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iDA- Interdisciplinary Areas

Environment Education Syllabus - Academic Year 2024-25

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Chapter 1:

Understanding Our Environment

Hours: 6 hours (4 hours for theory + 2 hours for activities) **Marks:** 10

Topics:

- Meaning and Importance of the Environment
- Components of the Environment
- Living organisms (biotic components) and non-living organisms (abiotic components)
- Interrelationships, Interdependence, and Interactions of Various Components of Environmental
- Environmental Consciousness, Role, and Responsibility of the Individual in Environmental Conservation
- Human Behaviour and its Impact on the Environment
- Creating a connection with nature
- Understanding and inculcating environmental ethics
- Mission LiFE and its Relevance to Global Citizenship

Key Concepts	Learning Outcomes
• Meaning and importance of environment, components of environment.	• Understands the meaning of environment, its importance, and components.
• Living organisms (biotic components) and non-living organisms (abiotic components)	• Differentiates between biotic and abiotic components of the environment.
• Inter-relationships, interdependence, and interactions of various environmental components.	• Understands significance of Land, Water, Soil and Air in the survival and coexistence of flora and fauna of any region.
• Environmental consciousness, role, and responsibility of the individual in environmental conservation, • Human behaviour and its impact on the environment	• Is aware about the impact of human behavior on the environment, plans to repair the damage done and set up measures to prevent further damage. • Promotes environment conservation.

• Creating a connection with nature	• Develops various processes/skills, e.g. observation, discussion, explanation, experimentation, logical reasoning, through interaction with immediate surroundings.
• Mission LiFE and its relevance to global citizenship	• Encourages others to adopt a sustainable and environmentally conscious lifestyle.

Chapter 2: Biodiversity

Hours: Total 18 (Theory (8 hours) + Activities (10 hours) **Marks: 30 marks**

Topics:

1. Understanding Biodiversity- Genetic, Species and Ecosystems
2. Types of ecosystems (Terrestrial and Aquatic ecosystems)
3. Importance of Biodiversity and need for Conservation
4. Need for conservation
5. Documentation of Biodiversity and Associated Traditional knowledge

Key Concepts	Learning Outcomes
Understanding Biodiversity: Definition and Importance. **Genetic Diversity**: Definition and local examples from Goa (varieties of mango, rice, chillies, breeds of dogs). GI-tagged varieties of Goa. **Species Diversity**: Definition and local examples. Official state flora and fauna: major groups of animals (mammals, birds, reptiles, amphibians, fish, and insects) and plants (grass, herbs, shrubs, and trees). Learning their local names and understanding their ecological roles. **Ecosystem Diversity**: Definition and local examples (forests, plateaus, grasslands, wetlands, estuaries, rivers, and seas).	**Understanding Biodiversity:** • Defines biodiversity and explains its components—genetic, species, and ecosystem diversity. • Understands the significance of GI and exhibits knowledge of GI-tagged varieties in Goa • Acquires knowledge of the rich biodiversity found in Goa through local examples such as diverse varieties of mangoes and rice, as well as wildlife.
Types of Ecosystems: Terrestrial (forests, plateaus, grasslands, sand dunes); Aquatic (sea, estuaries, rivers, wetlands).	**Identifying Ecosystem:** Identifies various types of ecosystems found in Goa Learns the significance of various ecosystems.
Importance of Biodiversity: Ecological Importance (Ecosystem stability and resilience, food web dynamics, habitat provision, climate regulation, pollination, nutrient cycling, water purification, soil conservation, biodiversity conservation); Economic Importance (Food production, fodder, timber, medicinal resources, water purification and regulation, soil fertility and conservation, pest control,	**Appreciating Biodiversity's Importance:** • Appreciates the Importance of Biodiversity • Understands why biodiversity is crucial for nature's balance and human survival. • Learns how local biodiversity helps Goa's agriculture, tourism, and overall economy

