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2024

# APPSC

# FOREST RANGE OFFICER

# TOOLKIT

*The Ultimate Guide to Success*

**Module - 2**

## General Forestry – 1

[Unit – IV] Soil Science & Geology

[Unit – V] Water Resource Management and Watershed Management

[Unit – VI] Agroforestry

[Unit – VI] Joint Forest Management

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To all our successful candidates in

# MADHYA PRADESH FOREST SERVICE 2020

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# GENERAL FORESTRY

**MODULE – 2**

**EDITION : 2024**

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Module - 2

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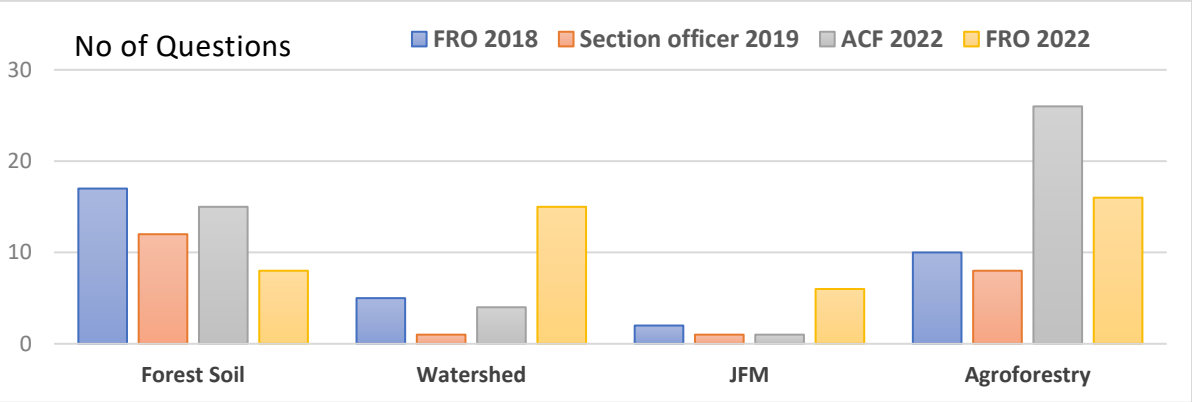
PYQs

# PAPER ANALYSIS

## PYQs ANALYSIS




## SYLLABUS

### SOIL SCIENCE & GEOLOGY [GENERAL FORESTRY-I | UNIT – IV]

- **Geological formation** of the rocks and minerals of India.
- **Earth and its layers**-domains of earth Types – of rocks and their formation. weathering process of rocks-factors affecting soil formation-physical, chemical and biological properties of soil; minerals, their types and their conservation.
- **Soil conservation** - definition, causes for erosion, types - wind and water erosion; conservation and management of eroded soils/areas, windbreaks, shelter belts; sand dunes; reclamation of saline and alkaline soils, waterlogged and other wastelands. Role of forests in conserving soils.
- Maintenance and build-up of **soil organic matter**; forest leaf litter and composting; Role of microorganisms in ameliorating soils; N and C cycles.

### WATER RESOURCE MANAGEMENT AND WATERSHED MANAGEMENT [GENERAL FORESTRY-I | UNIT – V]

- Basics of surface and subsurface water resources, pollution of water and water resource management.
- **Concepts of watershed**; Role of mini-forests and forest trees in overall resource management, forest hydrology, watershed development.
- **Water-harvesting and conservation**; groundwater recharge and watershed management; the role of integrating forest trees, horticultural crops, field crops, grass and fodders

### AGROFORESTRY [GENERAL FORESTRY-I | UNIT – VI]

- Scope and necessity; role in the life of people and domestic animals and in integrated land use, planning especially related to soil and water conservation, water recharge, nutrient availability to crops, nature and

eco-system preservation including ecological balances through pest-predator relationships and providing opportunities for enhancing biodiversity, medicinal and other flora and fauna.

- Agroforestry systems under different agroecological zones, selection of species and role of multipurpose trees and NTFPs, techniques, food, fodder and fuel security.
- Objectives, scope and necessity of social forestry.

**JOINT FOREST MANAGEMENT [GENERAL FORESTRY-I | UNIT – VI]**

- Genesis, principles, objectives and methodology of **Community Forest Management** in Andhra Pradesh

## SOIL SCIENCE

### INTRODUCTION

**1.** 'The smallest three-dimensional volume of a soil needed to give a full representation of horizontal variability of the soil' is termed as [APPSC (ACF) 2022 General Forestry – I]
(a) Soil horizon
(b) Pedon
(c) Soil profile
(d) Regolith

**2.** In soil classification systems, topsoil is known as the [APPSC (FRO) 2018 General Forestry Paper - I]
(a) O Horizon or A Horizon
(b) B Horizon
(c) C Horizon
(d) R Horizon

**3.** _____ is the mechanical movement of clay and other fine particles down the profile [APPSC (Forest Section Officers) 2019]
(a) Eluviation
(b) Illuviation
(c) Cheluviation
(d) Organic sorting

**4.** When is the World Soil Day celebrated annually? [APPSC (Forest Section Officers) 2019]
(a) 5th July
(b) 5th September
(c) 5th April
(d) 5th December

**5.** The headquarters of the Indian Institute of Soil and Water Conservation is located at which of the following places? [APPSC (ACF) 2022 General Forestry – I]
(a) New Delhi
(b) Ooty
(c) Dehradun
(d) Kota

### ROCKS & MINERALS

**6.** The study of rock layers preserved in the geological record is called [APPSC (FRO) 2018 General Forestry Paper - I]
(a) Geochronology
(b) Stratigraphy
(c) Sedimentology
(d) Palaeontology

**7.** When a rock is subjected to increasing stress, how many successive stages of deformation does it passthrough ? [APPSC (FRO) 2018 General Forestry Paper - I]
(a) 3
(b) 4
(c) 5
(d) 6

**8.** Repetitive layering in metamorphic rocks is known as [APPSC (FRO) 2018 General Forestry Paper - I]
(a) Lineation
(b) Foliation
(c) Nappe structure
(d) Beds

**9.** Which of the following minerals has the highest specific gravity? [APPSC (ACF) 2022 General Forestry – I]
(a) Pyrite
(b) Magnetite
(c) Haematite
(d) Wolframite

### SOIL FORMATION

**10.** How many factors and their interactions are responsible for the formation of soil [APPSC (FRO) 2018 General Forestry Paper - I]

(a) 3
(b) 4
(c) 5
(d) 6

**SOIL ORDER & CLASSIFICATION**

**11.** Identify the correct sequence of six levels of classification proposed by the USDA soil taxonomy [APPSC (FRO) 2018 General Forestry Paper - I]
(a) Order → Suborder → Great Group → Subgroup → Family → Series
(b) Order → Suborder → Great Group → Subgroup → Series → Family
(c) Great Group → Subgroup → Order → Suborder → Family → Series
(d) Great Group → Subgroup → Order → Suborder → Series → Family

**12.** Which of the following is the most dominant soil order in India? [APPSC (ACF) 2022 General Forestry – I]
(a) Vertisols
(b) Entisols
(c) Inceptisols
(d) Alfisols

**13.** Latosols are soils rich in Fe and Al oxides and are commonly found under [APPSC (ACF) 2022 General Forestry – I]
(a) Hot and dry tropics
(b) Hot and wet tropics
(c) Humid temperate
(d) Dry temperate

**14.** Are the soils of grassland ecosystems [APPSC (FRO) 2018 General Forestry Paper - I]
(a) Oxisols
(b) Mollisols
(c) Ultisols
(d) Andisols

**PHYSICAL PROPERTIES**

Soil Texture

**15.** The size of clay particles is [APPSC (ACF) 2022 General Forestry – I]
(a) <0.002 millimetres
(b) 0.002 to 0.003 millimetres
(c) >0.002 millimetres
(d) 0.002 to 0.004 millimetres

**16.** According to the International Society of Soil Science classification, the size of *silt particles* is [APPSC (ACF) 2022 General Forestry – I]
(a) 0.02 mm
(b) 0.002–0.02 mm
(c) 0.002 mm
(d) 0.002–0.02 cm

**17.** ..... is the *size of clay particles* as per USDA classification of soil texture [APPSC (Forest Section Officers) 2019]
(a) <0.02mm
(b) <2mm
(c) <0.2mm
(d) <0.002mm

**18.** Soil separates are the size groups of mineral particles that are [APPSC (FRO) 2018 General Forestry Paper - I]
(a) Between 3 mm and 4 mm in diameter
(b) Between 4 mm and 5 mm in diameter
(c) Between 5 mm and 6 mm in diameter
(d) Less than 2 mm in diameter

**19.** If the soil has porosity of 60%, its void ratio is [APPSC (ACF) 2022 General Forestry – I]
(a) 0.40
(b) 0.67
(c) 1.50
(d) 0.60

**SOIL WATER**

**20.** ..... Is defined as the 'water that is retained around soil particles and the capillary pores in the soil at forces approx. Between values of pf2.7 and 4.5'. [APPSC (ACF) 2022 General Forestry – I]
(a) Capillary water
(b) Hygroscopic water
(c) Gravitational water
(d) Hydrophobic water

**21.** Which fraction of the following water is readily available to plants? [APPSC (Forest Section Officers) 2019]
(a) Hygroscopic water
(b) Combined water
(c) Capillary water
(d) Gravitational water

**22.** Measure the amount of tension or pull roots are exerting on the soil water and how tightly water is

held by the soil [APPSC (FRO) 2018 General Forestry Paper - I]

(a) Time domain reflectometers
(b) Neutron probes
(c) Piezometer
(d) Tensiometers

**23.** In a completely saturated soil, the volume of air (Va) is [APPSC (FRO) 2018 General Forestry Paper - I]

(a) 0%
(b) 25%
(c) 50%
(d) 100%

**24.** What type of soil water is mostly available to plants? [APPSC (FRO) 2018 General Forestry Paper - I]

(a) Hygroscopic water
(b) Capillary water
(c) Gravitational water
(d) Molecular bonded water

**SOIL CHEMICAL PROPERTIES**

**25.** If the pH of the growing medium drops below 5.5, all micronutrients become soluble and are available to the plant, except [APPSC (FRO) 2018 General Forestry Paper - I]

