



Assistant Lecturer R.A.D.P.Ranaweera  
 Department of Geography  
 University of Kelaniya  
 ukdhanu@yahoo.com

# Introduction of Tropical Forest and Formations

## Abstract

Forest is a very important factor for the survival and functional aspects of human being and animals while absorbing  $CO_2$  from the environment. Actually, forests are very important for behavior in our day to day life. Forests are described in most of the articles as vital and about the adverse effects to the forest including rain forest etc. I intend to describe though this article regarding the forest ecosystem while introducing the tropical rain forest climate and the formation of rain forest.

## Forest ecosystem

Forests are formed by a community of plants which is predominantly structurally defined by its trees, shrubs, climbers and ground cover. Natural vegetation is vastly different from the landscapes that make up various types of forests. Their distinctive appearances are fascinating aspects of nature. Forest type forms a habitat for a specific community of animals that are adapted to live in it.

The forest ecosystem has two parts. First one is the non – living or abiotic aspects of the forest. This forest mainly depends upon the abiotic condition at the site. These forest mountains and hills can be identified according to the locations which differ from river valleys. The vegetations specify the rainfall, temperature, soil and latitude. Secondly factor is the living or the biotic aspects of the forest. The plants and animals from communities those are specific to each forest type. Biotic components include both the large and microscopic plant and animals. Plants include the trees, climbers, shrubs etc. These include species that angiosperms and gymnosperms, fungi and algae. The animals include species of mammals, birds, reptiles, amphibians, fish, and insects and other invertebrates and varieties of microscopic animals as the plants and animals are closely dependent on each other. There are different types of forest communities in the ecosystems.

## Tropical Rain Forest

The German Botanist A.F.W.Schimper has written a monumental book in 1898. He translated to English as Plant Geography upon an ecological basis in 1903 which was built upon hundred years or more European scientific discoveries in the tropics. We owe Schimper our gratitude for introducing the term Tropical Rain Forest (Tropics Reginald) for the forest of the permanently wet tropics. Schimper recognized four major sorts of woody vegetation in the tropics and recognized non – woody vegetation too.

woody forest	Non - Woody Forest
Rain Forest	Tropical Grasslands
Monsoon Forest	Deserts
Savana Forest	
Thorn Forest	

Source – created by author according to Whitmore (1984)



This classification helps to identify the various parts of the tropic. As well as Schimper's groups provide too coarse a classification of vegetation and it is useful to have a finely defined class. In addition, these groups could define the vegetation formation, on its structure and on the physiognomy. Actually tropical forest structure properties include high trees. Crown layers, different kind of climbers and epiphytes. Further physiognomic properties include buttressed, crown shape leaves etc. These properties are used to identify different forest formations which occur in many different places.

## Climate

Schimper had described the forest of the ever-wet tropics where there is no or only minimum, seasonal water shortage. This forest received over 2000 mm of rainfall annually. An average humidity is 80% and it has a short dry season. Radiation levels are high and leaves are exposed to the direct rays of the sun may heat up by several degrees above already high air temperature. Consequently, despite the high humidity, the surface of the leaves can be exposed to large saturation deficits. Therefore, these forests are very wet regions. Normally these forest receive over 25 °c temperature on monthly and really exceed 35 °c while variations are smaller than diurnal variations which may be much as 10<sup>0</sup>c. the micro – climate here and there are varying three types of rain forests above,

- Vertically from canopy top to the forest floor
- Horizontally from point to point beneath the canopy
- Vary between canopy gaps of differing size.

Micro – climate remains very incomplete in ecological implications But generally have been micro – climate features, radiation and light received below the canopy with only a small fraction reaching the forest floor. Minimum temperatures are very similar at all levels of the forest (Fig - 1)., wind speed declines to near zero within the forest (Figs -2), humidity is higher and saturation deficits are much lesser at lower level than in the upper canopy (Fig - 3), carbon dioxide (CO<sub>2</sub>) concentrations are greater close to the forest floor than higher up but there are diurnal variations in response to daily patterns of plant transpiration, photosynthesis and respiration (Fig - 4).