eco-tourism and recreation, genetic resources, cultural and aesthetic value).	
Need for Conservation: Threats to Biodiversity (due to habitat loss, pollution, and climate change), Importance of Conservation, and Methods.	**Recognising conservation needs:** • Knows different methods of conservation. • Identifies threats to biodiversity and demonstrates the necessity of conservation efforts to reduce these threats. • Plans to preserve biodiversity for the health of ecosystems, future generations, and human survival.
Documentation of Biodiversity and Traditional Knowledge: Importance of Observing and Recording Local Plant and Animal Diversity, Introduction to Traditional Ecological Knowledge.	**Valuing Traditional Knowledge:** • Understands and appreciates the interconnectedness between local people and their environment. • Values traditional knowledge, fostering respect for diverse knowledge systems, and promoting cultural awareness.

ACTIVITIES

a) Indoor activities

Sr. No	Activity	Explanation
1.	Interactive Presentations by the Guest Speaker	Invite local experts to give interactive presentations on topics related to biodiversity. Allow students to ask questions and engage in discussions.
2.	Nature Journaling	Provide students with blank journals or maintain a book to record their observations of local biodiversity in a creative manner. Encourage them to sketch plants, animals, and other natural features they encounter and to write descriptions of what they observe, poems or articles, creative models, and informative posters.
3	Specimen Identification	Specimens of local plant varieties, animal breeds, insects, and other natural objects (bird feathers, mammal hairs, animal stamps and postcards, snake skin, animal bones, dried plants—herbarium) Provide guidebooks or online resources for students to identify each specimen. Encourage them to take notes on the characteristics of each item.
4.	Virtual Field Trips	Utilise online resources, such as videos and documentaries, to take students on virtual field trips to understand biodiversity and different ecosystems. Engage them in discussions to enhance their understanding. This approach can expose students to biodiversity and various ecosystems without leaving the classroom.
5.	Design a biodiversity conservation campaign.	Challenge students to design a multimedia campaign to raise awareness about the importance of biodiversity conservation in their community by creating posters, videos, social media posts, or educational materials highlighting key messages and conservation actions. Encourage creativity and collaboration among students to develop impactful and engaging campaign materials.
6.	Celebrating important environment-related days to raise awareness	Organise events to celebrate important environmental days, fostering awareness and action among students.

b) Outdoor Activities

Sr. No	Activity	Explanation
1.	Field trip	Organising a field trip, nature walk, or birdwatching session to immerse students in the exploration of local biodiversity (around school, backyard, home garden, and community gardens) and ecosystems. Examples: wildlife sanctuaries, national parks, biodiversity parks, wetlands, mangroves, sand dunes, rivers, and beaches.
2.	Habitat Restoration and Conservation	Engage students in hands-on conservation work by participating in habitat restoration activities such as planting native species, a school garden (pollinator garden with flowering plants, butterfly gardens, medicinal gardens), removing invasive plants (*Chromolaena odorata, Lantana camara*, water hyacinth), building birdhouses, etc.
3.	Children's Biodiversity Register	Introduce students to the Children Biodiversity Register initiative, where they can contribute their observations and prepare a checklist of local biodiversity.
4.	Visit the Local Market	Encourage students to visit the local market in groups to collect samples or photos of different varieties and species of fish, grains, pulses, vegetables, and fruits. Have them share their knowledge with other students through a presentation to explain the concepts of genetic and species diversity.
5.	Nature Photography/ Videography/ Reels/Documentary	Encourage students to capture images or videos of local biodiversity. Provide guidance on composition and subject matter, and showcase their photos and videos in a school.

Chapter 3: Soil, Water and Air

Hours: Total 18 (Theory (8 hours) + Activities (10 hours) **Marks: 30 marks**

Topics:

- Soil: Definition and functions of soil.
- Soil: Composition, Types and Properties
- Formation of soil
- Availability and importance of water resources
- Atmosphere
- Soil, Water and Air: Role in supporting living beings
- Causes and effects of water pollution, air pollution, soil pollution and land degradation.

