

CHAPTER V

*The ecological ideas in the
Ramayana*

In Epic age, the Ramayana is the most important literary and oral texts in India which play significant role in religion and culture of the people. This epic poem provides insights into many aspects of Indian culture and continues to influence the politics, religion and art of modern India. The Ramayana was written in various regional languages in India which are Kamban's Ramavataram, known popularly as Kambaramayana in Tamil, Sri Ramacharita Manas by Tulasidas in 1576 CE, Premanand wrote a Gujarati Ramayana in the 17th century, Bengali version by Krittivas in the 14th century, in Oriya by Balarama Das in the 16th century, in Marathi by Sridhara in the 18th century, a Telugu version by Ranganatha in the 15th century, a Torave Ramayana in Kannada by the 16th century poet Narahari and in the 20th century Rashtrakavi Kuvempu's Sri Ramayana Darshnam, Saptakanda Ramayana in Assamese by the 14th century poet Madhava Kan doli and Adhyathma Ramayanam Kilippattu, a Malayalam version by Tunccattu Ezhuttaccan in the 16th century. There is a sub-plot to Ramayana, prevalent in some parts of India for example - Ahi Ravana and Mahi Ravana. The story is the evil brother of Ravana, the Ahi-mahi kidnapped Rama and Lakshmana as prisoners in a subterranean cave for sacrifice them to the Goddess Kali. Mappillapattu—a genre of song popular among the Muslims belonging to Kerala and Lakshadweep—has incorporated some episodes from the Ramayana into its songs. The 'Many Ramayanas' model promotes the appreciation of multiple story telling of their own but there is deep relation to Valmiki¹. Many scholars have tried to find out the historicity of the Ramayana. But the basic problem for finding out the actual time period is the existence of three types of Ramayana version i.e. the Valmiki Ramayana; the Ramopakhyana of the Mahabharata and the Dasaratha Jataka (DJ), (the Buddhist version). Each has considerable difference from other. Moreover with time all these have undergone change before the present shape. Brockington (1984) based on linguistic and stylistic details, is of the opinion that the Epic Ramayana grown to the present status in five phases: 1st (37.1% of the text, 4th to 5th century BCE); 2nd (34.1% of the text, 3rd Century BCE to 1st Century CE); 3rd (24.6% of the text comprising kandas I and VII, 1st to 3rd Century CE) and the remaining portion of 4.2% of the text after 4th Century CE to 12th Century CE (and above)². Some historians opine that age of this epic may be 800-600 BC and the battle field may be the Chotto-nagpur part of the India³. Others

view is that it is nothing but the conflict between the advancing Aryan race towards South India and the inhabitants. The place of the battle field is the modern Srilanka⁴. The writer of the Ramayana Valmiki is a great astronomer. He mentions sequential astronomical references on important dates related to the life of *Rama*. These references are the location of planets vis-à-vis zodiac constellation and the position of the other stars on the different position of the sky. Sri Pushkar Bhatnagar using the powerful software 'Planetarium Gold' tries to find out the exact date of birth of *Rama* and other incidents related to the life of *Rama*. This software is used to predict the solar / lunar eclipses and distance and location of other planets from the earth. The birth of *Rama* is mention in the following verses of the Ramayana⁵.

ततो यज्ञे समाप्ते तु ऋतूनां षट् समत्ययुः ।

ततश्च द्वादशे मासे चैत्रे नावमिके तिथौ ॥

नक्षत्रेऽदितिदैवत्ये स्वोच्चसंस्थेषु पञ्चसु ।

ग्रहेषु कर्कटे लग्ने वाक्पताविन्दुना सह ॥

The above description of the planetary positions of the particular day of the lunar month of *Chaitra* when the position of the different planets and the visible stars are given below :

- (i) Sun in Aries
- (ii) Saturn in Libra
- (iii) Jupiter in Cancer
- (iv) Venus in Pisces
- (v) Mars in Capricorn
- (vi) Lunar month of *Chaitra*
- (vii) Ninth day after no moon
- (viii) *Lagna* as Cancer (Cancer was rising in the east)
- (ix) Moon on the *Punarvasu* (Gemini constellation and Pollux star)
- (x) Jupiter above the horizon

The data is fed into the software and using the trial-error method the exact location of planets/stars or zodiac constellations is matched on the 10th of January noon time in the year 5114 BCE if viewed from latitude/longitude of Ayodhya (25°N 81°E). By using the software solar calendar is converted into lunar calendar. It is found that the date is the 9th day of *shukla paksha* in *Chaitra* month and the time is 12.30 p.m. The

relevant sky view generated by the Planetarium software is shown in the Figure1 and 2 (Figures)⁶.

There are many reference on Ramayana that king Dasaratha wants to hand over the kingdom to Rama at the twenty five years completion of later. Rama's birth is navami of Chaitra Shukla Paksh. It is known fact that Rama eventually goes to exile at that very day. So it is navami of Chaitra Shukla Paksh. Moreover it is described on the text that on the morning of that day sun rises up in the sky and the Cancer lagna comes. Then moon of the date of birth of Rama also becomes visible⁷.

उदिते विमले सूर्ये पुष्पे चाभ्यागतेऽहनि ।

लग्ने कर्कटके प्राप्ते जन्मे रामस्य च स्थिते ॥

Adding twenty five years to the date of birth of Rama it gives the year 5089 BC and on 12th January 5089 BC a full-moon occurs at star Spica in virgo constellation indicating the end of Chaitra month. Thus the navami of Shukla Paksh comes on 5th January 5089 BC. All these are revealed from the software and are given in the Figure 3 and 4(Figures)⁸. It is one way of prediction of the time of Ramayana.

Ramayana is an important literature which influences India and other Asiatic Country. It contains about 24000 verses which make ultimately the seven books or *kandas*. Throughout the all sections of the book different environmental awareness are reflected in the Ramayana. Here the following dialogue gives the idea of Rama's perception regarding the nature and its different components.

ततः सम्प्रस्थितः काले रामः सौमित्रिणा सह ।

सीतां कमलपत्राक्षीमिदं वचनमब्रवीत् ॥

आदीप्तानिव वैदेहि सर्वतः पुष्पितान्नगान् ।

स्वैः पुष्पैः किंशुकान्पश्य मालिनः शिशिरात्यये ॥

पश्य भल्लातकान्फुल्लान्नरैरनुपसेवितान् ।

फलपत्रैरवनतान्नूनं शक्यामि जीवितुम् ॥

पश्य द्रोणप्रमाणानि लम्बमानानि लक्ष्मण ।

मधूनि मधूकारीभिः सम्भृतानि नगे नगे ॥

एष कोशति नत्यूहस्तं शिखी प्रतिकूजति ।

रमणीये वनोद्देशे पुष्पसंस्तरसङ्कटे ॥
मातङ्गयूथानुसृतं पक्षिसङ्घानुनादितम् ।
चित्रकूटमिमं पश्य प्रवृद्धशिखरं गिरिम् ॥
ततस्तौ पादचारेण गच्छन्तौ सह सीतया ।
रम्यमासेदतुः शैलं चित्रकूटं मनोरमम् ॥ - Ramayana II.50.5-11

As Rama set out in the early morning with Saumitri, he began to speak to lotus-eyed Sita, “Look, Vaidehi, the Kimsuka trees are in full blossom now that winter is past. Garlanded with their red flowers they almost seem to be on fire, Look at the marking-nut trees in bloom, untended by man, how they are bent over with fruit and leaves. I know I shall be able to live. Look at the honeycombs, Lakshmana, amassed by honeybees on one tree after another. They hang down large as buckets. Here a moorhen is crying, and in answer to it a peacock calls through delightful stretches of forest richly carpeted with flowers. And look, there is Citrakuta, the mountain over there with the towering peak, teeming with herds of elephants and echoing with flocks of birds.” So the brothers and Sita proceeded on foot and reached the delightful mountain, charming Citrakuta.