(a) Iron
(b) Molybdenum
(c) Manganese
(d) Copper

**26.** The Walkley-Black method is used for the estimation of _____ in soil [APPSC (ACF) 2022 General Forestry – I]

(a) Available phosphorus
(b) Available potassium
(c) Bulk density
(d) Organic carbon

**27.** The Van Bemmelen factor used for the conversion of organic carbon to organic matter is [APPSC (ACF) 2022 General Forestry – I]

(a) 1.724
(b) 1.624
(c) 1.524
(d) 1.424

**28.** Nitrogen constitutes 25% of Dry weight of plants. The source of nitrogen in the soil is [APPSC (ACF) 2022 General Forestry – II]

(a) Atmosphere only
(b) Atmosphere and organic matter
(c) Bacteria only
(d) Fungal association of plants

**29.** Total organic matter in soil comes from [APPSC (ACF) 2022 General Forestry – II]

(a) Plant and animal residues, cells and tissues of soil organisms and substances synthesised by the soil population
(b) Farmyard manure and atmospheric carbon
(c) Humus, human waste and carbon dioxide
(d) Leaf litter, animal dung and bacteria

**30.** The C : N ratio of cultivated soils ranges from [APPSC (RFO) 2022 General Forestry – I]

(a) 8 : 1 to 15 : 1
(b) 10 : 1 to 12 : 1
(c) 20 : 1 to 30 : 1
(d) 4 : 1 to 9 : 1

**31.** _____ is the process of converting ammonia to nitrate [APPSC (RFO) 2022 General Forestry – I]

(a) Nitrification
(b) Assimilation
(c) Ammonification
(d) Denitrification

**32.** What type of pan is formed in alluvial soils of Uttar Pradesh and black cotton soils of the Deccan region? [APPSC (ACF) 2022 General Forestry – I]

(a) Silican
(b) Kankar
(c) Podsolic
(d) Lateritic iron

**33.** Which of the following is not a characteristic of alkali soils? [APPSC (FRO) 2018 General Forestry Paper - I]

(a) High ph (> 8.2)
(b) High exchangeable sodium percentage (> 15)
(c) High sodium carbonate
(d) High ECE 0020 ( >4ds $m^{-1}$)

**AFFORESTATION OF DIFFICULT SITES**

**34.** In Central India, *Soymida febrifuga*, *Acacia leucophloea* and Chloroxylon swietenia are indicator plants of [APPSC (ACF) 2022 General Forestry – I]

(a) Clayey soil
(b) Lime rich soil
(c) Stiff kankar clay
(d) Alluvial soil

**35.** Which of the following statement(s) is true with respect to formation of saline alkali soils? [APPSC (RFO) 2022 General Forestry – I]

i) Low pH and high proportion of exchangeable aluminium and hydrogen.
ii) Dominant in kaolinite and illite types of clay minerals.
iii) Found in arid and semiarid regions

Options

(a) I
(b) ii
(c) iii
(d) i and iii

**36.** Exchangeable sodium percentage of saline alkali soil is [APPSC (RFO) 2022 General Forestry – I]
(a) Greater than 15%
(b) Between 10% and 15%
(c) Between 8% and10%
(d) Less than 8%

**37.** Which of the following crops is highly salt tolerant? [APPSC (RFO) 2022 General Forestry – I]
(a) Sunhemp
(b) Pea
(c) Linseed
(d) Barley

**38.** Assertion (A) : Gypsum is added to acidic soil [APPSC (RFO) 2022 General Forestry – I]
Reason (R) : Gypsum lowers the ESP to desired value.

Based on the given assertion and reason, select the correct option.

(a) Both A and R are true, and R is the correct explanation of A.
(b) Both A and R are true, but R is not the correct explanation of A.
(c) A is false but R is true.
(d) A is true but R is false

**39.** Urea contains ..... % of nitrogen [APPSC (Forest Section Officers) 2019]
(a) 56
(b) 66
(c) 36
(d) 46

**40.** Lime, dolomite, basic slag, flue dust and wood ash are used for reclamation of ..... [APPSC (Forest Section Officers) 2019]
(a) Acidic soil
(b) Sodic soil
(c) Saline soil
(d) Fluffy paddy soil

**41.** Which of the following conditions define '*Saline soil*'? [APPSC (Forest Section Officers) 2019]
(a) ECe> 4 dS/m. pH < 8.5 and ESP< 15
(b) ECe> 4 dS/m. pH <8.5 and ESP> 15
(c) ECe>4 dS/m. pH > 8.5 and ESP < 15
(d) ECe< 4 dS/m. pH <8.5 and ESP> 15

**42.** ..... evaluates the quality of a soil as a function of its characteristics, water, plant and other biological properties. [APPSC (Forest Section Officers) 2019]
(a) Soil Sampling
(b) Soil Rating Chart
(c) Soil Testing
(d) Soil Health Card

**43.** Sodic soil is characterised by a disproportionately high concentration of [APPSC (FRO) 2018 General Forestry Paper - I]
(a) Na+
(b) K+
(c) Ca2+
(d) Mg2+

**SOIL EROSION**

**44.** Saltation, suspension and surface creep are three basic stages of _____ [APPSC (RFO) 2022 General Forestry – I]
(a) Geological erosion
(b) Wind erosion
(c) Water erosion
(d) Biotic erosion

**45.** Erosion because of the kinetic energy of falling raindrops is called _____ [APPSC (RFO) 2022 General Forestry – I]
(a) Rill erosion
(b) Splash erosion
(c) Gully erosion
(d) Sheet erosion

**46.** Which of the following is the most severe form of the erosion? [APPSC (Forest Section Officers) 2019]
(a) Gully erosion
(b) Splash erosion
(c) Rill erosion
(d) Sheet erosion

**47.** ..... mechanically breaks up the compacted soil layers. [APPSC (Forest Section Officers) 2019]
(a) Deep Ripping

(b) Mounding
(c) Levelling

**48.** Which of the following is Primany tillage? [APPSC (Forest Section Officers) 2019]
(a) Deep tillage
(b) Year round tillage
(c) All of the given options
(d) Sub soiling

**49.** Which of the following condition(s) is / are correct? [APPSC (Forest Section Officers) 2019]
(a) All fertile soils are productive.
(b) All productive soils are fertile.
(c) All productive soils need not be fertile.
(d) All of the given options

**50.** What kind of unconformity occurs when the beds beneath an erosional surface are tilted and eroded [APPSC (FRO) 2018 General Forestry Paper - I]
(a) Paraconformities
(b) Non- conformities
(c) Angular unconformities
(d) Disconformities

**51.** The minimum friction velocity required to initiate the movement of soil particles is called [APPSC (FRO) 2018 General Forestry Paper - I]
(a) Optimum friction velocity
(b) Maximum friction velocity
(c) Terminal friction velocity
(d) Threshold friction velocity

**52.** According to the global assessment of human-induced soil degradation (glasod), what is the percentage of world's land that is degraded due to human activity? [APPSC (FRO) 2018 General Forestry Paper - I]
(a) 2%
(b) 5%
(c) 10%
(d) 15%

## WATERSHED MANAGEMENT

**53.** How many Land Capability Classes are there? [APPSC (ACF) 2022 General Forestry – I]
(a) Six
(b) Four
(c) Five
(d) Eight

**54.** Which of the following species is the most suitable for the reclamation of saline and alkaline soils? [APPSC (ACF) 2022 General Forestry – I]
(a) Tamarindus indica
(b) Dalbergia sissoo
(c) Populus deltoides
(d) Prosopis juliflora

**55.** ..... is a watershed development project sponsored by the Central Government that aims at enabling the rural population to conserve water for drinking, irrigation, fisheries and afforestation [APPSC (ACF) 2022 General Forestry – I]
(a) Atal Bhujal Yojana
(b) Arvary Pani Sansad
(c) Haryali
(d) Neeru-Meeru

**56.** The Central Ground Water Authority was constituted under Section _____ of the Environment (Protection) Act, 1986 [APPSC (ACF) 2022 General Forestry – I]
(a) 3 (3)
(b) 5 (3)
(c) 2 (1)
(d) 6 (2)

**57.** Understanding of relationships between hydrological and biological processes at different scales to improve water security, enhance biodiversity and further opportunities for sustainable development by lessening ecological threats and maximising greater harmony within catchment processes, is called [APPSC (RFO) 2022 General Forestry – I]
(a) Ground water hydrology
(b) Hydroinformatics
(c) Hydrogeology
(d) Ecohydrology

**58.** Match the following hydrological events and their measurement method/ the factors they depend on [APPSC (RFO) 2022 General Forestry – I]

| Hydrological event | Measurement and/or dependent upon |
|---|---|
| A) Inconsistency of rainfall data | 1) Topography |
| B) Runoff | 2) Temperature |
| C) Evaporation | 3) Double mass curve technique |

(a) A-1, B-2, C-3
(b) A-3, B-1, C-2
(c) A-3, B-2, C-1
(d) A-2, B-3, C-1

**59.** Match the following hydrological events and their respective measurement methods [APPSC (RFO) 2022 General Forestry – I]

| Hydrological event | Measurement |
|---|---|
| A) Hydrological cycle | 1) Kirpich formula |
| B) Evapotranspiration | 2) Blaney criddle method |
| C) Time of concentration | 3) Water budget equation |

(a) A-3, B-1, C-2
(b) A-2, B-3, C-1
(c) A-1, B-2, C-3
(d) A-3, B-2, C-1

**60.** Match the following stream hierarchy and their number [APPSC (RFO) 2022 General Forestry – I]

| Stream hierarchy | Number |
|---|---|
| A) Water resources region | 1) 35 |
| B) Basins | 2) 112 |
| C) Catchments | 3) 3257 |
| D) Watersheds | 4) 6 |

(a) A-1, B-2, C-3, D-4
(b) A-4, B-3, C-2, D-1
(c) A-4, B-1, C-2, D-3
(d) A-4, B-2, C-3, D-1

**61.** The delineation of Water Resource Regions into their subsequent division and subdivisions is – Basin, Catchment, Watershed, Sub watershed and Micro-watershed. Arrange them in decreasing order of their size [APPSC (RFO) 2022 General Forestry – I]

(a) Catchment > Basin > Watershed > Sub watershed > Micro-watershed
(b) Watershed > Basin > Catchment > Micro-watershed > Sub watershed
(c) Basin > Catchment > Watershed > Sub watershed > Micro-watershed
(d) Catchments > Watershed > Basin > Sub watershed > Micro-watershed

**62.** The number assigned to Water Resource Region in which all drainage flow into the Arabian Sea except Indus drainage, as suggested by Dr. AN Khosla in 1949, is _____ [APPSC (RFO) 2022 General Forestry – I]

(a) 2
(b) 4
(c) 5
(d) 6

**63.** The initial stage of water erosion in any watershed is _____ [APPSC (RFO) 2022 General Forestry – I]

(a) rill erosion
(b) gully erosion
(c) sheet erosion
(d) splash erosion

**64.** Which of the following statements is/are correct? [APPSC (RFO) 2022 General Forestry – I]

A) The mass rainfall curve is a plot between the accumulated rainfall at a station as ordinate and time as abscissa, plotted in chronological order.
B) The hyetograph is the graphical representation of rainfall versus time.

