Chapter 15 The Hot, Wet Equatorial Climate

Distribution

The equatorial, hot, wet climate is found between 5° and 10° north and south of the equator. Its greatest extent is found in the lowlands of the Amazon, the Congo, Malaysia and the East Indies. Further away from the equator, the influence of the on-shore Trade Winds, gives rise to a modified type of equatorial climate with *monsoonal influences*. Within the tropics, the equatorial highlands have a distinctively cooler climate, modified by altitude, such as the Cameron Highlands in Malaysia, the Northern Andes, and the Kenyan Highlands in East Africa. Fig. 121 shows the regions of the world which experience the hot, wet equatorial climate.

Climate

Temperature. The most outstanding feature of the equatorial climate is its great uniformity of temperature throughout the year. The mean monthly temperatures are always around 80°F. with very little variation. There is no winter. Cloudiness and heavy precipitation help to moderate the daily temperature, so that even at the equator itself, the climate is not unbearable. In addition, regular land and sea breezes assist in maintaining a truly equable climate. The diurnal range of temperature is small, and so is the annual range.

Fig. 122 (a) and 122 (b) show the ryhthm of climate experienced in two different equatorial regions, one on a lowland (Kuala Lumpur) and the other on a highland (Bogota). The uniformity in temperature is apparent at once. Kuala Lumpur has its hottest month with 80°F, and its coolest month with 78°F. The annual range is not more than 2°F. The mean monthly temperatures for Bogota are comparatively low because of its altitudinal differences. It is located in the Andes, 8,730 feet above sea level. Its annual range is equally small, also 2°F. (59°F.–57°F.). The dotted line in the temperature graph shows its temperature reduced to sea level. Statistics taken from the various equatorial stations indicate that the annual range of temperature is small: Singapore, 2.3°F., Djakarta 1·8°F., Quito 0·7°F., Colombo 3·2°F. Over the oceans, the range is even smaller, e.g. Jaluit in the Marshall Islands in the Pacific Ocean records a range in temperature of only 0·8°F.

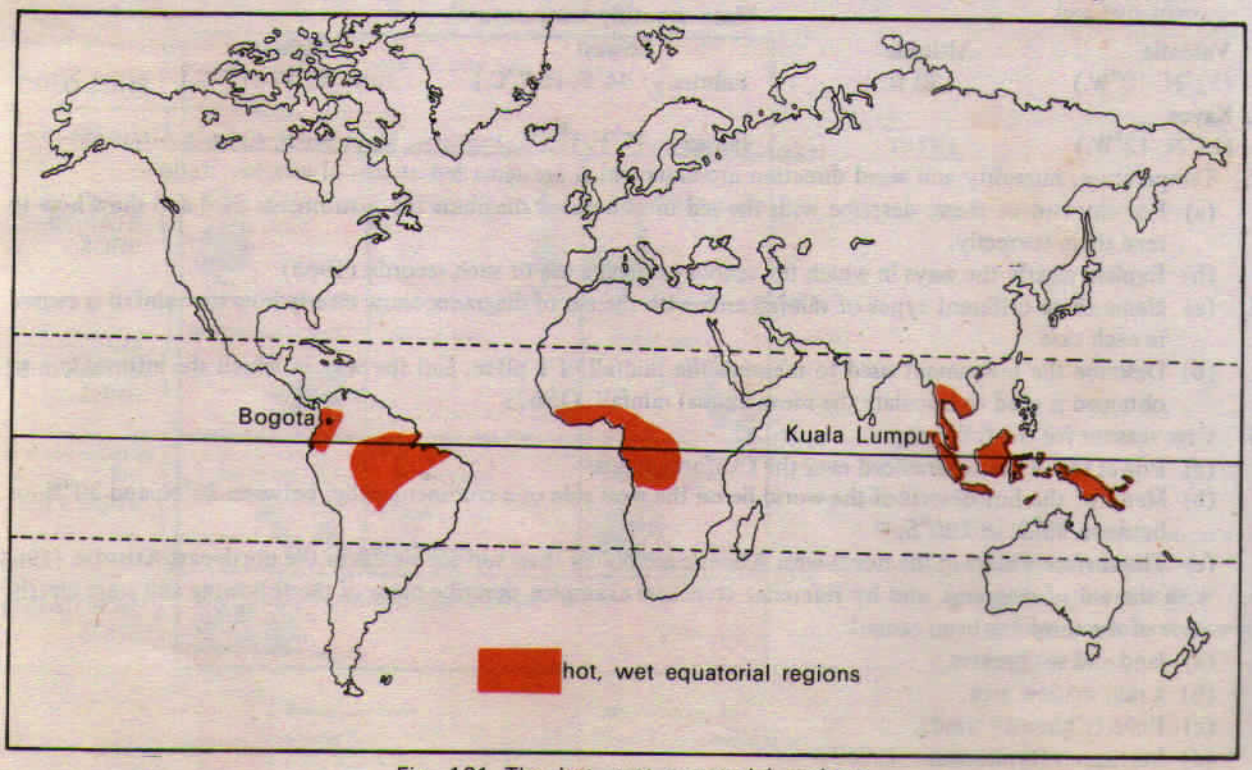
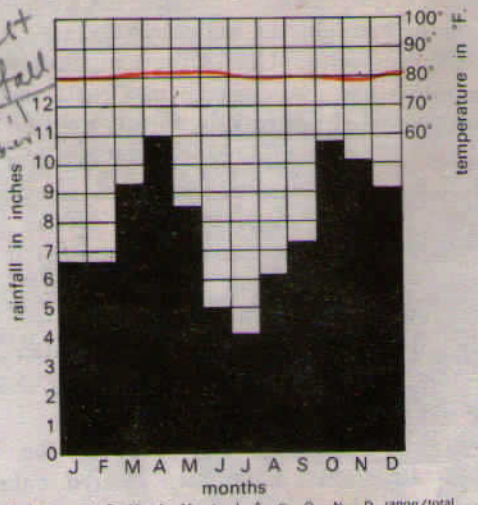


