



Learning Outcomes for Environmental Literacy

A Guide for Textbook Writers, Teachers and
Researchers

The publication lists specific learning outcomes in environmental education based on literature review and syllabus approved by National Council of Educational Research and Training (NCERT) to be achieved during eight years of compulsory primary education. The learning outcomes are organised as per the framework developed by North American Association for Environmental Education (NAAEE) in 2011.

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This publication is an outcome of doctoral research in the field of assessment of environmental literacy as the area of research.

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CONTENTS

	Page No.
Preface	4
1. Introduction	6
2. Environmental Literacy	10
3. List of the specific learning outcomes	15
3.1 Knowledge Domain	15
3.2 Disposition Domain	25
3.3 Competency Domain	28
3.4 Behaviour Domain	32
Bibliography	34

Preface

India is one of the few countries in the world where teaching and learning of Environment has been made compulsory by the directive of Hon. Supreme Court of India in 2003. A syllabus then was prepared by National Council of Educational Research and Training (NCERT) that guided the introduction of environmental education (EE) in school systems.

The final agreement, for introducing EE was on infusion in existing subjects, mainly science and social science. One of the challenges I felt in the process and have encountered with my work with teachers is the understanding of the perspective of environment as learning outcomes along with the expected outcomes of the core subject. It has been a challenge for teachers to crystallize and see the learning outcomes in the infused content, textbook writers trained in the core subject to bring about the environmental perspective in the content and assessment. As a researcher exploring environmental literacy of students, it was a challenge to collate the learning outcomes and priorities them for assessment.

After the Right to Education (RTE) 2009 making primary education compulsory, environmental education is an important dimension that every child should have in order to be able contribute to meet the expectation of the society where environmental sustainability is a concern and goal from local to global level.

Environmental Literacy (EL) is commonly viewed as something that develops and can be developed over time, rather than as a result of a single programme or a single year of schooling. (Marcinkowski et al., 2013, pg 325). This publication has put together an articulation of learning outcomes based on standards and expectation informed by various studies, syllabus developed by NCERT, analysis of textbooks, inputs from experts engaged in environmental education, and assessment studies in environmental literacy of students.

I would like to express my gratitude to the experts who have reviewed and validated the learning outcomes. I would like to acknowledge the inputs I received from Prof. Paul J Pace, Director Centre for Environmental Education and Research and Faculty of Education University of Malta, Ms. Madhavi Joshi, Programme Director, Centre for Environment Education, Mr. Madhusudan Menon, Ahmedabad Nature Lover's Association, Dr. C M Seth, Chair Person, WWF/CEET - Jammu and Kashmir, Mr. Reiner Mather, ESD Expertnet, Germany, Dr. A B Saxena, Principal (Retd.) Regional Institute of Education/NCERT, Bhopal/Ajmer, Mr. Sreekanth S, Wipro Applying Thought in Schools, Bangalore, Dr. K. K. Sharma, Principal (Retd.), Government College, Ajmer, Ms. Mamata Pandya, Programme Director (Retd.), Centre for environment Education, Dr. Shailendra Gupta, Ex. Principal/Registrar, Calorx Teachers' University, Dr. Ravikant Yadav, Faculty, Haribhau Upadhyaya Teachers College for Women, Dr. Harini Nagendra, Faculty, Azim Premji University, Bangalore, Dr. Sujit Sinha, Faculty, Azim Premji University, Bangalore, Shri. P. Boopathy Programme Coordinator, Directorate of School Education, Puducherry, Dr. Geetika Saluja, St. Kabir School, Ahmedabad, Ms. Rati Agarwal, Rachana School, Ahmedabad, and Ms. Gitika Sharma, Heritage School, Jammu.

Environmental Education by its nature is an evolving subject as we improve our understanding of the environmental issues and ways to address them. I invite the users/readers of the publication to contribute in its evolution to meet the expectation of the school systems to prepare the young people in facing the challenges in a fast changing world.

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1. INTRODUCTION

The Earth is facing immense anthropogenic pressure due to unsustainable consumption of natural resources, and the future of all life is at stake if positive actions are not taken to stop and reverse the damages. Education has been recognized as an important driver to reduce the footprint and live within the carrying capacity of Eco systems. The Earth Summit at Rio 1992 Conference produced an important outcome document ‘Agenda 21’ and Chapter 36 in Agenda 21 focuses role of education to attain sustainable development. The outcome document of the Rio+20 Conference, ‘The Future We Want’ talks about addressing specific issues like biodiversity, desertification, land degradation and drought and role of education in it. The UN Decade of Education for Sustainable Development (DESD) 2005-14 highlighted the important role education has to play to achieve the vision of a world where everyone has the opportunity to benefit from education and learn the values, behaviour, and lifestyles required for a positive societal transformation and a sustainable future. The Sustainable Development Goals, perhaps the only agreement in which all the countries at the United Nationals have agreed on a set of goals and targets in September 2013 to be achieved by 2030 also have a separate target 4.7 exclusively highlighting the role of education in sustainability (UN, 2015);

“By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture’s contribution to sustainable development”

The United Nations Educational, Scientific and Cultural Organization (UNESCO) in early 1970 took the lead in establishing the goal of environmental education as:

“to develop a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones.” (Gregor, 2014)

Recognizing the role of education for environmental conservation, the universalization of EE was mandated by Hon’ble Supreme Court Order on 22nd November 1991. The Court in its judgment of 18th December 2003 directed that the NCERT shall prepare a model syllabus and in the year 2004, Hon’ble Supreme Court issued further directions that “the syllabus prepared by the NCERT for class 1st to 12th shall be adopted by every state in their schools”.

