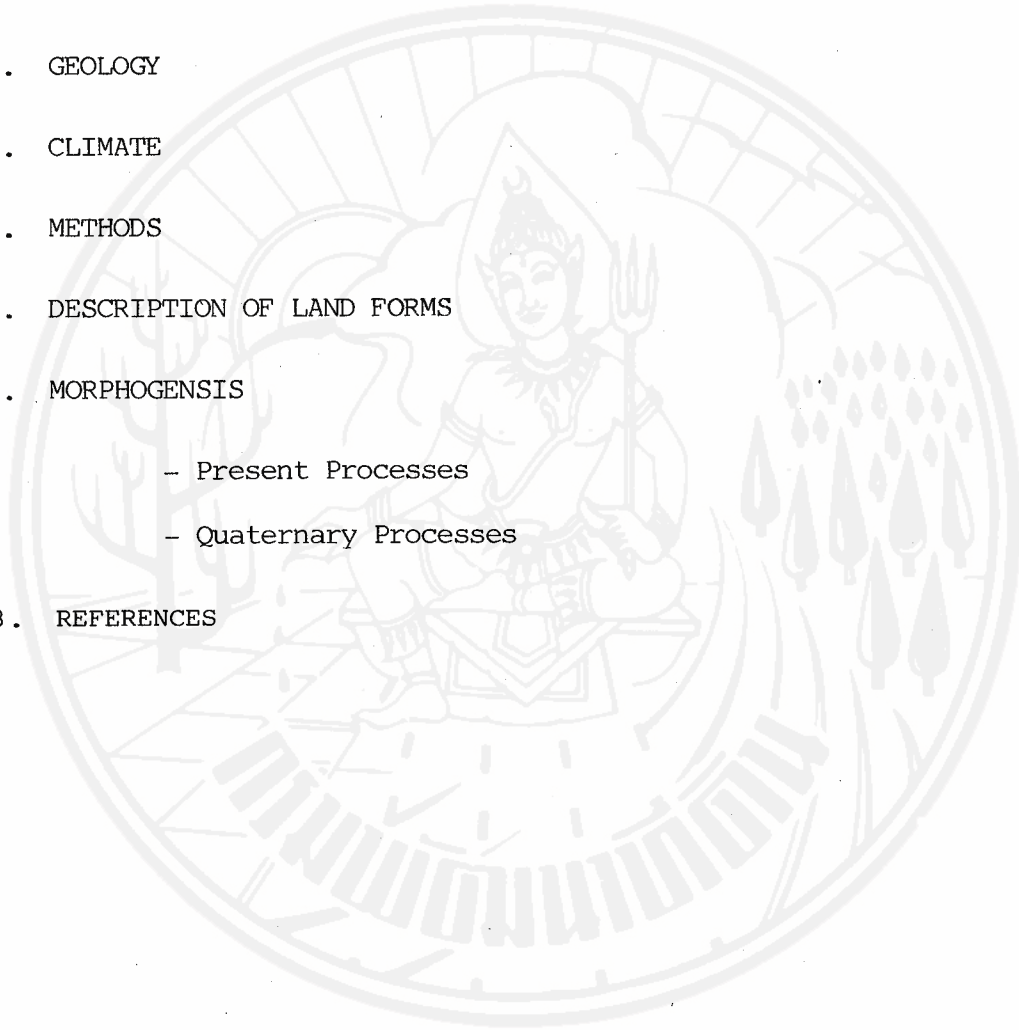
---

**ISBN 974 - 7614 - 32 - 4**

## CONTENTS

### ACKNOWLEDGEMENTS

1. INTRODUCTION
2. SITE AND REGION
3. GEOLOGY
4. CLIMATE
5. METHODS
6. DESCRIPTION OF LAND FORMS
7. MORPHOGENESIS
  - Present Processes
  - Quaternary Processes
8. REFERENCES



