GENDER GREEN TEACHER

NATIONAL INSTITUTE OF OPEN SCHOOLING

ISO 9001 : 2015 Certified

(An autonomous Institution under Ministry of Education, Govt. of India)

A-24-25, Institutional Area, Sector-62, NOIDA-201309 (U.P.)

Website: www.nios.ac.in Toll Free No: 18001809393

in collaboration with

COMMONWEALTH OF LEARNING

4710 Kingsway, Suite 2500

Burnaby, British Columbia

Canada V5H 4M2

Web: www.col.org

National Institute of Open Schooling is an autonomous Institution under the Ministry of Education, Govt. of India providing courses at Open Basic Education, Secondary, Sr. Secondary levels through Open Distance Learning (ODL) mode.

ADVISORY COMMITTEE

Prof. Saroj Sharma
Chairperson, NIOS

Dr. Rajiv Kumar Singh
Director (Academic), NIOS

Ms. Frances J. Ferreira
Gender Specialist, COL

CURRICULUM COMMITTEE

Prof. Nilima Srivastav
Director, SOGDS, IGNOU,
New Delhi

Ms. Madhavi Joshi
Senior Programme Director,
Centre for Environment Education

Ms. Sunila Athley
Principal, Amity International School
Ghaziabad

Ms. Sharad Gaur
Environment Consultant,
New Delhi

Mr. Parthesh Pandya
Chief Operating Officer, ITOWE
Development Foundation, Ahmedabad

Dr. B.K. Rai
Assistant Director (Academic), NIOS

Prof. Fauzia Khan
Professor of Education,
Jamia Milia Islamia, New Delhi

Dr. Sarita Anand
Associate Professor, Lady Irwin
College, Univ. of Delhi

Ms. Rita Kaul
Principal & Director, The Millennium
Schools, New Delhi

Mr. Santosh S. Sutar
Regional Director, Centre for
Enviroment Education (CEE)
South, Ahmedabad

Mr. Shankar Musafir
Embedding Specialist, UNESCO,
New Delhi

Ms. Anshul Kharbanda
Academic Officer, NIOS, Nioda

Ms. Asllesha Thakur
Chairperson, APS Schools & Director,
Lead Innovation, New Delhi

Dr. Chitender Singh Verma
Principal, Kautilya Government
Sarvodaya Bal Vidyalaya, New Delhi

Ms. Neetu Kapoor
Principal, Army Public School
Delhi Cantt.

Ms. Shivani Jain
Chief Operating Officer, ITOWE
Development Foundation, Ahmedabad

Ms. Hemalatha Srinivas Manchikanti
TGT, Army Public School, Delhi Cantt.

Ms. Naa Adjeley Sackey
Administration & Governance Coordinator, COL

COURSE WRITERS

Ms. Madhavi Joshi
Senior Programme Director, CEE
Ahmedabad

Ms. Shivani Jain
Chief Operating Officer, ITOWE
Development Foundation, Ahmedabad

Dr. Ruchi Gaur
Assistant Professor, Lady Irwin
College, University of Delhi

Mr. Santosh S. Sutar
Regional Director, CEE South
Bangalore

Mr. Parthesh Pandya
Chief Operating Officer, ITOWE
Development Foundation, Ahmedabad

Dr. Mala Bhandari
Founder, SADRAG, Noida

Dr. Sunaina Batra
Assistant Professor, Lady Irwin
College, University of Delhi

EDITORIAL BOARD

Prof. Aasha Kapur Mehta
Visiting Professor and Head,
Centre for Gender Studies,
Institute for Human
Development, New Delhi

Mr. Sharad Gaur
Environment Consultant,
New Delhi

Dr. Sarita Anand
Associate Professor,
Lady Irwin College,
University of Delhi

Ms. Padmakshi Badoni
Gender Consultant,
UN Women, New Delhi

Dr. Kiran Banga Chokkar
Advisor, Regional Centre of
Expertise in ESD (UNV-IAS)
Asia-Pacific Region New
Delhi

Dr. Benita Sen
Consultant Editor,
New Delhi

COURSE COORDINATOR

Ms. Anshul Kharbanda
Academic Officer,
NIOS, Headquarters, NOIDA (UP)

GRAPHIC, COVER DESIGN AND DTP

Raj Kumar Bejjanki
Graphic Artist, NIOS

M/s Shivam Graphics
431, Rishi Nagar, Rani Bagh,
Delhi-110034

About the Course

Dear Teachers,

We are happy that you have chosen this course that would help you enhance your understanding and knowledge about gender and environmental issues. Welcome to the Course in Gender Green Teacher Programme!

The only way in which both the issues of gender equality and environmental sustainability can be addressed is through education. The Sustainable Development Goals feature education in SDG4, and it also plays a role in contributing to the other SDGs, including SDG5 on gender equality and SDG 13 on climate action. By integrating gender and environment into the education it is envisioned that strides can be made to improve knowledge and attitudes about these issues, and encourage learners to make positive changes in their own actions and behaviours. However, for such an integration to occur, teachers need to be adequately prepared in these areas, both in terms of their own knowledge of the topics, and also how to mainstream these topics through their teaching so that they can make an impact on the their learners.

This course has been developed to enhance capacity building of teachers, to mainstream gender-environment through their teaching developing positive attitude among teachers towards gender and environmental issues and enabling them to use and create effective teaching-learning strategies to integrate gender and environment concerns in the teaching-learning process.

This course has three modules namely Gender, Understanding Environment and Teaching and Learning about Gender Environment and Sustainable Development. The course content focuses on basics of gender, environment and sustainable development and interlinkage of gender and environment.

I hope you will find the lessons and approach interesting and will be able to apply your knowledge in real life situations in your classrooms.

The details of the course comprising of the examination and evaluation procedure are mentioned in detail in the last pages of the course.

Do not hesitate to write to me, in case you face any difficulty in your studies.

Happy learning..

NIOS Team

Learning Material

GENDER GREEN TEACHER

Module 1 Gender

Module 2 Understanding Environment

Module 3 : Teaching and Learning about Gender, Environment and Sustainable Development

Module 1 : Gender

Contents

UNIT 1 UNDERSTANDING GENDER

STRUCTURE

1.0 INTRODUCTION

This is the first lesson in the series of the module, *Gender and Society*. It dwells upon the basic concepts of sex and gender as they exist in society and are practised in everyday life. It includes an introduction to gender roles, gender identities, gender stereotypes, patriarchy, and how understanding these concepts can contribute to the understanding of gender equality at home and at workplaces.

1.1 LEARNING OUTCOMES

After studying this lesson, the teacher-pupil will be able to:

- describe the genesis and practice of gender in society;
- relate the concept of gender to everyday life;
- contrast gender roles restrict opportunities of growth for women; and
- explain the need for gender sensitivity among boys and girls.

1.2 UNDERSTANDING GENDER

To begin with, we need to understand the two basic concepts of sex and

gender. Though these concepts are used interchangeably, yet they carry a different meaning and connotation in human life.

We are born with a set of physical and physiological features and reproductive/ sexual anatomy. These features together constitute the sex of the person. While the person with male reproductive organs is referred to as male, the one with female reproductive organs is referred to as female.

The reproductive system of males and females is different in structure and function. It has different biological and physiological characteristics and genes, hormones and reproductive organs. As a result, both males and females have a distinctively different reproductive function.

Gender, on the other hand, is a social concept. When the two sexes, male and female, are considered with reference to social and cultural differences, it is referred to as gender. Gender may vary from one society to another or may even vary within the same society.

Right after the birth of a child, the social and cultural factors interplay to assign a particular image, role and status to the male and female child. For example, while a female child helps her mother in household chores, the male child may go out to play.

Sex	Gender
Biological characteristics that define humans as female or male, or those who possess both male and female characteristics	Socially constructed set of roles and responsibilities associated with being a girl or boy, woman or man, and third or other gender
From birth	Is Learned
Universal	Varies across societies, cultures and historical periods
Cannot be changed, except with medical treatment	Can change because social values and norms are not static

1.2.1 Sex and Gender

On birth, the sex of the child determines the difference between boys and girls. As the child grows, society gives the person social roles, attributes, opportunities and privileges that may differ from one to the other. This compartmentalises men and women in separate moulds with differentiated roles and expectations. For example, we are born as a male or a female but it is the society that makes masculinity a male attribute and femininity a female attribute.

Apart from the defined categories of man & woman, some people identify as 'transgender', which refers to identification of their gender category which is different from their sex assigned at birth.

ACTIVITY:

Following are a few statements. Identify whether they are about sex or about gender by placing S for 'sex' or G for 'gender' against them:

- Women give birth to babies, men don't.
- Girls are gentle, boys are tough.
- Women are paid less wages as compared to men.
- Most long-distance truck drivers are men.
- Most building site workers in India are men.
- Men's voices break at puberty; women's do not.
- Caring professions such as nursing are more suitable for women than for men.