It is well recognized that behavior is an important outcome and has many predictors which are shaped by various experiences an individual gets in various contexts shaped by education and experiences influenced by social, cultural, economic and ecological contexts. The construct of environmental literacy recognizes that responsible environmental behavior is shaped by various predictors and hence the need to understand the domains of environmental literacy as a continuum. The present publication is an attempt to crystallize learning outcomes through literature review at the end of class VIII, now an important year after Right to

Education that aspires to prepare a generation to productively contribute and benefit from the societal aspirations.

In India, historically and culturally, social values and attitudes have been to live in harmony with the environment. The ancient writings reflect the recognition that all life on the earth - human life included is intimately dependent on the quality of the environment. These also talk of the human as a modest being in this larger system, and the need and responsibility to protect it. The Indian constitution captured much of these deep-rooted values and further strengthened them by giving responsibility to its citizens to protect the environment. The constitution of India enjoins the state to "take measures to protect and improve the environment and to safeguard the forests and wildlife of the country"(Article 48 -A).

It also makes it a "Fundamental duty of every citizen to protect and improve the natural environment including forest, lakes, rivers and wildlife and to have ecological compassing for the living creatures" (Article 51 A (g)).

Education is recognised as a primary means of achieving to environmental protection. The present status of Environmental Education (EE) in schools in India has its genesis in the National Policy of Education (NPE) 1986 (modified in 1992), in which 'Protection of the Environment' is stated as a common core around which a National Curriculum Framework (NCF) would be woven. The National Policy on Education 1986 emphasized the need to create awareness of environmental concerns by integrating it in the educational process at all stages of education and for all sections of society. Accordingly, the National Curriculum for Elementary and Secondary Education: A Framework - 1988 states the NCERT's view, "The school curriculum should highlight the measures for protection and care of the environment, prevention of pollution and conservation of energy."

The main focus of EE is to expose students to the real-life world, natural and social, in which they live; to enable them to analyse, evaluate, and draw inferences about problems and concerns related to the environment; to add, where possible, to our understanding of environmental issues; and to promote positive environmental actions in order to facilitate the move towards sustainable development. Students of middle school age were selected for inclusion in this study because this developmental age has been identified as the, "last best chance to avoid a diminished future" (Carnegie Council, 1989). In this statement the Carnegie Council communicated that the middle school years represent the time when early adolescents are developing the ability to think abstractly. In adolescence, this new-found cognitive ability is accompanied by a view of the world that is much broader than that previously experienced. In India, class VIII has been identified as the final stage for completion of compulsory and free education as per Right to Education Act, 2009.

India is among the few countries in the world where teaching and learning of Environmental Education is compulsory at all levels of formal education. This was an outcome achieved in December 2010, when the Public Interest Litigation (PIL), (Writ Petition (Civil) No. 860 of 1991) filed by Shri M C Mehta in 1991 in Honourable Supreme Court for compulsory EE was deemed fully disposed of based on the Affidavit (October 2007) submitted by the

National Council of Educational Research and Training (NCERT). This Affidavit is a key document outlining the sequence of relevant events subsequent to the PIL up to proposal for how Environmental Education (EE) may be transacted from Standard I to XII. It was drafted after detailed discussions among Shri M C Mehta the respondent, NCERT and the experts appointed by NCERT. The affidavit was in response to the matter pertaining to the Supreme Court order dated 2-11-1991 which stated; “We accept on principle that through the medium of education, awareness of the environment and its problem related to pollution should be taught as a compulsory subject. NCERT clarified that in order to have compliance; a separate subject is not a necessity as it can be done through infusion in science, social studies, mathematics, language and other subjects, and/or through a separate subject. Infusion - a cross curricular or integrating approach was taken to be a suitable approach as the subject of environment permeates all subjects and requires lots of cross linkages. At the same time, EE requires that we pull together knowledge and experiences from a very wide variety of situations and subjects, to bear upon a single problem. (NCERT Affidavit, 2007)

As part of the National Curriculum Framework (NCF) 2005 development process, the working group on Habitat and Learning recommended a systematic infusion of components of EE into the curricula of all disciplines while ensuring that adequate time is earmarked for pertinent activities. NCERT has recommended the following in the context of teaching and learning of EE;

- a. Classes I and II – EE concerns are transacted through activities.
- b. Classes III to V – EE is being imparted through a subject namely EVS (Environmental Studies).
- c. Classes VI to X – Follows infusion approach for EE.
- d. Classes XI and XII – Projects infusion in electives and General Studies.

In India, class VIII has been identified as the final stage for completion of compulsory and free education as per Right to Education Act, 2009. Adolescence is also a time when environmental issues are primary among their concerns and interests (Beane, 1993). Chronologically, the adolescent is progressing toward full participation as a citizen, moving through the acquisition and refinement of both abilities and inclinations to become engaged in environmental decision-making. It was critical, then, to focus this research on the students completing middle school.

This publication has put together an articulation of learning outcomes based on standards and expectation informed by various studies, syllabus developed by NCERT, analysis of textbooks, and inputs from experts engaged in environmental education. EL is commonly viewed as something that develops and can be developed over time, rather than as a result of a single programme or a single year of schooling. (Stevenson et. al, 2013 page 312). And hence, it is difficult to set the learning outcomes solely based on what happens in formal setting as per the agenda

Environmental education in its current form an emerging field. Some might argue that it has been part of our culture since we start interacting with environment as a primary means of sustenance, and in the process develop understanding and practices that has defined traditions and wisdom in different societies. The current construct of environmental education came with the fast development of science and technologies that changed and continues to change our relationship with the environment. The changing relationship and increasing understanding that environmental issues need effort with education a key input to prepare the generation to survive in the changing world.

