

**Subject: Environmental Science**

**W.E.F. Academic Session 2022**

**Title: Natural Resources and Biodiversity**

**Course Code: BES22C201**

**Credit: 04 Theory+02 Practical**

**Contact Hours: 64 (T) +64 (L)**

**Part-I: Theory (4 Credits)**

**Course Objectives:** *The course shall help the students to gain the ability to demonstrate comprehensive understanding of the natural resources and its biodiversity. It shall also help them to understand the distribution, importance and consumption of the natural resources.*

**Learning Outcomes:** *This paper is designed to introduce the concepts of Natural resources and Biodiversity. At the end of the course the student is expected to be able to:*

1. *Describe the various natural resources, their distribution and global consumption patterns.*
2. *Explain the importance of the natural resources and the connections between human population, natural resources and economic development.*
3. *Discuss biodiversity, its various components and ecological services.*
4. *Analyze biodiversity at its various levels.*

**UNIT I: FOREST AND FOOD RESOURCES**

Importance of forests, Timber and non-timber products, Forest types of India and J&K, Food resources of India: An overview, Green, white and blue revolution, Inland fisheries resources of India, World food problem and food security.

**UNIT II: SOIL AND WATER RESOURCES**

Soil as a natural resource, Pedogenesis and soil horizons, Soil types of India, Soil and food connect, An overview of Global water resources, Fresh water resources of India (Rivers, lakes, wetlands and Ground water), Population, food grain and water connect, Water resource of J&K (Rivers and Glaciers).

**UNIT III: MINERAL AND ENERGY RESOURCES**

Concept of resources and reserves, Mineral resources and types, Properties of minerals, of Mineral resources in India: distribution and consumption patterns Environmental impacts of mining. Classification of Energy Resources: Renewable (Solar, hydropower and green hydrogen) and Non-renewable (Coal, oil and Natural gas), Global Energy demand and supply, Energy scenario in India.

**UNIT IV: BIODIVERSITY**

Definition and concept, Components (Species richness and evenness), Levels of biodiversity: Organisational (genetic, species and ecosystem) and Spatial (alpha, beta and gamma) Endemism, Global biodiversity hotspots, Values of biodiversity: Direct (Productive and consumptive) and Indirect use (Ecosystem services), Ethical values, Threats to biodiversity, IUCN's Red list (Scheme and Status).

**LABORATORY COURSE (02 CREDITS)**

1. Visit to a Natural ecosystem (Forest, National park, Sanctuary, Lake )
2. Case study of Mining area and assessing the impacts (Boulder mining, sand mining, etc.)
3. Waste/water audit of your institution
4. Energy audit of your institution
5. Socioeconomic survey of any town/village
6. Phytosociology of plant communities
7. Identification of major rock types
8. Calculation of species biodiversity (alpha, beta and gamma)

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## **BIBLIOGRAPHY**

1. Environmental Science: Botkin, Keller
2. Environmental Science: Jackson & Jackson
3. Environmental Science: Tyler Miller
4. Essentials of Geology: Chernicoff, Fox, Venkatakrisnan
5. Concepts of Ecology: E.J. Kormondy
6. Environment Principles & Applications: Chris Park.
7. Fundamentals of Ecology: E.P. Odum
8. Population Ecology: P.S. Aaradhana
9. Ecology and Environment: P.D.Sharma
10. Ecology, Environment and Resource Conservation, Singh, J.S., Singh, S.P. and Gupta, S.R.
11. Environmental Chemistry, De, A.K.
12. Biodiversity of the Himalaya: Jammu and Kashmir State: Dar, G.H. & Khuroo, Anzar, A.

