



Weera



Palu



Kaluwera



Lepord



Bear



Deer



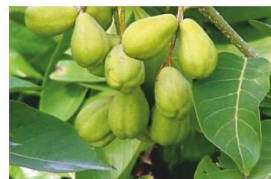
Gini andara



Ranawara



Heerassa



Aralu



Nelli



Bulu



Cymbopogon
Pagiri Mana



Imparata
Iluk



Cymbopogon
Pagiri Mana



Themada
(Pinibara Tana)



Wild Boare



Arudinella



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Chrysopogon
(Thuththiri)



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Memo Max

MEMORY
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Hora



Naa



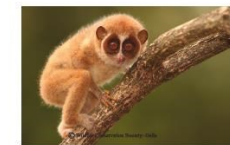
Hal



Purple faced
Lungur



Palm Cevet



Slender Loris

3
Environmental Biology
Terrestrial Ecosystems of Sri Lanka

UNIT
08



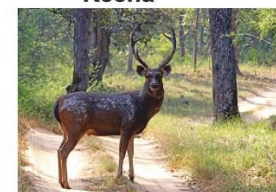
Keena



Gal weralu



Wal Kurudu



Sambar



Yellow eared
Bulbul



Highland Screw



SAMPATH
LANKADHEERA

B.Sc. (Hons), M.Sc.



Ecosystems of Sri Lanka

- Sri Lanka is in the north-equatorial tropical zone.
- Therefore it experiences a climate with high rainfall and temperature which permits the country to be blessed with a wide array of terrestrial and aquatic ecosystems.
- The ecosystems can be broadly classified into groups as follows.

1. Terrestrial ecosystems

- Forests-Lowland rain forests, Dry monsoon forests, Montane forests, Thorn scrubs
- Grasslands- Savanna, patana

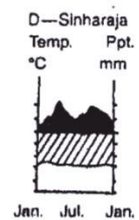
Intermediate Zone



Temperature: 24 - 32 °C
Rainfall: 1250 - 2000 mm
Altitude: 500 - 1500 m

Forests: Tropical Moist Evergreen Forests
Tropical sub-Mountain Forests
Grasslands: Savanna/Dry Patana

Wet Zone



Temperature: 16 - 28 °C
Rainfall: > 2000 mm
Altitude: 300 - 1000 m
900 - 1500 m
> 1500 m

Forests: Tropical lowland wet evergreen
Tropical sub mountain
Tropical upper montain

Grasslands: Talawa
Dry Patana
Wet Patana

Salt marsh Mangroves Sea shore Dunes Coastal marine Reser

Which of the following responses indicates all correct combinations of the vegetation type and the ecosystem where it is found?

- (1) A-P, B-S, C-R, D-Q (2) A-P, B-R, C-Q, D-S (3) A-R, B-S, C-P, D-Q
(4) A-R, B-P, C-S, D-Q (5) A-R, B-P, C-Q

2024/35

Essay

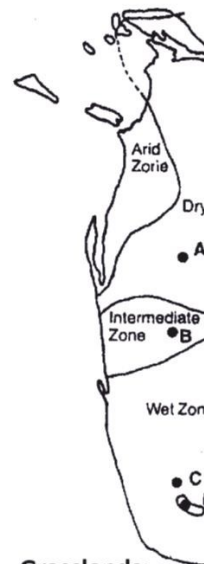
- (a) What are the major factors that determine the distribution of forests in Sri Lanka?
(b) Describe the distribution and characteristic features of forests in wet zone in Sri Lanka. (2008)

(a) What are the major factors that determine the distribution of forests in Sri Lanka?