2. ENVIRONMENTAL LITERACY

As cited by Stevenson et al. Ed. (2013, p. 14), according to Wheeler (1975, p. 15), the term 'environmental education' was first used in the United States and first usage in United Kingdom was in March 1965 at a conference at the University of Keele. Here it was agreed that environmental education "should become an essential part of the education of all citizens, not only because of the importance of their understanding something of their environment because of its immense education potential in assisting the emergence of a scientifically literate nation." The term "environmental literacy" has been used in environmental education since the 1960s and has been extended to include knowledge of the environment, attitude towards environmental problems, skills and motivations for solving environmental problems and active participation in keeping the balance between quality of life and the environment (Marcinkowski and Rehring, 1995; Roth, 1992).

It is important to develop environmental education programmes that are based on each country's own ecological, cultural, political, educational and economic context (UNESCO, 1980, 1985). For instance, environmental education for developing countries should be different from that for advanced countries, because the variables that affect environmental literacy are likely to be different.

Environmental education has its roots in the educational movement of the late 19th and early 20th centuries related to nature, conservation, and outdoor education. United Nations Educational, Scientific and Cultural Organization (UNESCO) lead the conceptualization of environmental education and that definition states, "The Goal of Environmental Education is: to develop a word population that is aware of, and concerned about, the environmental and its associated problems, and which has the knowledge, skills, attitudes, motivations and commitment to work individually and collectively towards solutions of current problems and the preventions of new ones." (Hollweg et. al, 2011)

The above statement was refined as objectives at UNESCO – UN Environment Programme (UNEP) Intergovernmental Conference at Tbilisi, then in the former U.S.S.R.,

1. **Awareness:** To help social groups and individuals acquire and awareness of, and sensitivity to, the total environment and its allied problems.
2. **Knowledge:** To help social groups and individuals gain a variety of experience in, and acquire basic understanding of, the environment and its associate problems.
3. **Skills:** To help social groups and individuals acquire the skills for solving environmental problems.
4. **Participation:** to provide social groups and individuals with an opportunity to be actively involved at all levels in working towards resolution of environmental problems. (UNESCO, 1978)

These objectives became the most widely recognized construct to define environmental education and were used to develop frameworks to develop programmes and assessment. It explains the goal, experiences and processes important to develop environmental literacy. Additional learning outcomes like environmental problem solving, additional affective outcomes, (e.g. environmental sensitivity, self efficacy), and a variety of skills for collaboration were integrated to the above objectives (Hollweg et. al, 2011 Page 2-2).

This publication uses the framework developed by North American Association for Environmental Education (NAAEE) ((Hollweg et. al, 2011). *The framework defines environmentally literate person as someone who both individually and together with others, make informed decisions concerning the environment; is willing to act on the decisions to improve the well being of other individuals, societies, and the global environment; and participate in civic life.* Those who are environmentally literate possesses, to varying degrees:

- the knowledge and understanding of a wide range of environmental concepts, problems and issues;
- a set of cognitive and affective dispositions;
- a set of cognitive skills and abilities; and
- the appropriate behavioral strategies to apply such knowledge and understanding in order to make sound and effective decisions in a range of environmental context. (Hollweg, 2011)

The publication uses the above definition of environmental literacy. The publication has further used the sub domain developed as a synthesis of review of research done by the authors since early 1970s. The framework is given in Table 1.1 and has been used to develop and organize the learning outcomes.

Table 1.1: The Domain of environmental literacy with component and sub components

Components	Sub Components
Knowledge	What one knows about <ul style="list-style-type: none"> • Physical and ecological systems • Social, cultural and political systems • Environmental issues • Multiple solutions to environmental issues • Citizen participation and action strategies
Dispositions	How one respond to environmental issues: <ul style="list-style-type: none"> • Sensitivity • Attitudes and concern towards the environment • Assumption of personal responsibility • Locus of control/self efficacy • Motivation and intention to act
Competencies	Skills and abilities that one knows how and when to apply

- Identify environmental issues
- Ask relevant questions about environmental conditions and issues
- Analyze environmental issues
- Investigate environmental issues (scientific and social aspects of issues using primary and secondary sources)
- Evaluate and make personal judgments about environmental issues (the interaction between environmental conditions and sociopolitical systems)
- Use evidence and knowledge to select and defend one's own position(s) to resolve issues
- Create and evaluate plans at various scales/levels to resolve environmental issues

Environmentally Responsible behavior Involvement in intentional and habitual behaviors, individually or as a member of a group, that work towards solving current problems and preventing new ones.