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SEMESTER 2<sup>nd</sup>

SKILL COURSE

## ENVIRONMENTAL SCIENCE W.e.f. Academic Session 2022

Title: Sustainable Agriculture-II  
(Organic agriculture and IFS)

Course Code: BES22S202

Credit: 02 (T) + 02(Practical)

Contact Hours: 32 (T) +64 (P)

**Course Objectives:** *The course shall help the students with the basic understanding and importance of organic farming. It shall also help them to gain the necessary understanding for integrated farming systems which is an important approach in the present era.*

**Learning Outcomes:** *The course shall equip the student with the necessary knowledge and skill to practice organic agriculture as well as integrated farming systems. It shall help the student to extend the practical knowledge in the field at any level.*

### Part-I: Theory (2 Credits)

#### **UNIT-I: Towards Organic Agriculture**

1. Organic Farming-Concepts
2. Principles of Organic Farming
3. Composting and recycling of wastes for organic farming
4. Various forms of organic agriculture
5. Practical production issues and success strategies

#### **UNIT-II: Integrated Farming Systems**

1. Concept of Integrated Farming Systems
2. Farming systems in India
3. Integrated Watershed Management
4. Integrated nutrient and pest management

#### **Bibliography**

1. Agronomy of Field Crops: Reddy , S R and Reddi Ramu 5th edition. 2016; Kalyani Publishers, Ludhiana.
2. Principles of Agronomy: Yellamanda Reddy,T. and Sankara Reddy ,G.H. 2016; Kalyani Publishers, Ludhiana
3. Fundamentals of Agronomy: Gopala Chandra De.1989; Oxford & IBH Publishing Company Pvt Ltd , New Delhi
4. Indian Society of Soil Science.2012. Fundamentals of Soil Science. IARI, New Delhi
5. Manures and Fertilizers: Yawalkar K.S, Agarwal, T.P and Bokde, S. 1995; Agril. Publishing House, Nagpur
6. Soil Fertility and Fertilizers: An Introduction to Nutrient Management: Jim,B and John,H. 2006; Prentice Hall India Learning Private Limited.
7. Introductory Soil Science: D. K .Das. 2014; Kalyani Publishers, New Delhi
8. Soil Fertility and Fertilizers: An Introduction to Nutrient Management: Samuel Tisdale, Nelson Werner L, Beaton James D and Havlin John L. 2005; Macmillian Publishing Co., New York.

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## **Part 2: LABORATORY COURSE (2 CREDITS)**

1. Production of compost from various organic wastes
2. Study of different agroclimatic zones
3. On map study of different watershed models in and around agricultural areas
4. Study of different crop zones at local level
5. A visit to an organic farm
6. Study of different integrated farming system models

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**Government Degree College Baramulla**  
**SEMESTER 1<sup>st</sup> to 3<sup>rd</sup> MULTIDISCIPLINARY**  
**COURSE**  
**ENVIRONMENTAL SCIENCE**  
**W.e.f. Academic Session 2022**

**Title: Natural Resource Management**

**Code: BES22M103**

**Credit: 03 (T)**  
**Contact Hours: 48 (T)**

**Theory (3 Credits)**

*Course Objectives: The student shall gain a broad and comprehensive understanding of the importance of natural resources and the causes of exploitation. It shall also help the student to develop proper management approaches for the Conservation of natural resources.*

*Learning Outcomes: After the completion of this course, the student shall be able to:*

- *Define and distinguish between different types of natural resources*
- *Create a personal inventory of consumption of natural resources*
- *Explain the different dimensions of the natural resources*
- *Implement the management strategies in view of the exploitation of this resource as well as the future sustainability.*

**UNIT-I: FUNDAMENTALS OF NATURAL RESOURCES**

1. Introduction to Natural Resources
2. Concept of resource, classification of natural resources
3. Factors influencing resource availability, distribution and uses.
4. Interrelationships among different types of natural resources.
5. Ecological, social and economic dimension of resource management.