Key Concepts	Learning Outcomes
• **Soil: Definition and functions of soil.** Definition of soil, functions of soil (Medium for plant growth, cycling of organic and inorganic nutrients, Habitat for soil organisms, System for water supply and purification, Recycling system for nutrients and organic wastes, Influencing the earth's atmosphere, Resource for infrastructure and Engineering)	• Defines soil and understands various functions of soil.
• **Soil: Composition, Types and Properties** Composition of soil: Basic components – Minerals, organic matter, air and water; Importance of soil components. Types of soil based on texture – Sand, silt, clay, loam. Properties of soil: Physical, chemical, and biological properties of soil.	Explains various components of soil. Identifies various types of soil. Explains physical, chemical and biological properties of soil.

• **Formation of soil** Weathering of rocks: types of weathering – Mechanical, Chemical and Biological; Factors of soil formation: (Natural and human induced processes) erosion – deposition – upheaval. Soil profile – Top soil, sub soil, parent rock.	• Relates weathering of rocks and soil formation • Identifies process of soil formation and soil profile
Availability and importance of water resources: Water as precious natural resource; availability of water (fresh and saline water); Water balance; Sources of water – Rainwater, Ground water and Surface water; Importance of water.	• Values water as precious natural resource and elixir of life. • Compares fresh and saline water and their availability. • Identifies various sources of water
Atmosphere: Composition of atmosphere; Greenhouse gases (CO_2, Methane, CFC). **Weather and climate**: Definition, weather elements, difference between weather and climate.	• Compares percentage of different gases in the atmosphere and their role • Differetiates between weather and climate • Identifies greenhouse gases
Soil, Water and Air: Role in supporting living beings	Explains role of soil, water, and air in supporting living beings.
Causes and effects of water pollution, air pollution and land degradation: Definition, causes and effects of pollution. Control measures.	• Understands the causes and effects of water pollution air pollution and land degradation • Explains the measures to control water pollution, air pollution and land degradation.

Activities

Sr. No	Topic	Activity
1	**Soil: Definition and Meaning; Functions of soil**	● Preparation of Potting media for planting. ● Visit to a house built using soil and feel the difference in the temperature outside and inside the house.
	Composition of soil; Types of soils; Physical, Chemical and Biological properties of soil	● Drawing of soil sample for soil analysis in laboratory ● Collecting soil samples from various areas (River bank, plateau, forest, hilly area, Coastal area, agricultural field) for understanding physical properties. ● Understanding physical properties of soil: Colour, Texture, Structure ● Estimation of soil texture by Feel Method ● Calculating water holding capacity of the soil ● Knowing pH of the soil sample
3	**Formation of soil**	• Observe the land cut site and observe the soil profile.
4	**Availability and importance of water resources**	● Visit to a spring and understand the Ground water movement. ● Calculate water usage through various modes like tap, mug and compare the quantity wasted. Visit to observe and understand various methods of rainwater harvesting.
5	**Atmosphere**	● Visit the India Meteorological Department, Altinho and observe various instruments used. OR ● Visit NIO, Dona Paula and observe Autonomous Weather Station (AWS)

		OR ● Visit the ICAR, Old Goa Meteorological Station and observe various instruments used. OR ● Visit Salauli Dam and observe Autonomous Weather Station (AWS) OR ● Follow the weather forecast and daily weather report (IMD) and understand its meaning.
6	**Soil, Water and Air: Role in supporting living beings**	● Observe important and commonly found soil microbes under microscope.
7	**Causes and effects of water pollution, air pollution and land degradation**	● Visit to a river or Drain line (nalla) to observe soil losses due to erosion. ● Learning about water treatment cycle.