(Source: Hollweg et al. 2011, Page3-2)

Brief Descriptions of the Knowledge, Dispositions, Competencies and Environmentally Responsible Behaviour (Hollweg, et al. 2011)

1. Knowledge :- Environmental literacy entails knowledge of:

- Physical and ecological systems—such as interdependent relationships in ecosystems; cycles of matter and energy transfer in ecosystems; interaction among earth's major systems; the roles of water in Earth's surface processes; climate change and how the effects of human activities on Earth's climate are modelled; conservation of energy and energy transfer. This area also includes humans as variables in ecosystems and Earth systems, which includes concepts associated with: the ecosystem services and natural capital on which humans (and all life) depend; adverse human impacts to these systems; and humans as agents in the protection and restoration of these systems;
- Social, cultural and political systems-- an understanding of the various social, cultural, and political systems (e.g., kinship, agricultural, transportation, economic, and legal systems), as well as the historical (temporal) and geographic (spatial) contexts in which they have developed and now function. This area also includes civic participation and the beliefs/practices associated with environmental problem-solving;
- Environmental issues—including (1) knowledge of a variety of environmental situations that arise from biophysical impacts apparent in the natural world, and the causes and effects of those impacts; and (2) knowledge of environmental issues that arise from human conflicts about environmental problems and solutions, including the causes and effects of those conflicts;

- Multiple solutions to environmental issues—including knowledge of past, ongoing, and current efforts, as well as of proposed and future alternatives, aimed at helping to solve environmental problems. This category of knowledge includes the legacy of efforts--both success stories and failures--aimed at solving environmental problems using a number of dimensions (from scientific and technical to economic, regulatory or educational efforts);
- Citizen participation and action strategies--forms of citizen participation, action, and community service intended to preserve or improve the environment. Action strategies include restoration projects; consumer and economic action; effective communication strategies; political action; and collaborative solution seeking.

2. Dispositions: Dispositions are important determinants of behaviours, both positive and negative, toward the environment. Learners' dispositions toward the environment are thought to influence their willingness to recognize and choose among value perspectives, as well as their motivation to participate in public deliberations about environmental issues. They include:

- Sensitivity--caring and positive feelings toward the environment;
- Attitudes, concern, and worldview--learned predispositions to respond in a favourable or unfavourable manner toward objects, events, and other referents;
- Personal responsibility—a personal commitment and thoughtful processes that lead individuals to avoid or reduce behaviours that contribute significantly to negative environmental impacts as well as undertake behaviours that contribute significantly to positive impacts;
- Self-efficacy--the belief and/or feeling that people hold that they individually or collectively will be able to influence or bring about the environmental change for which they are working; and
- Motivation and intentions—willingness and verbal commitment to act based on beliefs or attitudes.

3. Competencies: - Competencies are clusters of skills and abilities that may be called upon and expressed for a specific purpose. These include the capacity to:

- Identify environmental issues – including the ability to describe and provide evidence for the dimensions of the issue, human disagreements central to it, and factors that cause or contribute to it;

- Ask relevant questions – about environmental problems as well as human dimensions and historical or geographical features of an issue. This also includes the ability to ask higher-order questions aimed at discovering conditions that have implications for the issue;
- Analyze environmental issues – the interpretation and use of knowledge regarding physical, ecological and socio-political systems, and of information about stakeholders, their positions, beliefs and value perspectives. Also, this includes the ability to determine relevant factors and to discern interactions among those factors, and to predict likely consequences of issues;
- Investigate environmental issues – by gathering new information about an issue as well as locating and using relevant sources of additional information, synthesizing, and communicating the outcomes of the investigation;
- Evaluate and make personal judgments about environmental issues – constructing dispassionate evaluations and explanations based on available information and the beliefs and values of stakeholders, and articulating views about actions that may be warranted. Critical thinking is at the core of this competency;
- Use evidence and experience to defend positions and resolve issues – constructing and defending a sound evidence-based argument about what it will take to resolve or help resolve an issue; and
- Create and evaluate plans to resolve environmental issues – by assuming the responsibility for acting, frequently with others, and engaging in planning based on the environmental conditions, available resources, and socio-political contexts to resolve or help resolve issues.

4. Environmentally Responsible Behaviour: Environmentally responsible behaviour is the expression of knowledge, dispositions and competencies within a context.

3. List of the Specific Learning Outcomes for each Domain

Table 3.1 Knowledge Domain

Area	Knowledge (What we know?)
	Specific Learning Outcomes - Student will be able to ...
Systems in Nature (Physical and ecological systems)	1. Explain the unique place of the Earth in the solar system, which provides ideal condition for life.
	2. Analyze two motions of Earth and their effect in terms of day and night and seasons.
	3. Discuss Earth as the habitat of all forms of life including the humans.
	4. Describe major landforms of the Earth – e.g. Desert, forests, peninsula, mountains etc.
	5. Explain the four spheres of the Earth and their components (i.e. atmosphere, hydrosphere, lithosphere and biosphere).
	6. Explain that Earth is finite/ closed system - that the carrying capacity of the Earth is limited.
	7. Explain concepts of ecology such as species, population, community, ecosystem, biome
	8. Differentiate between environment and ecology.
	9. Differentiate between ecosystem and environment.
	10. Explain ecosystem; identify its components and their relationships.
	11. Classify different levels of organization in the ecosystem.
	12. Differentiate the relationships in the ecosystems.
	13. Compare different types of ecosystems.
	14. Locate a habitat.
	15. Represent the relationship between different living organisms through food chains and pyramids.
	16. Identify trophic levels in a pyramid.
	17. Illustrate the energy flow through ecosystem and examples of food chains.
	18. Identify the autotroph and the heterotroph in a food web.
	19. Classify animals as carnivores, herbivores and omnivores.