The Cosmogony and cosmology have a certain place in Ramayana. The origin of the universe is the quest for all people in the different period of the history. Indians are thinking it in their own line from the Vedic period. It is developed in the Ramayana taking all considerations from the vedic and upanishadic ages. So here we find some ideas which are matched with latest scientific discoveries in this field. But most of the sections are full of poetic illustration and no historicity of the fact and concrete data are given any where through which we can guess the actual fact. In the architectural point of view, Ramayana describes the *Brahma* as the *silpi* or artist whose artwork is this universe⁹.

In the philosophical point of view, Ramayana describes the idea of the *Kala* or time. In Ramayana Kala tells to Rama – “ Thou didst, in the pristine birth, beget me on Maya – I am Kala, the destroyer of all, Lord Brahma, the father of all creatures, has said thou didst promise to preserve the three worlds. Formerly when having slain all

animals by the maya, thou went asleep in the waters of the mighty deep, I was born. Thereafter, thou didst create the huge-bodied Ananta, living in the waters as the king of serpents”¹⁰. From this following points are derived: (a) Creation, existence and dissolution occur in a cyclic order, (b) Water is the primary element for all stages, (c) The basis of time or Kala. In the General Theory of Relativity Einstein proposes the Time-Space continuum where time and space are considered as the part or dimension of the same reality¹¹. Here time or *Kala* is considered as the reality upon which all creations originates, sustains and ultimately merges.

In the Ramayana for considering the instrumental origin of the universe, the idea of sun is stated. Ramayana mentions that the sun is the ruler of the whole worlds and also the created beings. He is the life-birth, the source of the seasons, the store-house of light, the nourisher of all and the one whose energy constitutes the seed of the universe. He is the source of happiness, the infuser of life in the life-less cosmic egg, all pervading and the cause of creation, preservation and destruction of the universe. He is the ruler of all, the sender of thick showers and bears the fire of dissolution in the womb. He courses swiftly along his own orbit, carries in him the resolve to evolve the universe, he is death, the destroyer of all, omniscient, all formed, the source of all evolutions, the controller of lunar mansions, planets and stars, the creator of all, and he appears in twelve forms (in the shape of twelve months of the year). The sun alone actually destroys, brings into existence and sustains all that has come into being. He is the supreme controller of all activities which are found in all living beings and architect of the universe who alone radiates heat by his rays. It is worth mentioning here that the central idea of the instrumental origin appears to be the creation of a cosmic nucleus – *Prajapati*, the maker of the universe. This nucleus is also named as Hiranyagarbha (golden egg) which is considered as the source of the existence of all mundane and heavenly entities because it contained fire (heat) within itself¹².

In the Ramayana there are texts where the stars and other luminaries are mentioned. Stars are called *Tara* or *Taraka*¹³.

अथ ताश्चारुसर्वाङ्ग्यो रयपेणाप्रतिमा भुवि ।

उद्यानभूमिमागम्य तारा इव घनान्तरे ॥ Ramayana I.32.14.

The existence of Saptarsi Mandala or Ursa Major is known from the vedic people. Any serious observer of the night sky can witness this fact. The word sapta means

seven and risi indicates stars give the number of stars in the Ursa Major which is mentioned in the Ramayana¹⁴.

आच्छादितास्ते वासोभिः पुष्पैर्गन्धैश्च भूषिताः ।

ससर्षयो दीप्तिमन्तो विराजन्ते यथा दिवि ॥ Ramayana I.14.25

Ramayana gives some insight about the Shape, size and movement of the earth. Ramayana mentions all the details of the earth in epic form. There is no systematic mention about the Earth and its scientific description. Whatever facts are mentioned in the Ramayana we can say that the people in Ramayana have the idea of round shape of the Earth. Ramayana mentions the regular presence of day and night which is controlled by sun¹⁵.

The sun is mention in Ramayana as *ritukarta* or the maker of all seasons. In Ramayana which indicates about the equinoxes and various motion of the sun¹⁶.

It is mentioned in Ramayana that the sun is described as *lokasaksi* or on looker of the world which indicates that sun neither sets nor rises and it remains awake¹⁷. This information indicates that the people in Ramayana have the idea of the revolution of the Earth round the sun.

In Ramayana there is a definite reference about the increase and decrease of the day and night and which is due to the northern and southern shifting of the sun¹⁸. This evidence indicates the knowledge of the people in Ramayana in respect of the movement of the Earth.

सेवमाने दृढं सूर्ये दिशमन्तकसेविताम् ।

विहीनतिलकेव स्त्री नोत्तरा दिक्प्रकाशते ॥ Ramayana III.16.8.

Paksha means ardhamaasa which is mentioned in Ramayana. There are two paksha i.e purva-paksha (former fortnight) and apara-paksha (later fortnight). Two pakshas make a chandramasa (lunar month) of about 29.5 days and lunar year has been calculated to be of 354 days which is 11 days less than solar year. Rama returned from his exile according to lunar years¹⁹.

In Ramayana it is mentioned that the earth is regarded as lying hidden in the heart of the vast ocean²⁰. The idea of continental masses are surrounded by the water body is mentioned in Ramayana²¹.

येषां स सगरो नाम सागरो येन खानितः ।

षष्टिः पुत्रसहस्राणि यं यान्तं पर्यवारयन् ॥

Ramayana mentions various types of rocks and their formation. The rocks of different colours such as green, blue, red, white, yellow, black and coral rocks and minerals²².

In Ramayana it is mentioned that mountains are formed splitting the earth²³. The mountains are called the balancing factor for earth and the roots of the earth²⁴. Besides the phenomenon of tectonic movement and submergence of rising of a mountain in an ocean deep²⁵, of horizontal and vertical movement of mountain or earth's crust²⁶, of submergence due to earthquake in the ocean²⁷, of submergence of very high mountain and genesis of level plain²⁸ are also mentioned in Ramayana. The mythology of the Ramayana confirms the idea of continental drift and orogenetic processes. The Ramayana clearly refers to erosive action of the downpour of rain²⁹, rock slides on the mountains and formation of plain³⁰. In Ramayana it is mentioned that Vindhya mountain is said as high as Himalaya. The Vindhya once became angry to the sun and checked its motion. Agastya asked the Vindhya to let him pass over and not grow till he return and the Vindhya still awaits the return of the sage³¹.

In Ramayana it is mentioned that rivers are originated from the mountain and flowing towards the sea. The main river Ganga is flowing from Himalaya and in its course it passes through the valley widening with corrosion and attrition in the foot of the mountains³². The text refers the vertical as well as the lateral erosion by the rivers in the rainy season. Through erosion process the rivers carry sand particles in the water which they transport far distance. The upper course of the Yamuna river was termed as *Silavaha* which signifies the presence of the boulders and pebbles in the bed in the upper portion³³. The Ramayana refers the various technical terms for river related patterns such as prapata (water fall), prasaravana (seepage), udbhida (spring), dari (hollow), etc.

Ramayana text gives some indication about some idea of Atmosphere. The cloud formation and its regulation are the important aspect of the atmosphere. The cloud are formed from the water drops and regulates the weather of any instance. Ramayana mentions the formation of the cloud and the subsequent rainfall all are due to the sun. In the epic it is mentioned that sun during six months attracts water drops from the water bodies and the next three months it pours the earth. Moisture evaporation and causing increase of humidity give rise to the production of clouds³⁴.

उपास्य हि रसान् भौमांस्तस्वा च जगदंशुभिः ।

परेताचरितां भीमां रविराविशते दिशम् ॥

उष्णमन्तर्दधे सद्यः स्निग्धा ददृशिरे घनाः ।

ततो झृपिरे सर्वे भेकसारङ्गबर्हिणः ॥ Ramayaan, I I.63.15-16

The Ramayana refers to different types of cloud through different Sanskrit words which has significant scientific meanings.

(a) Abhra³⁵ : These cloud do not bring any rainfall are known as Abhra. They indicates mainly the Cirrus clouds.

