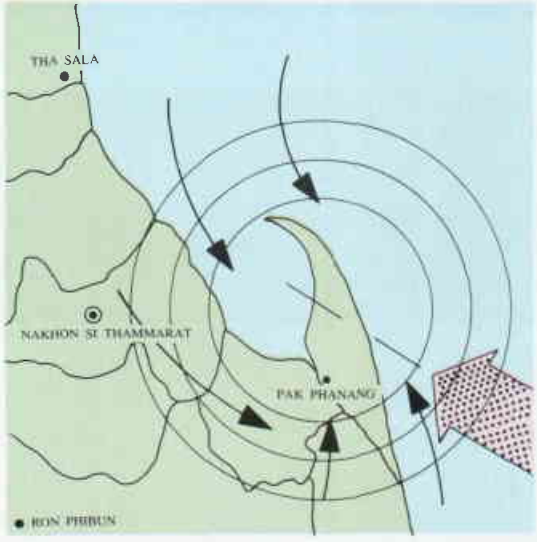
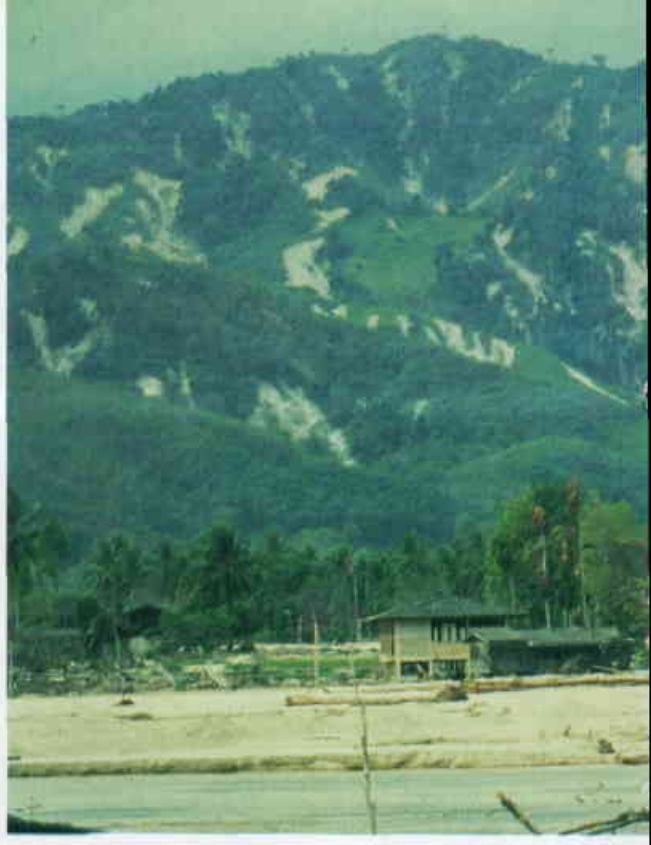
Loss of people life and property caused by Typhoon Harriet at Laem Talumpuk.

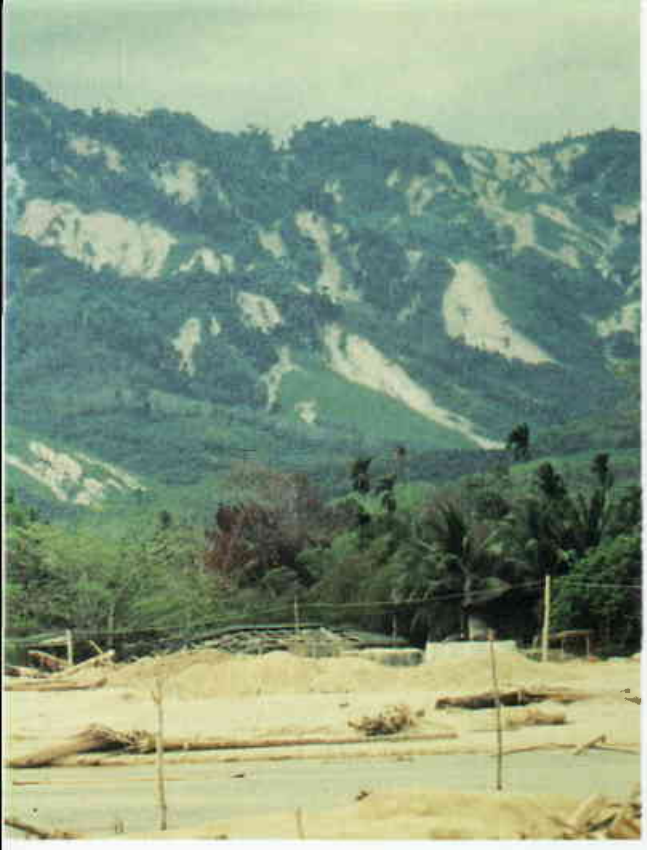


Laem Talumpuk is highly vulnerable to natural disaster.