- Temperature /2. Rainfall/3. Soil type/4. Altitude / 5. elevation above sea level

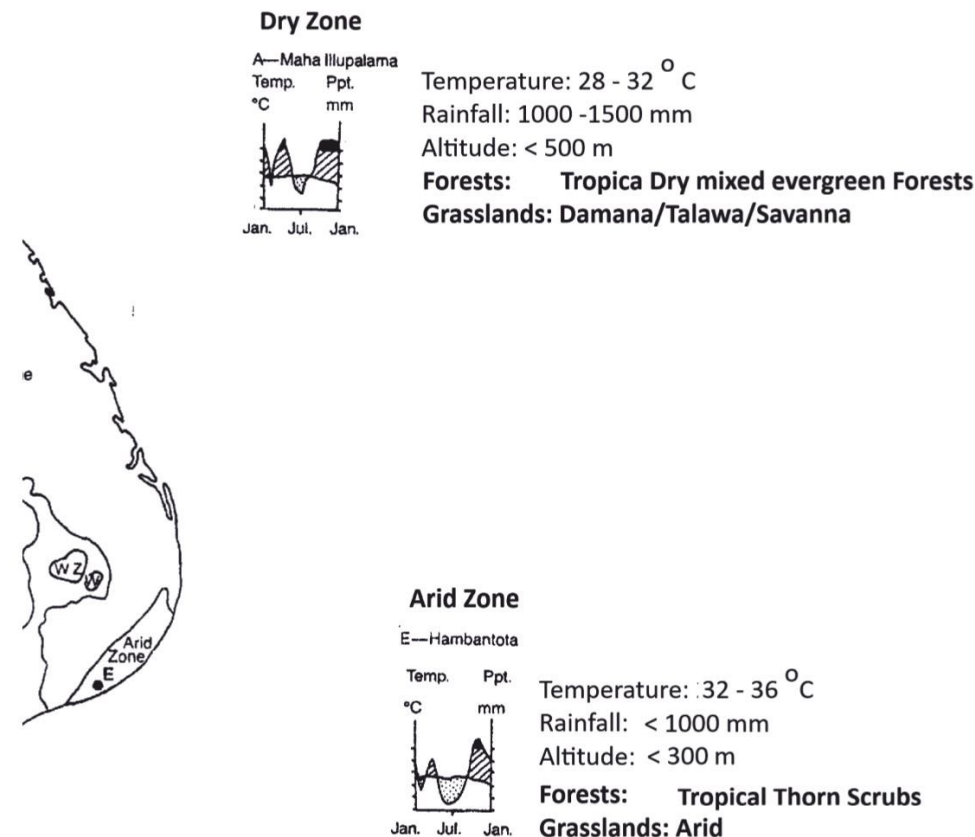
(b) Describe the distribution and characteristic features of wet zone forests in Sri Lanka.

- The tropical wet lowland rainforests are found below 900 m elevation in the south western quarter of the country.
- The mean annual temperature is about 28°C, and the mean annual rainfalls varies between 2000 mm- 5000 mm in different locations without any dry period.
- The humidity is very high.
- These forests are characterized by a tall canopy, sub canopy and a sparse shrub layer consisting mostly of the saplings of canopy trees.
- Sometimes an emergent layer is also seen above the canopy.
- The vegetation is filled with a network of woody lianas that reach to the canopy layer.
- A diverse population of epiphytic lichens, mosses, liverworts ferns, orchids are found while many fungi inhabit decaying woods and soil.
- High endemism of floral and faunal diversity can be seen in these forests.
- Eg. Sinharaja, Nakiyadeniya and Kanneliya are some examples for wet lowlands rainforests.
- These forests are disturbed due to expansion of tea cultivation, agriculture, industrial and residential development.
- Some tree species found in wet lowland rain forests are;
- S: Hora, T: Ennai (*Dipterocarpus zeylanicus*)
- S: Naa, T: Nagai (*Mesua ferrea*)
- S: Hal, T: Kungiliyam pinai (*Vateria copallifera*)
- Montane forests are distributed in central hills including Knuckles range, Piduruthalagala, Hakgala.
- They occur at elevation beyond 1500 m above mean sea level.
- The average temperature is about 16 °C and rainfall is about 2000 mm without any dry period.
- The humidity is high as lowland rain forests.
- These forests are characterized by a short canopy of about 13 m, with a dense shrub layer.
- There are trees with umbrella- shaped rounded crowns and twisted branches having leathery small leaves to accommodate the strong winds that prevail in the montane zone.
- High density of epiphytes cover the branches and stems of trees.
- Some plants found in these forests are;
- S: Keena, T: Pongu (*Callophyllum walkeri*)
- S: Walkurudu, T: Kaatu karuwa (*Cinnamomum ovalifolium*)
- S: Gal weralu, E: wild olive (*Elaeocarpus montanus*)
- Some animals that inhabit montane rainforests of Sri Lanka are Sri Lanka Yellow eared bulbul, Sri Lanka highland Shrew, Sambar.
- Montane forests were greatly affected due to tea cultivation.