वाजपेयसपुत्यानि छात्राप्येतानि पश्य नः ।

पृष्ठतोऽनुप्रयातानि मेघानिव जनात्यये ॥ Ramayaan, I I.45.22

(b) Megha³⁶ : These cloud produces little rainfall in form of sprinkling of water drop but not any heavy shower. In modern times these clouds are called Nimbus, Nimbostratus. In Autumn season such type of rainfall are found.

(c) Varidhara or Toyadhara or Balahaka³⁷ : These names indicates they produce the rain fall in the rainy season. They have lightning and produce rumbling sound. Their nature indicates that they are mostly Altostratus and Cumulonimbus cloud.

(d) Parjanya³⁸ : The rain producing cloud is generally called in this name. The word indicates that it nourishes and sustains all beings on the earth.

(e) Jimuta³⁹ : These clouds also produce rain. The word indicates it begets life. In Ramayana the colour of the cloud is dark-blue.

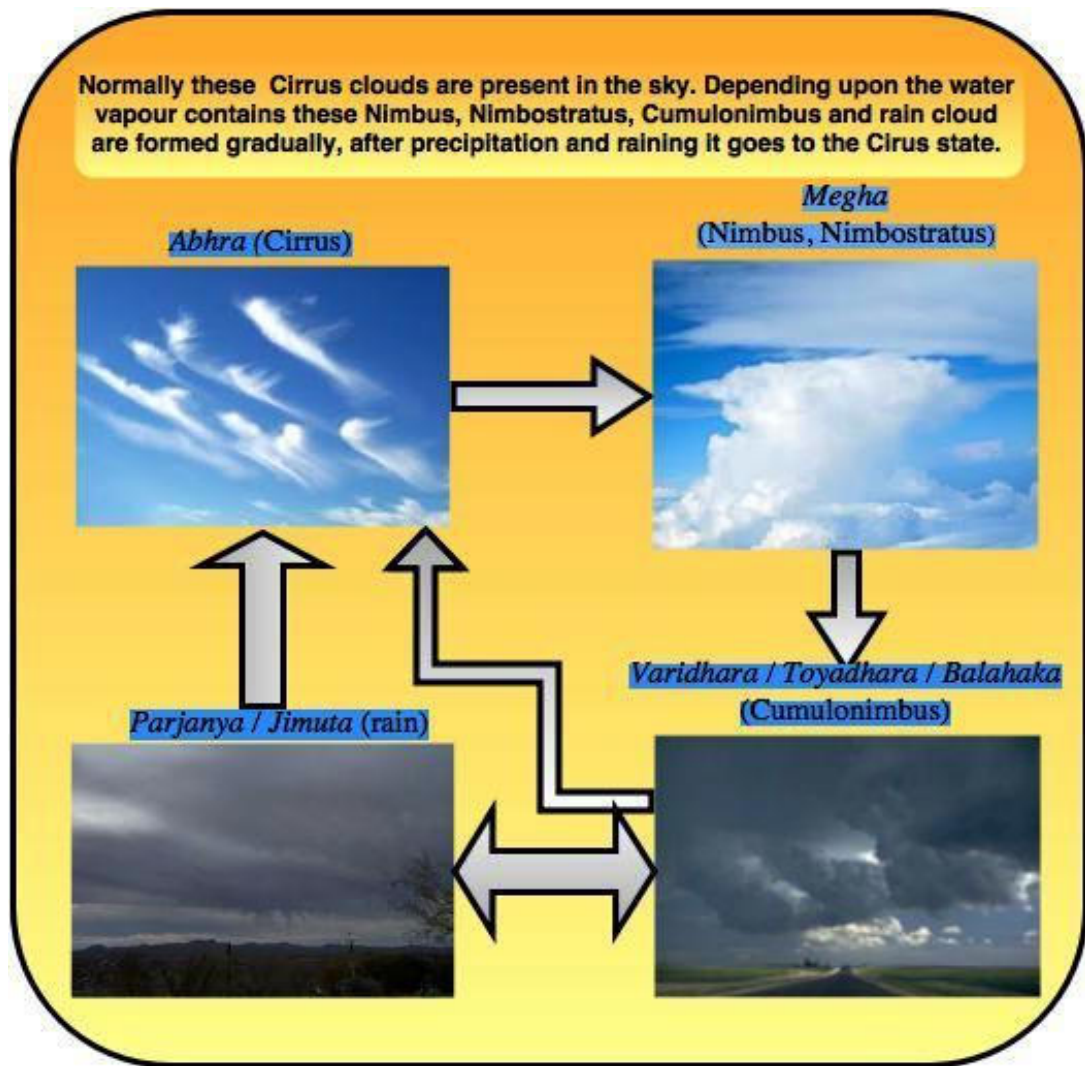


Diagram-14: Formation and distribution of different types of cloud.

In Ramayana it is not directly mention about the weather and weather-forecasting system but from the close description of the nature, season and natural habitants in Ramayana it is clear that the people in the period of Ramayana are very much interested about the subject. Their observation regarding the nature and its various manifestations are highly beneficial in agriculture and every walks of the life of the society. Though the people of this age do not use any so called sophisticated instrument for the weather-forecasting system but all the natural flora, fauna and all natural elements are the equipment, model, testing probe and experimental device whereas the whole nature is the experimental ground for testing the phenomena. The following methods of weather-forecasting system are used in the age of Ramayana :

- Methods of weather-forecast based on the observations of speed and direction of the wind.
- Methods of weather-forecasting based on the observations of the changes in trees and creepers etc.
- Methods of weather-forecasting based on the observations of the activities of some mammals. Birds, reptiles, amphibians, fish and insects.
- Methods of weather-forecasting based on the observations of some physical changes in the atmosphere appearing to be around the sun and moon viz. halo etc.
- Methods of weather-forecasting based on the study of location, movements, conjunction etc. of the planets and stars.
- Methods of weather-forecasting based on the study of the cloud forms and other sky features such as lightning, hurricane, thunder, rainbow etc⁴⁰.

Forest plays an important part in the ancient Indian culture. Ancient people pay more importance upon the vegetation and its utility. Forest actually controls the topography of the land and region. All climatic phenomenon depends upon the forest. Moreover the types of forest and its nature depend upon the different geographical location of the earth. In the age of Ramayana many dense forests like *Citrakutavana*, *Naimisaranya*, *Dandakaranya*, *Pancavati*, etc. are mentioned in the text.

According to the different reference in the Ramayana natural vegetation are classified in the following :

a) Forests

b) Grasses

a) Forests : The distribution of the different types of forests depends upon the rainfall features, physical and chemical properties of the soil and meteorological conditions. Moreover the different landscapes, its elevation from the sea level, soil salinity or acidity or basicity, etc are the important factor for the forest growth and distribution.

Chitrarath Vana : It is located north of Yamuna source and west of Bhagirathi around Dehradun and Mussoorie. It is very thick forest⁴¹.

Nandana Vana : It is thick forest in the Himalaya. A special variety of the sandal wood and deodare wood were the main tree found in forest in Ramayanic age⁴².

Sala Vana : It is located in the west of *Ayodhya* and the forest is present in landscape between the rivers *Gomati* and *Sarayu* ⁴³.

Kurujangala : A forest exists between the upper portion of the rivers *Sataswati* and *Drisadvati* in north west of *Hastinapura* ⁴⁴ and it is presently identified as the eastern Punjab.

Naimisaranya : It is the famous forest for the dwelling place of ascetics and the place for their sacrifice. It is present in the left bank of the *Gomati* ⁴⁵ and it is also identified as *nimsar* forty-five miles to the north-west of Lucknow.

Tatakavana : it is located in the district of Shahabad (Bihar). It is dense forest inhabited by lions, tigers, wild boars, elephants, etc. and the trees like *dhavas*, *asvakarnas*, *kakubhas*, *bilvas*, etc. The forest is occupied by *Tataka*, a *yaksa* woman and the forest is named after her name ⁴⁶.