## ACKNOWLEDMENTS

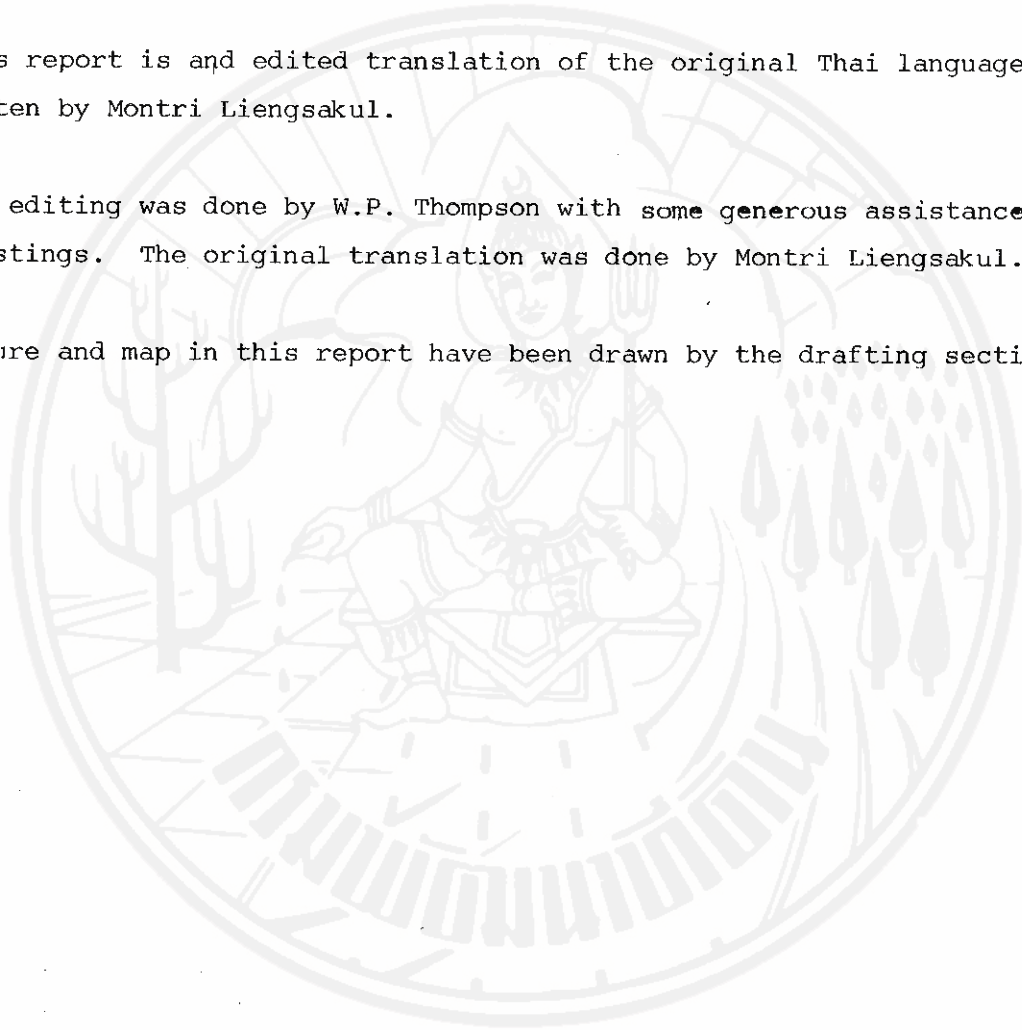
The work reported herein forms part of the Phase III TKR Project.

Field work was done by Ernst Loffler and Montri Liengsakul. Special thanks are due to officers of the Soil and Geology Division of RID who provided cores from same sites in the region.

This report is an edited translation of the original Thai language version written by Montri Liengsakul.

The editing was done by W.P. Thompson with some generous assistance from Paul Hastings. The original translation was done by Montri Liengsakul.

Figure and map in this report have been drawn by the drafting section of DLD.