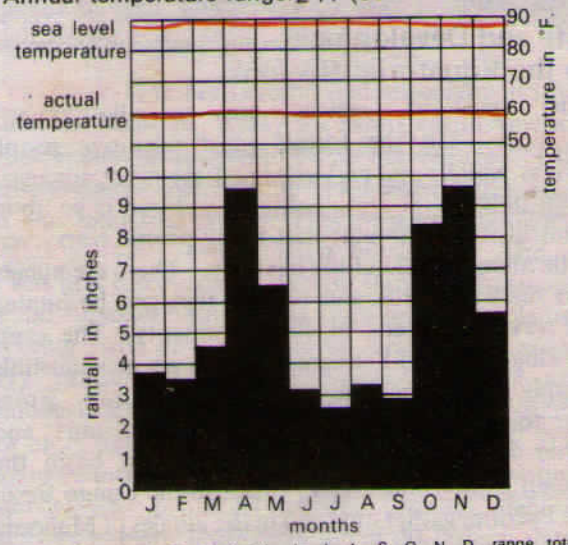
Fig. 121 The hot, wet equatorial regions

Fig. 122 (a) Equatorial Climate—a lowland station
Place: Kuala Lumpur (3°N., 102°E.)
Altitude: 54 feet
Annual precipitation: 95 inches
Annual temperature range: 2°F. (80°–78°F.)



Kuala Lumpur	J	F	M	A	M	J	J	A	S	O	N	D	range/total
Temperature	79	79	80	80	80	80	79	79	79	79	78	80	2 F
Rainfall	6.7	6.7	9.3	11.0	8.5	5.0	4.1	6.2	7.3	10.8	10.1	9.1	95 ins

Fig. 122 (b) Equatorial Climate—a highland station
Place: Bogota (4°, 38'S., 74° 15'W.)
Altitude: 8,730 feet
Annual precipitation: 63.4 inches
Annual temperature range: 2°F. (59°–57°F.)



Bogota	J	F	M	A	M	J	J	A	S	O	N	D	range	total
Temp.	58	58	59	59	59	58	57	57	57	58	58	58	2°F.	
Precip.	3.7	3.5	4.5	9.6	6.5	3.2	2.6	3.3	2.9	8.4	9.6	5.6		63.4"

Precipitation. Precipitation is heavy, between 60 inches and 100 inches, and well distributed throughout the year. There is no month without rain, and a distinct dry season like those of the Savanna or the Tropical Monsoon Climates, is absent. Instead, there are two periods of maximum rainfall, in April and October as shown in Fig. 122 (a) and 122 (b), which occur shortly after the equinoxes. Least rain falls at the June and December solstices. The double rainfall peaks coinciding with the equinoxes are a characteristic feature of equatorial climates not found in any other type of climate. But this simple pattern may be upset by local conditions, e.g. Kota Bharu, Kelantan receives most of its rainfall from the North-East Monsoon at the end of the year and Rangoon, Burma, from the South-West Monsoon between June and September. As one goes further north and south of the equator, particularly in coastal districts open to the influences of the trades, the tendency is towards a monsoonal pattern with the heaviest rainfall coming in the summer months, i.e. June, July and August in the northern hemisphere and December, January and February in the southern hemisphere.