	20. Describe different climatic zones of the world and the flora and fauna in these zones.
	21. Compare the flora and fauna of other places like ocean, deserts, and mountains with that of his/her location.
	22. Describe the climate, physical features of flora and fauna of the agro climatic zones.
	23. Describe adaptation in living world.
	24. Examine factors affecting living organisms.
	25. Distinguish between habitat and niche.
	26. Identify different types of soil.
	27. Describe the influence of land, climate, vegetation and wildlife on human life.
	28. State the major forest types in the climatic zone of India.
	29. List the major flora and fauna found in major forest types of India.
	30. Illustrate bio-geochemical cycles and energy flow in an ecosystem.
	31. Explain interrelationship of the realms of Earth.
	32. Recognize that the interrelationships between biotic and abiotic components maintain the balance in an ecosystem.
	33. Explain the role of plants in maintaining oxygen and carbon dioxide balance in nature.
	34. Categorise various symbiotic relations in nature with examples (mutualism, commensalism, and parasitism, prey – predation).
	35. Explain pressures and carrying capacity.
	36. Assess situations to illustrate balance in nature.
	37. Relate species diversity with ecosystem stability.
	38. Recognize dependence of human life on environment.
	39. Differentiate between photosynthesis and respiration.
	40. Construct scenarios of habitats and lifestyles for water availability as a variable.
	41. List the importance of forests including soil erosion.
	42. Identify interdependence of biotic and abiotic components in forests.

	43. Explain the components of the natural environment.
	44. Identify the natural resources.
	45. Differentiate between renewable and non renewable resources.
	46. Explain biodiversity and list its importance
	47. Distinguish with examples the levels of biodiversity.
	48. List renewable resources – solar, wind, hydro-energy, ocean, biomass including bio wastes
	49. List non renewable sources – coal, petroleum and its products, natural gas.
	50. Compare availability and need of water.
	51. Explain resource variety, location and distribution.
	52. Illustrate water cycle.
	53. Explain greenhouse effect.
	54. Describe complex inter relationship of human and natural environment.
	55. Explain relationship between the natural environment and human habitation.
	56. Explain causes of enhanced greenhouse effect and global warming.
Social, cultural and political systems (+economic)	57. Recognize that, throughout history, societies utilized natural resources and altered the environment on both large and small scales.
Based on work of McKeown-Ice & Dendinger (2000)	58. Examine how historically, humankind's relationship to nature affected how human groups identify, develop, use, and conserve resources.
	59. Recognize different developments that contributed to a long and sustained period of population growth i.e. the size and rate of growth of the human population in any location is affected by economic, political, religious, technological, and natural environmental factors.
	60. Relate that a rise in expectations for ownership of material goods, personal comforts, and convenience is seen throughout history and the expectations of more affluent societies are often exported to less affluent societies.
	61. Conclude that environmental degradation can affect the quality of life for humans, including decrease in health and economic prosperity.

	62. Discuss that pressure to conform to social expectations is strong in every aspect of life and individuals learn to anticipate what others expect and usually shape their behaviour accordingly.
	63. Recognize that economic values dominate contemporary heterogeneous culture and thus overshadow other ethics and values.
	64. Analyze that the way individuals and groups treat other members of society and the planet is often shaped by principles and ethics, religious understanding, and world view.
	65. Conclude that natural-resource perception and use are shaped by culture.
	66. Question laws that are often written but not enforced due to lack of resources/funding or conviction.
	67. Recognizes that a democracy <ul style="list-style-type: none"> • Encourages dialogue, debate, and compromise. • Allows nongovernmental groups to have a voice in shaping laws and regulation. • Constrains group interests through the process of consensus. • Often leads to impasse.
	68. Infer that all activities have risk/impacts associated with them and it is individuals and societies who decide which immediate and long term /impacts are acceptable and which are not.
	69. Conclude that a basic component in all economic systems is the use of natural resources.
	70. List the impacts of production and consumption practices on society and the environment.
	71. Analyze that all activities have a cost, and someone in this generation or from future generations will face the consequences.
	72. Concludes that the industrial revolution greatly changed the interaction between humans and nature.
	73. Evaluate the effect of a technological change in one sector of society on the other sectors of the society.
	74. Recognize that countries/communities engaged in primary economic activities (extractive), tend to be poor and disadvantaged in the global economy.

	75. Summarize that countries/communities engaged in secondary (manufacturing) and tertiary (service) industries tend to be wealthier.
	76. Explains that the mass media reach a worldwide audience, exposing people to ideas, values, behaviour patterns, and news that were previously inaccessible.
	77. Explain that mass media accelerate adoption of new social norms and culture trends.
	78. Discuss that each government defines the balance of rights and responsibilities of its citizens.
	79. Examine that individuals, communities, and nations often must make decisions that involve tradeoffs.
	80. Recognize that the decisions of one generation can both provide and limit the range of possibilities open for the next generation, sometimes decisions produce unexpected consequences.
	81. Describe that individuals are responsible for their own decisions and actions, and that there are consequences.
	82. Argue that the benefits and disadvantages of alternative plans of action are made clearer by involving people and groups who will be affected by the plans.
	83. Conclude that to keep government responsive to citizens' needs and interests, citizen must participate in the democratic process.
	84. Citizens can fill many roles in influencing the political process in their community, state and nation.
	85. Citizens, through the volunteerism, can greatly influence the quality of life in their community or other communities.
	86. Analyze the cultural differences existing in the world as an outcome of interaction, between human beings and their environment.
	87. Argue the judicious use of resources for sustainable development.
	88. Support the need for transport and communication for development of the community.
	89. Argue for providing equal opportunities to all irrespective of gender and caste.