Report on Land Types, Land Use/Cover, Secondary Salinization in  
the area East of Lam Sieo Yai - TKR

I. Introduction

Land type, land use/cover, secondary salinization in the area east of Lam Sieo Yai - TKR has been studied according to poor country development plan by co-operation with Australian government. The study has been done in order to complete the inventoring of the land resources of TKR. This report completes regional field studies first reported on by ADAB (1983).

2. Site and Region

Tung Kula Ronghai is in the southern part of northeastern Thailand and covers an area of 5 provinces as shown in fig 1. The area mapped is shown in Map 1 and comprises areas in the provinces of Roi Et, Srisaket, and Yasothon.

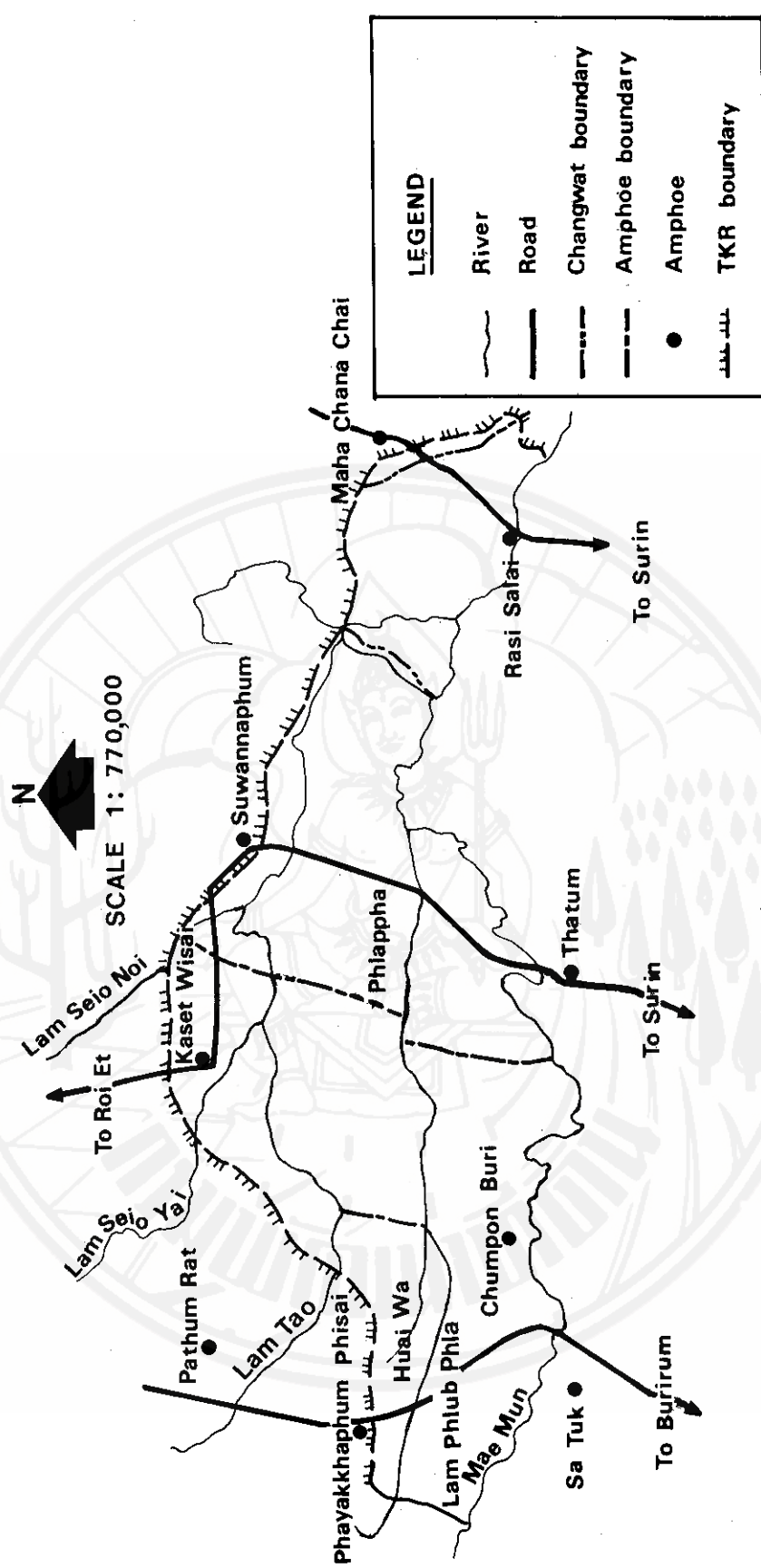
3. Geology

There are two rock units in the Tung Kula Ronghai. The upper unit is alluvium of Quaternary age. The other unit consists of sandstones, shales, mudstone and rock salt of Mahasarakham Formation which ranges in age from Cretaceous to Tertiary.

4. Climate

Climate of Tung Kula Ronghai is classified as Tropical Savannah (koppen "An") which has a dry season that alternates with a wet season per year. The rain in this region depends on the south westerns monsoon and lasts from May to October. The annual rainfall averages 1340 mm. The maximum rainfall is October and the minimum rainfall is in December or January.

**FIGURE 1 LOCATION MAP**



## 5. Methods

Orthophotograph scale 1:10,000, topographic map scale 1:50,000 and 1:250,000, soil map scale 1:100,000 and field survey were the basic tools and methods used in this work. The orthophotos were interpreted in the office. The office work consisted of boundary delineation and field check point selection. Field checks took place from 10 March 83 to 9 April 83 of the dry season, which concentrated on land use, top soil morphology, moisture, secondary salinization and water table were observed and recorded. Deep soil profiles were examined from wells, fish ponds, road cuts and other open pits. All data was compiled and final map was produced. There were some problems with the orthophotos, because there are old ones, which were taken in 1976. The detail in the field has changed and the quality the orthophoto is not very good. The same tone and texture sometimes does not indicate the same land feature, (for example, sandy soil and secondary salinization in some places show the same tone and texture on the photo). If the photos were up to date the field work would have been easier and quicker than this and the results would be much more accurate.