In the afternoon of October 25, 1962, Typhoon Harriet with wind speeds over 90 km/hr, swept through the province of Nakhon Si Thammarat leaving major destruction in her wake. Along the river in the urban area of Pak Phanang, water rose to a depth of 4 meters. In a village along Khlong Bang Chak, over 30% of the houses and 50% of the rice was destroyed. Laem Talumpuk was swept clean: all but five houses were destroyed in the village of 4,000 people on the end of the peninsula as 3 meter high waves battered the area. More than 1,000 people were said to have lost their lives and 422 were injured.

Typhoon Harriet marked a turning point in the local perception of the climate. Prior to Harriet, residents told the interviewing teams from CORIN, one could count on eight rainy months per year and a relatively benign climate. Since then, it is said, floods, storms and droughts have become more frequent, the rains have become erratic, and there is no sufficient freshwater for the rice paddies. In this chapter, the importance of local climate and the possibility of climatatic change are explored.



Landslide in upper watershed in 1988.

NATURAL DISASTER

There is no doubt that natural disasters have had a devastating effect on southern Thailand in recent memory. Typhoon Ruth struck hard at Chumphon province, 200 km north of Pak Phanang, in 1970, and severe flooding occurred at Nakhon Si Thammarat in 1975 after heavy monsoon rains. During the years 1951-1975, nine major tropical depressions or storms passed over the province of Nakhon Si Thammarat, with the two most violent being Typhoons Harriet and Ruth. Six of the nine occurred in November, and were accompanied by heavy rainfalls, river flooding, strong winds and very rough seas.

Most recently, a disastrous flood occurred on November 22, 1988 with extra-ordinarily heavy rains (rainfall up to 80 mm per hour, resulting in 670 mm total in 24 hours, recorded at the meteorological station in Nakhon Si Thammarat). In the provinces of Nakhon Si Thammarat, Surat Thani and Songkhla thousands of landslides occurred in the deforested hillsides and prolonged heavy flooding in the lowlands. Over 400 lives were lost, and property damage exceeded US$ 300 million. In Nakhon Si Thammarat Province, there were 263 dead, 30,296 homeless, and a property loss of 4,000 millions baht.

The Province of Nakhon Si Thammarat was threatened again by a major storm, typhoon Gaye, in November, 1989. Gaye veered to the north shortly before landfall, but not before residents of Laem Talumpuk were evacuated from the area. The close call is vividly remembered and residents expressed their concern about the exposure of their villages to such storms.

Flood in Pak Phanang in 1988.