**Options**

(a) Only statement B is correct
(b) Both statements A and B are incorrect
(c) Only statement A is correct
(d) Both statements A and B are correct

**65.** Which of the following statements are correct? [APPSC (RFO) 2022 General Forestry – I]

A) Runoff coefficient is the ratio of runoff to rainfall intensity
B) It is a larger value for areas with high infiltration and low runoff, and higher for permeable, well vegetated areas.
C) Runoff coefficient is regulated by vegetation composition, surface coverage, slope and soil type.
D) It is used in the rational method to calculate the quantity of water that the drainage system needs to handle.

**Options**

(a) Only statements C and D are correct
(b) Only statements A, B and C are correct
(c) Only statements A and B are correct
(d) Only statements B, C and D are correct

**66.** The range and average size (in hectare) of a micro-watershed in India is ____ and _____, respectively [APPSC (RFO) 2022 General Forestry – I]

(a) 500–1500; 1000
(b) 1000–2000; 1500

(c) 1000–1500; 750
(d) 2000–3000; 2500

**67.** The time taken for the runoff to reach from the remotest point of the watershed to the outlet is called [APPSC (RFO) 2022 General Forestry – I]
(a) Run off lag coefficient
(b) Runoff coefficient time
(c) Time of concentration
(d) Time lag coefficient

**68.** _____ is a set of characteristics curve that describe the rainfall characteristics specific to the region [APPSC (RFO) 2022 General Forestry – I]
(a) Peak-Flow
(b) Intensity-Duration-Frequency
(c) Peak-Erodibility
(d) Peak-Intensity-Flow

**69.** Permanent gully control structures are designed for a period of _____ years [APPSC (RFO) 2022 General Forestry – I]
(a) 5 to 10
(b) 10 to 20
(c) 20 to 25
(d) 25 to 50

**70.** _____ is a series of broad channel or embankments constructed at suitable spacing along the graded gentle slopes [APPSC (RFO) 2022 General Forestry – I]
(a) Continuous trench
(b) In-line trench
(c) Contour trench
(d) Staggered trench

**71.** _____ is/are widely used to estimate runoff from small-to medium-sized watersheds [APPSC (RFO) 2022 General Forestry – I]
(a) Soil-vegetation land use
(b) Antecedent moisture conditions
(c) SCS curve-number
(d) Soil antecedent moisture

**72.** ..... refers to a technique of lowering groundwater in waterlogged areas by raising tree plantations. [APPSC (Forest Section Officers) 2019]
(a) Bio-exhaustion
(b) Bio-drainage
(c) Bio-depletion
(d) None of the given options

**73.** The Chauka system is a method for harvesting rainwater practiced in which Indian state? [APPSC (FRO) 2018 General Forestry Paper - I]
(a) Rajasthan
(b) Gujrat
(c) Madhya Pradesh
(d) Bihar

**74.** Who is popularly known as the waterman of India? [APPSC (FRO) 2018 General Forestry Paper - I]
(a) Shirish Apte
(b) Ayyappa Masagi
(c) Rajendra singh
(d) Aabid Surti

**75.** What is the size of the milli watershed? [APPSC (FRO) 2018 General Forestry Paper - I]
(a) 10,000 to 50,000 ha
(b) 1,000 to 10,000 ha
(c) 100 to 1,000 ha
(d) 1to 100 ha

**76.** Who developed the universal soil loss equation (ULSE) [APPSC (FRO) 2018 General Forestry Paper - I]
(a) Lorenzo A Richards
(b) Justus von Liebig
(c) George Nelson Coffey
(d) W Wischmeier and D Smith

**77.** Subsurface water that is found in a fully saturated zone is known as [APPSC (FRO) 2018 General Forestry Paper - I]
(a) Vadose water
(b) Capillary water
(c) Groundwater
(d) Soil water

## AGROFORESTRY + SOCIAL FORESTRY

**78.** World Agroforestry Centre is located in [APPSC (ACF) 2022 General Forestry – I]
(a) Kenya
(b) South Africa
(c) Ethiopia
(d) Zimbabwe

**79.** The term 'social forestry' was coined by [APPSC (ACF) 2022 General Forestry – I]
(a) BT Kang
(b) JC Westoby
(c) Dietrich Brandis
(d) JB Raintree

**80.** Which of the following are the basic attributes of all agroforestry systems that form the basis for evaluation of various agroforestry systems? [APPSC (ACF) 2022 General Forestry – I]
(a) Potentiality, Productivity and Adaptability

(b) Sustainability, Profitability and Productivity
(c) Productivity, Sustainability and Adaptability
(d) Productivity, Suitability and Adoptability

**81.** 'Seasonal grazing of cattle in pastures under trees' is what type of temporal arrangement in agroforestry systems? [APPSC (ACF) 2022 General Forestry – I]
(a) Interpolated
(b) Concomitant
(c) Coincident
(d) Intermittent

**82.** Shifting cultivation is locally called _____ in Malaysia [APPSC (ACF) 2022 General Forestry – I]
(a) Hanumo
(b) Ladang
(c) Karen
(d) Milpa

**83.** Which secondary metabolite present in Leucaena spp. Is responsible for its allelopathic effect? [APPSC (ACF) 2022 General Forestry – I]
(a) Mimosine
(b) Cyanogenic glycoside
(c) Anthraquinone
(d) Coumarin

**84.** ..... Is a multipurpose tree species which is native to Australia [APPSC (ACF) 2022 General Forestry – I]
(a) Robinia psuodoacacia
(b) Prosopis juliflora
(c) Leucaena leucocephala
(d) Casuarina equisetifolia

**85.** Which of the following is **NOT** true with regard to the selection criteria for good alley cropping trees? [APPSC (ACF) 2022 General Forestry – I]
(a) It should be nitrogen-fixing in nature.
(b) It should be able to resprout quickly after pruning, coppicing or pollarding.
(c) It should have a shallow tap root system.
(d) It should have a light, open crown that allows sunlight to pass through.

**86.** The Zabo farming system is practised by tribal farmers of which state in India? [APPSC (ACF) 2022 General Forestry – I]
(a) Arunachal Pradesh
(b) Nagaland
(c) Sikkim
(d) Orissa

**87.** Which of the following factors is multiplied by total nitrogen content to determine the crude protein in fodder? [APPSC (ACF) 2022 General Forestry – I]
(a) 2.5
(b) 4.2
(c) 6.25
(d) 8.15

**88.** ..... Is the major cash crop of Chagga home gardens [APPSC (ACF) 2022 General Forestry – I]
(a) Tobacco
(b) Cashew nuts
(c) Coffee arabica
(d) Cloves

**89.** The practice of forestry in all its aspects on farm and village lands, generally more or less integrated with other farm operations, is called [APPSC (ACF) 2022 General Forestry – I]
(a) Village forestry
(b) Community forestry
(c) Farm forestry
(d) Social forestry

**90.** Taungya is a ___ Word [APPSC (ACF) 2022 General Forestry – I]
(a) Burmese
(b) Latin
(c) Greek
(d) French

**91.** Who among the following directed the development of a diagnosis and design (D&D) survey in agroforestry at ICRAF for the first time? [APPSC (ACF) 2022 General Forestry – I]
(a) GHS Nair
(b) JB Raintree
(c) PKR Nair
(d) JJ Tulman

**92.** Fan design and parallel row layouts, which are experimental designs in agroforestry, are examples of [APPSC (ACF) 2022 General Forestry – I]
(a) Y-designs
(b) Incomplete block designs
(c) Systematic designs
(d) Randomised complete block designs

**93.** Which of the following species is **NOT** recommended to create shelterbelts? [APPSC (ACF) 2022 General Forestry – I]
(a) *Quercus leucotrichophora*
(b) *Azadirachta indica*
(c) *Lannea coromendelica*

(d) *Prosopis juliflora*

**94.** Which of the following statements about social forestry is INCORRECT? [APPSC (ACF) 2022 General Forestry – I]

(a) Social forestry is the practice of forestry on lands outside the conventional forest area for the benefit of the rural and urban communities.

(b) Social forestry includes in it farm forestry, extension forestry, community woodlots, rehabilitation of degraded forests and recreation forestry.

(c) It was first recognised as an important component of forestry for meeting rural needs in the interim report of the National Commission on Agriculture in 1976.

(d) The term 'Social forestry' was coined by Indian National Congress in 1976.

**95.** Which of the following statements about selection of good agroforestry trees is INCORRECT? [APPSC (ACF) 2022 General Forestry – I]

(a) The trees should have light open crown that allows enough light penetration.

(b) The trees should have good re-sprouting ability after pruning or pollarding.

(c) The trees should have thick shallow roots.

(d) The trees should have good productive capacity for food, fibre, wood, etc.

**96.** Which of the following statements about home gardens is FALSE? [APPSC (ACF) 2022 General Forestry – I]

(a) They consist of an assemblage of plants, which may include trees, shrubs, vines and herbaceous plants, growing in or adjacent to a home compound.

(b) They have low species diversity.

(c) They exhibit diverse practices from growing vegetables behind houses to complex multistoreyed systems.

(d) The entire crop-tree-animal unit is managed by family labour.