## 6. Description of Land type

Ten major land types have been identified in the eastern part of TKR. The distribution of land types are shown on map 1

### I - Intermediate slopes - 2 % of area

Major Distinguishing features. Gently undulating to near level plains and slopes adjacent to hills and ridges. Bed rock often at shallow depth. Slope are less than 1% and soils of very light textures.

Detail Description. There are plains and very gentle uniform slopes along the northern of Lam Sieo Yai. They occur as transitional land types between the ridges and subcatchment alluvial plains. They are commonly underlain at shallow depth (< 5 m) by the Mahasarakham Formation, however in some areas deeper alluvial and possibly colluvial deposits are associated. These plains are believed to be mainly erosional in origin.

Land use is dominately wet season rainfed rice with small isolated areas of dry season bucket irrigated cash crop. A feature of the rice in this land is the presence of scattered isolated trees and shrubs within the paddy fields. The growth of rice around the tree is usually better than in the more open parts of paddies. Villagers use the trees as timber and fire wood (including charcoal). Comparison of 1954 and 1976 photograph show that tree density has decreased by some 20-30 % in these lands. As no new trees are being planted in these areas it is likely that tree density will continue to decline.

Soil are dominately Roi Et series with Nam Phong series associated. Secondary salinization is mostly restricted to the lower parts of slopes where this land type grades into the subcatchment alluvial plains.

RS - High Sand Ridges - 11 % of area

Major Distinguishing Features. High sand ridges over stratified alluvial sediments. slopes are < .5%. Approximate relative relief of 8-17 m. Soil are of very light texture.

Detail Description. These are scattered low hills and ridges with scarp and flat top. They are underlain at depths of between 4 to 6 m by thick stratified alluvial sediments. The sand is possibly of wind blown origin because it is very well sorted.

Land use is largely restricted to forest and a few dry land crops. The water table is 3 m deep near Chi river and 1.5 m near Mun river. Many willages are located on this land type. Soils are dominated by members of the Ubon, Namphong, Stuk and Khorat soil series.