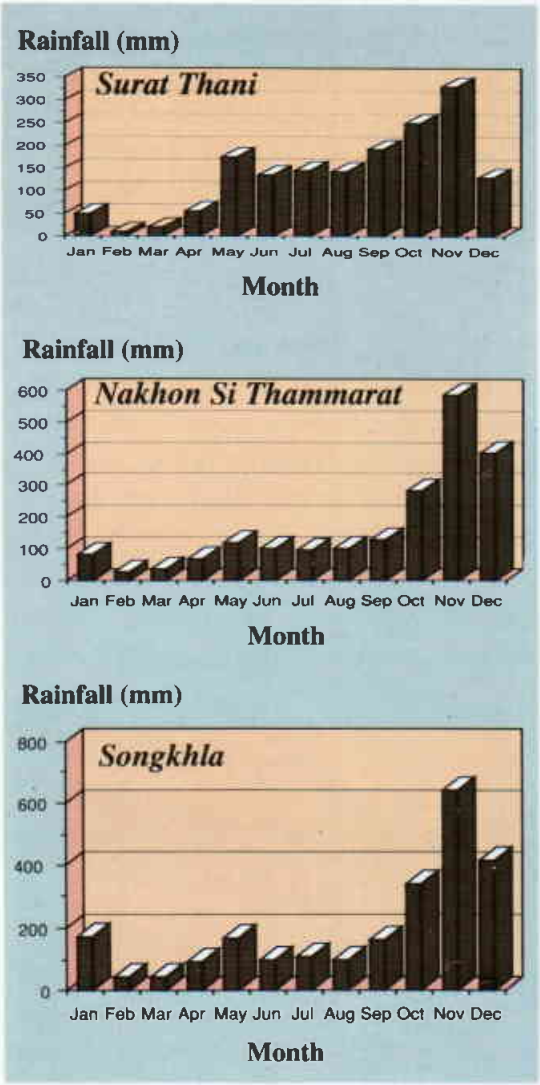


Figure 2.1. *Seasonal rainfall 1961-1990 at Nakhon Si Thammarat compared to other sites in southern Thailand.*

CHANGES IN RAINFALL

To determine whether or not there has been a quantifiable change in the regional climate that corresponds to the observations of the local people, we examined climate data from the meteorological station at Nakhon Si Thammarat, which has been in operation since 1951. The monthly average rainfall for Nakhon Si Thammarat is higher than at stations closer to the coast as shown in Figure 2.1. In fact, the average annual rainfall measured at the Pak Phanang Irrigation District Office was 700 mm less than that at Nakhon Si Thammarat. The average annual rainfall (calculated May-April) was 2,415 mm over the period 1952-1988, with a variation from about 1,600 mm in dry years to over 3,000 mm in the wettest years. In the 39 years between 1951 and 1989, there have been 8 years with rainfall less than 2,000 mm and 5 years with rainfall greater than 3,000 mm. The wet and dry years appear to be distributed randomly over the period, as shown in Figure 2.2.

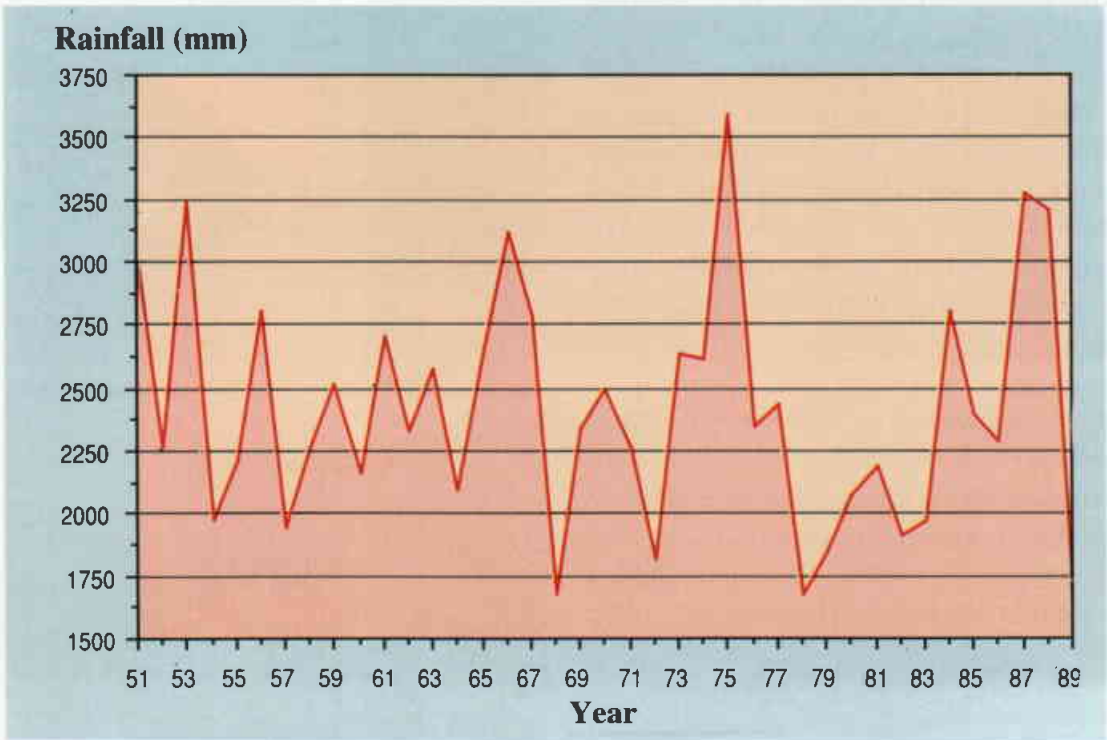


Figure 2.2. *Average annual rainfall 1951-1989 measured at Nakhon Si Thammarat meteorological station.*