**97.** In which Five-Year Plan period was National Research Centre for Agroforestry (NRCAF) established in Jhansi? [APPSC (ACF) 2022 General Forestry – I]

(a) Seventh

(b) Sixth

(c) Fifth

(d) Eighth

**98.** When two components— woody or non-woody— stay together for some part of life in an agroforestry system, the temporal arrangement of components is called [APPSC (ACF) 2022 General Forestry – I]

(a) Intermittent

(b) Interpolated

(c) Coincident

(d) Concomitant

**99.** As per the FAO classification of agroforestry systems, when all the three components, namely trees, animals and crops, are integrated into a system, then it represents _____ system [APPSC (ACF) 2022 General Forestry – I]

(a) Agrisilviculture

(b) Agrosylvopastoral

(c) Silvopastoral

(d) Hortipastoral

**100.** Hedge row inter-cropping and improved fallow are examples of _____ [APPSC (ACF) 2022 General Forestry – I]

(a) Hortipasture

(b) Silvipasture

(c) Agrisilviculture

(d) Agrihorticulture

**101.** In northern states of India like Haryana, Punjab and Uttar Pradesh, which tree crop combination does the most common agroforestry system have? [APPSC (ACF) 2022 General Forestry – I]

(a) Poplar and rice

(b) Teak and rice

(c) Grewia and wheat

(d) Poplar and wheat

**102.** International Council for Research in Agroforestry (ICRAF) or 'World Agroforestry' is located in _____ [APPSC (ACF) 2022 General Forestry – I]

(a) Gland, Switzerland

(b) Nairobi, Kenya

(c) Rome, Italy

(d) Vienna, Austria

**103.** The arrangement of components in an agroforestry system is done on a functional basis. Which of the following is the 'production function' role of an agroforestry system? [APPSC (ACF) 2022 General Forestry – I]

(a) Food

(b) Soil improvement

(c) Moisture conservation

(d) Shade

**104.** Taungya cultivation originated in _____ [APPSC (RFO) 2022 General Forestry – I]

(a) America
(b) India
(c) Burma
(d) Africa

**105.** Which of the following is NOT the basis of classification of agroforestry systems as given by Nair (1987)? [APPSC (RFO) 2022 General Forestry – I]

(a) History of the system (land use in the past)
(b) The structure of the system (composition and arrangement of components)
(c) Function of the system (role and output of components)
(d) Ecological spread (ecological zone where system exists)

**106.** Alley cropping is also called _____ [APPSC (RFO) 2022 General Forestry – I]

(a) tree-grain cropping
(b) hedge-row intercropping
(c) relay cropping
(d) shifting cultivation

**107.** Match the following basis of classification with their respective principles [APPSC (RFO) 2022 General Forestry – I]

| Basis of classification | Principle |
|---|---|
| A) Structure | 1) Level of input management (high or low inputs), commercial goals and, intensity and scale of management (Subsistence, commercial etc.) |
| B) Physiognomic | 2)Land use pattern in the course of adoption of agroforestry |
| C) Land use | 3) Composition and arrangement of components |
| D) Socio-economic | 4) Character of vegetation, e.g., Xeromorphic, etc. |

(a) A-1, B-2, C-3, D-4
(b) A-4, B-3, C-2, D-1
(c) A-3, B-2, C-4, D-1
(d) A-3, B-4, C-2, D-1

**108.** Match the following types of agroforestry systems with their respective time and temporal sequence of crops [APPSC (RFO) 2022 General Forestry – I]

| Type of Agroforestry system | Crop's temporal and time sequence |
|---|---|
| A) Concomitant | 1) When different crops grow on land together at one time, like pastures and trees |
| B) Interpolated | 2) When different components stay together for some period, like Taungya |
| C) Coincident | 3) When annual crops are grown under perennials, like wheat under populus. |
| D) Intermittent | 4) When different components occupy the space in different time, like home gardens. |

(a) A-2, B-4, C-1, D-3
(b) A-3, B-1, C-4, D-2
(c) A-1, B-2, C-3, D-4
(d) A-4, B-3, C-2, D-1

**109.** Match the following based on the functional classification of agroforestry systems [APPSC (RFO) 2022 General Forestry – I]

| Agroforestry system | Examples |
|---|---|
| A) Productive | 1) Soil Conservation |
| B) Protective | 2) Hedge-row cropping |
| C) Multipurpose | 3) Rearing of animals and fishes along with trees |

(a) A-1, B-2, C-3
(b) A-3, B-2, C-1
(c) A-1, B-3, C-2
(d) A-3, B-1, C-2

**110.** Which of the following is NOT a tropical/subtropical multipurpose tree in India? [APPSC (RFO) 2022 General Forestry – I]

(a) *Grewia optiva*
(b) *Betula utilis*
(c) *Bauhinia variegate*
(d) *Leucaena leucocephala*

**111.** *Ailanthus excelsa* is a fast-growing fodder tree that could be propagated in association with forage and food crops widely grown in the Indian Peninsula. What is its common name? [APPSC (RFO) 2022 General Forestry – I]

(a) Kadamb, Cadamba
(b) Whistling tree, Junglisaru
(c) Kapok tree, Silk-cotton tree
(d) Tree of Heaven, Ardu

**112.** Which of the following trees are NOT temperate agroforestry trees in India? [APPSC (RFO) 2022 General Forestry – I]

A) *Abies pindrow*
B) *Juglans regia*
C) *Robinia pseudocassia*
D) *Picea smithiana*

**Options**

(a) B and C
(b) A and B
(c) B and D
(d) D and A

**113.** In an agroforestry system, soil productivity is enhanced due to [APPSC (RFO) 2022 General Forestry – I]

A) Decreased soil organic matter
B) Addition of Nitrogen in the soil if leguminous plants are grown
C) Maintain soil organic matter
D) Promote more open nutrient cycling.

**Options**

(a) A and B
(b) A and C
(c) B and D
(d) B and C

**114.** Which of the following trees does NOT enhance nitrogen in soil, and thus soil productivity being a non-nitrogen fixing species? [APPSC (RFO) 2022 General Forestry – I]

(a) Caragana
(b) Luecaena
(c) Populus
(d) Faidherbia

**115.** In an agroforestry system, soil health is maintained by which of the following? [APPSC (RFO) 2022 General Forestry – I]

A) Decreasing biological components of soil
B) Increasing or stabilising physical components of soil
C) Improve chemical components in the soil in favour of plants

**Options**

(a) Only A
(b) Only B and C
(c) Only B
(d) Only A and C

**116.** Which of the following benefit soil health in agroforestry practices? [APPSC (RFO) 2022 General Forestry – I]

A) Improved soil nutrient availability and soil fertility due to the presence of trees in the system
B) Suppressed soil microbial dynamics
C) Incorporation of trees in agroforestry to enhance soil organic carbon

**Options**

(a) A and C
(b) A, B and C
(c) B and C
(d) A and B

**117.** Match the following ecozones with agroforestry systems that are primarily used to improve the habitat [APPSC (RFO) 2022 General Forestry – I]

| | |
|---|---|
| A) Tropical Soil productivity | 1) Agrisilvi, silvihorti and silvipasture |
| B) Arid lands soil productivity | 2) Multistorey cropping agrisilvisulture |
| C) Hill region soil productivity | 3) Shelter belts |
| D) Wetlands | 4) Alley cropping |

(a) A-2, B-4, C-3 D-1
(b) A-1, B-3, C-4, D-2
(c) A-4, B-1, C-2, D-3
(d) A-3, B-2, C-1, D-4

**118.** Social Forestry programme was launched in [APPSC (RFO) 2022 General Forestry – I]

(a) Seventh five year plan
(b) Sixth five year plan
(c) Fifth five year plan
(d) Eighth five year plan

**119.** Which of the following agroforestry trees is NOT known to cause allelopathy or toxicity in the soil? [APPSC (RFO) 2022 General Forestry – I]

(a) Eucalyptus
(b) Leucaena
(c) Gmelina
(d) Populus

**120.** Among the crops grown in the homestead ..... is the most dominant and important tree known as 'Tree of Hundred uses' [APPSC (Forest Section Officers) 2019]

(a) Palmyra
(b) Coconut
(c) Arecanut
(d) Tapioca

**121.** Home Gardens is the most prevalent agro-forestry system being adopted in ..... [APPSC (Forest Section Officers) 2019]

(a) High land
(b) Semi arid region
(c) Humid tropical region
(d) Arid region

**122.** The sustainable land use systems involving trees combined with crops and I or animals on the same unit of land is termed as..... [APPSC (Forest Section Officers) 2019]

(a) Sustainable forest management
(b) Social Forestry
(c) Agroforestry
(d) Farm Forestry

**123.** ..... cultivation is also known as 'slash and burn' or Swidden cultivation'. [APPSC (Forest Section Officers) 2019]

(a) Shifting
(b) Taungya
(c) Silvipasture
(d) Hortipasture

**124.** Of succulent feeds, .....is the most convenient and economic method for maintaining larger livestock [APPSC (Forest Section Officers) 2019]

(a) pasture
(b) Cultivated fodder tree
(c) Cultivated fodder crops
(d) Silage

**125.** ..... species is an important fodder tree for dry region of the country. [APPSC (Forest Section Officers) 2019]

(a) *Agropyrum caninum*
(b) *Acacia nilotica*
(c) *Salix spp.*
(d) *Populus alba*

**126.** Which type of farming is used to restore soil fertility in India's dry lands? [APPSC (Forest Section Officers) 2019]

(a) Co-operative farming
(b) Irrigation farming
(c) Ley farming
(d) Plantation farming

**127.** The homegardens are cited as an excellent example to show diversity and complexity of the structure and function of tropical homegardens. [APPSC (Forest Section Officers) 2019]

(a) Kandyan
(b) Javanese
(c) Kerala
(d) Fuyo

**128.** How many agro - climatic zones are there in India? [APPSC (FRO) 2018 General Forestry Paper - I]

(a) 10
(b) 13
(c) 15
(d) 20

**129.** How many biogeographic zones are there in India? [APPSC (FRO) 2018 General Forestry Paper - I]

(a) 10
(b) 11
(c) 9
(d) 12

**130.** Agrosilvopastoral systems consist of which of these elements [APPSC (FRO) 2018 General Forestry Paper - I]

(a) Animals, tress and crops
(b) Only trees and crops
(c) Only animals and crops
(d) Only animals and trees