S - Low Sand sheets - 3 % of area

Major Distinguishing Features. Low sand sheets and sandy rises of probable wind blown sand origin. Slopes are very gentle (1:100) to virtually level (1:1000). Soils are very light textures.

Detailed Description. These are convex to planar low rises and sand sheets scattered between the subcatchment streams of Lam Sieo Yai, Huai Pra Bang, Huai Nam Khum and Mun river built up of fine well sorted sands up to 10 m thick occasionally with illuviated clay horizons. They are underlain by sandstone and shale of sandy shale of the Mahasarakham Formation, where the pallid zone has been partly or totally eroded. The fine sand is most probably of wind blown origin, however, at depth in some sites evidence for alluvial deposits exists.

Land use is mainly forest on the low sandy rises and grazing on the low sand sheets but paddy rice and dry land crop also occurs. Abandoned rice paddies are common and new systems of paddies have sometimes been superimposed onto the old abandoned paddy system indication the marginal suitability of this land type for rice. Secondary salinization does not appear on this land type. Dominant soils are Ubon and Namphong series.

SA - Flat top sandy ridges - 5 % of area.

Major Distinguishing Features. Flat top sandy ridges and rises over stratified deep alluvial sediments. Slopes of < 3 %. Approximate relative relief of 1-6 m.

Detail Description. These are flat top sandy ridges and rises scattered along the major streams top soil is fine, well sorted sand underlain by deep, stratified alluvial sediments similar to S Land type excepting the underlying rock formation is deeper and a thick sequence of alluvial sediment.

Land use is mainly forest paddy field associated with scattered isolated low trees and shrubs and grazing land. A few of them are cultivated dry land crop. Some secondary salinization is scattered in fields associated with low trees and shrubs. Dominant soils are Ubon and Namphong series.



RM - Relict Meander Belts - 2 % of area

Major Distinguishing Feature. - Relict meander belts associated with Mun and Chi river consisting of linear and curved sandy rises represent former discontinuous levees and sand bars and intervening elongated plains which are infilled river channels.

Detailed Description. These are the relict meander belt of the Mun and Chi river of the present action meander plain. They are no longer subject to lateral migration of the river, however the low lying plains are subject to flooding from Mun and Chi river overflow channels.

Stratigraphy is variable and again reflects the depositional environment. The low sand rises are often raised by man for village sites, while the elongated intervening plains are used for paddy rice. Secondary salinization occurs through out this unit. Dominant soils are Tha Tum and Kula Ronghai series on the elongated flooded area and various unnamed soil series on the sandy rises.

T - Uniform alluvial plains - 32 % of area

Major Distinguishing Feature. Uniform alluvial plain with extremely low gradient (1:15,000) on stratified clay and sand.

Detailed Description. This are extremely flat plains of alluvial plain origin extending from the Mun river. The upper layer consist of clayey alluvium with a range of underlying Quaternary sandy sediments. In most areas, the clayey deposits are abruptly underlain by oxidized sandy sediments which in turn overly organic sands. Underlying bed rock is very deep. Soils are dominated by Tha Tum and Kula Ronghai series. Land use is mainly paddy rice. Secondary salinization is irregularly scattered through the unit.

TS - Gently undulating alluvial plains - 28 % of area

Major Distinguishing Features. Alluvial plains on stratified clay and sand with isolated low sand rises. Surface soil tend to be more sandy than for T.

Detail Description. This land type is spatially related to both the T and RM units.

It is intermediate between the two in terms of topographic variation, with a lower frequency of low sandy rises than on the T land type but a lower frequency than on the RM type. The elongated flat plain areas are similar to the Tha Tum and Kula Ronghai series of the I unit, however its stratigraphy is more variable. Paddy rice dominates the land type with the low sandy rises often showing cultural raising.

Land use is mainly paddy rice associated with scattered low trees and shrubs. Secondary salinization is scattered throughout the unit.