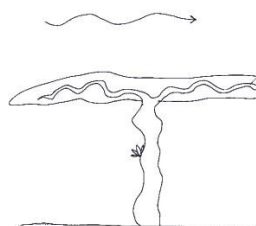
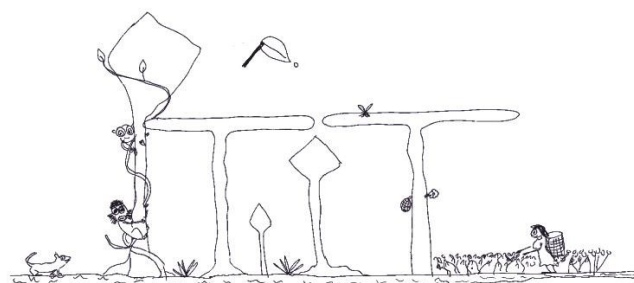


17. Savanna present in,
 (1) Haputhale, Monaragala, Mahiyanganaya, Wellawaya
 (2) Hortain plains, Hanthana, Gampola, Welimada
 (3) Puttalam, Yala, Mahiyanganaya, Wellawaya
 (4) Bibile, Hambantota, Mahiyanganaya, Yala
 (5) Bibile, Monaragala, Mahiyanganaya, Wellawaya
18. What is the annual rainfall of dry patana grasslands.
 (1) over 2000mm (2) 1000mm (3) 1400-2000mm (4) 2000-5000mm (5) less than 750mm
19. Which of the following plants would you not expect to find in Sinharaja forest?
 (A) *Acrostichum aureum*. (B) *Mesua ferrea* (C) *Ipomea pescaprae*
 (D) *Japan jabara* (E) *Vateria copallifera*
20. In which of the following list/s all the tree species can be dominant species in a dry mixed evergreen forest.
 (1) *Drypetes sepiaria*, *Manilkara hexandra*, *Diospyros ebenum*.
 (2) *Callophyllum walker*, *Elaeocarpus montanus*, *Cinnamomum ovalifolium*
 (3) *Dipterocarpus zeylanicus*, *Mesua ferrea*, *Vateria copallifera*.
 (4) *Dichrostachys cineria*, *Cassia auriculata*, *Cissus quadrangularis*
 (5) *Terminalia chebula*, *Phyllanthus emblica*, *Terminalia bellirica*
21. Quantities of mineral nutrients in soils of tropical rain forests are relatively low because
 (1) Plant density is high. (2) Microorganisms are not in abundance in tropical soils
 (3) Decomposition of organic matter in soil and re-assimilation of the minerals by plants occur very rapidly.
 (4) Mineral cycling occurs at a relatively slow rate in tropical soils.
 (5) The prevailing high temperature in the soil degrades the nutrients.
22. The dominant plant species in the dry patana in the Uva Basin is
 (1) *Cymbopogon nardus* (2) *Ipomea pescaprae* (3) *Imperata cylindrica*. (4) *Chrysopogon*.
 (5) *Salicornia sp.*
36. Dry patana grasslands in Sri Lanka are found in
 (1) and intermediate and wet zones. (2) dry and intermediate zones (3) dry and arid zones,
 (4) dry, intermediate and wet zones. (5) arid, dry and intermediate zones. 2019/36
37. Which of the following responses indicates/indicate in correct order, the plants that are found in three ecosystems located in increasing altitudes of Sri Lanka?
 (A) *Salicornia sp.*, Heerassa, *Themeda* (B) Kadol, Weera, Hora
 (C) Katu ikili, Gal weralu, Ranawara (D) Palu, Tussock grass
 (E) Karan koku, Naa, Gini andara 2022/47
38. Two species of plants that can be seen in the highest altitudes of Sri Lanka are
 (A) *Cymbopogon nardus* and *Themeda tremula*.
 (B) *Eleoarpus montanus* and *Mesua ferrea*.
 (C) *Chrysopogon nodulibarb*is and *Callophyllum walkeri*.
 (D) *Cinnamomum ovalifolium* and *Arundinella villosa*.
 (E) *Terminalia chebula* and *Imperata cylindrica*. 2023/49
39. Some vegetation types and die ecosystems where they can be seen in Sri Lanka are given below.
- | Vegetation type | Ecosystem |
|------------------------|------------------------------|
| A - Stunted vegetation | P - Tropical montane forests |
| B - Dense scrub layer | Q - Tropical thorn scrubs |
| C - Thick grass cover | R - Sand dunes |
| D - Sparse large trees | S - Savanna |