Fig 1 – Temperature

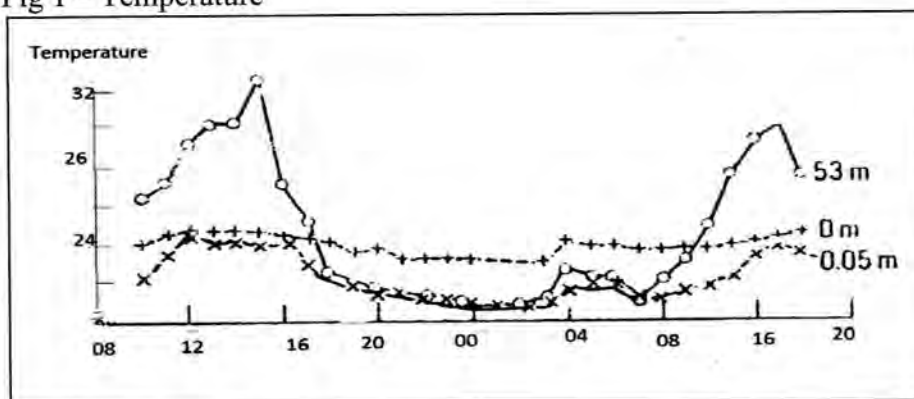


Fig 2 - Wind speed

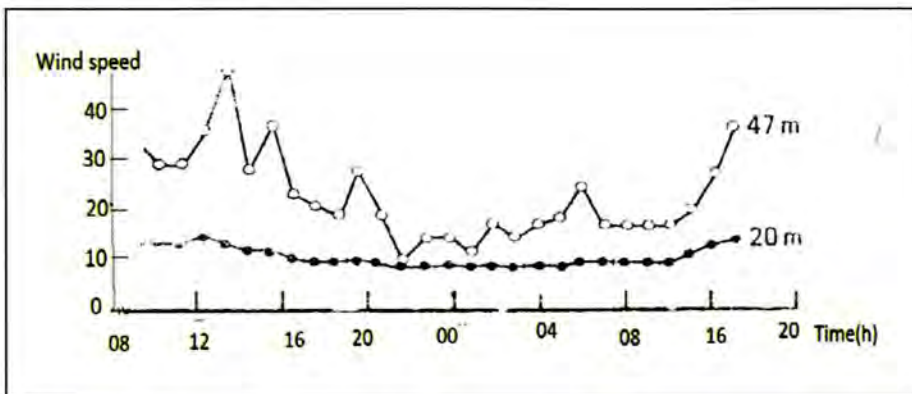


Fig 3 – Humidity

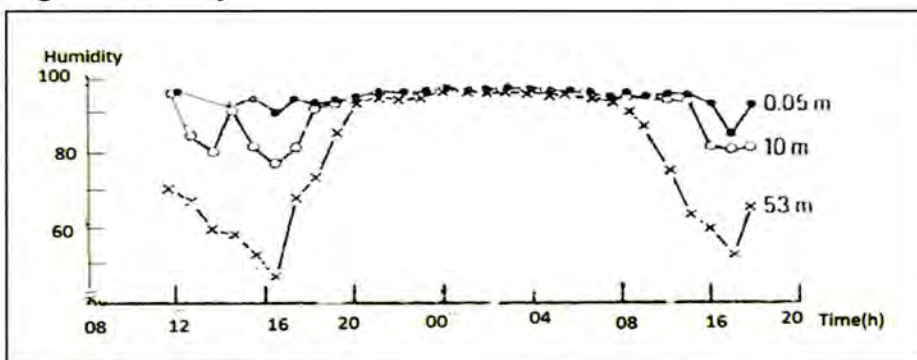
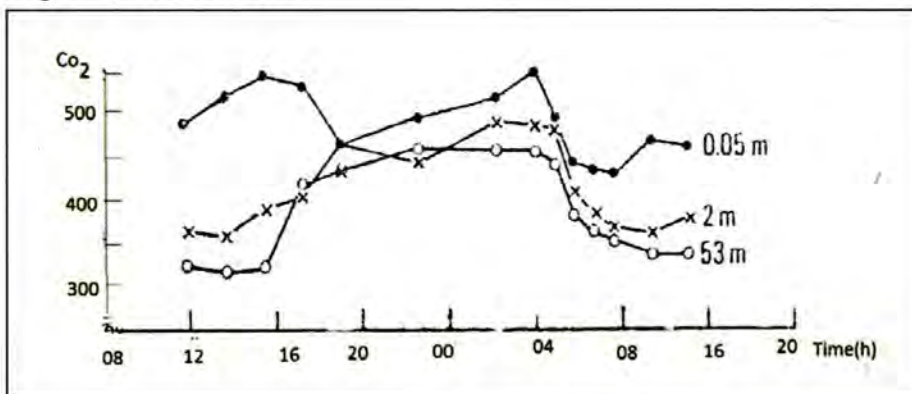


Fig 4 - Carbon dioxide



Source – Whitmore ( 1984)

### Distribution of tropical rain forest

Tropical rain forests occur between Tropics of Cancer and Capricorn and distributed among about 30 different countries. It can be identified in main three areas in the world as bio hotspots.

#### ➤ American rain forest area

This rain forest covers approximately  $4 \times 10^5 \text{ Km}^2$ . It is half of the global total. The total broad – leaf, one - sixth of the world. These occur in three parts. Figure 1 shows the American rain forest area. This forest cover has been destroyed over 99%.