A - Flooded alluvial plains - 6 % of area.

Major Distinguishing Features. Alluvial plain along major streams with finer textured soils.

Detailed Description. These are the flat narrow flood plains bordering the subcatchment stream in the middle to upper parts of the stream courses within TKR. Associated stratigraphy is highly variable with layered sands, gravels and clays extending to depths of 15 to 20 m. These plain are prone to flooding, however, as relative uniform topography and clayey soils in some areas make them suited to paddy rice. The more severely flood prone lands are used for grazing while some vegetable cropping from dry season water holes is practised on the lighter textured soils. Soils are dominantly members of Phimai series with associated sandies members of the alluvial complex soil association map unit. Secondary salinization does not appear.

M - Active meander belts - 9 % of area

Major Distinguishing Features. Active highly unstable meander belts along major rivers with oxbows, scrolls, bars and low discontinuous levees.

Detailed Description. These are the active meander belts forming the flood plains of the subcatchment streams and the Mun River. In the middle to lower parts of the subcatchment stream courses and main Mun River course the stream bed are strongly meandering with an irregular topography containing oxbows, scrolls, bars, and low discontinuous levees.

The area are prone to seasonal floods and have a highly variable stratigraphy reflecting the lateral migration of the channels.

Land use is largely grazing in the dry season which has resulted in considerable degradation and woody weed invasion (such as the unpalatable *Zizyphus* spp.) on these lands. Soils are highly variable clayey and sandy members of the immature alluvial soils.

#### V - Major Village sites

Major Distinguishing Features. Major village sites.

Detail Description. Two general types of village sites occurs.

- Naturally elevated sites. - Within the R,S and I land types, villages are located on naturally elevated areas.
- Man made sites - Within the flatter more flood prone land types the construction of moats, salt making activity and accumulation of cultural material etc. have enhanced the relative relief on sites used as villages. In these areas the upper stratigraphy to depths of 3 to 6 m contain the domestic spoil of the villages, underlying stratigraphy essentially similar to the surrounding plain. Such enhancement possibly provides some defensive and flood protection, while the moats provide a dry season water supply.

#### 7. Morphogenesis

##### Present Processes

The main morphology in the area is **formed** by stream action. Many

ridges or rises are also present which have a 3-6 m uniform texture and consist of sorted fine sand. These are believed to be wind blown in origin. The ultimate source of this sand is thought to be blown out from the alluvial plains of streams in the area. The main characteristics of this landform are relatively steep slope or scarp structure, flat top or broad ridges with very well sorted sand. The low sand sheet in the plain is probably alluvial origin. Under present land use conditions evidence for a continuation of the process exists. Along roads in the area where vegetative cover is poor aggradation of stream channels and slight rises is evident. In some cases wind sorting and aggradation of original and alluvial levees is evident with both sides of the channel being veneered by very well sorted sand grains.

This process may result in the various ridge and sand sheet land types in the area.

#### Quaternary Processes

As part of the program of mapping, samples of various strata have been submitted for more detailed analysis. A full technical report on the morphogenesis will be available when these analyses are completed. However some general comments on morphogenesis are possible from surficial data. Most of the land surface of eastern TKR has been shaped by alluvial processes. The confluence of the Chi and Mun Rivers in recent times is evident from the abandoned river channels (mapped as A and RM units), that extend from the Chi at Maha Chanachai to the present Mun west of Rasi Salai. There is however only limited evidence for the Chi to have been any further west than the present Lam Sieo Yai.