2. Inland wetland ecosystems - Rivers and streams, Reservoirs, Marshes and swamps, villus
3. Ecosystems is with coastal areas - Lagoons and estuaries, Mangroves, Coral reefs, Sea shore, Sand dunes, Sea grass beds, Salt marshes.
- The distribution of major vegetation types may be considered as broadly linked to the local climate (mainly rain fall and temperature), topography, and the edaphic (soil) conditions.
 - A broad classification of major ecosystems of Sri Lanka is given below.



rs Rivers Streams and riverine wetland Marshes Villus



- (1) Savannas have a thick grass cover and few scattered trees.
- (2) These are common on hill slopes of the dry or intermediate zone.
- (3) The thick layer of soil on hill slopes cannot support the growth of trees and the grass cover of savannas helps to bind soil particles and reduce erosion of soil.
- (4) Periodic fires are common to this ecosystem as the dried grass cover easily catch fire in dry period of the year.
- (5) They have trees with fire resistant species.

10. Incorrect regarding patana grass lands

- (1) Grassland based on the rainfall pattern and soil of the site.
- (2) Wet patana found in areas above 1500 m from the sea level with mean annual rainfall of over 2000 mm.
- (3) Wet patana temperature ranges from 18°C to 24° C.
- (4) Wet patana grass lands are Mist, fog and frost are common in these areas and do not experience any dry period.
- (5) The animals include a large Sambar and Wild - boare populations and few leopards.

Questions 11–13 below are based on the following list of plant genera.

- | | | | |
|------------------------|--------------------------|--------------------------|--------------------------|
| (1) <i>Manilkara</i> . | (2) <i>Dipterocarpus</i> | (3) <i>Callophylum</i> . | (4) <i>Cymbopogon</i> . |
| (5) <i>Mesua</i> | (6) <i>Diospyrus</i> . | (7) <i>Themeda</i> . | (8) <i>Elaeocarpus</i> . |

11. Name two genera which are commonly seen in montane forests.

- (1) 1 and 2 (2) 3 and 7 (3) 2 and 6 (4) 2 and 5 (5) 3 and 8

12. Name two genera that is present in dry mixed evergreen forest of Sri Lanka .

- (1) 4 and 9 (2) 5 and 9 (3) 1 and 6 (4) 7 and 8. (5) 3 and 4.

13. Name two genera which are seen among the dominants of the dry patana grasslands.

- (1) 1 and 2. (2) 2 and 3. (3) 4 and 7. (4) 1 and 9. (5) 2 and 7.

14. Indicate the two genera which are found among the dominants of the dry mixed ever green forests in Sri Lanka.

- (1) *Dichrostachys* and *Manilkara*. (2) *Elaeocarous* and *Diospyrus*.
(3) *Drypetes* and *Manilkara*. (4) *Drypetes* and *Mesua*. (5) *Mesua* and *Vateria*.

15. Indicate the two naturally found genera which are economically important timber trees in Sri Lanka.

- (1) *Vateria* and *Mesua* (2) *Mesua* and *Dipterocarpus* (3) *Cinamomum* and *Themeda*.
(4) *Elaeocarpus* and *Manikara* (5) *Drypetes* and *Manilkara*.