	90. Articulate on how lack of facilities like sanitation, transport, water etc. impact women and girls more acutely.
	91. List basic human needs and expresses concern for making essentials for life available to all.
	92. Explains different aspects of diversity and how it is connected to the inequality.
	93. Demonstrates understanding of the constitutive principles and attempts to make connections of the values imbibed in the constitution to the reality.
	94. Develops sensitivity towards pluralism and interdependence
	95. Examine the intricacies involved in the local administration's provision of water.
	96. Explain equality and reflect on the peoples' movements around social, environmental and economic issues.
	97. Explain the political process and importance of the democratic process of participation.
	98. Grasp the interconnectedness between environmental, political, social and economic issues.
	99. Empathies with people suffering from stereotyping – gender, marginalized, differently-abled.
	100. Describe the role of individuals in maintaining <ul style="list-style-type: none"> • peace, harmony and equity in nature; • good neighbourly behaviour; • use and misuse of Common Property Resources
Environmental Issues and Concerns	101. Recognize that the Earth resources are limited.
	102. Explain the dynamic nature of environment.
	103. Realize the extent of dependency of people on natural resources.
	104. Discuss human interactions with natural ecosystems/resources/Relationship between humans and environment.
	105. Summaries contemporary concerns of environment.
	106. State reasons for natural resource degradation.
	107. Give examples to demonstrate scarcity of resources.
	108. List the natural resources that are used by humans.

	109. List the factors responsible for the degradation of natural resources.
	110. List the various pressures on natural resources
	111. Discuss the affect of over using resources.
	112. State the factors that lead to the degradation of forest.
	113. List the changes in farming practices.
	114. Discuss how micro organisms affect health and cause diseases.
	115. List the uses that human beings derive from biodiversity in general and forests in particular
	116. Explain the phenomenon of climate change.
	117. Identify the livelihoods dependent on natural resources.
	118. Explain impact of the pressures on biodiversity, land/soil and water, energy sources.
	119. Define pollution
	120. List various types of pollution/ summarize various types of pollution including sound pollution.
	121. Explain air pollution (Including Indoor Air Pollution) – causes and effects.
	122. Explain pollution. (Pollution of soil, air and water – sources, impact on physical environment and all forms of life, control and preventive measures (modern and traditional) Noise pollution – sources, impacts and preventive measures.)
	123. List the measures to prevent different forms of pollution.
	124. List factors responsible for the phenomenon of acid rain.
	125. Describe eutrophication and bio magnification.
	126. Summarise ways to control pollution.
	127. Explain environmental disasters.
	128. Explain the concept of ecological footprint.
	129. Conclude that enhanced green house effect leads to global warming.
	130. Recognise causes of ozone depletion and its effects on living organisms.
	131. Explain climate change.
	132. Identify the causes of climate change.

	133. Explain effects of climate change – global and country level.
	134. List the measures for reducing climate change.
	135. Describe the effects of natural disasters.
	136. List the major natural disasters.
	137. List the measures taken to reduce risks from disasters.
	138. Relate environmental degradation with disasters.
	139. Explain impacts of environmental disasters on human well-being.
	140. Explain disaster management plans.
	141. Recognize that humans are active agents in changing the Earth’s surface.
	142. List the impact of population growth on ecosystem, human settlements, and land distribution.
	143. Relate to stress due to population growth on – common social facilities and civic services;
	144. List the factors affecting environment – overexploitation of resources, population growth, industrialization, use of synthetic materials.
	145. Explain disasters – natural and caused by humans, major types and their causes, impact on environment and human life.
	146. List impact of environmental degradation on – natural habitats, living forms, endangered and extinct species, and domestic animals.
	147. Analyze effect of human activities and population growth on areas like agriculture, energy, housing, industrial development and other areas of consumption and social activities.
	148. Name plants and animals which are under threat.
	149. Identify generation of waste and its sources
	150. Classify types of waste – solid liquid and gaseous
	151. Explain hazards of waste accumulation.
	152. Identify relationship between waste, community health and sanitation.
	153. List different types of waste and its disposal.
Natural Resources Management/Conservation	154. Give example the initiatives taken by various agencies
(Multiple Solutions to	155. Communicate simple methods to manage resources.

Environmental Issues and citizen participation and action strategies)	156. Comprehend the meaning of conservation and list various steps taken towards conserving natural resource.
	157. List various management practices for conservation and management of natural resources.
	158. Discuss the advantage of forests.
	159. Recall people's movements to protect their forests.
	160. List plants and animals which have come from other countries and their uses.
	161. Explain the meaning of conservation.
	162. Identify the various initiatives taken for conserving the environment.
	163. List the different protected areas.
	164. Explain the conservation of soil.
	165. State ways to prevent the contamination of water.
	166. Discuss the importance of conserving forest
	167. List down ways to conserve forest.
	168. Describe biodiversity hot spots.
	169. Map the global biodiversity hot spots.
	170. Locate protected areas.
	171. Summarise the role of communities in forest management/conservation.
	172. Explain the traditional agriculture practices.
	173. Compare the traditional farming with the modern farming methods.
	174. Identify crops as <i>rabi</i> or <i>kahrif</i> crop.
	175. Identify common plants and animals.
	176. Examine various methods of conserving energy.
	177. Explain the importance of natural resources in our life.
	178. List harmful and useful microorganisms.
	179. List the processes involved in agriculture.
	180. Prepare a food trail for common food items.
	181. Recognize various types of farming and agriculture development in different regions.
182. Explain the role of individuals, community and government in planning, decision making, legislation and social action for prevention of pollution and improvement of environment.	