International Federation of Red Cross & Red Crescent Societies, 2003

1.3 GENDER ROLES

Gender role is the prescribed norm for our respective sex that refers to desired conduct for action, language, clothing, grooming and behaviour. For example, girls and women are generally expected to speak, dress and behave in feminine ways. Men, on the other hand, are expected to be strong and masculine.

Every society and community prescribes gender roles for men and women. These gender roles may vary from group to group. While women are prescribed only household and care work in certain groups, they may be encouraged for formal employment by others.

While ascribing gender roles to the respective male and female sex, the society establishes certain gender stereotypes. These stereotypes influence gender roles across the following areas:

- **Persona** — Related to personality. While women are expected to be accommodating and emotional, men are expected to be logical and aggressive.
- **Behaviour** — Related to speech and conduct. Women are expected to be polite and feminine. Men are, on the other hand, expected to be dominant and decision-makers.

- **Occupation** — Related to work roles. Occupations based on soft skills such as teaching, nursing and HR are prescribed as suitable for women. The authoritative and commanding jobs such as senior management, armed forces and engineering are considered suitable for men.
- **Appearance** — Related to physical and presentation attributes. While women are expected to be beautiful, slim and graceful, men are expected to be handsome, tall and muscular.

1.4 GENDER IDENTITY

The identity of self that we relate to gender is termed as Gender Identity. It indicates the options and choices that are available to members of the society to choose from a set of social identities. These could be based on the inclinations one has across the continuum of one's sexual identity, interests and social experiences.

Primarily, gender identity is how a person feels and who they know themselves to be or their awareness when it comes to their gender. There may be instances when the person may not be comfortable with his/her sex identity and may like to alter it medically.

Sexuality	Sexual Orientation
It is a person's understanding/ expression of being a male or a female and it influences whom one has sex with.	It is an individual's preference for sharing sexual expression with members of the opposite sex (heterosexuality), one's own sex (homosexuality) and both sexes (bisexuality).

Manabi with the changed gender identity

Manabi Bandopadhyay was born as a male child. However, he liked to behave like a girl. The family had two daughters so the father wanted Manabi to earn and sustain them all.

Manabi was uneasy with himself. He felt that he was a woman who was forced to inhabit a man's body. After completing High School, Manabi decided to consult a psychiatrist on his own. He was advised not to be confused, forget his state and move on as he is.

Subsequently, Manabi faced a lot of ridicule from his father, family and society at large. In 1995, Manabi started the first magazine for transgender people — *Ob-Manab*, or sub-human — in Bengali. He applied for a job at the Vivekananda Centenary College in Jhargram, where he was coerced

to apply as a male lecturer. He was the first transgender to become a college lecturer. Manabi continued to face discrimination and ridicule. In 2003, Manabi underwent a series of sex-change surgeries and from a transgender, he became a trans-woman.

Society, however, did not support Manabi and she faced total social ostracism. Though she was highly educated and reached a respectful position in academia, she was never socially accepted.

1.4 GENDER CONCEPTS:

Women may have a low social and cultural status due to gender. It may cause unequal production, access and distribution of resources between men and women as defined by the following gender concepts:

- **Gender stereotype:** It refers to the characteristics that are to be possessed and the roles that should be performed by females and males. Gender stereotypes may have positive and negative connotations. For example, the perception that women are nurturing, is a positive stereotype; the idea that women are weak is a negative stereotype.

Gender stereotypes are harmful when they restrain men or women to develop their personal adeptness, pursue professional careers and make choices in life. For example, the stereotype that women are more caring, soft and nurturing, though positive, may lead to women being entrusted with household care and child-rearing responsibility.

Related close to gender stereotype are the concepts of masculinity and femininity. These concepts correspond to the sex category and prescribe different notions for males and females. The notion of masculinity is associated with the male being tough and strong. Femininity is, on the other hand, associated with women being docile and submissive.

Gender stereotypes condition our thinking and conduct in every walk of life. For example, pink and blue colours are gendered colours. While pink is considered feminine, blue is considered a masculine colour. Therefore, while boys are dressed in blue, girls are dressed in pink.

- **Gender Bias:** This is evident through a preference for one gender over the other. The preference for a male child is the most common indicator of gender bias. The pregnant woman is blessed with, "Putravati bhava!" (May you be blessed with a son!). There are celebrations in the family when a male child is born. There is gloom when a female child is born. This gender bias has resulted in skewed sex ratio with 933 females per 1000

males (Census of India 2011). In absolute terms, **India** has 48% female population compared to 52% male population (Statiscistimes.com).

- **Gender Discrimination:** This is when we discriminate between boys and girls with regard to availability and access to opportunities and privileges. For example, by sending boys to school and keeping girls at home, we are excluding the female population from the opportunity to study and grow. This is the exclusion of one particular gender from the development discourse.
- **Gender Equality:** This refers to equal access to resources and opportunities to all to ensure that no one is left out of economic, political and social participation and decision-making. Regardless of gender, development options should be made available to all. Gender equality is also the 5th goal among the 17 goals of the UN Sustainable Development Goals (SDGs).
- **Gender Equity:** This refers to the fairness of treatment for women and men, according to their respective needs. Women have a reproductive role that requires proper health and sanitation facilities. These facilities must be provided, besides the facilities required for their general health and wellbeing.

Gender equity	Gender equality
Equity recognises the differences and accommodates them to prevent the continuation of an inequitable status quo. It emphasises fairness in both process and outcome.	Equality between men and women in rights, responsibilities, entitlements and equal voice in civil and political life.

- **Gender Mainstreaming:** This refers to the process of integration of gender perspective into preparation, design, implementation, monitoring and evaluation of policies, regulatory measures and spending. It is important that specific needs and requirements of women are duly considered while planning the development programmes and schemes.
- **Gender Neutral:** It refers to the conviction that policies, language, social institutions and gender identity should not distinguish roles based solely on sex or gender. People of all genders should be addressed at par, irrespective of their sex category.
- **Gender Gap:** This refers to the difference between the participation of women and men in social, political, intellectual, cultural and economic fields. A gender gap indicates gender inequality. For example, the mere 14.4% per cent participation of women in the Lok Sabha (2019) supports the fact that our country's governance is still in the hands of men.

ACTIVITY:

Given below are some gender stereotypes still practised. Against each stereotype, write Yes or No as you consider correct.

S.No.	Men are by nature	Yes or No	Women are by nature	Yes or No
1.	Powerful		Supportive	
2.	Assertive		Intuitive	
3.	Dominant		Loving	
4.	Competitive		Giving	
5.	Responsible		Compassionate	
6.	Logical and rational		Understanding	
7.	Objective		Nurturing	
8.	Controlling		Emotional	

1.5 UNDERLYING REASON FOR GENDER DIFFERENTIATION

Gender has often been explained in terms of patriarchy. The gender concepts such as gender stereotypes, gender bias and discrimination, are in fact said to exist due to the existing patriarchal system in our society.

The word *patriarchy* means the dominance/rule of the elderly male, said to be the patriarch of the family. This would be the male-dominated family – the household of the patriarch, that may comprise of women, men, children and grandchildren. The patriarch is the decision-maker and governs the family's affairs as per his discretion.

In feminist discourse, the word *patriarchy* is used as a concept or tool to suppress women by the overbearing male patriarch of the family. It points to the power dynamics with men at the helm of affairs where the women are at the receiving end. Patriarchy operates in multiple domains, such as social, cultural, economic and political, in both public & private spheres of life.

Movement against patriarchy

Source:https://upload.wikimedia.org/wikipedia/commons/6/69/Fight_Patriarchy_graffiti_in_Turin.jpg

While the space surrounding the person, within the home and family is considered private, the space outside the home, on the road, in schools, parks, offices and markets is considered the public space.

These movements aim for women's empowerment so that they can overcome the socio-cultural and economic barriers, and get access to basic health, education and employment opportunities. Several movements have been taking place across the globe to fight patriarchy.

One of the effective strategies of women's movements is to fight with the collective spirit of womanhood. The women have gathered together to raise their unified voice against oppressive patriarchy and prevailing gender norms. Economic and social empowerment of women has been facilitated through Self Help Groups (SHGs) through which women have come together to work for mutual growth and development. The women's SHGs have been a successful example of women's collectivism in India.

The Strength of Women's Collectivism

At the national level, the National Policy for Empowerment of Women provides guidance for work on gender equality with inputs from public, private and civil society organisations. Among public organisations are National Commission for Women (NCW) and Rashtrtiya Mahila Kosh (RMK) which have conceived and implemented welfare schemes such as Balika Samriddhi Yojana (BSY) and Indira Mahila Yojana (IMY).