14. Name the two genera which are found among thorn shrubs of Sri Lanka.

- (1) *Cymbopogon* and *Imperata* (2) *Terminalia* and *Phyllanthus* (3) *Cissus* and *Phyllanthus*
(4) *Dichrostachys* and *Cissus* (5) *Cassia* and *Terminalia*

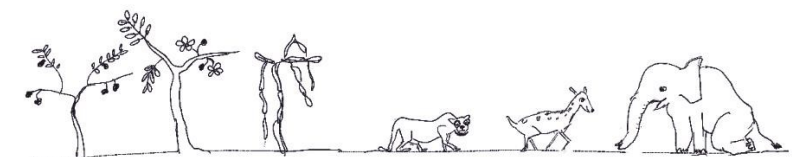
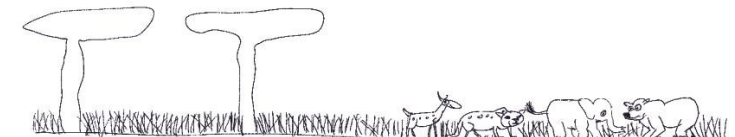
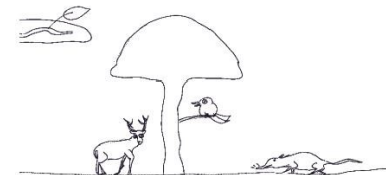
Questions 15 and 16 are based on the following five species of plants

- (A) *Terminalia chebula* (B) *Phyllanthus embelica* (C) *Cymbopogon nardus*
(D) *Imperata cylindrical* (E) *Chrysopogon nodulibarbis*

15. Which of the above species are trees present in savannah.

16. Which of the above species are grass species present in savannah.

- (2) The most extensive forest type in Sri Lanka is the tropical dry mixed evergreen forest.
 (3) Wet zone rain forests are exceptionally rich in biodiversity and high in endemics.
 (4) One of the most important and largest wet zone forest in terms of biodiversity is the peak wilderness sanctuary.
 (5) The latest survey in Sri Lanka shows that natural forests occupy only 40% of the total land area. (2005/38)
3. Which of the following statement is correct regarding monsoon forests.
 (1) The mean annual temperature is about 28°C, and the mean annual rainfalls varies between 2000 mm- 5000 mm in different locations without any dry period.
 (2) Some animal species found are Purple faced langur, slender loris.
 (3) The average temperature is about 16°C and rainfall is about 2000 mm without any dry period.
 (4) These forests have mean annual temperature of about 29°C and rainfall around 1000 mm- 1500 mm.
 (5) The mean annual temperature is around 31°C and rainfall is below 1000 mm with a longer dry period.
4. Which one of the following is correct regarding tropical rain forests in Sri Lanka?
 (1) They are located in areas where annual rainfall is 1200 – 2000 mm.
 (2) Prominent plants are the evergreen and deciduous trees.
 (3) their canopy is discontinuous. (4) There is a clear stratification of plants.
 (5) there is well developed ground layer. (2010/45)
5. Which of the following ecosystems has evergreen trees with continuous canopy?
 (1) Dry mixed evergreen forest (2) Thorn forest (3) Montane forest (4) Tropical rain forest
 (5) Mangrove forest (2011/35)
6. Which of the following is incorrect regarding tropical rain forests
 (1) Evergreen (2) Highest endemic species present (3) Well grown ground layer absent
 (4) Rapid recycle of nutrients present (5) Deep soil present
7. Incorrect regarding mountain forests
 (1) Montane forests are distributed in central hills including Knuckles range, Pidurutthala-gala, Hakgala.
 (2) They occur at elevation beyond 1500 m above mean sea level.
 (3) These forests are characterized by a short canopy of about 35m, with a dense shrub layer.
 (4) There are trees with umbrella- shaped rounded crowns and twisted branches having leathery small leaves to accommodate the strong winds that prevail in the montane zone.
 (5) High density of epiphytes cover the branches and stems of trees.
8. Which of the following shows the correct combination of organisms with forest type.
 (A) Tropical wet low land rainforests—S: Hora, T: Ennai/ S: Naa, T: Nagai/Slender loris.
 (B) Mountain forest— Gal weralu/ Wild olive, S: Nelli, T: Topu - nelli
 (C) Tropical Thorn shrubs— S: Gini- andara , T:Vindattai/S: Ranawara, T: Avaram poo
 (D) Pathana— *Chrysopogon nodulibarbis* and *Arundinella villosa*.
 (E) Savana— S: Mana, E: Citronella grass, Vasanai pullu (T)/S: Walkurudu, T: Kaatu
9. Which of the following is incorrect regarding savanna.