**131.** The first taungya plantations were raised in North Bengal in the year [APPSC (FRO) 2018 General Forestry Paper - I]

(a) 1896
(b) 1897
(c) 1899
(d) 1898

**132.** The term social forestry was first used in 1976 in India by [APPSC (FRO) 2018 General Forestry Paper - I]

(a) The National Commission on Agriculture
(b) The National Commission on Horticulture

(c) The National Commission on Forestry
(d) The National Commission on Silviculture

**133.** Diversity of plant material in polycultural systems often leads to [APPSC (FRO) 2018 General Forestry Paper - I]
(a) Higher pest intensities
(b) No pest intensities
(c) Lower pest intensities
(d) Very high pest intensities

**134.** The scope of social forestry does not include which type of forestry [APPSC (FRO) 2018 General Forestry Paper - I]
(a) Farm forestry
(b) Community woodlots
(c) Community reserve
(d) Extension forestry

**135.** In which year was the national agroforestry policy launched in india? [APPSC (FRO) 2018 General Forestry Paper - I]
(a) 2013
(b) 2014
(c) 2017
(d) 2018

**136.** Where is the headquarters of the international centre for research in agroforestry (icraf) located? [APPSC (FRO) 2018 General Forestry Paper - I]
(a) Kathmandu
(b) New Delhi
(c) Dhaka
(d) Nairobi

**137.** The term 'social forestry' was coined by [APPSC (FRO) 2018 General Forestry Paper - I]
(a) Gifford Pinchot
(b) Dietrich Brandis
(c) JCWestoby
(d) John Evelyn

## JOINT FOREST MANAGEMMENT

**138.** The policies and guidelines of the joint forest management are enunciated in [APPSC (FRO) 2018 General Forestry Paper - I]
(a) The National Forest Policy of 1952
(b) The National Forest Policy of 1988
(c) The Forest (Conservation) Act, 1972
(d) The Biodiversity Act, 2002

**139.** Joint Forest Management in Andhra Pradesh was initiated in the year [APPSC (ACF) 2022 General Forestry – I]
(a) 1992
(b) 1990
(c) 1986
(d) 1996

**140.** National Forest Policy of 1988 (NFP) represented a major paradigm shift from earlier policies and this shift began to take some shape through the introduction of [APPSC (RFO) 2022 General Forestry – II]
(a) ban on any non-forest activity or the de-reservation of forest land
(b) Use of biological diversity subject to the approval of National Biodiversity Authority
(c) Joint Forest Management (JFM) in India in 1990
(d) Demarcation of over 500 National Parks and Sanctuaries termed as 'protected areas' (Pas)

**141.** Joint Forest Management Committees (JFMC) and Eco-Development Committees (EDC) were formed in JFM [APPSC (RFO) 2022 General Forestry – I]

(A) Because rural communities are equal partners in the protection and management of forests
(B) Because forest departments were not able to handle JFM objectives adequately
(C) Because both members and non-members control the management of forest and community lands
(D) To decrease the influence of all people in the objectives of management of their local forests
(E) To develop local leadership for bigger role in future

Which of the following statements are correct?

(a) Only statements A, B and D are correct
(b) Only statements B, D and E are correct
(c) Only statements C, D and E are correct
(d) Only statements A, C and E are correct

**142.** JFM guidelines 2002 proposed capacity building for recognising the importance of NTFP management in good forest areas through [APPSC (RFO) 2022 General Forestry – I]

(a) Their non-destructive harvesting in accordance with working plans.
(b) Unequal sharing of economic benefits as per the agreement done by the Forest department and people community at the beginning of project.
(c) Institutional reforms

(d) Strengthening the set-up of NTFP management

Select the correct option based on the following.

(a) A, B and C

(b) A, C and D

(c) B, C and D

(d) A, B, C, and D

**143.** Guidelines by MOEFCC for strengthening the Joint Forest Management Programmes included [APPSC (RFO) 2022 General Forestry – I]

(A) Methods of legal backup to the JFM committees

(B) Proposed conditions to promote participation of women, certain threshold criteria were proposed for JFMCs

(C) Proposed Micro Plan preparation methods for both new working plan and existing working plan areas.

(D) Suggested to reinvest 35% of the share of village community and of the forest department in forest for regeneration of resources.

(E) Proposed concurrent monitoring at Division and State level. Evaluation at interval of 5 years at division level and 6 years at state level.

Select the correct option based on the following

(a) A, D, and E

(b) A, B, C and D

(c) A, B, D and E

(d) A, B and C

**144.** A democratic, decentralised and transparent local institution of forest and forest fringe dwelling communities, that is part of the Gram Sabha fully or partially, and set up as per the provisions of applicable JFM rules/guidelines of the state outside the protected areas and their buffer zones, is called [APPSC (RFO) 2022 General Forestry – I]

(a) Executive Committee

(b) Eco-Development Committee

(c) Joint Forest Management Committee

(d) Forest Development Committee

**145.** Various committees are constituted in any JFM programme so that [APPSC (RFO) 2022 General Forestry – I]

A) Rural communities are equal partners in the protection and management of forests

B) Both members and non-members have control on the management of forest lands and community lands.

C) They develop forest resources for sustainable use, but don't claim direct benefits from it.

D) Local leadership for bigger role in future is developed.

Select the correct option based on the following

(a) A, B and C

(b) B, C and D

(c) A, B and D

(d) B and A

**146.** The first JFM guidelines was issued by MoEF in the year ..... [APPSC (Forest Section Officers) 2019]

(a) 1992

(b) 2000

(c) 1990

(d) 1996

**147.** Joint forest management originated in 1980s in which Indian state? [APPSC (FRO) 2018 General Forestry Paper - I]

(a) Bihar

(b) Assam

(c) Madhya Pradesh

(d) West Bengal

# Answer Key

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. b | 2. a | 3. a | 4. d | 5. c | 6. b | 7. a | 8. b | 9. d | 10. c | 11. a | 12. c |
| 13. b | 14. b | 15. a | 16. b | 17. d | 18. d | 19. c | 20. a | 21. c | 22. d | 23. a | 24. b |
| 25. b | 26. d | 27. a | 28. b | 29. a | 30. a | 31. a | 32. b | 33. d | 34. c | 35. c | 36. a |
| 37. d | 38. c | 39. d | 40. a | 41. a | 42. d | 43. a | 44. b | 45. b | 46. a | 47. a | 48. c |
| 49. b | 50. c | 51. d | 52. d | 53. d | 54. d | 55. c | 56. a | 57. d | 58. b | 59. d | 60. c |
| 61. c | 62. c | 63. d | 64. c | 65. a | 66. a | 67. c | 68. b | 69. d | 70. a | 71. c | 72. b |
| 73. a | 74. c | 75. b | 76. d | 77. c | 78. a | 79. b | 80. c | 81. d | 82. b | 83. a | 84. d |
| 85. c | 86. b | 87. c | 88. c | 89. c | 90. a | 91. b | 92. c | 93. a | 94. d | 95. c | 96. b |
| 97. a | 98. d | 99. a | 100. c | 101. d | 102. b | 103. a | 104. c | 105. a | 106. b | 107. d | 108. a |
| 109. d | 110. b | 111. d | 112. d | 113. d | 114. c | 115. b | 116. a | 117. b | 118. c | 119. d | 120. b |
| 121. c | 122. c | 123. a | 124. a | 125. b | 126. c | 127. b | 128. c | 129. a | 130. a | 131. a | 132. a |
| 133. c | 134. c | 135. b | 136. d | 137. c | 138. b | 139. a | 140. c | 141. d | 142. b | 143. d | 144. c |
| 145. c | 146. c | 147. d | | | | | | | | | |

CHAPTER 1

# FOREST SOIL

## [INTRODUCTION]

## 1.1 WHAT IS SOIL ?

Soil is the *unconsolidated mineral material on the immediate surface of the earth* that serves as a natural medium for the growth of land plants.

Forest soil is a portion of the earth's surface that serves as a medium for the growth and sustenance of forest vegetation.

**PEDON** ?

A *pedon* is a 3-dimensional smallest unit or volume of soil that contains all the soil horizons of a particular soil type with 1 $m^2$ at the surface and extends to the bottom bedrocks of the soil.

Term Soil is derived from the *Latin* term – *Solum*, which means *Floor****

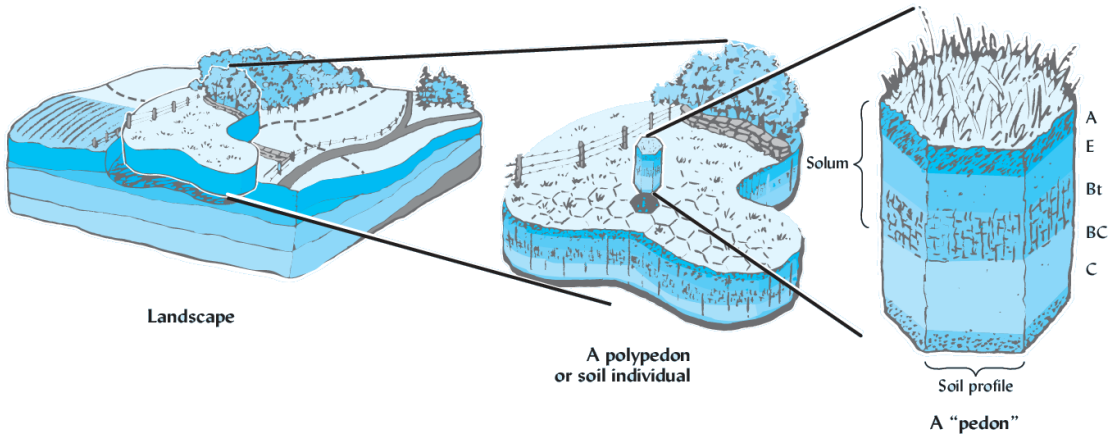



**Figure 1.1 :** Pedon is a natural body of soil that is large enough to allow classification of the soil.

**PEDOLOGY** : Pedology = Pedon + Logos = Greek word

↓ ↓

Soil/Earth Study

Pedology is the study of *soil genesis*, *classification*, and *mapping*/description of soil for land use planning. Therefore, it is helpful in forestry, forest road construction, and land capability classification.