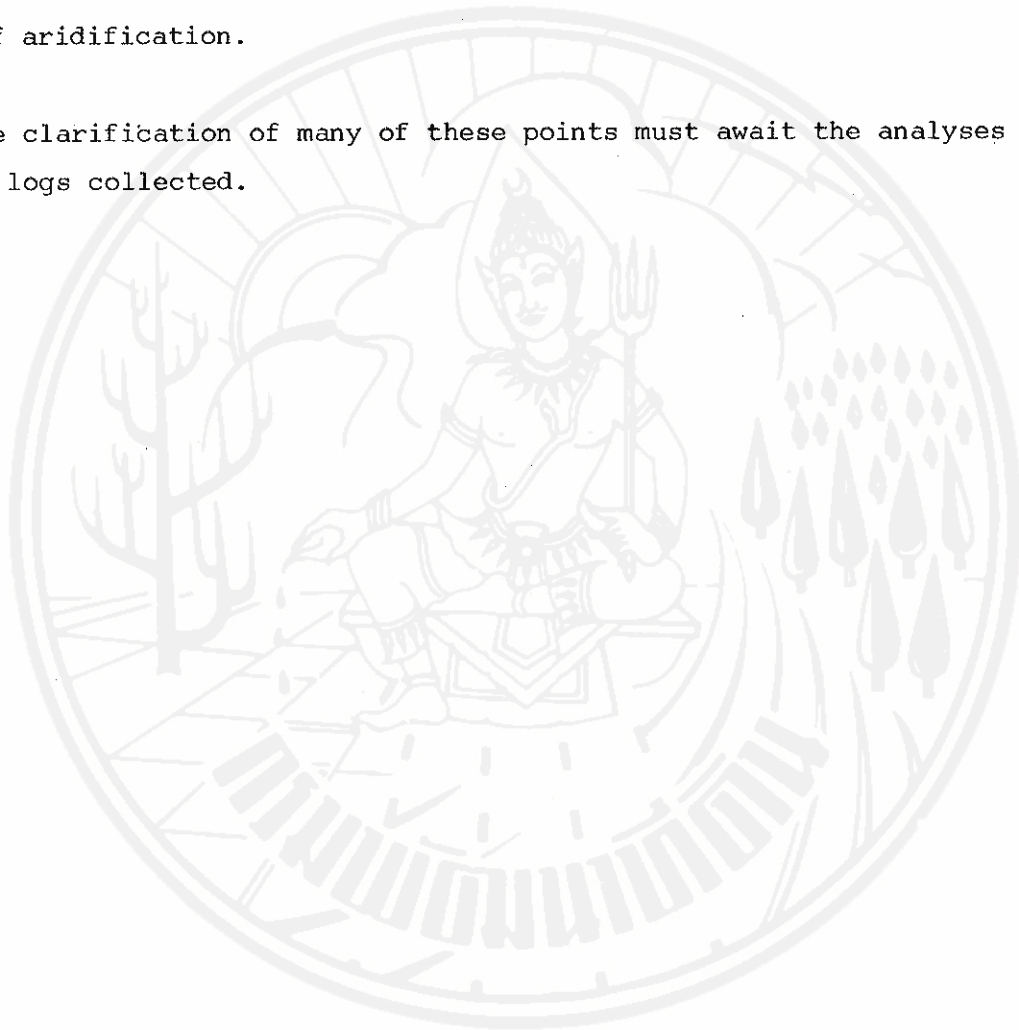
It would seem likely that the area of the confluence between Rasi Salai and Maha Chanachai became choked with sediments and over a period of stable base levels caused the Chi to migrate to the east beyond the statistical boundary of TKR.

There is also evidence that contemporaneous/or following this migration, aeolian processes within the abandoned channel area has tended to

both obscure and exaggerate some elements of the land forms. The RS, R, S, SA and possibly TS land types are all veneered by well sorted sands of probable aeolian origin blown out of the lower lying areas.

There is the possibility that this aeolian stage is more recent than the period established by deeper stratigraphic records in west TKR. If it is in fact a recent (as opposed to late Pleistocene) phenomena, the causes may lie in the deforestation of the area in recent times or in more continental processes of aridification.

The clarification of many of these points must await the analyses of samples and logs collected.



8. REFERENCES

ADAB, 1983, Thung Kula Ronghai Salinity Study, 145 p.

RID, 1976, Orthophotos scale 1:10,000, Thung Kula Ronghai areas.