Tropical wet low land rainforests

- The tropical wet lowland rainforests are found below 900 m elevation in the south western quarter of the country.
- The mean annual temperature is about 28°C, and the mean annual rainfalls varies between 2000 mm- 5000 mm in different locations without any dry period.
- The humidity is very high. These forests are characterized by a tall canopy, sub canopy and a sparse shrub layer consisting mostly of the saplings of canopy trees.
- Sometimes an emergent layer is also seen above the canopy.
- The vegetation is filled with a network of woody lianas that reach to the canopy layer.
- A diverse population of epiphytic lichens, mosses, liverworts ferns, orchids are found while many fungi inhabit decaying woods and soil.
- High endemism of floral and faunal diversity can be seen in these forests.
Eg. Sinharaja, Nakiyadeniya and Kanneliya are some examples for wet lowlands rainforests.
- These forests are disturbed due to expansion of tea cultivation, agriculture, industrial and residential development.



- Some tree species found in wet lowland rain forests are;
S: Hora, T: Ennai (*Dipterocarpus zeylanicus*)
S: Naa, T: Nagai (*Mesua ferrea*)
S: Hal, T:Kungiliyam pinai (*Vateria copallifera*)



Emergent trees

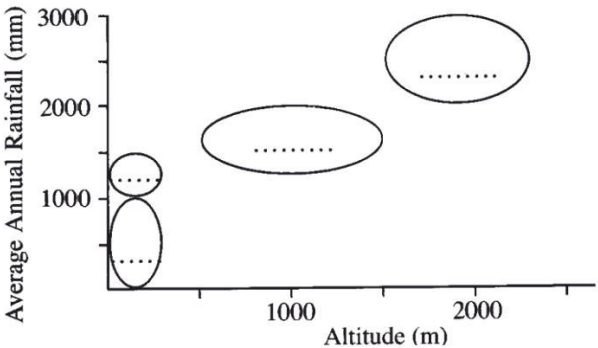
.....
Trees with twisted trunks

.....
Continuous canopy

2020 AL

(ii) (a) Using the correct letter, indicate the ellipse in the diagram that represents each of the following ecosystems of Sri Lanka.

- A – Savanna
- B – Tropical thorn scrubs
- C – Wet patana
- D – Tropical dry mixed evergreen forests



(b) Which one of the ecosystems given in (ii) (a) above can be found in the dry zone as well as in the intermediate zone of Sri Lanka?

.....
(iii) Write the common name of an endemic plant found in tropical wet lowland rain forests of Sri Lanka.

.....
(iv) Write the common name of a plant in Sri Lanka which is facing a very high risk of extinction in the wild.

.....
(v) (a) State the group of organisms that contributes most to reduce the CO2 content in the atmosphere.

.....
(b) What is the major global environmental issue that affects the organisms stated in (v) (a) above?

MCQ

1. What is the approximate percentage of land covered by forests in Sri Lanka at present?
(1) 10% (2) 20% (3) 30% (4) 40% (5) 50% (2001/34)
2. Which of the following statements is incorrect regarding forests in Sri Lanka?
(1) Variations in rainfall, altitude and soil have brought above a variety of forest types in Sri Lanka.

Model

Low country wet zone of Sri Lanka has an annual rainfall of about (1)..... mm which is fairly well distributed throughout the year. This region receives rain mainly from the (2)..... monsoon. The tropical wet lowland rainforests are found below (3)..... m elevation in the (4)..... quarter of the country. The mean annual temperature is about (5)..... °C. The most famous example of these forests in Sri Lanka is (6)..... .