CHANGES IN THE TIMING OF THE RAINY SEASON AND INCREASING DROUGHT

The rainy season in southern Thailand usually occurs in the months of May through January, with the heaviest rains during October to December (Figure 2.3). The rains are not only concentrated in a few months, but in most years a large proportion of the annual precipitation falls on only a few days. When the rainfall data are plotted as 6 day averages, it becomes apparent that in almost every year there was one, or sometimes two, 6-day periods in which more than 600 mm of rain fell (Figure 2.4). Therefore, approximately 25% of the total annual rainfall occurs in about a week. Starting in the late 1970s and early to mid 1980s, there was a sequence of 9 years in which six-day periods with rainfall greater than 600 mm of rainfall occurred only once. We also compared the difference between each year's rainfall to the average annual rainfall for the 39 year period (Figure 2.5). Note the period of ralative drought for seven years prior to 1985. In 10 of the 15 years since 1974, rainfall has been below the 39-year mean, reflecting the observations of residents, that the recent years have been drier than in the past.

This period of relative drought suggests that the people of Pak Phanang may be correct to believe that the recent years have been drier than earlier times. However, we found no support in the data for the suggestions we repeatedly heard that changes in rainfall patterns coincided with the occurrence of Typhoon Harriet.

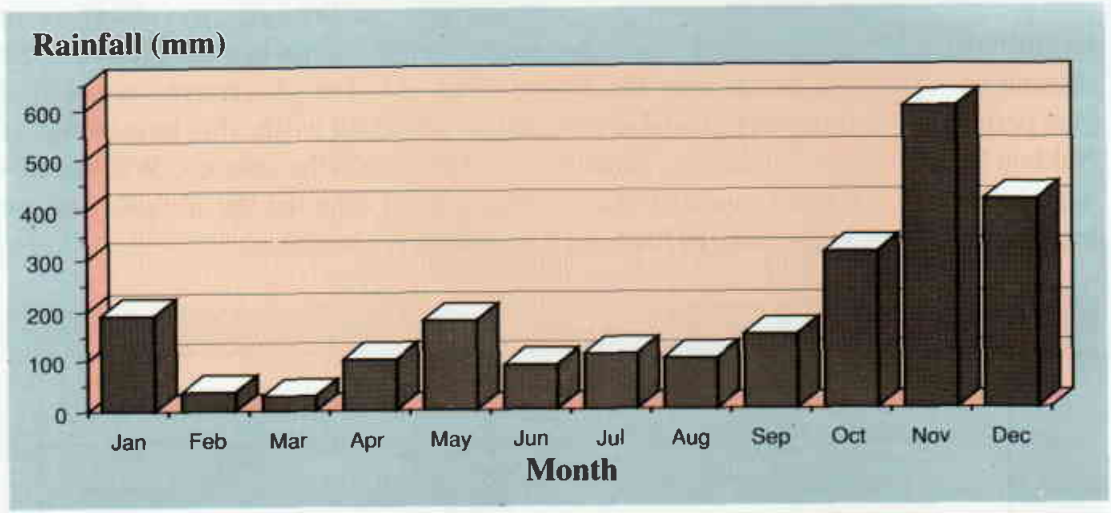


Figure 2.3.
Seasonal pattern of monthly rainfall 1951-1989 at Nakhon Si Thammarat.