Citrakuta Vana : it is stretched between *Shankargarh* hills to the present *Chitrakuta* , called in modern time as *Kamatnathgiri*, sixty miles from *Prayaga*. The thick forest have many important trees like, *Amra*, *Jambu*, *Asanas*, *Lodhras*, etc. This type of forest is the dwelling place of tigers, leopards, bears, ⁴⁷ etc.

Dandakaranya : The most reputed forest is *dandaka* forest which begins from the *citrakuta* hill and extends between modern Bundelkhand and the river *Krisna* ⁴⁸. It is present in the territory of Tamil kingdoms. *Dandaka* is the common name which comprises of all forests from Bundelkhand to the river Krishna. According to the epic it is present between the Vindhya and the Saival mountains and a part of it is called *Janasthan* ⁴⁹. In Ramayana Agastya narrated to Rama the details of the forest which was once conquered by *Dandaka*, an ancestor of Rama. The different forests of *Dandakaranya* are known by different names.

a) *Pippalivana*: According to Ramayana the Ashrama of Agastya is 16 *krosas* or 32 miles where peepal trees are widely present ⁵⁰ and it is the region south of Narmada or surrounding region of *Mahadeo* hill.

b) *Madhuka* and *Nyagrodha Vana* : These forests are present between *Agastyasrama* and *Pancavati* ⁵¹. It is present in the region of *Sahyadri Parvata* or Ajanta range.

c) *Pancavativana* : It is a beautiful forest and is close to the river *Godavari* and the place is full of different types of metallic ores ⁵². *Pancavati* of Ramayana corresponds to the place of present Nasik and the present *Pancavati Vana* covered the region of *Satmala* Hills. The trees like *Sala*, *Tala*, *Tamala*,

Kharjura, Panasa, Nivara, Tinisa, Punnaga, Cuta, Asoka, Tilaka, Ketaka, Campaka, Sandal wood, parnasa, Lakuca, Dhava, Arjuna, kakubha, Jambu, Dadima, Bakula, etc. are widely grown in this region⁵³. These trees are also found in present time in the Nasik and the present *Pancavati* region. Rama spent a part of his exile period in this forest.

d) *Krauncaranya* : it is the dense forest covered for three *kroses* (6 miles) from *Janasthana*⁵⁴ and is present in the hilly forest of *Dalaghat* hills.

e) *Matangaranya* : The great forest full of flower plants and fruit bearing plants with plentiful deer, birds and animals is six miles from the *krauncaranya* in the east⁵⁵. The forest have covered the region between the river *Manjra* and *Bhima* south of *Balaghat* range and up to *Risyamuka* mountain and *Pampa* region⁵⁶. The forest is full of different types of trees. The trees of this forest belong to the deciduous group.

f) *Velavana* : It is present between the *Mahendra* mountain (south part of Travancore hills) and the sea⁵⁷.

All these forests are depicted clearly in the Figure No-5 (Figures) for the clear knowledge of the distribution of the forests in all over India land⁵⁸.

Besides these important forests in Ramayana many unnamed forests and also some minor forests are also mentions. Some are identified at present and some are not identified at present. But all these data indicates the people in the period of the Ramayana have extensive knowledge about the vegetation or plantation. Their way of life is the great message for the preservation and protection of the forest and environment as a whole.

b) Grasses : Grasslands are present extensively all over the India and it is mainly present in the alluvial plains of northern India. The grass is the chief food staff for the domestic animals but the use of the grass extends different parts of human day to day life. The main types of grasses are referred in Ramayana are *Darbha*⁵⁹, *Kusa*⁶⁰, *Munja*⁶¹, *Kasa*⁶², *Sadbala*⁶³ and *Sara*⁶⁴.

In Ramayanic age forests are mainly governed by the kings and it is the great source of revenue for the kingdom as well as for whole state. The forests in this age are full of tropical and subtropical vegetations. So the Ramayana epic has attached a great importance upon the afforestation⁶⁵. Vegetation and plantation science give rise to many industries related to the agricultural products, stocking and processing purpose. The texts of Ramayana reveals the many uses of the forests and its related item.

Forests are used as pasturelands⁶⁶. Forest dwellers and other people use the forest for their required fuels⁶⁷. Many tools and household items are made of woods like *sala*, *audumbara*, *bamboo*, *tala*, *deodara*, *sandal*, etc. The items are like houses, carts, chariots, cots, wooden seat, wooden sandals, combs, umbrellas, palanquins, boats, ships, various musical instruments like *vina*, *vipanci*, *vallaki*, *mridanga*, *muraja*, *pataha*, *panava*, *dundubhi*, *dindima*, etc. are made of wood⁶⁸. The trees like *biva*, *khadira*, *palasa*, *deodara*, *plaksa*, etc. are very important from the religious rites as these are used for the sacrifice purpose⁶⁹. Various powders, scents, cosmetics and unguents are prepared from forest resource. Medicinal plants and herbs are very common for besmearing the body and oral and other medication⁷⁰. Honey is the important food item in the Ramayanic age. It is found abundant in forest and is also used for preparation of various kinds of liquors (*madhvika*)⁷¹. Fruits and roots are the important food items of the forest dweller and ascetics and these are plenty in the different forests⁷². Moreover these fruits are also used for making condiments and drinks. Hermits used to put on garments like *valkalavastra* made of the barks of the trees⁷³.

The cattle wealth of the country in Ramayana indicates the agricultural development, economic development, family culture and social structure of the people at that time. The Ramayana mentions the origin of different kinds of animals and birds in a mythological way⁷⁴. The major classes of the society are engaged in preservation and rearing of the cattle. Animal husbandry is clearly indicated by several pastoral villages⁷⁵. The science of cattle-breeding is well developed in *Ramayanic* age. The cow, horse and bullock play an integral part in the human life and habitation in the Ramayanic age. In army different types of animal are used and the demand of good varieties of horse, elephant, camel and mule is evident in this age and the people use scientific breeding for this purpose. The improved breed of animals are imported from neighbouring state or country⁷⁶.

The animals in the epic can be classified into two classes :

a) Domestic animals

b) Wild animals and birds

a) Domestic animals : In ancient India people used to lead a life of mobile nature. They always keep a large number of animals like bullocks, horses, elephants, sheep, goats, dogs, asses, etc. with them. In the age of Ramayana large cities are formed and

people develop the settled life and life style. In epic the cow has possessed a unique role. The people used to give cow to the Brahmin and marriage occasions as gifts. Giving cow is considered as the meritorious deed in the religious rites and performances⁷⁷. Bullocks are the main animals used for pulling the carts and ploughs. Horses are used for riding, pulling chariots and are used for sacrifice in Asvamedha yajna. In Ramayana it is mentioned that the horses of Kamboja, Vahluka and Vanayu region are of good breed⁷⁸. It is said that Ayodhya is crowded with horses of excellent breed⁷⁹. The camels are used in riding, pulling chariots and carrying goods⁸⁰. The Ramayana is the first book where elephants are used as riding purpose, offering gifts and regularly trained for the purpose of war⁸¹. The Ramayana also mentions the species of elephants of excellent breeds i.e. *Airavata, Mahapadma, Anjana, Vamana, Bhadra, Mandara and Mriga*. Besides crossbreeds like *Bhadra-Mandara-Mriga, bhadra-Mandara, Bhadra-Mriga* and *Mriga-Mandara* have been also referred to the epic⁸². The goats and sheep are given freely as gifts. The kings of Ramayana are very much fond of keeping pet birds and animals⁸³.

b) Wild animals and birds : The different wild varieties of animals are mentioned in Ramayana⁸⁴ – lion, Tiger, elephant, bear, pig, deer, jackal, hare, leopard, wild buffalo, antelope, yak, gayal and porcupine. The text of the epic mentions four principal species of deer i.e. *Varana, Risya, prista and Manarura*⁸⁵. Among birds crow, swan, Peacock, ruddy geese, wild duck, water-fowl, crane, vulture, locust, parrot, woodpecker, buzzard, heron, howl, pigeon, eagle and owl are referred in Ramayana⁸⁶. The wide varieties of aquatic animals like fish, turtle, elligator, shark, crocodile, giant fish, frog, serpent, conch, etc are mentioned in Ramayana⁸⁷. People are used to catch fish in Ramayana by means of hook, arrow or nets for trapping purpose⁸⁸. The epic also mentions the different kinds of fishes namely Rohita, Vakratunda, etc⁸⁹.