Due to the great heat in the equatorial belt, mornings are bright and sunny. There is much evaporation and convectional air currents are set up, followed by heavy downpours of convectional rain in the afternoons from the towering cumulonimbus clouds (see Chapter 13). Thunder and lightning often accompany the *torrential showers* and the amount of rainfall recorded in one single afternoon may be as much as the deserts receive for the entire year! Besides the convectional rainfall, mountainous regions also experience much orographic or relief rain. In addition, there are some intermittent showers from cyclonic atmospheric disturbances caused by the convergence of air currents in the Doldrums.

The relative humidity is constantly high (over 80

Forested slopes of Mt. Kinabalu. The lower slopes have been cleared in places for cultivation. The vegetation on the higher slopes gradually changes in response to lower temperatures *Paul Popper*

per cent) making one feel 'sticky' and uncomfortable. The monotonous climate, oppressive and enervating, taxes one's mental alertness and physical capability, though along the coasts refreshing sea breezes do bring some relief. As a result, most of the white settlers, whose bodies are attuned to cooler and more varied conditions take to the cooler highlands whenever they can.

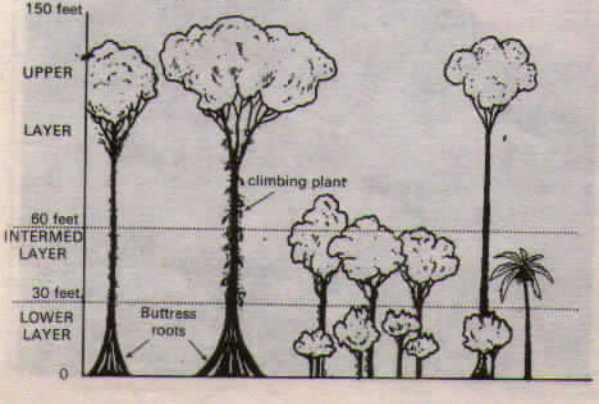
Equatorial Vegetation

High temperature and abundant rainfall in the equatorial regions support a luxuriant type of vegetation – the tropical rain forest. In the Amazon lowlands, the forest is so dense and so complete in its vegetational extravagance that a special term 'selvas' is used. Unlike the temperate regions, the growing season here is all the year round – seeding, flowering, fruiting and decaying do not take place in a seasonal pattern, so some trees may be in flower while others only a few yards away may be bearing fruit. There is neither drought nor cold to check growth in any part of the year. The characteristic features of the equatorial vegetation may be summarized as follows.

1. A great variety of vegetation. The equatorial vegetation comprises a multitude of evergreen trees that yield tropical hardwood, e.g. mahogany, ebony, greenheart, cabinet woods and dyewoods. There are smaller palm trees, climbing plants like the lianas or rattan which may be hundreds of feet long and epiphytic and parasitic plants that live on other plants. Under the trees grow a wide variety of ferns, orchids and lalang.

2. A distinct layer arrangement. From the air, the tropical rain forest appears like a thick canopy of foliage, broken only where it is crossed by large rivers or cleared for cultivation. All plants struggle upwards for sunlight resulting in a peculiar layer arrangement. The tallest trees attain a height of over 150 feet (Fig. 123). Their slender trunks pierce skywards with wide-spread branches at the top. The smaller trees beneath form the next layer, and the ground is rooted with ferns and *herbaceous* plants which can tolerate shade. Because the trees cut out most of the sunlight the undergrowth is not dense.

Fig. 123 Sketch to show the three distinct layers of an equatorial forest



3. Multiple species. Unlike the temperate forests, where only a few species occur in a particular area, the trees of the tropical rain forests are not *found in* pure stands of a single species. It has been estimated that in the Malaysian jungle as many as 200 species of trees may be found in an acre of forest. This has made commercial exploitation of tropical timber a most difficult task. Many of the tropical hardwoods do not float readily on water and this makes haulage an expensive matter. It is therefore not surprising that many tropical countries are net timber importers!

4. Forest Clearings. Many parts of the virgin tropical rain forests have been cleared either for *lumbering or shifting cultivation*. When these clearings are abandoned, less luxuriant secondary forests, called belukar in Malaysia, spring up. These are characterized by short trees and very dense undergrowth. In the coastal areas and brackish swamps, mangrove forests thrive.