These forests are characterized by a (7)..... canopy, sub canopy and a sparse shrub layer. The tallest of the trees, sometimes forming an emergent layer, often reach more than (8)..... meters in height. Three common tree species found in these forests are (9)..... , (10)..... and (11)..... .

The vegetation is filled with a network of woody (12)..... that reach to the canopy layer. A diverse population of epiphytic (13)....., (14)....., (15)....., (16)..... are found while many fungi inhabit (17)..... and soil.

These forests are disturbed due to expansion of (18)....., (19)....., (20)..... and (21)..... development. The tropical montane forests, in contrast, occur at elevations beyond (22)..... m with average temperature of about (23)..... °C and rainfall of about (24)..... mm without any dry period.

Some animal species found in the wet lowland rainforests are (25)..... and (26). High endemism of (27)..... and (28)..... diversity can be seen in these forests.

Structured Essay

2012 AL

(iii) Name two main grassland ecosystems in Sri Lanka and state the major difference between those two.

Grasslands -

Major difference -

.....

(iv) State in which forest ecosystem in Sri Lanka, the following could be seen

Evergreen trees

.....

.....

Hora



Naa

Hal

- Some animal species found in the wet lowland rainforests are Purple faced langur, Sri Lanka slender loris, Golden wet zone palm civet.



Purple faced langur



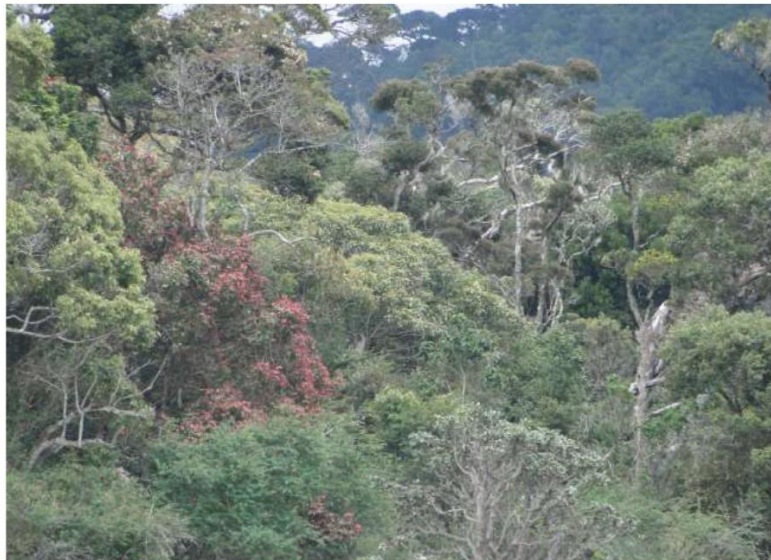
Golden wet zone palm civet



Sri Lanka slender loris

Tropical Montane Forests

- Montane forests are distributed in central hills including Knuckles range, Pidurutalagala, Hakgala.
- They occur at elevation beyond 1500 m above mean sea level.
- The average temperature is about 16 °C and rainfall is about 2000 mm without any dry period.
- The humidity is high as lowland rain forests.
- These forests are characterized by a short canopy of about 13 m, with a dense shrub layer.
- There are trees with umbrella- shaped rounded crowns and twisted branches having leathery small leaves to accommodate the strong winds that prevail in the montane zone.
- High density of epiphytes cover the branches and stems of trees.



- Some plants found in these forests are;
 S: Keena, T: Pongu (*Callophyllum walkeri*)
 S: Walkurudu, T: Kaatu karuwa (*Cinnamomum ovalifolium*)
 S: Gal weralu, E: wild olive (*Elaeocarpus montanus*)



Keena



Gal weralu



Wal-kurudu

Patana

- There are two types of 'Patana' found in Sri Lanka; wet patana grassland and dry patana grassland based on the rainfall pattern and soil of the site.

Wet Pathana

- Wet Patana grass lands are found in areas above 1500 m from the sea level with mean annual rainfall of over 2000 mm.
- Temperature ranges from 5°C to 18° C. Mist, fog and frost are common in these areas and do not experience any dry period.
- The grasses do not reach more than one meter height and are called tussock grasses which include the *Chrysopogon nodulibarbis* and *Arundinella villosa*.
- The animals include a large Sambar and Wild - boare populations and few leopards.
- Extensive "Wet Patana" are found only in Horton plains.