	183. Differentiate between needs and wants.
	184. Respect the values (cultural, religious, spiritual, aesthetic) and practice towards nature and its conservation.
	185. Define their roles and responsibilities along with that of other individuals/ groups in environmental conservation
	186. Relate environment and development.
	187. Describe the environmental dimension embedded in religion and culture.
	188. List the major challenges in environmental conservation.
	189. Explain the ways to reduce resource consumption and change the life styles.
	190. Identify common food crops.

Table 3.2 Learning Outcomes in Disposition Domain

Area	Disposition (How we respond to environmental issues?)
	Specific Learning Outcomes - Student will be able to ...
Sensitivity	1. Show the extent of dependency of people on natural resources.
	2. Displays sensitivity towards the need for managing the resources.
	3. Analyze adaptation of various life forms for their survival.
	4. Display values like love and respect for nature and its laws.
	5. Exhibit respect for rights of others, including animals.
	6. Contextualize the role of environmentally related occupations (e.g. conservationist, naturalist, gardener, horticulturalist)
	7. Display empathy towards every life forms and the inter-dependency existing in the natural world.
	8. Display control over emotion for nature.
Attitudes, concerns and world view towards the environment	9. Relate environmental degradation to human wellbeing.
	10. Debate about how unscientific developmental activities, like construction of roads, can be harmful to the environment and society.
	11. Appreciate and respect the values (cultural, religious, spiritual, aesthetic) and practice towards nature and its conservation.
	12. Identify the environmental dimension embedded in religion and culture.
	13. Display habits, values, attitudes and emotions that maintain and promote environmental quality for human survival/wellbeing.
	14. Demonstrates through writings how media can facilitate interaction between the government and citizens.
	15. Critically analyse the impact of media on people's lives and choices. I am not sure I understood the last part of the statement.

	16. Distinguish the cultural, geographical, linguistic and religious diversity of the planet, starting from the city/village to the state to the country to the planet.
	17. Identify the differences among people of different regions, cultures and religions along with biodiversity in nature.
Assuming personal responsibility	18. Expresses views on the environmental concerns.
	19. Point out issues of equity and impact of climate change.
	20. Identify his/her role in the National Climate Change Action Plan (or any other environmental conservation plans – for example Swachh Bharat Abhiyan).
	21. Act as social mobilize to address issues in his/her context.
	22. Appraise the welfare of others above her/his own whenever s/he is given opportunity to make choices.
	23. Decide and accepts opinion of majority.
	24. Take responsibility for his/her choices in energy consumption and conservation.
	25. Interpret the wider meaning of “think globally but act locally”
	26. Take initiative in a group to plan and conduct conservation work (e.g. cleanup, tree planting, etc.
Locus of control/ self efficacy	27. Monitor own lifestyle in the context of resource consumption.
	28. Share available resources with others.
	29. Respect the culture and traditions promoting living in harmony with nature.
	30. Support environmental protection initiatives.
	31. Accept that small actions, like switching off the unwanted bulb or tube, stopping a running water tap or giving a lift to your friend in your vehicle, have a significant impact on environmental quality.
Motivation, and intention to act	32. Support people’s movements to protect their forests.
	33. Disseminate messages about environmental conservation.

	34. Adopt actions that promote environmental conservation.
	35. Adopt appropriate urgent action to resolve environmental problems.
	36. Identify actions to solve environmental problems.
	37. Identify that appreciation of someone's environmental action is also an action in the right direction.
	38. Join local organizations as a volunteer to create environmental awareness.

Table 3.3 Learning Outcomes in Competency Domain

Area	Competency (Skill and abilities that we know how and when to apply)
	Specific Learning Outcomes- Student will be able to ...
<p>Identification of Environmental Issues</p> <p>Recognize and distinguish environmental from others, describe or give evidence</p>	<ol style="list-style-type: none"> 1. Identify local environmental problems and their causes. 2. Relate urbanization and industrialization with environmental issues. 3. Identify sustainable development practices and challenges. 4. Identify some of the common environmental disasters. 5. Recognizes consequences of human activities – stress on land use, water sources, energy and mineral resources, forests, ocean life, environmental degradation. 6. Differentiate between the human induced and natural disasters. 7. Identify a deforested area and its drivers.
<p>Ask relevant questions about environmental conditions and issues.</p> <p>(Inductive vs. deductive, fact, concept, procedural, probable response)</p>	<ol style="list-style-type: none"> 8. Assess the influence of urbanization and industrialization on the natural resources. 9. Ask in local context why a problem has become an environmental issue. 10. Prepare a set of questions from Newspaper stories, case studies. 11. Identify the evidence to believe.
<p>Analyze environmental issues.</p> <p>(History, scope, manifestations and probable consequences)</p>	<ol style="list-style-type: none"> 12. Assess situations to illustrate balance in nature. 13. Analyse the relationships in nature. 14. Analyze the consequences of mineral extraction on the environment. 15. Assess the law and policies in development context. 16. Analyse the consequences of keeping large number of livestock. 17. Analyze the causes and effect of storms. 18. Engage analytically on local issues and feel connected to people’s struggle for justice, equality and dignity. 19. Predict the condition of soil when crops are continuously grown without replenishment of