- *Soil genesis* : the mode of origin of soil with particular reference to the processes and soil-forming factors responsible for the development of solum or true soil.
- *Soil survey* : consists of morphological examination, description, classification, and mapping of soils in their natural environment.
- *Soil classification* : is the process of logical grouping based on the properties and characteristics of representative units (pedon).

CHAPTER 2

# ROCKS & THEIR FORMATION

## 2.1 INTRODUCTION

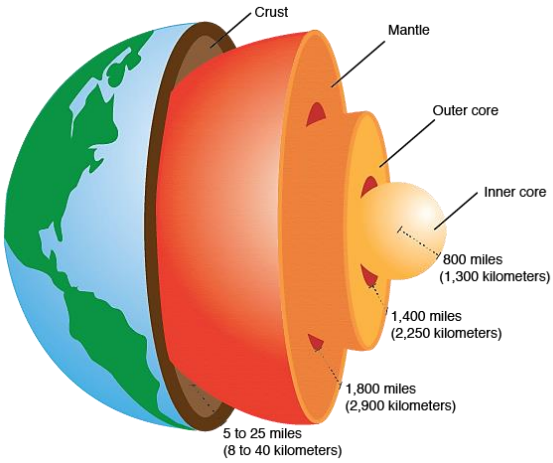
Earth formed about *4.6 billion years* ago from a mixture of gas and dust around the sun. The dust particles were drawn together by drag, forming clumps of rock called *planetesimals*. These planetesimals collided with each other, growing into Mars-sized *protoplanets*. Earth's final size was achieved through a major collision with another Mars-sized object, known as the *moon-forming impact*.

### EARTH STRUCTURE

The structure of the earth is divided into four major components: the crust, the mantle, the *Outer Core (Liquid)*, and the *Inner Core (Solid)*. Each layer has a unique chemical composition and physical state.

### COMPOSITION OF *Earth Crust****

| | | | |
|---|---|---|---|
| **Non-Metal** | ***Oxygen*** ($O^{2-}$) | 46.6% (***Highest***) | **≈ ¾** of total |
| | Silicon ($Si^{4+}$) | 27.7 % | |
| Metal | ***Aluminium*** (Al) | 8.1 % | ≈ ¼ of total |
| | Iron (Fe) | 5 % | |
| | Calcium (Ca) | 3.6 % | |
| | Magnesium (Mg) | 2 % | |
| | Others | 1.4 % | |




✍ ***O–Si–Al, Fe–Ca–Mg***

## 2.2 WHAT ARE ROCKS

*Rocks are a* ***hard mass of mineral matter*** *comprising one or more rock-forming minerals.* Rocks are the materials that form the essential part of the Earth's solid crust.

### BASED ON THE MODE OF FORMATION

► **IGNEOUS ROCKS** : Cooling and consolidation of molten magma within or on the surface of the Earth.

Characteristics

- Crystal formation = ✓
- Layers = ✗
- Porous = ✗

✍ Rocks are formed from the molten material known as *Magma*.
✍ *Petrology* = The study of rocks (in Greek, Petra means rock, Logos means science).
✍ *Petrogenesis* = Study of the origin of rocks.

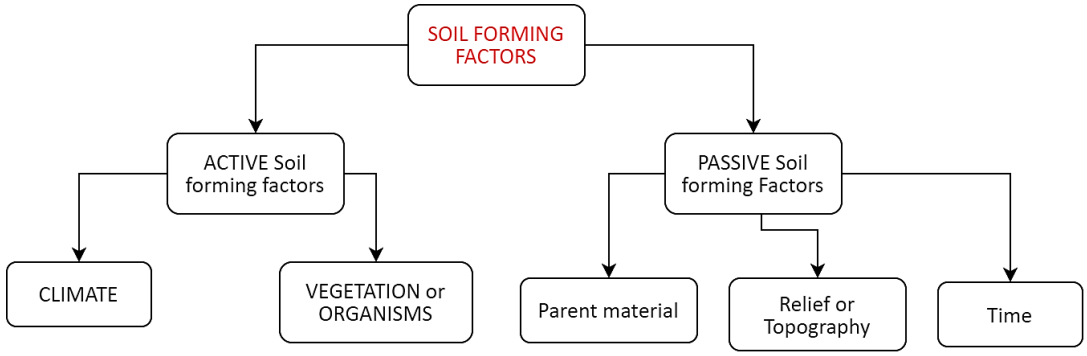
CHAPTER 4

# SOIL FORMATION

## 4.1 SOIL FORMATION ?

Soil formation is the *evolution of true soil from regolith* taken place by the combined action of ① soil-forming factors and ② Processes.

### SOIL FORMING FACTORS




- **Climate** : Impact of rainfall, heat, cold, wind, etc., over rocks.
- **Vegetation** or **Organism** : Many organisms play an active role in breaking down rocks and minerals and transforming them into fertile soil, *i.e.*, Wild animals, Fossorials, Plants, Fungi, Man, etc.
- **Parent material** : Soil is the result of the weathering and pedogenic process of Rocks. So, types of rocks and their composition indirectly (Passively) influenced the soil properly like Soil texture, Structure, pH, water holding capacity, the dominance of specific minerals, etc.

| SN | Soil Group | Predominant vegetation |
|---|---|---|
| 1. | Lateritic soil | Xylia xylocarp (Irul wood) |
| 2. | Basaltic rocks (pH 6.5 to 7.5) | Teak - prefer to grow in lime-rich soil and generally avoid growing below and above this pH |
| 3. | Acid rocks contain Iron Ores | *Shorea robusta* |
| 4. | Quartzite rock | Chir-pine and Pterocarpus santalinus (Red sanders) grow very well. However, Dendrocalamus strictus (Male bamboo) avoid to growth on this rocky soil. |
| 5. | Mica schist rock | Blue pine |

  - *Dipterocarpus* prefer to grow on conglomerate and hard metamorphic sandstone.

- **Time**
- **Relief or Topography** : topography refers to the differences in the elevation of the land surface. As per FAO guidelines –

CHAPTER 5

# SOIL CLASSIFICATION

Before the onset of modern scientific exploration and classification of soil, we relied on a *traditional method* that was not only easy for the common person to understand but also provided some insight into their physical features, such as red soil (red in colour), Usar (unfertile soil), black (kali) soil, alluvial (jalod) soil, and others.

**ISSUE WITH THIS SYSTEM**

- It is based on the physical features of soil, or we can say its external appearance. However, as our knowledge about soil broadens with globalization, it creates challenges: how can we differentiate one type of soil from another?
- The same types of soil may have different names in various regions, which has led to the need for standardization of soil names.
- The traditional system did not explain the presence of a particular type of soil in a particular type of environment, its origin, and its development.

► **DOKUCHAIV** : the 1st-time *genetical system of soil classification* based on ***zonation*** given by Dokuchaiv. Later, **Boldwin** further extends and improves this concept. According to this system of classification, soils are –

  - **[Class A] ZONAL SOIl** : types of soil that are distributed in particular types of climate and have well-developed soil profiles, *i.e.*, Laterite soil, Tundra soil, Chernozem soil, etc.
  - **[Class B] INTERZONAL SOIL** : the types of soil that are present in an area b/w of two zones and more influenced by local condition rather than climatic zone, *i.e.*, Saline soil (*Halomorphic* soil), Bog soil (*Hydromorphic* soil), and Rendzina soil (*Calcimorphic* soil), etc.
  - **[Class C] AZONAL SOIL** : Young soil that neither shows any effect of climatic zone nor has a well-developed soil profile, *i.e.*, Alluvial soil, Aeolian soil.

**SOIL TAXONOMY : A COMPREHENSIVE SYSTEM**

A more comprehensive and morpho-genetic system of soil classification in which the morphology of soil, which is the outcome of soil genesis, serves as a guide. The system is based on the properties of soil as they exist today.

**Taxonomic categories**

*Order* (Highest category) → Sub-order → Great-*group* → Sub-group → *Family* → *Series* → *Phase*

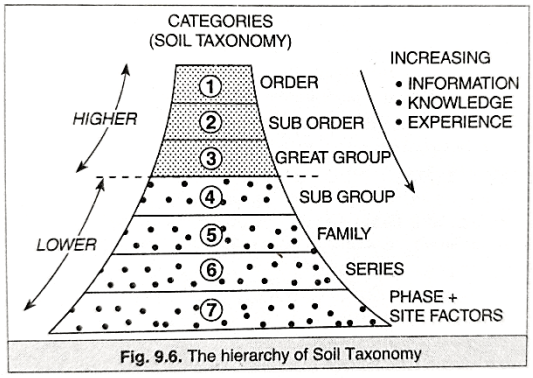


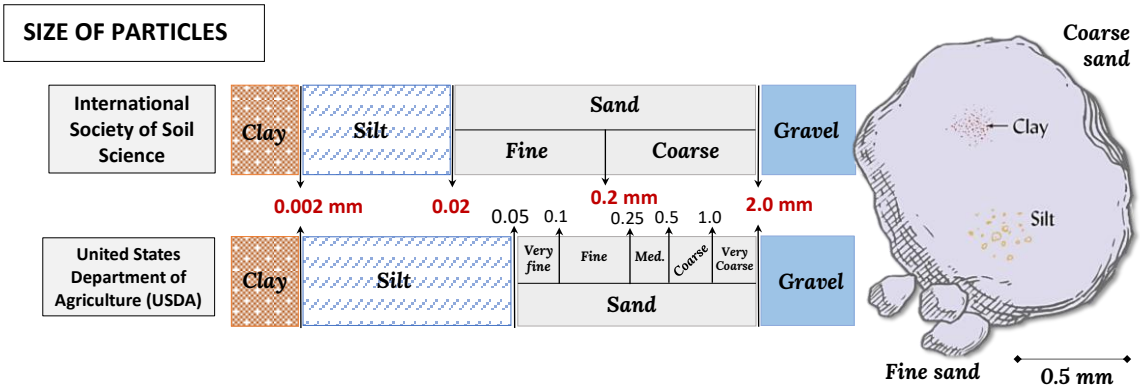
**Fig. 9.6.** The hierarchy of Soil Taxonomy

CHAPTER 6

# SOIL PHYSICAL PROPERTIES

## 6.1 SOIL TEXTURE

The *relative percentage of sand, silt, and clay in the soil*[***]. Where *sand and silt work as a skeleton* of soil in which *clay particles fill as flesh*. The size of particles in mineral soil is not subject to change (*i.e.*, by cultural practices). Therefore, this composition is considered a permanent feature and a *basic property* of soil. Mechanical analysis of soil separates, *i.e.,* the percentage of sand, silt, and clay done by the *hydrometric method*.