The different animals are distributed according to the topography of the land and climate of the region. The river valleys and plains of northern India have the abundance of pasture. Cow, ox and other gazing animals are found specially on the bank of river Tamasa and Gomati rivers⁹⁰. Horses are found on the Kamboja, Vahluka and Indus Valley⁹¹. Himalaya, Vindhya, Sahya mountains, Citrakuta and Dandakaranya region are the places full of elephants of superior breed⁹². Donkey and mules are found in all places. Camels are found in dry desert. All other wild animals are found in the dense forest like Pancavativana, Dandakaranya, Vindhya forest and Himalayan forest⁹³.

In the age of Ramayana people use milk and different milk products for their daily food and drink items. The curdling and churning of milk are well known in this epic age. Meat is the common item in this age. People belongs to Raksasa cult are fond of all kinds of meats and they are called as *Pisitasanas*⁹⁴. The Aryans have the choice clean and unclean meat. The meat of deer and ram are extremely good⁹⁵.

Different types of minerals are present on the earth surface in different forms. It plays an important role for the socio-economic development of the human beings in the path of human civilization. Present day minerals give the status of the country in respect of economic growth. Moreover the industrial civilization largely depends upon the minerals and their various uses. In Ramayana mining activity is carried on by the miners as *Khanaka*⁹⁶. The expert persons in this field known as *Bhumipradesajna*⁹⁷ are engaged in exploring new mines and exploiting minerals from the mines.

अथ भूमिप्रदेशज्ञाः सूत्रकर्मविशारदाः ।

स्वकर्माभिरताः शूराः खनका यन्त्रकास्तथा ॥ Ramayana II.80.1

In Ramayana people are quite aware of numerous minerals and their utilizations. Minerals like *Jambunada* or *svarna* (gold), *Rajata* (silver), *Ayasa* (iron), *Tamra* (copper), *Trapu* (Tin) and *Sisa* (lead) are the chief in the epic age⁹⁸.

Modern geologists can conform the site of the minerals deposit in different parts of the India. During epic age systematic mining and investigation of the mineral ores are practiced from their knowledge of the minerals and their use. The following Figure No-6 (Figures) describes the availability of some important ores in the age of Ramayana⁹⁹.

The mountains of Himalaya, Kailasa, *Citrakuta* and *Risyamuka* are said to be the place of different minerals deposits¹⁰⁰. *Panchavati* region is enriched with minerals like gold, silver, and copper¹⁰¹. Ramayana mentions the mountain ranges of seashore full of gold and silver¹⁰². There are references of mineral of different colours¹⁰³. Quartz and dolomite are also found in the vicinity of Chitrakuta mountain¹⁰⁴. Copper are found in Kurnool district of Andra Pradesh, gold in Anantpur district and at Bellary in karnataka, manganese and iron ores are found in sandur hill range of Bellary district¹⁰⁵.

The agriculture is the main process for getting food items not only for the human consumption but for the other domestic animals. So agriculture is the means and resource for the growth and development of civilization. In Ramayana period the agricultural process and its science is known as *Anrita*¹⁰⁶. It is also known that people are well acquainted with the knowledge of mixed farming. From beginning India is the agricultural country and all growth are based upon the development of the agriculture. In Epic age the king of a state is master of the all lands¹⁰⁷ and exercise his power of framing the rules and planning policy for the agricultural process of the state. The subject of the agricultural science is included in the eight fold administrative items of the state¹⁰⁸. He used to take the sixth part¹⁰⁹ of the agricultural product as tax for facilities provided by the state to the farmers. King of a state always extend their help to all farmers or people in all six fold calamities i.e. fire, flood, epidemic diseases, famine, pestilence and human agencies¹¹⁰. Like other items i.e. trade and cattle rearing, agriculture is also included in the science of *varta*¹¹¹ – a special branch of learning.

In Ramayanic age fertility of alluvial soils deposited by the ganga makes the ganges valley more fertile for agricultural development. The temperature and weather condition is also the added advantage for making the land agriculture based. *Magadha, Kosala* and *Vatsa* are the states full of agricultural products¹¹².

The Ramayana mentions the four types of land uses for human habitation depending the life-style and geographical location of the land¹¹³.

- a) Habitation lands which include houses and places for township
- b) Agricultural land
- c) Pasture land
- d) Forests and uncultivated lands

The forests in Ramayanic age are vast. The uncultivated land includes waste land and barren land. The waste land in Ramayana is mentioned as *Usara*¹¹⁴ and the barren land is mentioned as *Iriana*¹¹⁵. So the position of land and its utility are well known to the people in Ramayana age. The king of the land has good knowledge about the topography of the soil in his kingdom.

In Ramayana refers the agricultural villages as *Gramas*, the pastoral village where large area of open land for grazing of the cattle as *Ghosas*, the larger regional towns and big markets for trading purpose of agricultural product produced from the near about villages as *Nagaras*, and smaller rural towns managing the trade affairs of the

surrounding villages as *Pattanas*¹¹⁶. The dwellers of Ayodhya are full of farmers and the cultivating fields are surrounding the main town catering the needs of the inhabitants as well as the need of the whole kingdom. The town provides the trading place for market facilities of the dwellers and the farmers of the surrounding locality¹¹⁷.

In Ramayana different ploughs are mentioned for different purpose of the agriculture systems prevailing at that time. Valmiki has mentioned different accessories used for the purpose of the agricultural processes i.e. *Kathinakaja* (leather bag), *Kalasa* (pitcher), *Kuthra* (axe), *Kuddala* (spade), *Kshura* (knife), *Khanitra* (spade), *Pitaka* (basket), *Fala* (the wooden blade of a plough pointed with an iron tip), *langala* (Plough) and *Hala* (Plough)¹¹⁸.

Water is the chief component for the farming process. But in India farming process is largely dependent upon the monsoon in Ramayanic period¹¹⁹. So people are helpless on the hand of the nature. Moreover less rain not only yields the less quantity of crop but it decreases the quality of the soil largely. It in long run makes the land barren and less fertile for the production of the crops. So the kings of this age provide some artificial means of irrigation systems for the farmers. The rivers, tanks, canals, wells, and lakes are the chief sources of irrigation for the cultivating lands. The canals, wells and tanks are constructed by *Yantrakas* (engineers)¹²⁰.

कर्मान्तिकाः स्थपतयः पुरुषा यन्त्रकोविदाः ।

तथा वर्धकयश्चैव मार्गिणो वृक्षतक्षकाः ॥

कूपकाराः सुधाकारा वंशकर्मकृतस्तथा ।

समर्था ये च द्रष्टारः पुरतस्ते प्रतस्थिरे ॥ Ramayan.II.80. 2-3.

In Ramayanic age there might have been two kinds of crops – one is dry crops which is largely dependent upon the rain and second one- wet crops depend largely upon the irrigational canals and rivers¹²¹. In this age many fields are irrigated by the canals and river. People widely know the processes for overcoming the shortfall of rain. In Kosala the fields are irrigated largely and are known as *Adevamatrika*¹²².

In Ramayana there are reference of the perennial water sources on which the dam are constructed for the irrigation purpose¹²³. In the incident of *Kartavirya Arjuna* of Ramayana the powerful ruler of *Mahismati* blocked the Narmada river like a dam with his thousand arms which clearly indicates the construction of dam across the

river¹²⁴. Moreover the people in this age are more aware of the environment and eco-friendly relationship. They want to utilize the nature for the benefit and development of the civilization keeping its nature intact. Valmiki has mentioned the dams which are made of sand¹²⁵ and due its nature in rainy time the dams are washed out and again people built these for their use. The fields of the land filled with rows of crops and the sumagadhi¹²⁶ indicates that these fields are irrigated by the water-lifting machine for lifting water from the water pool to the land. The canals are used largely for irrigation purpose of the Northern India. Canal network is made in such a way that the poorest farmer can utilize the water of canal for irrigation of their land for cultivation purpose.