Dry Pathana



- Dry patana grasslands are found in altitudes between 500 m to 1600 m.
- They receive a rainfall about 1400 mm to 2000 mm with a definite dry period.
- Temperature ranges from 18°C to 24° C.
- The vegetation is made up of grasses that grow up to 1-2 m height such as Pangiri mana (*Cymbopogon nardus*) and *Themeda*/(Pinibara tana)/ *Themeda tremula*.
- "Dry Patana" is common on hill tops in in Hantana, Gampola, Welimada, and Haputale .

Savanna

- Savannas have a thick grass cover and few scattered trees. These are common on hill slopes of the dry or intermediate zone. The thin layer of soil on hill slopes cannot support the growth of trees and the grass cover of savannas helps to bind soil particles and reduce erosion of soil.
- Periodic fires are common to this ecosystem as the dried grass cover easily catch fire in dry period of the year. They have trees with fire resistant species.
- Some plant species found in Savanna are trees are;
S: Aralu, T: Kadukkay (*Terminalia chebula*)
S: Nelli, T: Topu- nelli (*Phyllanthus emblica*)
S: bulu , T: Adhan- koddai, tanti (*Terminalia bellirica*)



Aralu



Nelli



Bulu

- and have grass species such as
S: Mana, E: Citronella grass, Vasanai pullu (T) (*Cymbopogon nardus*)
S: Iluk E: Cogon grass T: Tharpai pullu (*Imperata cylindrica*)



Mana



Iluk

- Savannas are seen in Bibile, Monaragala, Mahiyanganaya, Wellawaya areas.
- These are distributed by periodic fires set by villagers for various reasons.

- Some animals that inhabit montane rainforests of Sri Lanka are Sri Lanka Yellow eared bulbul, Sri Lanka highland Shrew, Sambar.
- Montane forests were greatly affected due to tea cultivation.



Sambar



Sri Lanka Yellow eared bulbul



Sri Lanka Highland Shrew

Tropical dry mixed evergreen forests/Dry monsoon forests

- These forests have mean annual temperature of about 29 °C and rainfall around 1000 mm-1500 mm., most of which falls during the northeast monsoon periods.
- There is a marked dry spell from May to August. Above forests are distributed in areas below 300m altitude.
- These forests are characterized by having sparse canopy, a sub canopy and a well-developed shrub/herb layer.



- Some plant species naturally found in these forests are
 S: Weera T: Virai (*Drypetes sepiaraia*)
 S: Palu, T: Paalai (*Manilkara hexandra*)
 S: Kaluwara, T: Karun-kaali (*Diospyros ebenum*)



Weera



Palu



Kaluwara

- Some of the canopy trees are deciduous during the dry spell of the year.
- These forests harbor the largest elephant populations in Asia.
- The mammal fauna includes leopard, bear, deer.



- Most of the forests are protected as National parks such as Yala National park, Wilpattu National Park, Wasgamuwa National Park, Maduru-Oya national park, Ritigala Strict Nature reserve and many sanctuaries and forest reserves.
- These forests are disturbed by 'chena' cultivation, human settlements, extraction of timber, poaching etc.

Tropical thorn scrubs

- These are called "scrubs" than "forests" as large trees are sparse and the vegetation is mainly consists of thorny shrubs.
- They are found in arid lowlands. The mean annual temperature is around 31 °C and rainfall is below 1000 mm with a longer dry period.



- The following plant species are commonly found ;
 S: Gini- andara , T: Vindattai (*Dichrostachys cineria*)
 S: Ranawara, T: Avaram poo (*Cassia auriculata*)
 S: Heeressa, T: Pirandai (*Cissus quadrangularis*)



Gini- andara



Ranawara



Heeressa

- Due to the dry conditions many fauna species cannot be found. However Deer, Leopard, elephants can be seen in these areas.
- They are distributed near Hambantota, Yala, Mannar, Puttalam areas and disturbed due to various development pressures.