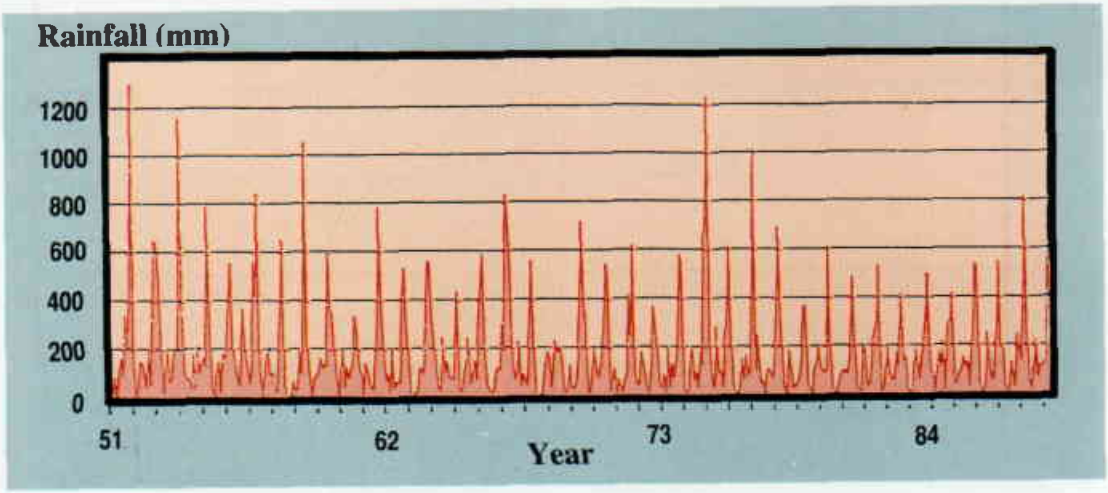


Figure 2.4.
Large proportion of the annual rainfall is concentrated within only 6 days of each rainy season at Nakhon Si Thammarat (ESCAP 1989).

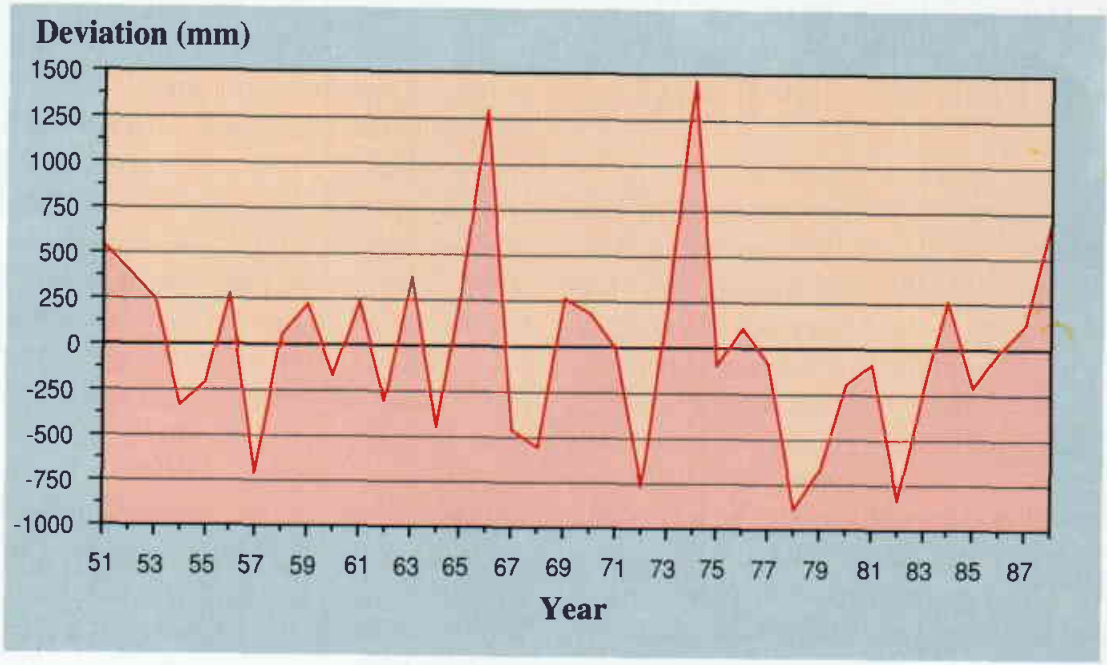


Figure 2.5. *Pattern of deviation of annual rainfall from the mean for Nakhon Si Thammarat.*

AIR TEMPERATURE AND RELATIVE HUMIDITY

Examination of temperature records showed no significant trends over the 39 year period that records were available for Nakhon Si Thammarat. However, annual average relative humidity appears to have increased suddenly in the early 1970s from about 75-78% RH to 80-83% RH and to have stayed at the higher level (Figure 2.6). We have no easy explanation for this increase, although a change in instrumentation has been suggested. The timing of the increase coincided approximately with the beginning of deforestation in the uplands. Whether this might have affected the humidity in the lowlands is not clear.