Life and Development in the Equatorial Regions

The equatorial regions are generally sparsely populated. In the forests most primitive people live as *hunters and collectors* and the more advanced ones practise shifting cultivation. Food is so abundant in such a habitat that many people worry very little about the life of the next day. There are numerous animals, birds and reptiles that can be hunted to serve the needs of the community. The ever-flowing rivers and streams provide an inexhaustible supply of fish that the people spear or trap. From the forest, they gather leaves, fruits, nuts and other forest products. In the Amazon basin the Indian tribes collect wild rubber, in the Congo Basin the Pygmies gather nuts and in the jungles of Malaysia the Orang Asli make all sorts of cane products and sell them to people in villages and towns. In the clearings for shifting cultivation, crops like manioc (tapioca), yams, maize, bananas and groundnuts are grown. When the fertility is exhausted, the clearing is abandoned and they move on to a new plot. Such farming practices are becoming more and more widespread even among backward tribes.

With the coming of the Europeans, many large

Harvesting oil palm fruits in Malaysia

plantations have been established, especially in Java, Sumatra, Malaysia, West Africa and Central America. The climate has proved to be very favourable for the cultivation of certain crops that are highly valued in the industrial West. The most outstanding is natural rubber, called *hevea brasiliensis*. Though it was first discovered in its wild state as *Para rubber* in the Amazon basin, it has since been transplanted to other parts of the equatorial lands and is grown very profitably on large estates. Malaysia and Indonesia are the leading producers, each accounting for more than a third of the world production. The home country, Brazil exports practically no natural rubber. The problems of tree diseases and the lack of commercial organization of the Indians in the Amazon lowlands have brought about this unexpected 'shift' of rubber cultivation.

Another tropical crop that has achieved an amazing success is cocoa. It is most extensively cultivated in West Africa, bordering the Gulf of Guinea. The two most important producers are Ghana and Nigeria. There is a keen demand for the crop and acreages are rapidly on the increase. Most of the crop leaves West Africa for Europe or North America for the cocoa and chocolate industry. From the same area another crop, oil palm, has done equally well and many countries outside Africa have now taken to its cultivation. Other crops that have been found suitable for the hot, wet equatorial climate and are extensively cultivated are coconuts, sugar, coffee, tea, tobacco, spices, cinchona, bananas, pineapples and sago.

Factors Affecting the Development of Equatorial Regions

1. Equatorial climate and health. Under conditions of excessive heat and high humidity, Man is subject to serious physical and mental handicaps. He perspires profusely and loses vigour and energy in such an enervating environment. He exposes himself to such dangers as sun-stroke and to such diseases as malaria and yellow-fever. Consequently, his capacity for active work is greatly reduced and his resistance to diseases is much weakened. Unless there is adequate provision for satisfactory sanitation, physical and mental health are bound to be affected. Nowadays malaria eradication schemes are in progress in most tropical areas and vaccines

Market gardening in Singapore. In many parts of the equatorial zone intensive farming, to supply city-dwellers with vegetables, is profitable *Primary Production Department Singapore*

have been developed to counteract other diseases.

2. Prevalence of bacteria and insect pests. The hot, wet climate which stimulates rapid plant growth, also encourages the spread of insects and pests. As germs and bacteria are more easily transmitted through moist air, equatorial conditions are ideal for the survival of such organisms. Insects and pests not only spread diseases but are injurious to crops. They plague both men and animals.