ACTIVITY I:

Share your observations and experiences on:

- Who is the first to answer in class? Girls or boys?
- What is the trend for subject options like Science, Commerce and Humanities? What do the girls generally opt for?
- What is the ratio of girls in comparison to boys who take up engineering drawing and computer science in school?
- Do you think boys are better at sports than girls?
- What are the reasons given by girls and boys for their absence from school? Are the reasons similar?

ACTIVITY II:

1. Make a list of behavioural attributes that you think are typical of males, females and transgenders. Talk to one person each from your older and younger generation and find out their attitude towards these attributes.

	You	Older individual	Younger individual
Male			
Female			
Transgender			

Write the differences in replies of the respondents.

ACTIVITY III.

We have discussed how the manifestation of gender difference can be found in the construction of:

a. Roles or what women and men do

b. Relations or how women and men relate to each other

c. Identity or how women and men perceive themselves

Now, ask your students to think about what their roles, relations and identity are. Ask them to talk to a person who is of the opposite sex, to find out about his/her thoughts about the same. Discuss the major differences, if any:

ACTIVITY IV.

Talk to five or six girls living near your community. Prepare a map of streets/ roads/shops or areas they consider safe or unsafe while travelling in your community. What makes these spaces safe or unsafe?

1.6 LETS SUM UP

- Sex constitutes the physical and physiological features and reproductive/ sexual anatomy. Gender, on the other hand, is a social concept.
- Gender role is the prescribed norm for our respective sex that refers to desired conduct for action, language, clothing, grooming and behavior.
- While ascribing gender roles to the respective male and female sex, the society establishes gender stereotypes.
- The notion of masculinity is associated with the male with being tough and strong. Femininity is, on the other hand, is associated with women being docile and submissive.
- Gender gap indicates gender inequality which may not be desirable in development discourse. The gender concepts such as gender stereotypes, gender bias and discrimination, are in fact said to exist due to the existing patriarchal system in our society.
- Worldwide, several movements are taking place to fight patriarchy as it is seen as a hindrance in women's rights and empowerment.
- In India, the National Policy for Empowerment of Women provides guidance for work on gender equality with inputs from public, private and civil society organisations.

1.7 UNIT-END EXERCISES

1. What are gender concepts? Name any three with examples.
2. Explain with examples, the process of social construction of female and male gender.
3. How are gender stereotypes reinforced at home?
4. Do you think that transgenders are accepted with respect by our society?
5. Explore the history of women's movement in India. Refer to online open sources for this research.

1.8 SUGGESTED READINGS AND REFERENCES

Bhasin, K (2003). *Understanding Gender*. Kali for Women: New Delhi.

Bhasin, K (2011). *What is Patriarchy?* Kali for Women: New Delhi.

Agarawal, Bina (ed) 1991. *Patriarchy and the Modernising State: An Introduction.* Kali for Women: New Delhi

Gender & Development: Concepts and Definitions (2000). BRIDGE DFID: UK.

Oakley, Ann. (1972). *Sex, Gender, and Society*. Harper and Row: New York.

Sex ratio of India 2019 - StatisticsTimes.com

statisticstimes.com › demographics › sex-ratio-of-india

TED talk video by Kamla Bhasin

https://in.video.search.yahoo.com/search/video; ylt=AwrwI4V8l dZdJSIA2k u7HAx.;_ylu=X3oDMTByYmJwODBk BGNvbG8 Dc2czBHBvcwMxBHZ0aWQDBHNlYwNzYw—?p=Ted+talk+video+by+ kamla+bhasin&fr=mcafee#id=1&vid=9f1cb 7e9b2ff9d61e8 5bff8d18f9 fe0a&action=view

Notes

UNIT 2 GENDER AND SOCIETY

STRUCTURE

2.0 INTRODUCTION

This lesson dwells on the concept of Gender and Society and its manifestation. It explains the connotation of society, the understanding of gender, its perception, role and responsibilities and the making of a gender-sensitive environment.

2.1 LEARNING OUTCOMES

After studying this lesson, the teacher-pupil will be able to:

- explain the social and cultural connotations of gender;
- describe the manifestation of gender in society and its implication; and
- interpret the process of socialisation through construction of gender identities and gender stereotypes.

2.2 SOCIALISATION

In Lesson 1, we learnt about the concepts of sex and gender differentiation.

In this lesson, we will study the social process of establishing gender identity, gender-based perceptions and image.

The conception of a child is a product of human biology. It grows in the closed environment of the womb. It is after birth that the child enters the social world and comes in contact with people. The people related to the child, whether near or far, create an interactive social environment around the child. These people are a part of society and are governed by social institutions such as family, household, religion, school etc. They formulate common norms and practices which are used to condition the behaviour and conduct of people along pre-defined lines. These collectively constitute a socio-cultural ecosystem that determines the learning, growth and development of the child. This process is called socialisation. It begins at birth and continues through every phase of life.

Socialisation influences the child's perception, behaviour, actions and interactions through the socio-cultural environment that it builds. This process aims to groom the child for conformity to the norms of society and community.

The process of socialisation is carried out by social agents who belong to different institutions of society. These institutions are family, peer group, school, religion and community. These agents collectively work on social conditioning of the child, both implicitly and explicitly. They ingrain social conditioning in the process of a child's upbringing.

The social agents and institutions together form the society, where people, bound by common laws and cultural norms, live together with one another. These social agents impart social and cultural practices, norms and rules so that specific perspectives are set in and opinions are formed.

2.2.1 Social Institutions/Agents

Social agents constitute a social and cultural environment that comprises the values, beliefs, customs and expectations to be imbibed during the process of socialisation. This process continues unabated with the child continuing to acquire a certain value system during childhood. These values are based on the perceived social role and status corresponding to the sex of the person. This process carries on over generations and determines the basic fabric of our society.

It is the process of gender socialisation that conditions the child's mind for social expectations, attitudes and behaviours associated with boys and girls. They learn the values, behaviour, speech and dress expected for males and females. For example, they learn from the environment that males are masculine and females are feminine.

This binary differentiation takes roots in childhood and strengthens as one grows.

CHECK YOUR PROGRESS 2.1

1. What is socialisation?
2. What are social agents? Give examples.
3. How do social agents build the socio-cultural environment?
4. How does socialisation create socially abiding individuals?
5. Why is the process of socialisation important for society?

Gender Socialisation at Home

Radha lives with her parents and a younger brother in a small village in Uttar Pradesh. She is 13 years old and her brother is three years younger. Radha's father tills the tiny land that the family owns. Her mother looks after the home and helps in agricultural activities.

Radha and her brother study in the village school. After they return from school, they lunch. After lunch, while Radha helps her mother wash and clean, her brother goes out to play. His friends and he go to the river, swim, and return home late in the evening.

While Radha helps in household chores, her brother has a joyful time.

Reflect on the following aspects of the story:

1. How are Radha and her brother groomed by the family?
2. Radha and her brother are siblings. Are their routines the same or different?
3. How, according to you, should the family groom Radha and her brother?
4. How is the process of socialisation creating differentiated gender roles in the family?

2.3 GENDER AND FAMILY

The family is the first social institution that a child experiences after birth. It is a group of persons united by the ties of marriage, blood, or adoption, and interacting with each other in their respective social positions, usually those of spouses, parents, children, and siblings.

The family performs the following important functions:

1. **Securing future generations:** The family plans for the birth of the child and makes arrangements for her/his care and well-being. The role and responsibilities may be divided and assigned as per age, availability of time and level of involvement of family members.

2. **Socialising the child:** The family comprises people related through an ever- growing web of inter-personal relationships. Based on the basic structure, the family may be divided into two types: Nuclear and Joint.

   - **Nuclear Family:** A nuclear family includes the parents and their unmarried children living in the same house.
   - **Joint Family:** A joint family includes all relatives in close proximity such as grandparents, aunts, uncles, and cousins. This type of family is also called an extended family or multi-generational family, depending on which members are included.

The family conserves the cultural norms, practices and traditions over the years. Family members bring up the younger ones on values that they had imbibed from older members. These values can go back generations. This process continues throughout a person's life.

The family is a heterogenous unit constituted by members of varying age, likes and dislikes, hobbies and interests. Their access to available household resources may be conditioned by age, gender and decision-making power. Consider, for example, the availability and access to food within the household. Food is procured from outside and is prepared at home for the family. It is usually the woman of the house who cooks and distributes food in the family. While distributing food, she may consciously decide to divide food on the basis of gender, i.e., she may give a larger portion to the son rather than to the daughter of the family. This is **gender discrimination.**

> The woman's access to food is primarily determined by the meal-eating pattern in the household. This pattern is based on multiple factors such as age, sex, social status and decision-making power of the member and the priority given to the same (Bhandari, M: 2004).