- Clay particle size : < 0.002 *mm*[***]
- Soil texture refers to the relative amounts of sand, silt, and clay, and it directly affects a soil's *cohesion*, *adhesion*, and *plasticity*. Clay soils have a characteristically *fine/heavy texture*.
- **Loam soil** – (a) best suitable soil for agriculture purposes, (b) it contains *sand, silt and clay minerals in an equal property*[***] proportional and *not in equal percentage*.
- **Soil texture determination methods** : (a) Feel methods – Ball formation, Ribbon formation. (b) Laboratory method – Mechanical analysis.

### EXERCISE

**1.** The size of clay particles is [APPSC (ACF) 2022 General Forestry – I]
(a) <0.002 millimetres
(b) 0.002 to 0.003 millimetres
(c) >0.002 millimetres
(d) 0.002 to 0.004 millimetres

**2.** According to the International Society of Soil Science classification, the size of *silt particles* is [APPSC (ACF) 2022 General Forestry – I; OPSC Civil (pre) 2006]
(a) 0.02 mm
(b) 0.002–0.02 mm
(c) 0.002 mm
(d) 0.002–0.02 cm

**3.** ..... is the *size of clay particles* as per USDA classification of soil texture [APPSC (Forest Section Officers) 2019]
(a) <0.02mm
(b) <2mm
(c) <0.2mm
(d) <0.002mm

**4.** Soil separates are the size groups of mineral particles that are [APPSC (FRO) 2018 General Forestry Paper - I]
(a) Between 3 mm and 4 mm in diameter
(b) Between 4 mm and 5 mm in diameter
(c) Between 5 mm and 6 mm in diameter
(d) Less than 2 mm in diameter

1. (a), 2. (b), 3. (d), 4. (d)

CHAPTER 8

# AFFORESTATION OF DIFFICULT SITES

**CONTENT**

1. Hot desert and shifting sand dunes
2. Acidic soil
3. Saline alkaline area
4. Ravine land
5. Cold desert
6. Coastal land
7. Wetland
8. Mined area

## 8.1 HOT DESERT AND SHIFTING SAND DUNES


► **DISTRIBUTION** : The total area of hot desert in India is ~~*31.7 million hectares*~~, 61 % of which lies in Rajasthan.

| Types | 2008 - 09 | 2015 – 16 (% to TGA) |
|---|---|---|
| Ravines Sand | 3165 $km^2$ | 3121 $km^2$ (0.09) |
| Coastal Sands | 709 $km^2$ | 671 $km^2$ (0.02) |
| Desertic sand | 8323 $km^2$ | 8191 $km^2$ (0.25) |

(*Source* : Westland Atlas of India 2019)

► **LOCALITY FACTORS** : Mean annual rainfall = 100 mm to 450 mm. The rainfall in these regions is irregular, and droughts are frequent.

- **Temperature** : 48 °C in may-June to 15°C during winter, even sometimes it goes below freezing point at several places.
- **Wind** : 100 to 150 km per hour are experienced during summer.
- **Soil** : Sandy in character with a well-developed *hardpan* of *calcium carbonate* at varying depths. Desert soils are purely mineral soils obtained by the mechanical disintegration of rocks. Characteristics : (i) Very low organic matter, (ii) High percentage of soluble salts, (iii) Low nutrient status, particularly nitrogen, (iv) High pH and calcium carbonate, (v) Structureless and coarse-textured, (vi) Very poor water holding capacity and (vii) Absolute deficiency of soil moisture.
- **Sand dunes** are the dominant form that covers around 60 % area of the Thar desert.

► **ISSUES** : (1) Poor nutrients & organic matter, (2) Unstable soil structure and often shifting of it (shifting sand-dunes) (3) poor water holding capacity, (4) High salinity and pH, (5) poor rainfall, (6) Formation of calcareous hardpan, etc.

CHAPTER 1

# WATERSHED MANAGEMENT

## 1.1 WHAT IS WATERSHED ?

*A watershed is a geohydrological unit of land that feeds all the water running under it and drains at a common point.*

Or

*A watershed is a geohydrological unit of land that feeds all the water running under it and drains at a common point.*

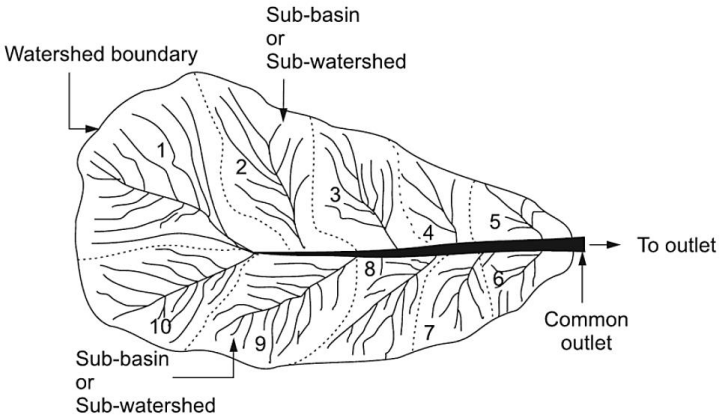



**Figure 1.1** Definition sketch of watershed.

### WATERSHED MANAGEMENT

Watershed management is the study of the relevant characteristics of a watershed aimed at the sustainable distribution of its resources and *the process of creating and implementing plans, programs, and projects to sustain and enhance watershed functions that affect the Plants, Animals, and human communities within a watershed boundary.*

### OBJECTIVES OF WATERSHED MANAGEMENT?

- Soil and water conservation by controlling damaging run-off.
- Improve the ability of the land to hold water
- Rainwater harvesting and recharging
- Employment generation
- Maintain ecological balance by Growing greeneries - trees, crops, and grasses
- Increase farmers' income (doubling income by 2022)
- Moderate floods in the downstream areas.
- Developing fuel, fodder, and timber resources for the local population.

- **Mountainous Watershed** : Because of higher altitudes, such watersheds receive considerable snowfall. Due to steep gradients and relatively less porous soil, infiltration is less, and surface run-off is dominantly high for a given rainfall event. The areas downstream of the mountains are vulnerable to flooding.
- **Forest Watershed** : watersheds where natural forest cover dominates other land uses. In these watersheds, interception is significant, and evapotranspiration is a dominant component of the hydrologic cycle. The ground is usually littered with leaves, stems, branches, wood, etc. Consequently, when it rains, the water is held by the trees, and the ground cover provides a greater opportunity to infiltrate. The subsurface flow becomes dominant. Because forests resist overland water flow, the peak discharge is reduced. Complete deforestation could increase annual water yield by 20 to 40 %.
- **Desert Watershed** : There is little to virtually no vegetation in desert watersheds. The soil is mostly sandy, and little annual rainfall occurs. Stream development is minimal.
- **Coastal Watershed** : Usually, these watersheds receive high rainfall, mostly of cyclonic type, do not have channel control inflow and are vulnerable to severe local flooding. In these watersheds, the water table is high, and saltwater intrusion threatens the health of coastal aquifers, which usually are a source of the freshwater supply.
- **Wetland Watershed**

► **BASED ON SIZE**

Variability in watershed characteristics increases with size. Therefore, large watersheds are most heterogeneous, with more water storage.

| watershed | Size | |
|---|---|---|
| ***Macro***-watershed (~~Mega~~) | 50k to 2 Lakh hectares | MPPSC (ACF) 2014 |
| ***Sub***-watershed | 10k to **50k** hectares | |
| ***Mili****** Watersheds | 1000 to **10,000** hectares | APPSC (FRO) 2018 |
| ***Micro****** watershed | 100 to **1000** hectares | |
| ***Mini****** watershed | 10 to **100** hectares | |

**WATERSHED ATLAS OF INDIA**

A systematic delineation of different river basins of the country was made by the central water power commission under the chairmanship of **Dr. A. N. Khosla in 1949** and the country was delineated into ***6 river resources*** regions, ***35 basins***, ***112 Catchments***, ***550 Sub-catchments*** and ***3257 watersheds***.

**Watershed Codification**

A watershed can be symbolized as **1A2B3a** (Alphanumeric system) where "**1**" stands for River Resource Region, "**A**" designates the Basin in that water (river) resource region, "**2**" indicates the Catchment within the basin, "**B**" indicates Sub catchment and "**3**" stands for the watershed number, "**a**" stands for Subwatersheds designated by small English alphabets as a, b, c.

# CHAPTER 2

# COMMUNITY FOREST MANAGEMENT

**Chapter outline**


**2.1** Historical Background
- Success stories

**2.2** Objectives of JFM adoption

**2.3** Salient features of JFM

**2.4** JFM structure
- JFMC
- Eco-dev. Committee
- Powers of FPCs

**2.5** Formation of a JFMC
- Introduction
- Approval
- Formation of JFMCs and Executive committees

**2.6** Legal back-ups to the JFM

**2.7** Causes of Poor performance of JFMCs [Constraints]

**2.8** Role of JFM

**2.9** Exercise


**Joint Forest Management** (JFM) is an approach and program initiated by the *National Forest Policy of 1988*. Under this, the state forest departments support local forest-dwelling and forest fringe communities to protect and manage forests by sharing the costs and benefits of the forests with them. Communities organise themselves into a JFM Committee to preserve and manage nearby forests, guided by locally prepared guidelines and micro-plans.

➢ JFM is a *participation of the local community* in the management of forest

## 2.1 HISTORICAL BACKGROUND

In 1931, Van Panchayats in Uttarakhand started participating in forest management, as the remote Himalayan region where creating hardness to the forest department because of the poor Cost-benefit ratio.