**UNIT-II: Distribution and Exploitation of Natural Resources**

1. Forest resources: Distribution, Use and over-exploitation
2. Land and Mineral Resources: resources: Land degradation and exploitation of minerals
3. Water resources: Use and over-utilization of surface and ground water
4. Energy resources: Growing energy needs, renewable and non-renewable energy sources
5. Food resources: world food security, changes caused by agriculture and over-grazing

**UNIT-III: Management of Natural Resources**

1. Resource Management Paradigms
2. Resource conflicts: Resource extraction, access and control system.
3. Approaches in Resource Management
4. Resource Management: Implications in developing countries
5. Management of Common International Resources

**Books Recommended**

1. Ecology of Natural Resources. Francois Ramade.1984. John Wiley & Sons Ltd.
2. Fundamentals of Ecology. Odum, E.P. 1971. W.B. Saunders Co. USA.
3. Global Change and Natural Resource Management, Vitousek, P.M. 1994. Beyond global warming: Ecology and global change. Ecology.
4. Environmental Biology, Agarwal, K.C., 2001. Nidhi Publication Ltd. Bikaner.
5. Global Biodiversity Assessment. Heywood, V.H. & Watson, R.T. 1995. Cambridge Univ. Press.
6. Environmental Science, Miller T.G. 1940; Jr. Wadsworth Publishing Co. (TB)
7. Essentials of Ecology, Townsend C., Harper J, and Michael Begon. 2008. Blackwell Science.

**Government Degree College Baramulla**  
**SEMESTER 1<sup>st</sup> to 3<sup>rd</sup> (Value Added Course)**  
**ENVIRONMENTAL SCIENCE**  
**W.e.f. Academic Session 2022**

**Course Title: Environmental Science Education (VAC)**

**Course Code: BES22V104**

**Credit value: 02 (Theory)**

**Contact Hours: 32 (T)**

**Theory: 02 Credits**

**Course objectives:** *The course intends to provide broad based knowledge on environment and makes students*

1. *Understand the structure of our environment*
2. *Understand the concept of ecosystem and the general structure of ecosystems*
3. *Appreciate the services provided by different ecosystems and understand the dependence of humans on these services.*
4. *Understand biodiversity and its importance*
5. *Understand different forms of pollution and measures for their control*

**Learning outcomes:** *The course will empower the students by:*

1. *Gaining in-depth knowledge on environment and its various components.*
2. *Understanding of Ecosystem and its services*
3. *Predicting the consequences of human actions on the biodiversity*
4. *Developing critical thinking for shaping strategies (scientific, social, economic and legal) for environmental protection and conservation of biodiversity.*
5. *Capability to identify relevant environmental issues, analyse the various underlying causes, evaluate the practices and policies, and develop framework to make informed decisions*

**Unit 1: Understanding Environment**

**16 Hours**

- 1.1. Concept and importance of environment
- 1.2. Components of environment—physical, biological and social
- 1.3. Concept of ecosystem, trophic structure of an ecosystem
- 1.4 Ecosystem services—provisioning, regulating and cultural
- 1.5 Biodiversity—definition, values, threats and conservation

**Unit 2: Natural Resources and Environmental Issues**

**16 Hours**

- 2.1 Natural resources—classification and distribution
- 2.2 Natural resource management—basic principles
- 2.3 Air and water pollution—causes, consequences and control
- 2.4 Soil pollution, municipal solid waste management
- 2.5. Climate change—causes, consequences and management

**Books Recommended**

1. Environmental Science: A Global Concern: William P. Cunningham and Mary Ann Cunningham, 2009. Glencoe/McGraw-Hill School Pub.
2. Environmental Science: Earth as a Living Planet: Daniel B. Botkin and Edward A. Keller. 2005; John Wiley & Sons.
3. Environmental Science: Toward A Sustainable Future: Meg Keen, Valerie A. Brown, Rob Dybal. 2005 (1st edition). Routledge.

4. Ecology and Environment: P.D.Sharma. 2011. Rastogi Publications.
5. Text Book for Environmental Studies : Erach Bharucha. 2019. Universities Press (India) Private Limited
6. Perspectives in Environmental Studies: Kaushik & Kaushik. 2018. New Age International Publishers