The family may treat boys and girls differently and define their access differently to available resources in the household. It may initiate and practise gender discrimination as a norm. Like food, boys may receive better apparel and medical care compared to girls.

CHECK YOUR PROGRESS 2.2

1. Is the family a homogenous group?

2. Define family and its types.

3. How does the family practise gender discrimination between boys and girls?

4. How does socialisation reinforce gender discrimination within the family?

2.4 GENDER AND SCHOOL

The school is meant to provide the learning experience to children. It is an institution that carries forward the process of socialisation by reinforcing the cultural norms and practices among children.

The school has three major influencers: Teachers, peers and textbooks, which not only influence the child's mind but also condition it through repeated messages.

A. Teachers:

In school, children study under the guidance of teachers. They spend time with teachers while learning and during other engagements. Teachers can directly and indirectly influence the personality and conduct of the children in three ways.

First, the teachers belong to the same socio-cultural milieu as the children. They may carry the same gender biases and discriminatory practices as the children. Second, the teachers may not be trained to recognise and combat gender stereotypes and prejudices of their own as well as of others. For example, the teacher may repeatedly say in the class that the subject of Mathematics is easier for boys than for girls or that boys are better in sports than girls. This may represent the teacher's personal perspective on gender which she implicitly passes on to children to follow.

Ritu Singh teaches the students of class 4 in a school. It is a school where boys and girls study together. One day, she wanted a class desk to be shifted. She called Ajay and explained the task to him.

She did not call Kavita for doing the same work.

Message to children: Girls may not be able to lift weights because they are physically weak. Boys are strong and can do work that requires heavy lifting.

Third, the teacher may teach children in a gender-differentiated manner and the children learn and internalise that boys and girls talk, think and act differently since their teacher says so.

To sum up, the teacher reinforces gender differentiation by:

- **Reinforcing gender stereotypic behaviour:** The teacher may exhibit "math phobic" behaviour and recommend subjects like Science and Maths to boys but not to the girls.
- **Different expectations from females and males:** The teacher may refer muscular tasks to boys. For example, the teacher may send boys to the playground for sports and the girls to the library to read and write.
- **Reinforcing children's gender group:** The teacher may discourage cross-gender groups and playmates among the children by segregating them into "only boys" and "only girls" groups and engage with them separately.
- **Addressing children based on gender:** The teacher may give a tougher role to boys. Their perception that girls need more care and protection may let them address girls more gently and caringly.

B. Peers : The children in school are similar in age group, interests and hobbies. They together engage in learning and sports activities. They usually like to be in small groups with children whom they call their friends and like to spend time with them. These are called peer groups.

The peer group is a primary group of people who have similar interests, age, background and social status. The members of this group are likely to influence each other's beliefs and behaviour. *Wikipedia*

The peer groups form a circle of influence around the children. This circle provides a collective identity to children based on the principle of group loyalty. The collective identity influences the behaviour and overall conduct of the children.

Those who align with the group's ideology remain in the group. Those who do not, are not accepted in the group. The children usually strive to adhere to group ideology so as to remain within the group.

Raja, Ramesh, Chand and Ankit study in the same school. They are all in class X. They like to spend time with each other. They have common interests like playing cricket and listening to music. They are together in school as well as after the school.

They have formed a group of four members and named it the Four Musketeers. They study and play together as a group. They do not like it when other children try to break into their group. Their group loyalty is so strong that they keep their gossip and activities a secret from others.

Activity: What do you think would be the day-long activities of the Four Musketeers group.

The peers contribute significantly to the process of socialisation through the following ways:

1. Strengthening gender stereotypes:

The peer group influences gender stereotypes in behaviour, dressing up, speech and action among the members.

Aman and Akshay are close friends in school. One day, Aman told Akshay that boys should have short hair and girls should have long hair.

When Akshay asked, "But why?" Aman replied that girls should not keep their hair short because they look beautiful with long hair.

Aman said that he agreed with him.

Premise: While Akshay reinforces his personal perspective, Aman is trying to conform to peer group loyalty.

2. Causing gender segregation:

Children like to play with same-sex playmates. For example, boys like to play with boys. It strengthens gender perceptions with more time spent in stereotypic play activities.

During a study, researchers observed pre-school children at play for six months. They found that as the amount of time that children played with same-sex peers increased, children's own behaviour became more gender stereotypical.

Source : http://www.child-encyclopedia.com/gender-early-socialization/according-experts/peer-socialization-gender-young-boys-and-girls

C. Textbooks:

Children follow the content written in textbooks prescribed by the school. It is very likely that textbooks reflect gender bias and discrimination that the writer of the books may have experienced on a personal level. Therefore, textbooks may reinforce the following gendered notions:

- **Gender Image:**

The school textbooks may show men in economically active, high careers and the women in household doing chores like cooking. Men may be shown as financial tycoons, engineers and management experts but the women are not shown in any of these roles.

- **Roles and Responsibilities:**

Within the family, women are shown in the specific role of care and support to other members. On the other hand, the male members are shown in

procurement and management roles. Men are depicted as decision makers and the women as the followers of decisions.

➢ **Gendered Occupations:**

Men and women are depicted in differentiated occupations with the women shown as teachers and men shown as engineers. While the engineering stream is shown masculine and is prescribed as appropriate for men, the profession of teaching is considered feminine and is prescribed as appropriate for women.

Gender Stereotyping

School as Gender Equaliser:

The school can provide a gender-neutral environment using powerful tools such as teachers and textbooks who can impart the values of gender-neutral behaviour and conduct through classroom transactions and various in-house activities. The school can provide a gender equal eco-system in the following ways:

❖ **Open Learning Environment:**

The school can provide an open learning environment with books, toys, sports equipment and musical instruments made equally available to the girls and boys.

❖ **Gender-Neutral Language:**

The school can ensure that the words, terms and tasks given to girls and boys are gender-neutral.

❖ **Cognisance of Discriminatory Practices:**

The school may educate children on gender issues. Children should be sensitised and made aware to identify and relate to gender bias and discrimination existing around.

❖ **Teacher's Conduct:**

In school, the teacher should be cautious of personal conduct and behaviour. The teacher's actions should not be biased against a particular gender.

❖ **Acceptance and Assimilation:**

The teacher should equally engage with boys and girls in all the activities. No child should be left out of any engagement on the basis of sex.

CHECK YOUR PROGRESS 2.3

1. How does school reinforce gender stereotypes among the children?
2. Do you think that teachers engage in gender discriminatory practices in class? Explain.
3. Should school textbooks have gender-equitable content?
4. How can we make gender-equitable schools?

2.5 GENDER AND COMMUNITY

Gender inequality exists in various forms. Women face discrimination in education, food, health, skill development, employment and protection from abuse. The community reinforces customary rituals and socio-cultural practices that provide differential roles, privileges and life options for women and men. Women remain at the receiving end in many areas like:

- **Inheritance of Property**

  Women in various societies did not receive ownership or property rights of the house they are born and brought up in. In 2005, an amendment was done in the Hindu Succession Act, 1956, whereby every daughter, whether married or unmarried, has equal rights as her male sibling to inherit her father's property after his death. However the law needs to be adopted and implemented in Indian households.

- **Low Wage Rate**

  Women are paid less for the same amount of work performed by men in both formal and informal sectors. The Equal Remuneration Act, 1976 aims to provide for the payment of equal remuneration to men and women workers and for the prevention of discrimination on the ground of sex, against women in matter of employment and for matters connected therewith or incidental thereto (National Portal of India). However, the ground reality is grim.

- **Employment & Income**

  Women have comparatively lesser opportunities to work outside the home. Gender bias at the workplace and restrictions from family limit their mobility outside the home. Several occupations remain out of their reach due to policies that encourage only male applicants. As a result, the female workforce participation rate continues to fall. However, it is important to recognise that women's work at home or in family enterprises is not monetised and therefore their contribution as workers does not get reported in data.

- **Decision-making**

  Women are, by and large, excluded from the realm of decision–making. The patriarchal set up at home emphasises that men plan for the procurement and consumption of household resources while the women's involvement is limited to decisions like, what to cook and how to clean the house.

- **Social status**

  The role of women as caregivers and nurturers are considered lower in social prestige and power. Men are considered economically productive with a higher social status. Though women are working professionally these days and they also contribute an income to the family, they are yet to be at par with men when it comes to social status.

- **Unequal distribution of resources**

  The son is considered as the permanent member of the family. Since the daughter marries and moves to another family, it is not felt important to provide the same resources to son and daughter. For instance, while the son is sent to school, the daughter is often not sent to school or may be sent to a less reputed school.

- **Food and medical care**

  The role and responsibility of running the household may leave little time for women to refer to the doctor in time and they may be the last to receive medical care in the family.