- I. Amazon and Orinoco basins
- II. Across the Andes on the Pacific coasts of Ecuador and Colombia and extending up to the middle of North America as far as Southern most Mexico.
- III. Atlantic coast of Brazil

Figure 5 : The American rain forest



Source: Biogeography and Ecological (2006)

➤ **Eastern tropical rain forest area**

This rain forest area is secondly large. It has been distributed  $2.5 * 10^5$  Km<sup>2</sup> area. The eastern rain forests extend beyond Malaysia into the Pacific and South worlds as a narrow broken coastal stripping Queensland, North-east Australia. The Malaysian rain forest distributes Malay Peninsula into continental South-east Asia, Burma, Thailand, and Indo-china. They are extended in South-west Sri Lanka and Western Ghats of India. Figure 6 shows the Eastern tropical rain forest area.

Figure 6 : The Eastern tropical rain forest



Source: Biogeography and Ecological (2006)

➤ **Africa tropical rain forest**

Africa rain forest is the smallest. It is distributed  $1.8 * 10^5$  Km<sup>2</sup> area. On centered in Congo basin forest continues westwards in to Gabon and Cameroon. A narrow belt flows to the coast of the Gulf of Guinea through Nigeria to Ghana and beyond finally ending in Guinea a 10 N°. The area of continuous forest reaches western Uganda, Western Kenya and North-western Tanzania. There

are tiny patches of rain forests on the East coast of Madagascar and in the Mauritius and Reunion. Figure 7 shows the African tropical rain forest.

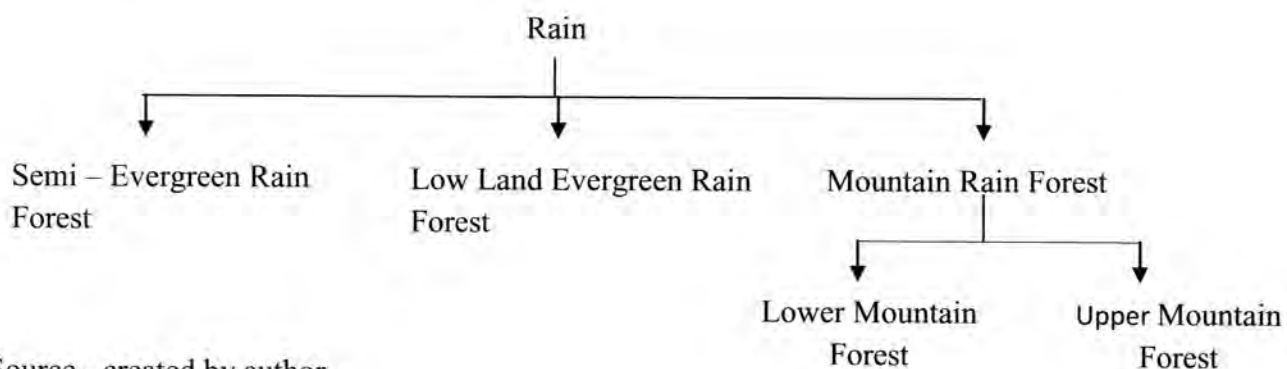
Figure 7: The African tropical rain forest.



Source: Biogeography and Ecological (2006)

### Rain Forest Formation

There is a considerable variation forms a place in this rain forest mantle due to the distinct forest formations. Forest formation described a particular combination of vegetation structure and physiognomy. Forest Formation occupies various physical characteristics of habitats. Therefore rainforest formation can be grouped.



Source - created by author

### Semi – Evergreen Rain forest

This forest occurs regular annual period of moisture stress and forms rainfall seasonally and particular soil conditions. This forest is close to high forest sometimes attaining up to 45 m. It includes both evergreen and in the top of the canopy. The number of species is high but lesser than in evergreen rain forests. The canopy is sometimes locally stratified. Big woody climbers tend to be very abundant. Mainly Bamboos are present.

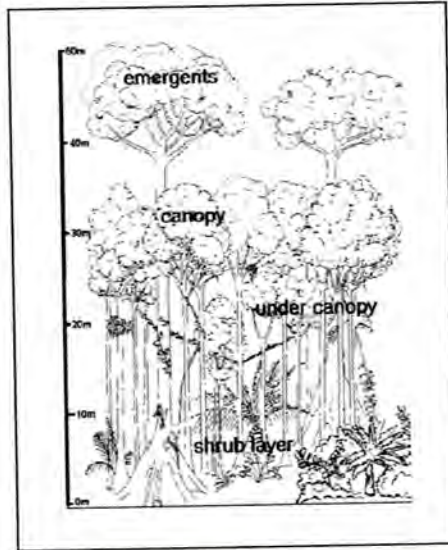
### Tropical Low Land Evergreen Rain Forest

A Tropical low land rain forest is most luxuriant of all plant communities. This forest is very tall and large numbers of tree species are available. Gregarious dominants are uncommon and usually two – thirds more of the upper – canopy trees are of species individually not contributing more



than one per cent of the total number. This forest has three tree layers. Figure 8 shows the Structure of Tropical Low Land Evergreen Rain Forest. The top layer is individual or grouped with giant trees over 25m – 45 m. Ground vegetation is often sparse and mainly of small trees some of the biggest trees have clear bole of 30m and reach 4.5m girth. Boles are usually almost cylindrical buttresses are common. cauliflory and ramification are common features in this forest. Leaves are blades of mesophyll size predominate. Big woody climbers are bole. Shade and sun epiphytes occur occasional to frequent stages.