The following geographical factors are responsible for canal irrigation In Ramayana :

a) The perennial rivers of the north, with the sources from the perpetual snows of the Himalayas. b) The gradual slope of the plains enabling the canals to be taken out from the upper courses of the rivers easily irrigated the land in their lower valley. c)

The absence of the rocky ground in the plains facilitated easy cutting of canals. d) The fertile soils which gave the greatest return to irrigation¹²⁷.

Regarding agricultural crops in Ramayana, two types of crops are found in epic age *Kristapacya* and *Akristapacya*¹²⁸. *Kristapacya* are the crops which are cultivated in the field through tilling and other farming process. But *Akristapacya* includes self-growing and ripening crops which are produced in the field naturally and cultivated in the field without tilling. The crops cycle throughout the year is well known to the people in the Ramayanic age. The main crops are mentioned in the epic age are paddy, barley and wheat and other cash crops are also mentioned. The following figure indicates that the different crops are produced in India throughout the land¹²⁹.

Sali (Paddy) : paddy is the important crop in Ramayanic age. People used paddy rice in different ways. Some uses of rice are *Tandula* (the husked rice)¹³⁰, *Payasa* (boiled rice with milk and sugar)¹³¹, *Laja* (parched rice)¹³², *Odan* (boiled rice)¹³³ and *Krisara* (a mixed preparation of rice)¹³⁴. People used to practice ceremonial, rituals and social programme where unhusked rice (*Akshata*) is used. *Sali* is the variety of paddy is sown rainy season and harvested in autumn. The process of cultivation of the *Sali* is different. At first paddy is grown in a land far from the water-logged field and when it is grown upto two feet, it is then planted into the field of main land in the month of September. This paddy is grown in this field in a water-logged condition and in its

ripen stage water of the land is gradually dried and ultimately in the month of December it is harvested from the field. The autumn paddy is called *Sali*¹³⁵.

गृहगाढामविच्छिद्रां समभूमौ निवेशिताम् ।

शालितण्डुलसंपूर्णामिक्षुदण्डरसोदकाम् ॥ Ramayana. 1.5.17.

दिव्यपायषंपूर्णा पात्री पत्नीमिव प्रियाम् ।

प्रगृह्य विपुलां दोर्भर्यां स्वयं मायामयीमिव ॥ Ramayana. 1.16.15

इक्षुन्मधूंस्तथा लाजान्मैरेयांश्च वरासवान् ।

पानानि च महार्हाणि यक्ष्यांश्चोच्चावचां स्तथा ॥ Ramayana. 1.53.2

ततस्तिलौदनं भुक्त्वा पुनः पुनरघः शिराः ।

तैलेनाभ्यक्तसर्वाङ्गस्तैलमेवावगाहत ॥ Ramayana. II.69.10.

पायसं कृसरं छागं वृथा सोऽश्नातु निर्धृणः ।

गुरुंश्चाप्यवजानातु यस्यायोऽनुमते गतः ॥ Ramayana. II.75.30.

The geographical distribution of different crops are mentioned in Figure No-7 (Figures) for the proper understanding of the production of different crops in the time of Ramayana¹³⁶.

The Paddy field is known in epic age as *Kalamakshetra*¹³⁷. The paddy producing lands are present on the bank of the rivers. As we know that the paddy requires the supply of abundant water, so the land near the river water source fulfill the condition. Moreover, the nature of the soil is important for the growth of the paddy rice. The alluvial soil deposited by the Ganga, Sindhu and their branches are the main paddy producing areas in Ramayanic age. *Ayodhya*, *Kiskindha* and *Bharadvaja Asrama* are reports the main paddy producing region in Ramayanic age¹³⁸. In northern part of India in epic age is favourable for the cultivation of paddy and scarcity of rain is not mentioned in the text. So people produce good quantity paddy in rainy season. But the people do not keep quite upon the seasonal rain and they develop their skill in artificial irrigation through canals and lifting process. In the text lifting process is mentioned by using the stone-wheels (Asma cakra)¹³⁹. Using the wheels the bucket is tied with rope and water is lifted from the wells and poured into the desired field for

irrigation. This irrigation is used for the cultivation other than the rainy season and for production of crops throughout the year.

Yava (Barley) : From very beginning the barley is used as the main food item. People know very well its cultivation. In Vedic period it is first produced in the fertile fields on the bank of Saraswati river. Then it is produced in the bank of the Ganga and Yamuna river. According to Ramayana the main barley producing area is the bank of Ganga-Yamun river and Panchavati¹⁴⁰. It is the crop sown in the season autumn and harvested in the season of Spring. The production of the crop does not require much rain. Only little rain is required for its production. So many places it is sown using the irrigation from the canals and pools. The new barley grains are offered for God and manes in the month of Bengali *agrayana*¹⁴¹.

Besides these other crops like godhuma (wheat) is mentioned but it is not an important crop in epic age. Other cereals like Mudga (kidney beans), Masa (bean), Canaka (gram), Kulattha (a pulse) and Til (oil seed) are important during the epic age.

Cash crops : Among cash crops, sugarcane and spices are important in the epic age¹⁴². Sugarcane and its products – guda (molasses), sarkara (sugar), and khandava (sugarcandy) are extremely popular in the epic age¹⁴³. The main area of the cultivation are fertile land present in the Ganga-Yamuna basin in the northan India where the soil is alluvial made of the light clay. For its cultivation nothing is required as special. The cultivation of various spices are found in the coastal region of India. Dry ginger, cumin and ajowan are main spice items are used widely in this age¹⁴⁴. Cotton (karpas) was previously belong to India and from India it dispersed to the several countries of the world¹⁴⁵. The cotton is the most important crop in the ancient India. India is self-sufficient in cotton production in epic age¹⁴⁶. It is mainly cultivated in the Ganga-Sutlej basin. Besides the cotton other fibers are silk and hemp are also used in the epic age.

Ramayana gives vast knowledge about the Ecological Diversity. Ramayana describes the variety of plants and animals. In all parts of Ramayana starting from the birth of Rama, and His whole life on the earth relate the vivid existence of the forest and its natural support. It is a great description how the nature can influence the whole part of the life of human beings. It is mentioned in the Ramayana that –

There are lovely trees on the mountains, *Sala, talas, tamals, Kharjuras, panasas, amrakas, nivaras, timisas, and pumnagas* : thick groves of various other trees – mangoes, *asokas, tilaks, campakas, and ketakas* and flower, vines, and shrubs; sandalwood trees, too and *syandanas, nipas, panasas, lakucas, dhavas, asvakarnas, khadiras, samis, kimsukas and patalas*. This is a pure and holy spot teeming with birds and beasts, and here is where we will live...¹⁴⁷. In the above text Rama mentions twenty five plants in the surroundings of the *ashrama Panchavati* forest. Some texts are modified in course of time in different version of the Ramayana. The exact number is also blurred by synonymy in some of the Sanskrit names. We see that there are twenty three Sanskrit names for the important Ayurvedic plant *Asvagandha* (*Withania Somnifera*)¹⁴⁸. In the texts many plant species are reported. But all are Sanskrit texts and it have no equivalent scientific names. May be all species are extinct at present or names are given by according to local names of these plants. Moreover 200 species of plants are described in the text¹⁴⁹. The entire flora of India is estimated approximately 15000 species and some 4900 species are listed in *The Wealth of India*¹⁵⁰. Ramayana mentions many plant species with rich diversity and some are mentioned in the earlier texts. In the similar way it describes the variety of animals and birds. Some plants names are cultivated species and others are wild types. The Figure No-8 (Figures) mentions the rich knowledge of the diversity of the plants in the Ramayana¹⁵¹.