  Women cook for the family. But their own share of food may be unfair and variable as it often comes after every other member has been given his share. Women are expected to forego their share voluntarily if food finishes after serving others.

2.6 STATUS OF WOMEN AND GIRLS

India's population is 1.23 billion out of which females constitute around 48 per cent (Census: 2011). The status of women needs to be studied in the context of basic development indicators such as education, health and livelihood options within the Life Cycle framework. The detailed information on each of these indicators is:

1. Food and Nutrition:

On an average, Indian girls are breast-fed for half a month less than their brothers (F. Jasmine : 2014). It may be one of the underlying causes of malnutrition in girls below five years of age and higher mortality rate among the female child.

As childhood advances, girls enter adolescence and have a rapid spurt in growth between the age of 10 and 13 years. The rapid physical changes increase nutritional needs. Nutritional deficiency may result in stunted growth, anaemia, poor bone formation, impaired reproductive organs and their functions.

In the adult phase, the health status of women is relatively poor in comparison to men. It is estimated that 60 per cent of the chronically hungry people in the world are women and girls (WFP Gender Policy and Strategy). Among other rights of women, their Equal Right to Food has been enshrined in the *Convention on the Elimination of All Forms of Discrimination against Women* but the situation on the ground is not too promising.

2. Right to Life:

The female child is deprived of her right to live through the rampant practice of sex determination tests and induced abortion of female foetuses. The fact is supported by the skewed sex ratio in India which has 933 females per 1000 males (Population Census: 2011). This is despite the Pre-Conception and Pre-Natal Diagnostic Techniques (PCPNDT) Act, 1994.

Do You Know?

Right to live free from violence, slavery, and discrimination was enshrined by the United Nations for every human being nearly 70 years ago.

Women's rights are the fundamental human rights universally.

Global Fund for Women

3. Literacy and Education:

Literacy rate in India is 73 per cent (Census of India: 2011). While the literacy rate of men is 81 per cent, it is 65 per cent for women. This is proof that fewer girls are sent to school in comparison to boys. In 2014-15, there were 93 girls per 100 boys in primary school, 95 in middle school, 91 in secondary school and 90 in senior secondary school. This implies that more girls drop out of school with the increasing level of formal school education.

4. Participation in Economy:

India has a considerably low female work participation rate in economically gainful work. The female Workforce Participation Rate in India was around 26% in 2018 (Eco. Survey of India). The domination of social and cultural notions may be the reasons for low participation of women in the employment market.

Seema Was Aghast!

Seema was 21 years old when she completed graduation. She wanted to take up a job, but her father insisted that she should learn household chores first. Seema stayed at home and learnt household work from her mother. She had a sister who was studying in class 5. Seema taught her younger sister every day. The time spent with her sister was dear to her because during this time, she was away from household chores.

One day, Seema's father announced that a man was visiting them with his family. On being asked, he said without qualms that he had fixed Seema's marriage with that boy. He added that the man was educated and well-placed.

Seema asked her father if she could take up a job after marriage. Her father shed off his responsibility by saying that it was now up to that man and his parents if they would allow her to take up a job after marriage.

Seema was not told that there was a pre-condition from the groom's side that she would remain at home after marriage and there was no scope for her to take up a job.

Thus began an inescapable maze of family and household responsibilities for Seema.

Women's work in household care fetches them no wages or income. They do household tasks, attend to children, the sick and the elderly members and save money for the family. However, their contribution in building the family and household economies is completely ignored while calculating

the gross domestic product. Similarly, in an agricultural economy, women work in family-owned farms and on others' farms as casual labour. They are mainly responsible for labour-intensive and time-consuming tasks such as sowing, weeding, harvesting, cleaning, packaging and care of livestock. Since the value of these tasks is not monetised, the contribution of women goes unnoticed and ignored.

5. Participation in Decision-making:

Women have traditionally been deprived of a decision-making role both at home and in public. At home, strong patriarchal norms empower men to take all kinds of decisions while women are made responsible for household chores. Likewise, women's participation in public domain fields such as police, judiciary, engineering etc. is much lower than that of men. Available data on women in administrative positions in the judiciary substantiates the fact. Against the present working strength of 670 judges in 24 High Courts of the country, only 73 are women as of 23 March 2018.

In India, the presence of women in national and state level governance is very low. Women formed only 12 per cent of the total members in the 16th Lok Sabha following the 2014 general elections (*National Herald* 2014). There has been a demand for 33 per cent reservation for women in legislatures. This agenda has been added by political parties in their election manifesto. However, no legislation has come to this effect till date.

To increase the participation of women in governance at local level, the 73rd Constitution Amendment Act, 1992 provides 33 per cent reservation to women in Panchayati Raj institutions. In 2016, around 46 per cent of the elected representatives in Panchayati Raj Institutions were women (Pria.org).

2.7 CHALLENGES IN WOMEN'S EMPOWERMENT

Women's empowerment is a movement involving respect, honour and recognition towards all women (*Wikipedia, the free Encyclopaedia*). It has three main dimensions: Personal, relational (with respect to relevant others such as spouse, family, and community), and societal (in the larger social context).

Social and cultural factors are major barriers to women's empowerment. The strict norms and restrictions, built around sexuality and reproductive role of women hinder their active participation in the public domain. Violence against women deprives women of their freedom of choice, mobility and movement. The violence may occur in the form of physical, mental, emotional and sexual

abuse, typically by a man and may result in domestic abuse, sexual assault and murder. In India, violence against women is actually more prevalent than it may appear.

To safeguard the fundamental rights of women, several laws have been formulated to ensure their safety from abuse and violence.

Protective Legislation for Women	
Dowry Prohibition Act, 1961 Giving, taking or advertising of dowry is prohibited. Demanding or giving dowry, calls for a minimum of five years of imprisonment/ fine of Rs. 15,000 or total amount demanded as dowry. Streedhan is her right. Denying you Streedhan would invite two years of imprisonment/fine of Rs. 5,000-10,000.	**Maternity Benefits Act, 1961** A woman, working in an establishment for more than 80 days in a year before her delivery, is entitled to 26 weeks' maternity leave. The establishments with 50 or more employees must provide crèche facility to women employees.
Indecent Representation of Women(Prohibition) Act, 1986 Women cannot be represented indecently in public No publications, writings, paintings or figures can portray women in indecent light. Penalty is imprisonment of up to two years with fine	**Protection of Women from Domestic Violence Act, 2005** Domestic violence includes anything that:harms, injures or endangers the health, safety, life or wellbeing, whether mental or physical, of women. It includesphysical, sexual, verbal, emotional and economic abuse against womenHarassment of woman or her relatives for dowryThe Act includes live-in relationships and other relationships arising out of membership in a family
Immoral Traffic Prevention Act (PITA), 1986 A person administering, acting or aiding in the keeping of a brothel shall be punished with rigorous imprisonment of not less than two	**The Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013** This Act seeks to protect women from sexual harassment at workplace,

years which may be further extended with fine.	be it in public or in private. Sexual harassment includes unwelcome act or behaviour including: a. Physical contact or advancesb. A demand or request for sexual favourc. Making sexually coloured remarksd. Showing pornographye. Any other unwelcome physical, verbal or non-verbal conduct of sexual nature
Protection of Children from Sexual Offences Act, 2012 The POCSO Act provides protection to children under the age of 18 years from the offences of sexual assault, sexual harassment and pornography. It follows child-friendly procedures for reporting, recording evidence, investigation and trial of offences through Special Courts.	**The Commission of Sati (Prevention) Act, 1987** The Act gives the Collector or District Magistrate the power to prohibit Sati and the power to remove temples and other structures glorifying sati.

2.8 WOMEN OF GRIT

There are women who have overcome all kinds of obstacles to achieve higher goals in life. Ela Bhatt is one such woman who has brought millions of poor women out of the shackles of poverty through self-dependence and innovation.

A Woman of Grit: Ela Ramesh Bhatt

Ela Ramesh Bhatt was born in Ahmedabad in Gujarat on 7 September 1933. Her father was a successful lawyer, while her mother was active in the women's movement. Second of three daughters, her childhood was spent in the city of Surat, where she studied Law after completing graduation. Ela Bhatt was pained to see millions of women working without respect, social security and protective legislation. With an idea to provide support to these women, she founded the Self-Employed Women's Association of India (SEWA) in 1972 as a branch of the Textile Labour Association (TLA), a labour union founded by M.K. Gandhi in 1918. The organisation grew quickly, with

30,000 members in 1996, to 1,919,676 members in 2013. An Indian cooperative organiser, activist and Gandhian, Ela Bhatt has consolidated home-based women producers and organised them for their self- respect and welfare.

2.9 LETS SUM UP

Gender is a social concept with roots in social environment around the child. Gender becomes a part of human psyche as one grows in a certain socio-cultural milieu The process of Socialization strengthens the individual and collective perspectives and opinions along the socially sanctioned norms.