	resources.
	20. Predict the effect of wrong hygiene and sanitation behaviours.
	21. Develop strategies for reducing the usage of fossil fuels.
	22. Predict the impact of water pollutants.
Investigate environmental issues (scientific and social aspects of issues using primary and secondary sources)	23. Relate environmental degradation to human well-being.
	24. Survey the uses of resources in their locality.
	25. Investigate the extent of use of plastics and suggest solutions to reduce the use.
(Locate source of information)	26. Investigate how the non-degradable waste poses a great threat to environment.
	27. Investigate the extent of forest cover over the years
	28. Assess Municipal waste management systems (solid and liquid).
	29. Evaluate the impact on the environment due to change in land use.
	30. Prepare a menu of balanced diet.
Evaluate and make personal judgments about environmental issues (the interaction between environmental conditions and socio-political systems)	31. Evaluate the changes happening around them leading to imbalance in nature.
	32. Give reasons for the alterations that humans have made in natural ecosystems.
	33. Analyse the consequences of keeping large number of livestock.
(Set criterion, decision based on data)	34. Evaluate changing lifestyles/resource consumption over 3 generations.
	35. Take actions at their level leading to environmental stewardship.
	36. Develop a sense of commitment towards the protection of environment.
	37. Debate on how unscientific developmental activities like construction of roads can be harmful to environment and society.
	38. Assess the causes and impact of contaminated water.
	39. Evaluate different irrigation practices.
	40. Evaluate the changes happening around them.
	41. Evaluate the changes happening around us with examples.
	42. Ability to assess the outcomes of environmental action and initiatives.

	43. Compare crops, sources of water in different parts of India.
	44. Compare traditional and modern agricultural practices.
Use evidence and knowledge to select and defend one's own position (s) to resolve issues. (Debate, role play, decision – data and support)	45. Express views on the environmental concerns.
	46. Monitor your lifestyle in context to resource consumption.
	47. Apply concept of ecological footprint to estimate your resource consumption.
	48. Recognize the potential of human beings as resources in sustainable development processes.
	49. Analyse the areas where non-renewable sources may be used.
Create and evaluate plans at various scales/levels to resolve environmental issues.	50. Suggest methods of reducing impacts of transportation on environment and society.
	51. Suggest ways to prevent pesticides pollution.
	52. Explain important strategies in preventing disaster.
	53. Support the initiatives taken by various agencies including communities for environmental conservation.
	54. Select the best options for environmental management in various contexts.
	55. Define their roles and responsibilities along with that of other individuals/ groups in environmental conservation.
	56. Create models of sustainable development.
	57. Identify the various initiatives taken for conserving environment.
	58. Evaluate the advantages and disadvantages (including health) of renewable and non-renewable resources. (Wind, Water, Solar, Fossil fuels, Biomass).
	59. Critically evaluate the role traditional/indigenous practices in biodiversity conservation.
	60. Summarise the role of communities in forest management/conservation.
	61. Explain benefits of ecotourism.
	62. Compare the traditional farming with the modern farming methods.
	63. Recognises natural resource distribution, conservation and utilization as integrated aspects of national development.
	64. Design a model of their local environment

	applying sustainable development perspective.
	65. Spreads message to protect nature and its invaluable resources.
	66. Appreciate international efforts (convention and treaties).

3. 4 Learning Outcomes in Behaviour Domain

Area	Behaviour (Involvement and intentional and habitual behaviour individually or as a member of a group, that work towards solving current problems and preventing new ones.)
	Specific Learning Outcomes – Student will be able to ...
Eco Management	1. Practice four R's – Refuse, Reduce, Recycle and Reuse.
	2. Participate in the mock drills to reduce the impact of disasters.
	3. Engage in plantation activities.
	4. Apply methods of proper disposal of waste.
	5. Implement/Participate in conservation related activities such as planting, waste management.
	6. Illustrate watershed management – rainwater harvesting, ground water recharging.
	7. Practice and appreciate the diversity in food habits – vegetarians and non vegetarians, stop discrimination based on food habits.
	8. Show a sensitive behaviour while in a Wildlife Sanctuary.
	9. Practice the right hygiene and sanitation behaviours.
	10. Use principles of water management for treatment of contaminated water, sewage disposal and sanitation.
Persuasion	11. Spread message of conservation of environment and its invaluable resources.
	12. Participate/conduct campaigns for sustainability.
	13. Use logical argument through writing letters to papers/appeals in media on environmental issues.
	14. Practice and spread the philosophy of “five mega elements of nature” – air, water, soil, sunlight and the space.
	15. Present the arguments for not using the weedicides, fertilisers and manures in agriculture.
Consumer/economic action	16. Initiate measures at personal level for reducing climate change and its impacts.

	17. Keeps environment/sustainability as a decision making criteria for purchasing or choosing options.
	18. Donate/transfer used material like books etc. to others who can use them.
	19. Buy certified products/appliances – BEE rating, Eco mark etc.
	20. Warn/communicate about the hazards of products on health/environment.
	21. Show a personal decision/commitment not to purchase or use any wildlife products like ivory, animal skin, tooth, horn and the products made up of these.
	22. Take a personal decision to not keep any endangered or scheduled animal as a pet.
	23. Say no to plastic/polythene bags.
Political action	24. Engage with panchayat members/society/school authorities etc. to review initiatives/measures to reduce environmental impacts.
	25. Cooperate with agencies working with environmental conservation/sustainability issues.
	26. Help the local representative to become aware of the violations in your neighbourhood like tree cutting, pollution, garbage accumulation.
	27. Discuss issues with SMC/PTA to find solutions.
	28. Express concern for the socially, economically and physically disadvantaged.
	29. Participate in pollution control drives.
Legal action	30. Report violations to the appropriate authority like school management/teachers/parents/society members/government help lines.
	31. Have a personal resolve to report anybody violating the laws that protect environment, wildlife and natural resources.

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