The War described in Ramayana gives an indication about the ecological significance and perspective behind the episode. The whole epic has ample reference where the rain, mountain, cloud and vegetation are enumerated in different forms.

Monkeys: All the prominent monkeys mentioned in Ramayana are named after the different mountains names. All these mountains mentioned are present around the mount Meru. Some mountains are mythical type and some are yet to be certain as the mountain of India¹⁵². Following is the list of monkeys name matched the name of mountains.

Sl. No.	Name of Monkeys	Details of The Mountain With Same Name In Monnier Williams Dictionary of Sanskrit-English, Brahma Purana and Brahmananda Purana.
1	Raksa (father of Vali and Sugriva)	Raksavat, one of the seven Kula mountains of Jambudwipa

2	Ānjaneya (Hanuman)	Anjanagiri, located on the southern side of Kailasa in Jambodwipa.
3	Kesari (father of Hanuman)	Kesari, one of the seven Kula mountains of Sakadwipa
4	Sugriva	Sugriva, a mountain mentioned in Monnier Williams Dictionary of Sanskrit-English, but without details.
5	Nala	There is no mt. with this name, but it is the name of a famous king of Nisadha mountain region situated to the south of Meru.
6	Nila	Nila, a central range to the north of Meru.
7	Maindra	Maindras, Greek name for the Mandara mountain range – located east of Meru.
8	Gandhamadana	Gandhamadana, situated to the west of Meru.
9	Sveta	Sveta, a range of mountains. to the north of Meru.
10	Hemakuta	Hemakuta, Varsa mountains. to the south of Meru, part of northern Himālayas.
11	Risabha	Risabha, located in Jambudvipa east of the subcontinent Kimpurusa- north of Meru (south of Meru in Ramayana).
12	Dvividā	Dvividā, located in the continent Kraunca.
13	Kumuda	Kumuda, situated in the continent of Salmala or Plaksa.
14	Jambavat (king of bears)	Jambunada - a mountain. mentioned in Mahabharata
15	Jambumat	Jambumat (Markandeya Purana).
16	Candra	Candra, one of the Varoea mountains of Kimpurusa in Plaksa
17	Dhumra (lord of bears), (brother of Jambavat)	Dhumra: east of the Varoea mountains of Kimpurusa situated to the east of Meru and west of Kailasa
18	Samarocana	Samarocana
19	Sannadana	Samdhana
20	Aruna	Aruna - located east of Meru and west of Kailasa.
21	Gaja	Gajasaila
22	Durdhara	Durdhara: a mountain located inKusa-dwipa
23	Gaya	Gaya: a mountain. range south-west of the city of Gaya ¹⁵³
24	Susena	There is no mt. with this name, but it means 'beautifully clustered' (Monnier Williams Dictionary of Sanskrit-English): implying a mountain or hill

The above table gives the clear similarity in the names mentioned in the Ramayana as monkeys and the mountains in different *puranas*¹⁵⁴.

Rakshasas : The rakshasas is compared as cloud in the Ramayana. There is the clear evidence of cloud where the name of the son of Ravan , Indrajit as Maghanath (Lord of the cloud). The association of the word *asura* is also mentioned in Ramayana to represent the Rakshasa. The meaning of the word *asura* is cloud (Monnier Williams Dictionary of Sanskrit-English).

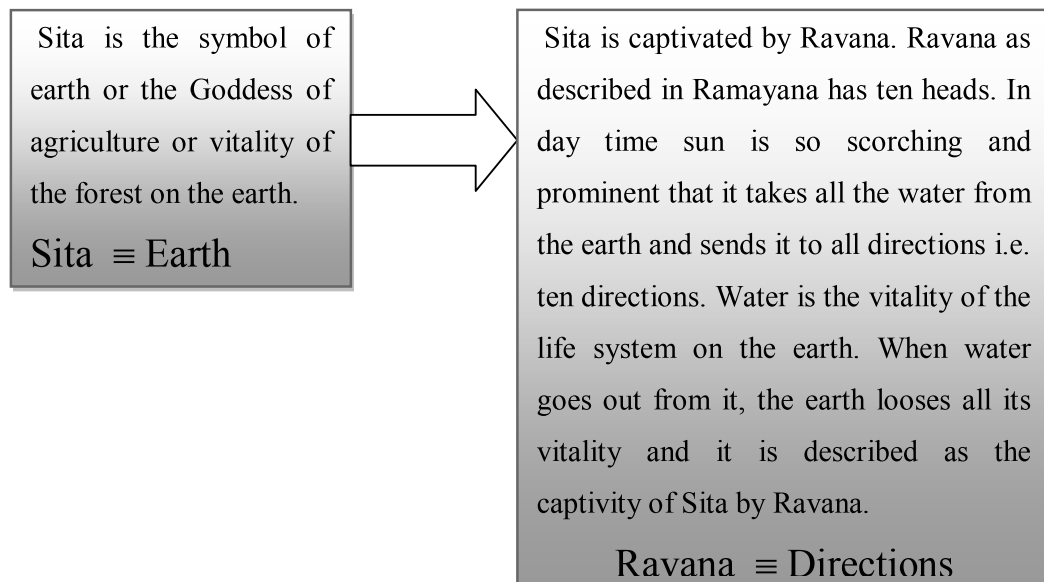
Sita : Sita is the great character mentioned in the epic. Sita means furrow or the Goddess of Agriculture. In Monnier Williams Dictionary of Sanskrit-English Sita is the wife of Indra. In whole Ramayana Sita spends more of her life time in forest. During her captivity in Lanka, she is kept under a tree in the garden. “Sita looked like the earth with its dark blue forests in the rainy season”(Ramayana, Vol-5, 15). Another place she is described as the Goddess of Sri Lakshmi (Ramayana, Vol-3, 34). Moreover she is born from the earth and finally she enters into the earth. In the intermediate period she is the life or vitality of the plant.

Rama: In throughout the Ramayana Rama is described as *Rama-Chandra*. His face is like the moon(Ramayana, Vol-3, 31) and he is spreading happiness to all (Ramayana, Vol-2, 16). Only this much comparison is not enough to call him Chandra because many are compared as Chandra in Ramayana. In epic period Vedic Soma is identified with Chandra or moon. Like soma in Vedic period Chandra is identified with the Lord of Vegetation¹⁵⁵. In epic time it is known that moon is responsible for the formation of the rain drops through its cold aspects. In daytime sun emits the high energetic photon particles which converts the water body present in the earth into vapour phase which moves to the upper direction due to its lightness. But in the night the moon through its cool ambience the upper layer of air becomes cool and becomes heavy, moves downwardly as dew drops. So may be this reason moon is describes as the cause for the formation of the rain drops. Moreover, Rama is described as the Indra or the God of battle. Indra is helped by the wind God Maruts (Hanumann), and Vishnu (Lakshman). In some verses of Ramayana(Ramayana, Vol-6, 92, 267) Lakshman is called Upendra or Vishnu. In Ramayana it is mentioned that Rama kills all the rakshasas with help of Hanumann, Vanara (Monkey) and Lakshaman.

So the great battle in the Ramayana is the symbolic representation of the raining phenomenon which is the main cause for vegetation or life process on the earth. Here Indra and Soma (*Rama – Chandra*) do the raining process by obstructing the clouds (

Rakshasa) on the mountains (monkeys) and also with the help of *Hanumana* (Wind) and *Lakshman* (Vishnu or space). So the conversion in form of destruction of cloud into rain is the normal process of vegetation on the earth. Thereby earth flourishes with all its natural habitants i.e. natural resources. Sita, the Goddess of the earth or agriculture is rescued.

From the above description of the important characters of Ramayana and their significance related to the different environmental factors following correlation of events are worth mentioning.