Grooming the child in gender concepts is called Gender Socialization. This process begins on birth and strengthens the gender identities and stereotypes all along the life. This unit has discussed the social and cultural connotations of gender that exist and groom our identity and social being.

This unit has contributed to our understanding on differentiated gender identities and the reasons thereof. It reflects upon the prevailing status of women in the society and the measures taken to enhance their social, economic and the cultural status.

2.10 UNIT-END EXERCISES

- Do cultural customs and practices dictate differential roles, privileges, and life options for women and men? If yes, explain how.
- What prevents women from entering an active economic and social life?
- Why do you think more girls are undernourished than boys? Cite specific reasons.
- What is women's empowerment and how can it be achieved?

ACTIVITY:

- Collect three stories of women who have excelled in their fields.
- Talk to a school child. Discuss if s/he perceives any kind of behavioural differentiation by the teacher in the class.
- Prepare an Activity Chart for all the members of the houshold. You may consider your own family for this exercise. Record the activity of each member of the household in the given format as below. Analyse the information gathered for the family as a unit comprising mother, father, children and other members, if any. See the first row as the sample.

Name, member & age	5 to 6 a.m.	6 - 8 a.m.	8 - 10 a.m.	10 a.m. -1 p.m.	1 – 4 p.m.	4 – 6 p.m.	6 – 9 p.m.	9-11 p.m.
Sunita Sharma, Mother, 50 years	Wakes up	Cooking	Serving/ packing food, cleaning kitchen	Washing clothes, cleaning the floors, bathing	Lunch, shopping for essentials, resting	Watching T.V., teaching her children	Cooking and serving dinner	Cleaning kitchen, goes to sleep

2.11 SUGGESTED READINGS AND REFERENCES

- Bhandari, M., *Quality of Life of Urban Working Women*, 2004, Abhijeet Publishers, Delhi, Page 275
- Census: 2011, Govt. of India
- Gender Policy and Strategy, World Food Programme, https://www.wfp.org/publications/2015-wfp-gender-policy-2015-2020-
- (https://www.ndtv.com/india-news/of-670-judges-in-various-high-courts-only-73-are-women-centre-to-panel-1977109
- Do Girls Have a Nutritional Disadvantage Compared with Boys? Statistical Models of Breastfeeding and Food Consumption Inequalities among Indian Siblings, Fledderjohann Jasmine **& Others, 2014, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4167551/**
- https://pria.org/knowledge_resource/
- Men & Women in India: 2014, http://www.mospi.gov.in/
- Lok Sabha polls: https://www.nationalheraldindia.com/india/lok-sabha-polls-**2014**
- **Only 73 women judges in High Court https://economictimes.indiatimes.com/news/politics-and-nation**

- Participation of women: https://www.rediff.com/news/report/rediff-labs-participation-of-women-in-decision-making-roles-in-india/20151209.htm
- Sex ratio in India, Population Census: 2011
- The World Health Organisation, www.who.org
- WFP Gender Policy - https://www.wfp.org/publications/wfp-gender-policy
- Women's Human Rights - https://www.globalfundforwomen.org/womens-human-rights/

Notes

UNIT 3 INDICATORS OF GENDER INEQUALITY

STRUCTURE

3.0 INTRODUCTION

This is the third lesson in the module on Gender and Society. It dwells on the typology of gender inequalities that exist in society and its continuity over generations. It explains the impact of gender inequalities on development indicators such as health, education, safety, economic and political participation of women.

3.1 LEARNING OUTCOMES

After studying this lesson, the teacher-pupil will be able to:

- describe gender inequalities in various development indicators;
- explain the inequalities in the upbringing, roles and responsibilities assigned to men and women;
- analyse the impact of gender inequalities on the economic and social participation of men and women; and
- decide the transformative action and legislation for the protection of women and the girl child.

3.2 CONCEPT OF GENDER INEQUALITY

Gender inequality is a widespread social fact. Though the Constitution of India grants equal rights to all and prescribes no differentiation between men and women, gender disparities continue to plague our society.

"We, the people of India, having solemnly resolved to constitute India into a Sovereign, Socialist, Secular, Democratic, Republic and to secure to all its citizens: Justice, social, economic and political: Liberty of thought, expression, belief, faith and worship; Equality of status and of opportunity; Fraternity, assuring the dignity of the individual and the (unity and integrity of the Nation); In our Constituent Assembly this Twenty-sixth day of November, 1949 do hereby adopt, enact and give to ourselves this Constitution." Human rights are an integral part of the concept of human dignity

Article 14 - Women's right to equality

Article 15 - Affirmative and positive action for women by the state

Article 16 - Equality of opportunity with no discrimination on the ground of sex

The Constitution of India

Gender inequality is primarily referred to as male and female differentiation with regard to availability and access to basic development indicators such as health, education, livelihood and participation in economic and political spheres of life etc. Gender inequality is primarily studied in four major indicators of development: Health, Education, Work Participation Rate and Participation in Political & Governance sphere.

We would now discuss each of these four indicators of development within the development discourse.

3.2.1 Inequality in Education:

Gender inequality is explicit in the domain of education. In India, male literacy rate is 82 per cent, female literacy rate is 65 per cent. Around 12 million girls do not attend formal school. Between 2006 and 2010, only 26 per cent of girls completed secondary school as compared to 50 per cent of the boys who completed secondary school education (Census of India: 2011). This data shows a wide gender gap in high school education. The girl child is often the victim of discrimination and bias in the family. She is not sent to school because she is entrusted with the responsibility of household chores and care of younger siblings at home. It is the common trend that while boys of the family go to school, the girls remain at home and are vulnerable to abuse, child marriage and poor nutrition.

Several measures have been taken over the years to accomplish universal school enrolment. Gender-sensitive education policies have been drafted to address gender inequalities in education through enrolment and retention of

the girl child in school. Though there has been an improvement in the enrolment of girls in school, we are yet to ensure that 100 per cent of the female population goes to school stays in school and completes school. One of the ways to achieve this goal is to consider the cause and allied problems while planning for the solution of this gigantic problem. This would require a multi-stakeholder approach which would be inclusive of children, parents and the school to collectively create an enabling environment for girls to go to school.

ACTIVITY 1:

Make a list of the factors that you think may cause young girls to drop out of school.

Talk to someone older like your mother, father or grandparents and try to find out if girls went to school in their time.

List the probable reasons for girls not attending school now and in earlier times.

Observe if there is any difference in the listed factors. Have the causal factors changed over the generations?

3.2.2 Inequality in Health:

Health is a life cycle concept for women. This multifarious concept operates at various stages of the life cycle of women that includes infancy, childhood, adolescence and adulthood. At the beginning of the life cycle, women are prone to poor health indices such as high female infant mortality and maternal mortality. As they grow, the physical and mental violence, occupational and environmental hazards dominate their life.

Infant mortality is the death of young children under the age of one year. This death toll is measured by Infant Mortality Rate (IMR), or the number of deaths of children under one year of age per 1,000 live births. According to the 2017 Sample Registration Survey (SRS), the Infant Mortality Rate dropped to 33 in 2017 from 34 in 2016. However, the female infant reported a higher mortality rate in 24 states out 29 states. Only in five states, the girls had a better chance of survival than the boys. These states are Chhattisgarh, Delhi, Madhya Pradesh, Tamil Nadu and Uttarakhand.

In India, higher female mortality between ages one and five years and high maternal mortality rates are due to the following reasons:

- **Inadequate and poor nutrition**
- **No access to primary health care**

- **Poor reproductive health**
- **Discrimination against girls**

Similarly, maternal mortality has been high in India primarily due to the tradition of childbirth at home facilitated with the help of the midwife. Coupled with lack of medical care, this practice results in high mortality rate during childbirth. Maternal Mortality Rate (MMR) refers to deaths due to complications from pregnancy or childbirth. Over the years, there has been sustained emphasis on promotion of pre-natal and anti-natal care and institutional delivery. As a result, the latest Sample Registration System (SRS) 2015-2017, has reported that MMR has declined from 130 per one lakh live births in 2014-2016 to 122 per one lakh live births in 2015-2017. However, women still die due to malnutrition and the burden of reproduction due to proper medical facility and care.

As discussed in the preceding lessons of this module, women lack access to resources owing to gender bias and discrimination practised in our patriarchal society. The gender norms and values restrict their access and share in the available resources within the family. Some of the socio-cultural factors that prevent women and girls from receiving quality health services and attaining the best possible level of health include:

- Unequal power relationships between men and women. The women are usually the last to avail medical facilities
- Social norms due to which women are devoid of education and paid employment
- Physical, sexual and emotional violence

The central government had conceived of the National Health Mission in 2013 with the focus on women's reproductive health, maternal health and infant health. Under the mission, state-specific plans and programmes were made to reach out to women in both rural and urban areas.