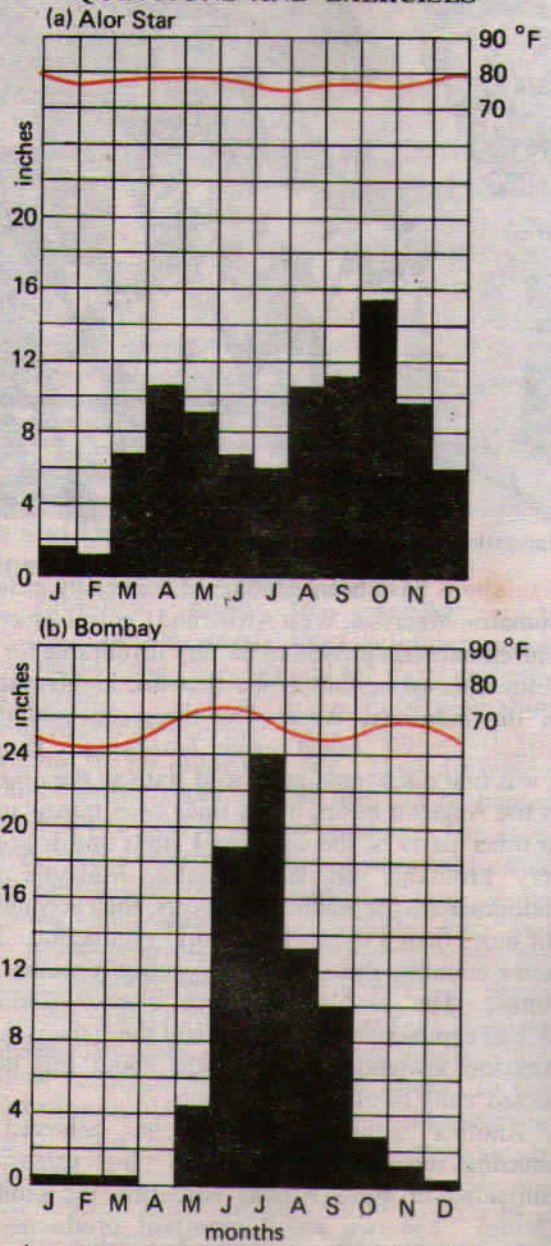
3. Jungle hinders development and maintenance. The jungle is so luxuriant that it is quite a problem to clear a small patch of it and even more difficult to maintain it. Lalang (tall grass) and thick undergrowth spring up as soon as the shade trees are cut and unless they are weeded at regular intervals, they may *choke crops* and overwhelm estates. In the same way, roads and railways constructed through the equatorial lands have to cut through forests, dense thickets and swamps and those who build and maintain them encounter wild animals, poisonous snakes and insects. Once completed, they have to be maintained at a *high cost*. Many remote parts of the Amazon basin, the Congo and Borneo are without modern communication lines. The rivers form the only natural highways.

4. Rapid deterioration of tropical soil. It is a misconception that tropical soils are rich. In its virgin, untouched state, due to heavy leaf-fall and the decomposition of leaves by bacteria, a thick mantle of humus makes the soil fairly fertile. This is clear from the shifting cultivators' heavy croppings in their newly cleared ladangs. But once the humus is used and the natural vegetative cover is removed, the torrential downpours soon wash out most of the soil nutrients. The soil deteriorates rapidly with subsequent soil erosion and soil impoverishment One may quote the Indonesian island of Java as an exception, because of its rich volcanic ashes and the energetic local people. In Malaysia, Singapore and eastern Brazil much progress has also been made in the development of the tropical lands through systematic planning and the will of the people to succeed.

Difficulties in lumbering and livestock farming. As mentioned earlier, though the tropics have great potential in timber resources, commercial extraction is difficult. The trees do not occur in homogenous stands, there are no frozen surfaces to facilitate logging and the tropical hardwoods are sometimes too heavy to float in the rivers, even if these flow in the desired directions.

Livestock farming is greatly handicapped by an absence of meadow grass, even on the highlands. The few animals like bullocks or buffaloes are kept mainly as beasts of burden. Their yield in milk or beef is well below those of the cattle in the temperate grasslands. The grass is so tall and coarse that it is not nutritious. In Africa, domesticated animals are attacked by tsetse flies that cause *ngana*, a deadly disease.

QUESTIONS AND EXERCISES



1. The above two graphs taken from two different stations, Alor Star in West Malaysia and Bombay in India, show two different types of climate.

(a) Name the type of climate experienced in each of the stations.

(b) Describe the major differences in temperature and precipitation between the two stations.

(c) In what ways are the rainfall of the the two stations similar.

2. What type of climate is characterized by two periods of maximum rainfall? Explain why this is so. What local conditions may upset this normal pattern?

3. Outline the characteristics of the equatorial climate and vegetation and for any *one* equatorial region describe how the inhabitants overcome some of the difficulties posed by the environment.

4. Write brief notes on any *three* of the following statements about the equatorial regions.

(a) Cloudiness and heavy precipitation moderate the temperature of the equatorial regions.

(b) The most prominent feature of the tropical rain forest is its layer arrangement.

(c) Large-scale livestock farming is unknown in the hot, wet equatorial areas.

(d) The greatest single drawback to commercial lumbering in equatorial regions is inaccessibility.

(e) The equatorial environment is best suited to plantation agriculture.

5. On the map of the world, locate the hot, wet equatorial forests. Relate their vegetational characteristics to the climate of the regions.