Later, the Forest Department of West Bengal successfully started a pilot project in the Arbari*** village (hilly area) during 1971–72, and it was a major success.

Followed by Haryana and Odisha, but all these (WB, HR, Odisha, etc.) were pilot projects or individual efforts of some dedicated forest officers and had no forest policy or legal back-ups.

Other similar efforts, *i.e.*, Forest Cooperatives in the Madras Presidency (the 1900s) and cooperative Forest Societies in Kangra (1940s, earlier Punjab, now Himachal Pradesh). Woodlots on panchayat lands under Social Forestry (the 1980s - with Revenue sharing agreements).

The actual initiative by MoEFCC on JFM started with the ***National Forest policy – 1988***** on its past experiences, followed by the ***Guideline of 1990***** to utilize forest wealth to improve local livelihoods. This guideline explains how the forest committee was formed, its powers & functioning, NWFP sharing %, etc. *This guideline forms the basic foundation of JFM in India. That's why most Academicians consider this as the year of initiation of JFM in India*.

CHAPTER 3

# AGROFORESTRY

## [INTRODUCTION]

**Agroforestry** is a collective name for sustainable land-use systems involving *trees combined with crops* *and/or animals* on the *same unit of land*. It combines the -

- The production system of food crops with protection covers of trees especially in fragile ecosystems.
- Emphasis on the use of *indigenous trees has multi-purpose uses* (MPFTs) and *High yield short rotation* (HYSR) tree varieties.
- It is structurally and functionally *more complex than monoculture*.
- It also *provides alternative investment opportunities* with insurance cover that if our main agriculture crops fail, we still have the trees cover to sell them and sustain their house economy.
- This concept is *based on our ancient tradition and Socio-cultural values, to grow trees* on the boundaries of the farm, protect them and harvest them at a necessary point in time to reduce village dependency on the Forest.

► **DEFINITION** : Agroforestry is a *sustainable land-use system that maintains or increases total yields by combining food crops (annuals) with tree crops (perennials) and/or livestock on the same unit of land, either alternately or at the same time* while using management practices that suit the local social-cultural characteristics of society and Economic and ecological conditions of the area.

Remember "Crop + Tree ± Domestic animals". 1st two are the essential requirement, 3rd component is optional it may be present or absent.

**Nair (1979)** defines agroforestry as a land use system that integrates trees, crops and animals in a way that is scientifically sound, ecologically desirable, practically feasible and socially acceptable to the farmers

Land use system that integrates trees, crops and animals in a way that is scientifically sound, ecologically desirable, practically feasible and socially acceptable to the farmers [**Bene, *et.al.***]

► **ATTRIBUTES OF AGROFORESTRY**

**Productivity** : maintain or increase the production of preferred crops & productivity of the soil.
**Sustainability** : By conserving the production potential of the resource base, mainly through the beneficial effects of woody perennials on soils; **Cornerstone of agroforestry**]
**Adaptability** : The word "adopt" here means "accept" (not "modify" or "change). The implication here is that improved or new agroforestry technologies that are introduced into new areas should also conform to local farming practices.

► **SCOPE/NECESSITY** : Agroforestry has an excellent scope in the context of Indian Agriculture due to its intrinsic relation with traditional agricultural practices. Agroforestry practices are beneficial in –

CHAPTER 7

# MULTI-PURPOSE TREES IN AGROFORESTRY

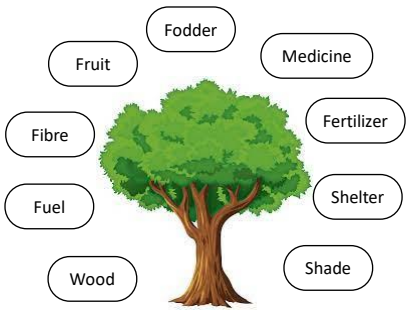
The term *'multipurpose tree*' (MPT) refers to *all woody perennials that are purposefully grown to get more than one production and/or service function (i.e., shelter, shade, land sustainability)*.

Trees are Multipurpose in two ways -

- **A single tree can yield more than one crop** : For example, farmers in Maharashtra grow *Gliricidia sepium* as living fences that provide fuelwood, fodder, and green manure for food crops all at the same time.
- **Trees of the same species, when managed differently, can yield different crops** : In the tropics, for example, *Leucaena leucocephala* is managed so that some trees will principally yield wood while others predominantly produce leaf fodder.

## 7.1 BENEFITS/OBJECTIVES OF MPTS

- Reducing risk of total crop failure : If farmers grow *Leucaena leucocephala* for animal fodder and the tree's leaves are destroyed by pests, they will still have wood that can be used for fuel, Pulp, or light-weight construction material.
- Income generation and distribution : Increases net revenue comes from harvesting different tree crops in different seasons.
  - Provides a viable and alternate investment option to the farmers.
- Production services : Food (*i.e.*, Fruits, nuts, leaves), fodder, fertilizers (*i.e.*, N-fixation, nutrient recycling)
  - Source of Energy - firewood for direct combustion, charcoal, Oil, gas, methanol, ethanol, etc.
  - Raw materials for the processing industry - fibres for weaving and cottage industry. Fruits & nuts for food-processing industries.




- Ecosystem services
  - Soil and water conservation - regulation of streamflow to reduce flood hazard, increase water supply by reducing run-off, and improve interception and storage.
  - Microclimate amelioration.
  - Shelter - Windbreaks and shelterbelts for protection of settlements, building materials for house construction, shade trees for humans, livestock and shade-loving crops, and Living fences.

## 7.2 SELECTION CRITERIA (CHARACTERS) FOR MPTs

CHAPTER 10

# AGROFORESTRY POLICY 2014

**NEED FOR AGROFORESTRY POLICY ?**

- Our previous agroforestry and social forestry programs have failed to achieve the goal due to the absence of a dedicated and focused national policy and a suitable institutional mechanism.
- An integrated farming system is also lacking in these programs and often focuses only on growing exotic species rather than native ones.
- Restrictive regulatory regimes on forest policy, Supreme Court guidelines, and various decisions of the National Green Tribunal over the felling of trees are creating significant obstacles in the implementation and marketing of trees growing outside of forest land.
- Insufficient research, extension, and capacity building in this field.
- Institutional finance and insurance coverage.
- Weak market access for agroforestry produce.
- Industry operations at a sub-optimal level.
- Integration of our forest policy targets and goals through agroforestry practices.

*Major policy goals*

- Setting up a *National Agroforestry Mission* and an *Agroforestry Board* to implement the National Policy by bringing coordination, convergence, and synergy among various elements of agroforestry scattered in various existing missions, programs, schemes, and agencies about agriculture, environment, forestry, and rural development sectors of the Government.
- Improving the *Productivity, Employment, Income, And Livelihood Opportunities* of rural households, especially of the smallholder farmers through agroforestry.
- *Meeting The Ever-Increasing Demand* for timber, food, fuel, fodder, fertilizer, fibre, and other agroforestry products.
- Conserving natural resources and forests, protecting the environment, providing environmental security, and increasing forest/tree cover.

Which is not the major goal of the National Agroforestry Policy, 2014? [MPPSC Forest Service (Main) Exam 2022; Exam Held on 10 December 2023]

(a) Setting up a Agroforestry Mission.
(b) Improving productivity and livelihood opportunities of the smallholder farmers through agroforestry
(c) Reduce the area under cultivation.
(d) Meeting the ever-increasing demand of timber, food, fodder, fibre and other agroforestry products

*Basic objectives*

- *Encourage and expand tree plantation* in a complementarity and integrated manner with crops and livestock to improve productivity, employment, income, and livelihoods of rural households, especially the smallholder farmers.

CHAPTER 11

# SOCIAL FORESTRY

► **DEFINITION** : Social forestry is the practice of forestry on land outside the conventional forest area for the benefit of rural and urban communities.

► **PRINCIPLE** : Voluntary (sometimes compulsory) people participate in a project from its inception up to its completion, which is planned and managed by government agencies.

► **AIM / OBJECTIVES / BENEFITS**

- Supplying basic rural needs like fuelwood, timber, and other forest products [Energy security].
- To meet the requirements of leaf fodder for ruminants.
- To meet the raw material requirements for household, cottage, and forest-based industries [Reduce pressure on the forest].
- To increase rural income, employment, and equality.
- Eco-restoration, rehabilitation, and reforestation of degraded forest areas and wasteland [Habitat conservation]
- Supplement the National Forest Policy (1951, 1988), the objective of having 33 per cent of land area under the tree over [+ INDC].
- Protection of agricultural land against harsh weather, *i.e.*, Frost, Hot/cold wind, crop-lodging, etc., and revive the productivity of farms.
- Regulate water cycle and control runoff = Erosion control + flood control.
- To meet the recreational needs of both urban and rural populace.
- To reduce noise pollution in urban areas and increase the aesthetic value of the urban landscapes.

Jack Westoby*** during his inaugural address at the 9th Commonwealth Forestry Conference held in Delhi in **1968** *coined the term social forestry* to include forestry activities that aim at "producing flow of protection and recreation benefits for the community". The term remained unused and unnoticed till the National Commission on Agriculture (NCA) resurrected it in its interim report on "production forestry and man-made forestry" (1973).

► **SCOPE**

- Creation of woodlots in the village common lands, government wastelands and panchayat lands (Estimated at least 12 million ha).
- Planting of trees on the sides of roads, canals, and railways. This, along with planting on wastelands under 'extension' forestry.
- Afforestation of degraded government forests close to villages, which have experienced the unauthorized harvesting of biomass (Estimated at over 10 million ha).


Aman Patidar


Devesh Trivedi


Arvind Singh Thakur


Sachin Bhondele


Jaikishan Sharma


Gaurav Trivedi


Durgesh Jee Pandey


Sourabhn Kumar Chourasiya


Anita Surwayamshi


Rohit Sharma


Pooja Baghel


Ravikant SIrvaiya


Pushparaj Singh Sikarwar


Shubham Kulhade


Ashish Singh Sikarwar


Anupam Mishra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Somesh Sharma


Keshav Meena


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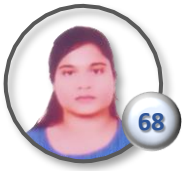
Atul Kumar Patel

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