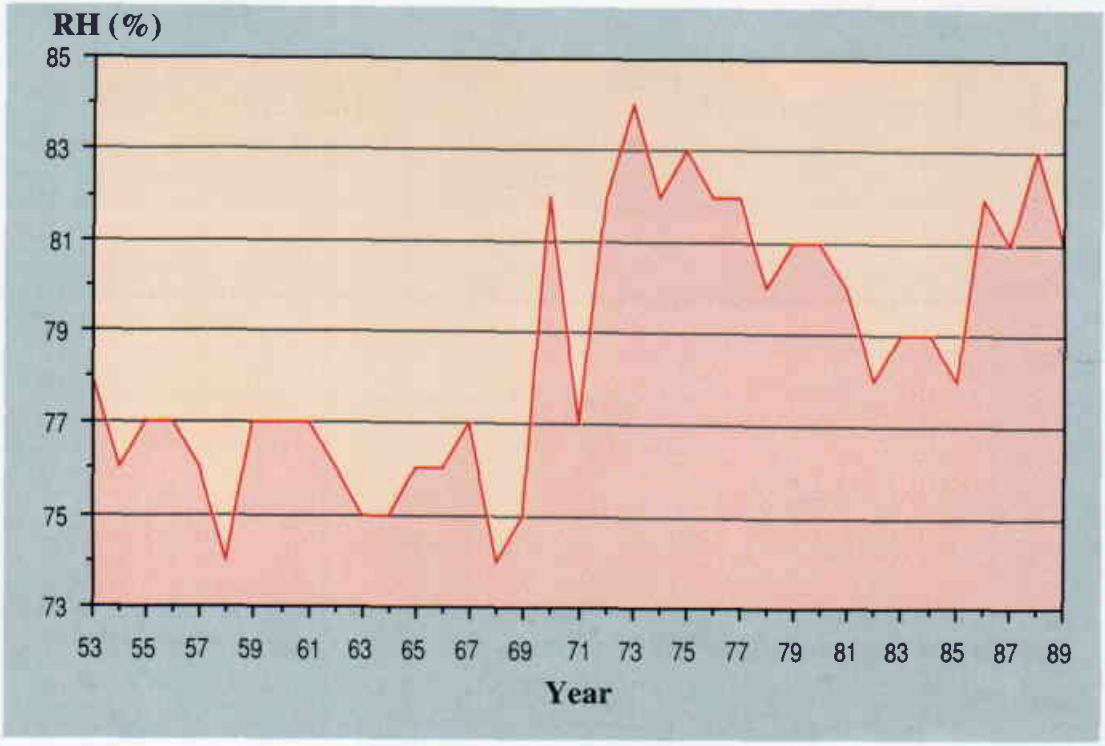


Figure 2.6. *Mean monthly ralative humidity (RH) at Nakhon Si Thammarat.*

LOCAL PERCEPTIONS

Nevertheless, the local people, the farmers and fishermen, who must know the weather well for their livelihood, insist that there has been a change in the climate since the 1960s, since Typhoon Harriet. Not only do they think that extremes of drought and flood occur more often than before but they think there are more subtle changes as well. The timing of the onset of monsoon or wet season is less dependable which is critical for successful planting and harvesting of rice, especially where the rainfall rather than irrigation is the source of water for flooding the rice paddies.

Experts claim that deforestation leads to microclimate changes. In recent years, deforestation of the hills in the upper watershed of the region has occurred at an accelerated rate in the conversion to rubber plantations. Although it is not yet clearly evident in the meteorological data, the local people may indeed be sensing local climate changes. Another hypothesis is being tested by meteorologists interviewed at Sonkhla, who think they may be detecting a change in the pattern of the northeast monsoon which may be changing from convergence to divergence over southern Thailand. This might also result in changes in the pattern and amount of rainfall in Pak Phanang and Nakhon Si Thammarat.

If human activities are causing changes in the landscape and the water balance of evaportranspiration or exacerbating flooding by clear-cutting the vegetation and if these activities are adversely affecting the rainfall in the lower parts of the watershed, this is a prime example for the need of a holistic ecosystem approach to coastal resources management.

Rubber plantation.