Chapter 4: Agriculture, Food Security and Climate

Hours: Total 18 (Theory (8 hours) + Activities (10 hours) **Marks: 30 marks**

Topics:

- Introduction
- Definition and significance of agriculture and horticulture
- Agro-climatic zones and major crops in India
- Agro-climatic features of Goa
- Cropping seasons in Goa and major crops
- Types of farming systems
- Agro-based economic activities
- Agriculture, food security, and climate

Concepts	Learning Outcomes
• Definition of Agriculture and horticulture, significance of agriculture in human life, history of agriculture.	• Differentiates between agriculture and horticulture. • Realizes the importance of agriculture as a food source and its role in cultural and economic development.
• Agro-climatic zones in India and major crops cultivated in India, Agro-climatic features of Goa.	• Identifies Agro-climatic zones in India and the crops grown in those zones. • Identifies Agro-climatic features of Goa
• Cropping seasons in Goa and major crops.	• Aquires knowledge about cropping seasons and the crops cultivated in those seasons.
• Types of farming systems: Shifting cultivation (Kumeri, Puran sheti), Subsistence Farming, Agro-forestry, Commercial farming, Extensive farming, Plantation farming, Mixed farming, Modern systems of farming (Kitchen Garden, Hydroponics, Vertical Farming, Polyhouse, Mushroom cultivation)	• Aquires knowledge about major agricultural practices from traditional to modern cropping systems • Aquires knowledge about the modern methods of farming.
• Agro-based allied economic activities: Dairy, Poultry, Agro-processing, Nursery, Agro-tourism, Pisciculture, Apiculture, Salt farming, Integrated farming (eg. biogas, agro-waste management)	• Explains various agro-based allied economic activities.
• Agriculture, food security and climate: Define food security, challenges. Impact of climatic factors on agriculture and food security, Climate	• Discusses food security of the country • Learns about the impact of climatic factors on the crop production and food security. • Identifies climate smart traditional and

smart agriculture practices.	modern agriculture practices.

Activities:

Sr. No	Topic	Activity
1	Definition of Agriculture, Nature and significance	▪ Enlist and observe various inter cultivation practices (e.g: Land preparation, sowing, planting, irrigation, harvesting etc.) carried out in the field. ▪ Invited talk by nutritional experts ▪ Enlist various nutritional benefits from different crops
2	Agro-climatic zones and major crops in India	• Mark various agro-climatic zones on the map of India. • Prepare a chart to depict soil and climatic requirements of major crops of Goa.
3	Types of major Agricultural systems	• Field visit to Kulagar / Kumeri /Khajan cultivation/ vegetable plots / cashew and pineapple cultivation sites/ salt pans/ Pisciculture units to understand various cultivation practices followed. • Visit to 'Award Winner' farmers of Goa • Conduct a group activity related to agriculture - Develop a kitchen garden/ Setup vermicomposting unit in the school premises or at home and submit the report.
4	Agro based economic activities	• Visit to allied economic activities (e.g. dairy, poultry, nursery, agro-processing) • Organize the talks of the experts and entrepreneurs involved in agriculture and allied activities. • Organizing the exhibition cum sale of pots / saplings
5	Important crops of Goa	• Enlist various crops and their varieties along with their characteristics • Visit to various sources of irrigation and understand working of system.
6	Agriculture, food security and climate	• Visit to various Agricultural festivals. E.g: Cashew festival, Mango festival, etc. • Visit to fair price shop to understand the working of Public Distribution System (PDS) and it's relevance to food security. • Organize 'Food Festival focused on locally grown food crops/ Vegetable/ Micro-greens exhibition'. • Organise discussion with the farmers to understand changing patterns due to seasonal shifts and its impact on crop growth and economy. • Visit to agriculture-related Institutions in Goa (e.g: ICAR-CCARI, Krishi Vidnyan Kendra, Zonal Agriculture office, Hatchery by Directorate of Fisheries, Livestock farms of Directorate of animal husbandry, Agriculture Education Institute) and study Research and Development in agriculture.