The National Health Mission (NHM) aims to strengthen health systems in rural and urban areas. The focus has been Reproductive-Maternal-Neonatal-Child and Adolescent Health (RMNCH+A), and Communicable and Non-Communicable Diseases. The NHM envisages achievement of universal access to equitable, affordable and quality health care services that are accountable and responsive to people's needs.(www.mhm.gov.in)

ACTIVITY:

Take down the food intakes of your sister/brother and you, for any one day. In case you have no sibling, you may do this exercise studying your mother

and father. Use recall method* to note down the time and quantity of food items consumed by the respondents.

*you may ask the respondents about their food intake at the end of the day

After completing the exercise, prepare your observations on the similarities and differences between the food intake of respondents in terms of frequency, quantity and quality of food items. Analyse the observations in the socio-cultural context of gender differentiation.

3.2.3 Work and gender:

Work is an economic or non-economic activity with or without an income. While the nature of work may differ in and outside the home, it remains classified in the definition of work. An activity that is performed at home with no money is work as is work performed outside the home for an income.

However, when we define work as an activity attributed to gender, then it becomes the gendered definition of work. For instance, when in the household setting, we say that cooking is the woman's work and fetching goods from market is the man's work, we are defining work in terms of gender. Similarly, when in terms of occupation, we assign engineering to men and teaching to women, we are segregating work roles on the basis of gender. This segregation has given rise to many gendered work stereotypes.

A few gendered work stereotypes

- Men are to work! They are the bread earners! So any activity that they engage in is work. Their work is important in every aspect.
- A woman must do household work because it's her moral duty. Men have to fetch resources for the household.
- Outside home, women are good for soft skills jobs such as admin and HR and the men are good in logical and decision-making work that requires innovation and technology.

With changing times, women have entered the formal employment sector outside the periphery of home. Over time, their presence can be seen in various sectors such as technology, banking, insurance, education, health, research, policy and planning in both organised as well as unorganised sectors of the economy. Their participation ranges from being wage earners in the unorganised sector to that of decision-maker in the international corporates of the organised sector. However, this journey has not been easy particularly in view of gender prejudice and bias at the workplace. Women are predisposed to differential treatment and opportunities at workplace which many a times, hamper and restrict their growth at workplace.

Key highlights of the report by Oxfam, 2018:

- "While inequality in jobs has increased, inequality in education has decreased between boys and girls. However even as girls frequently outperform boys in school examinations, they are not finding suitable jobs for the skills that they have."
- "Women's labour force participation in India is one of the lowest in the world. Women comprise half of the Indian population but make up less than a quarter of the labour force."
- "Three in four Indian women do not work in the country.

In India, the female labour force participation has not been promising. It has suffered with a decadal fall from 37 per cent in 2005 to 26 per cent in 2018 amid lack of access to quality education and underlying social, economic barriers limiting the opportunities for women. The bulk of women, i.e., around 95 per cent are employed in the unorganised sector or in unpaid word (The Deloitte Report).

Women bear the brunt of gender bias at the workplace in both the organised as well as unorganised sectors. They are prone to sexual abuse, power dynamics and male dominance at the workplace. In the corporate sector, the unseen "glass ceiling" curbs the growth trajectory of women employees. The issues such as security, gender predisposition and marital status are considered at the time of job promotion and appraisals of women employees. Women bear the double burden of work and family but they are not considered efficient for top management positions. This trend hinders their professional growth and over all well-being.

While discussing the reasons for low participation of women in workforce, a strong point that has emerged is safety of women and provision of a supportive environment at the workplace. One of the important initiatives taken by the government has been enactment of the Sexual Harassment of Women at Workplace (Prohibition, Prevention & Redressal) Act 2013.

The Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013 is a legislative Act in India that seeks to protect women from sexual harassment at their place of work. It was passed by the Rajya Sabha on 26 February 2013.

Under the Act, women are protected against sexual harassment at all workplaces, be it in public or private. It is based on the premise that safe workplaces would improve women's participation in work and it would result in their economic empowerment and inclusive growth. The Act defines sexual

harassment to include any unwelcome physical, verbal and non-verbal behaviour with a sexual connotation. It may include:

a) Physical contact

b) A demand or request for sexual favours

c) Sexually coloured remarks

d) Showing pornography

e) Any other unwelcome physical, verbal or non-verbal conduct of a sexual nature, e.g. leering, dirty jokes, sexual remark about a person's body, etc.

The Act elucidates the forms and manifestations of sexual harassment, responsibility of the employer to prevent it at workplace, the complaint mechanism etc. The Act specifies two main kinds of situations for sexual harassment of women:

1. **Quid pro quo –** It occurs when a woman is asked for sexual favour in exchange of job growth at workplace. It is likely that the male colleague may demand a favour in exchange for help in work or otherwise.

Case Study: Quid pro quo

Malini is working as a young team leader in a call centre. Known to be forthright, she is dedicated and hardworking. One day, Malini stays back late at work with Rajiv, her colleague to work on an important presentation. Rajiv offers to buy Malini dinner and later drop her home. After dinner, Rajiv proposes to Malini that he would like her to spend the night with him. Malini refuses politely but firmly and goes home. Next evening, Rajiv repeats his request and on Malini's refusal, threatens her that if she doesn't give in, he will tell everyone that she made a pass at him. In the above example, Rajiv threatens Malini that if she does not agree to his 'request' for a sexual favour, he will in return smear her character at the workplace as a person who wants to use sexual favours to her advantage. This constitutes quid pro quo form of sexual harassment.

2. **Hostile Work Environment –** When women employees do not feel safe at the workplace. They have to face sexist remarks, display of pornography, obscene or sexist graffiti or slogans and unwanted physical intrusion etc.

Case Study – Hostile Working Environment

Sunita is a daily wage labourer at a construction site. Every day at lunch time, she sits under the shade of a tree to feed her 11-month-old baby. She finds Raju, a worker, staring at her from a distance. Sunita feels uncomfortable

and asks Raju to look away while she's feeding the baby. Raju persists and always sits at a place near her. The fellow workers gossip about her. They catcall and whistle at her at work. When she objects, they tell her that they are just joking. Stalking and gossiping constitute a hostile work environment for Sunita.

ACTIVITY:

Talk to two men and two women working in the organised sector and in the unorganised sector. List their occupations, skill sets, educational backgrounds and their daily routine.

Find out the difference between the two. Identify the areas where you find gender disparity in male and female work conditions and status.

3.2.4 Participation in Politics:

Making up nearly 50 per cent of the female population, it becomes imperative to include women in the realm of governance and politics. Governance and politics are two interlinked spheres of power and influence. These spheres have traditionally been dominated by men. Women are, by and large, deprived of a role except for those who belong to politically influential families.

In the contemporary arena with women joining the varying occupations, there is a growing concern about the lower participation of women in the world of politics. With women leaving a mark in other spheres and occupations, their leadership is being increasingly recognised. Over the last two decades, the rate of women's representation in national parliaments globally has incrementally increased from 11.8 percent in 1998 to 17.8 percent in 2008 to 23.5 percent in 2018. Though an increase, there is still a long way to reach the 30 per cent benchmark which is identified as the necessary level of representation to achieve a "critical mass" – a considerable presence of women legislators to make a significant impact.

The world is wasting a precious resource in the dramatic underrepresentation of women in leadership positions, often resulting in the exclusion of women's talents and skills in political life.

–Madeleine Albright
Former United States Secretary of State.

This would help to make our democracies strong and vibrant. To achieve the goal, the global development policy is now focusing on inculcating leadership role for women at local, community and national levels.

In India, legislative reforms have been made to bring women's representation in local governance. In 1994, the 73rd and 74th constitutional amendments reserved 33 per cent of seats in local governments for women. This was an

effort to increase women's participation in grassroots politics. Today, around 1.37 million women are the elected members of the panchayats in India.

Chhavi Rajawat was born in a Rajput family in Jaipur, Rajasthan. She is from a small village called Soda in Malpura tehsil, Tonk district. In 2010, she was the Sarpanch of her village Soda, 60 kilometres (37 mi) from Jaipur. Though holding an elected post, Chhavi is not affiliated to any political party. The Panchayats are officially supposed to be non-partisan and Panchayat elected representatives thereby do not fit into the bracket of mainstream politics.[1] She has been reported to be the youngest person to hold the office of Sarpanch.[2]

In national level politics, the representation of women has increased too. During the elections in 2019, the 17th Lok Sabha was formed with 14.3 per cent of women's representation. It was the highest ever women's representation with 78 women MPs out of the total of 543 elected representatives. In 2014, the number of women elected representatives were 62. These women represented different geographies, caste, class, community, education and socio-economic backgrounds.