Figure 8 : The Structure of Tropical Low Land Evergreen Rain Forest

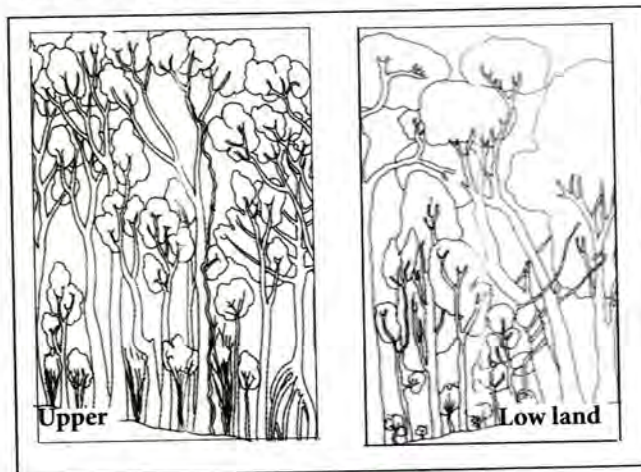


Source: [www.tropicalforest/formation](http://www.tropicalforest/formation)

### Tropical Mountain Rain Forest

Trees occur over a short distance mesophyll dominated forest an uneven bellowing canopy surface to a lower stage. Often pale colored, microphyll dominated canopy of more slender trees, usually with gnarled limbs and very dense sub crowns .This formation is only 10 m taller or less trees. Small mountains, upper mountain rain forest abuts on low land rain forest but bigger ones on an intermediate formation. Lower mountain rain forest abuts on low land rain forest but bigger ones on an intermediate formation. Lower mountain rain forests occur broad ecotone against the low land formation .On the highest Peaks upper Mountain rain forest and replaced upwards to shorter more gnarled formation with thin leaves. As well as trees have to adapt climatic limits and their environment with elevation. . Figure 9 shows The Structure of Tropical Mountain Rain Forest and Table 1 shows Characters of Structure and Physiognomy used to define the principle of mountain forest formation.

Figure 9 : The Structure of Tropical Mountain Rain Forest



Source- [www.tropicalforest/formation](http://www.tropicalforest/formation)

Table1: Characters of structure and physiognomy used to define the principle of mountain forest formation

Formation	Tropical low land evergreen rain forest	Tropical lower mountain rain forest	Tropical Upper mountain rain forest
Canopy height	25-45m	15 -33m	1.5 – 18m
Emergent trees	Characteristic to 60m tall	Often absent to 37m tall	Usually absent to 26m tall
Pinnate leaves	Frequent	Rare	Very rare
Leaf size class of woody plant	Mesophyll	Mesophyll	Microphyll
Buttresses	Usually frequent and large	Uncommon and small	Usually absent
Cauliflory	Frequent	Rare	Absent
Big woody climbers	Abundant	Usually none	None
Bole climbers	Often Abundant	Frequent to Abundant	Very few
Vascular epiphytes	Frequent	Abundant	Frequent
Non- Vascular epiphytes	Occasional	Occasional to Abundant	Frequent Often Abundant

Source; Whitmore (1984)

### Summary

Tropical rain forest occur in tropical areas. Therefore tropical climate is close to tropical rain forests. Various species and various type of structure on forest can be identified. The rain forest has a only a short dry season but it doesn't affect as this forest is adopted. Three categories of rain forest, like this Tropical low land evergreen rain forest, Tropical lower and upper mountain rain forest, Semi – Evergreen Rain Forests could be identified. Rain Forest distinct forest formations have tropical rainforest. They are different mainly in structure and physiognomy and some formation occur in similar sites throughout the humid tropics.

### Reference

Whitmore T.C,1990, An Introduction to Tropical Rain Forest, Oxford

Cox,Barry,c.&Moor,D.Peter, 2006, Biogeography an Ecological and Evolutionary Approach, Seventh Edition,Blackwell.

Bharucha.Erach, 2005, Enviromental Studies, Universiti press in india.

[www.elsevier.com/locate/foreco](http://www.elsevier.com/locate/foreco)

[www.tropicalforest/formation](http://www.tropicalforest/formation)