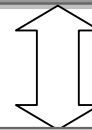
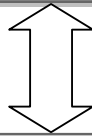
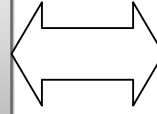


Rakshasas are the symbol of cloud. As all rakshasas are the brain child of Ravana. So cloud comes from all directions. Rama is described as Indra and Soma or moon. Indra, the God of fighting unites all the clouds coming from different directions through its weapon thunderbolt. This is the fighting of Rama with all rakshasas.

Rakshasas \equiv Cloud

The mountains are described as monkeys. All clouds are obstructed on the mountains and thereby condense into rain drops. In this way all monkeys i.e. the mountains help the Rama.

**Monkeys \equiv
Mountains**



Wind (*Hanuman*) is carrying the cloud from all directions. The space(*Lakshamana*) is vital for union of all clouds. In this way both *Hanuman* and *Lakshaman* helps the mission of Rama. Moreover, without the wind power the scattered clouds from different directions could not accumulate in a particular point. So *Hanumana* is described as the chief servant of *Rama*. Space is pervaded everywhere. In space earth, moon, sun, etc. all are present. Space is part and parcel of all the existing entities. In environment if somewhere any vacant space is generated in the air the nearby air rushes vehemently from all directions to fill up the vacant space. In course of its journey it takes all the cloud along with it and cloud ultimately unites each other at that point. All take place in the space. So *Lakshman* is called the brother of *Rama*.

**Hanuman \equiv Wind
Lakshaman \equiv Space**

The Pictorial diagram relates the ecological significance of the great war between *Rama* and *Ravana* mentioned in *Ramayana* through the story considering the above correlation made with the different environmental phenomenon:

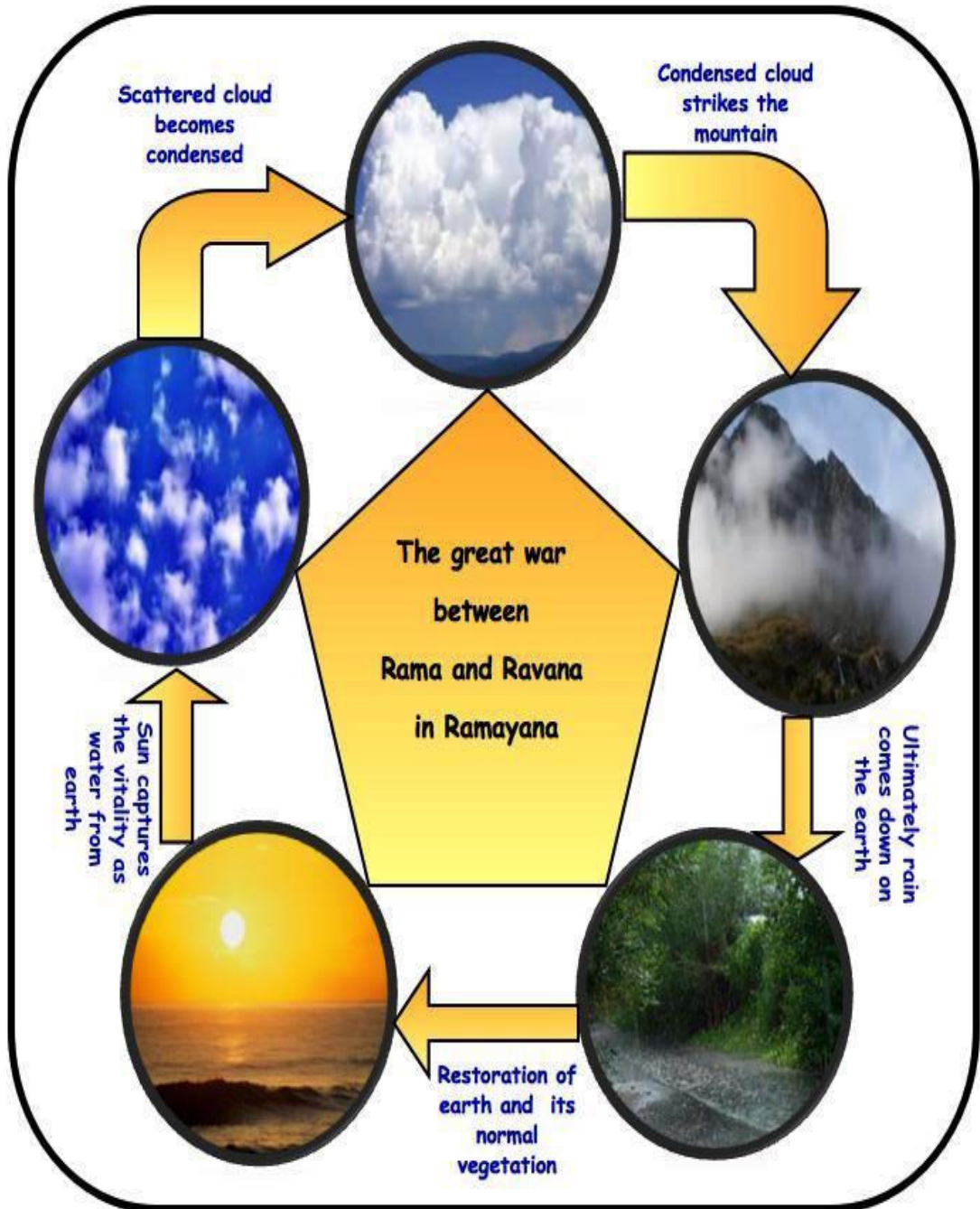


Diagram-15: Ecological aspect of the war between Rama and Ravana.

All events of Ramayana take place in the terrestrial ecosystem of the region. In the course of the war between Rama and Ravana, Hanumana collects the medicinal plants in alpine regions of the Himalayas. Sita is kept in the Lanka of Asoka Kanana which is tropical evergreen forest. The early days of the Ayodhya and the exile in Dandaka occur in the single ecosystem that spans much of the Indian subcontinent : tropical deciduous forest¹⁵⁶. The forest ecosystem depends upon the rain-fall and the soli type of the region. The southwest monsoon reaches every year in Kerala and moves up the peninsula. The heaviness of the rain depends upon the location of the land and altitude of the land compare to the sea level. The amount of the rainfall in every year determines the richness of the forest in the particular region of the land. Many species like *Kinmsuka*, *Khadira* and *Patala* grow throughout the distribution of the biome. From the description it is clear that Valmiki observes the forest Dandaka from his own residence on the northern edge of the ecosystem in the shadow of Himalaya. When Laksmana describes Rama the beauty of the forest in the winter, he includes the dusting of snow and the morning frost which never occur in the Dandaka. Valmiki mentions the tree Sala (*Shorea Robusta*) which is dominant in the north but is replaced by teak (*Saka*, *Tectona Grandis*) in the south. He knows very much the trees of the south from their products, such as aromatic sandalwood (*candana*) and the medicinal bark of Pumnaga (*Calophyllum Inophyllum*). He also describes the many wild variety trees present in the forests. Moreover he describes many animals and describes their behavior- such as the elephants rubbing against the trunks of trees – native to ecosystem¹⁵⁷.

The vivid scenery in Ramayana indicates the presence of water body and its various existence. In the deep forest water present in the lake and pool are full of aquatic plants like lotus and water lilies of various colour. The water bodies in forest are frequently found with the bird like crane. In Ramayana most of the birds are Kraunca (*Saras Crane*). Water is the central element in the ecology of the tropical deciduous forest. The rain in the monsoon helps to germinate the seeds of the plant species and the production of the various animals. Valmiki is fully aware of the change of the forest after monsoon. He describes the flowering of the Kimsuka tree (*Palasa*) in the winter months just after the monsoon rains. The same scene we see throughout the distribution of the tropical deciduous forest ecosystem. The thick forest ensures the presence of water in the water bodies exist in the forest during the summer or dry months. The strong connection between the water and the forest indicates the

ecological reality. Valmiki was a natural historian as well as a poet. He knew much about the ecology of his home, although he had to guess about areas he had not visited¹⁵⁸.

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