32-year-old, Raksha Khadse is a Member of Parliament from the Raver constituency of Maharashtra. She was a member of the 16th Lok Sabha as well as the youngest MP at the age of 26. She was also Sarpanch at the age of 22 and was elected to Jalgaon Zila Parishad at 24. She has been involved in politics since 2010.

Activity:

Find the profile of a female elected representative of your area. Read about her to know the struggles and challenges of her political career.

MEASURING GENDER INEQUALITY:

Gender inequality needs to be measured for a focused action along the lines of gender gaps and deficiencies. These points are indicators against which changes can be assessed. These indicators may be in the form of pointers, facts, numbers, opinions or perceptions which are used to signify changes in specific conditions or progress towards particular objectives (CIDA, 1997).

When an indicator measures gender-related changes over time, it is called Gender Indicator. Gender Indicators are of two types:

1. **Quantitative gender indicators:** Measures that provide sex-disaggregated statistical data which provides separate measures for men and women on indicators such as literacy, health, employment and wages, participation and empowerment.

2. **Qualitative gender indicators:** Measures that focus on qualitative changes in the status of women. These may measure change in level of empowerment or attitudinal change towards women.

The measurement of gender indicators is important because:

- The indicators help to prioritise gender issues and concerns for appropriate action;
- Based on groundwork, indicators can foster effective planning and implementation of programmes and policies;
- The indicators provide a road map to institutions to fulfil their responsibility for gender equality;
- Substantial data collected for these indicators may trigger change

International Gender Indicators

- **Sustainable Development Goals (SDGs)** are a collection of 17 global goals designed to be a blueprint to achieve a better and more sustainable future for all
- **Gender-related Development Index (GDI)** adjusts the Human Development Index (HDI) for gender inequalities in three dimensions, i.e., life expectancy, education, and income. However GDI is not specifically a measure of gender inequality.
- **Gender Empowerment Measure (GEM)** measures relative female representation in economic and political power. It considers gender gaps in political representation, in professional and management positions in the economy, as well as gender gaps in incomes (Klasen, 2006)."

In the recent past, the United Nations Development Program (UNDP) formulated the Gender Inequality Index (GII) in the Human Development Report, 2010. GII is considered to be free from the flaws detected earlier with indices like Gender-related Development Index (GDI) and Gender Empowerment Measure (GEM). These were also launched by the United Nations Development Program's Human Development Report in 1995.

GII has been designed to capture gender inequality in three dimensions:

- **Empowerment:** This component is very vital to judge women's well-

being because with empowerment, gender bias is likely to fade away.

- **Reproductive Health:** It is a significant component for evaluating women's well-being. It comprises two indicators: the maternal mortality ratio (MMR) and the adolescent fertility rate (AFR). In India maternal health has improved over the years but MMR is more than 200 in the states of Assam, Bihar, Madhya Pradesh, Orissa, Uttar Pradesh and Rajasthan We need to work harder to achieve the target MMR of 150.

  AFR is a serious concern due to prevalent practice of early marriage. Though early marriage has reduced due to national-level Education for All campaign, it is still practised in some parts of the country.

- **Economic activity:** The female labour force participation (LFP) rate is an important indicator of women's involvement in economic activity.

The Gender Inequality Index is equivalent to 0 if women and men fare equally well in each dimension. The Gender Inequality Index grows to one if the gap between women and men's achievement increases. Thus the GII ranges from 0 to 1.

ACTIVITY:

❖ Find the information on Sustainable Development Goals which focus on gender equality.

❖ Find out India's current rank on various gender inequality indicators.

3.3 LETS SUM UP

- Gender inequality is primarily referred to male and female differentiation with regard to availability and access to basic development indicators. It is a widespread social fact.
- In India, the male Literacy rate is 82%, the female Literacy rate is 65%. Around 12 million girls do not attend the formal school as they are the victims of discrimination.
- Inequality in health operates at various stages of the life cycle of women that includes infancy, childhood, adolescence and adulthood.
- Women bear the impact of gender bias at workplace in both the organised as well as unorganised sectors. They are prone to sexual abuse, power dynamics and male dominance at workplace.
- Governance and politics have traditionally been dominated by men. In India, legislative reforms have been made to bring women representation in local governance.

- Gender inequality needs to be measured for a focused action along the lines of gender gaps and deficiencies through qualitative and quantitative indicators,
- Indicators like SDGs, GDI, GEM, GII prioritize gender issues and concerns for appropriate action.

3.4 UNIT-END EXERCISES

1. Do boys and girls have differential access to education and health?
2. In traditional society, was work divided between men and women?
3. Is a safe workplace a woman's right? How is it ensured?

ACTIVITY:

1. Talk to any 10 working women. Ask them if they have been refused a job interview or a job promotion in their office. Can they anticipate the reasons for it?
2. Sneha has been working in an MNC for over six years. She is at the post of Assistant Manager in the organisation. She reports to Mayank who has an experience of 3.5 years and works as the Senior Manager. Sincere and with more work experience, Sneha is still not getting promoted to Senior Manager. She continues to report to someone less qualified and less experienced. Is Sneha a victim of Sexual Harassment at the Workplace? What should she do?
3. Let's create! Pen down your story as a girl/woman/daughter/wife/mother. Particularly, highlight incidents where you have been left out or have been lifted up. Think: could your life be different, if you weren't a woman?

3.5 SUGGESTED READINGS AND REFERENCES

- BRIDGE (NA). Publication retrieved from https://www.bridge.ids.ac.uk/bridge-publications/cutting-edge-packs/gender-and-indicators
- Female labour force participation in India fell to 26% in 2018: Report https://www.thehindu.com/business/female-labour-force-participation-in-india-fell-to-26-in-2018-report/article26467857.ece
- Ghadially, R. (2007).Urban Women in Contemporary India. New Delhi: sage Publications
- Girl child survival rate higher than boy in only five states, https://economictimes.indiatimes.com/news/politics-and-nation/70339668.cms? at https://www.poshatwork.com/sexual-harassment-act-rules/

Notes

- Goel, A. (2004) Education & Socio-Economic Perspectives of Women Development and Empowerment. New Delhi: Deep & Deep.
- Goel, A. (2004) Organisation & Structure of Women Development and Empowerment. New Delhi: Deep & Deep
- Guidelines for Prevention of Sexual Harassment at Workplace retrieved from http://www.iitbbs.ac.in/notice/sexual-harrassment-of-women-act-and-rules-2013.pdf
- Handbook on POCSO retrieved from -https://www.arpan.org.in/wp-content/uploads/2018/07/POSCO-Act-English.pdf and https://www.arpan.org.in/wp-content/uploads/2018/07/FAQS-BOOK-ENGLISH.pdf
- http://www.indiaenvironmentportal.org.in/content/462432/mind-the-gap-state-of-employment-in-india/
- https://en.wikipedia.org/wiki/Gender_inequality_in_India
- Kishwar, M. (1994) *Off the Beaten Track – Rethinking Gender Justice for Indian Women*. Mumbai: Oxford University Press.
- Krishna, S. (Ed) (2003) *Livelihood and Gender Equality in Community Resource*

Management. New Delhi: Sage Publications

- Murthy, S. (2001). Women & Employment. RBSA Publications, Jaipur
- Video on gender inequality https://in.video.search.yahoo.com/search/video;_ylt=AwrwJShvo99d2G0APxS7HAx.;_ylu=X3oDMTB0N2poMXRwBGNvbG8Dc2czBHBvcwMxBHZ0aWQDBHNlYwNwaXZz?p= gender+inequality&fr2= piv-web&fr=mcafee#id=15&vid=168f8df0922e02 80f5a 962a6bf0884e1&action=view
- Video on POSH https://in.video.search.yahoo.com/search/video;_ylt=AwrPhtpNpN9drUcA8wrmHAx.;_ylu=X3oDMTB ncGdyMzQ0BHNlYwNzZWFyY2gEdnRpZAM-?p=sexual+harassment+in+the+workplace+&ei=UTF-8&fr2=p%3As%2Cv%3Av%2Cm%3Asb%2Crgn%3Atop&fr=mcafee#id=1&vid=6871c3f00325e6dd51248d1cf0c12b0f&action=view
- Women Sarpanchs tell UN how rural India's power structure is changing https://economictimes.indiatimes.com/news/politics-and-nation/women-sarpanchs-tell-un-how-rural-indias-power-structure-is-changing/articleshow/71387686.cms?utm_source=contentofinterest&utm_medium=text&utm_ campaign=cppst

Module 2 :
Understanding Environment

Contents

UNIT 4 BASICS OF ENVIRONMENT AND ECO SYSTEMS

STRUCTURE

4.0 INTRODUCTION

The environment encompasses everything that is around us on this earth. Humans are a part of the environment they live in it and from it. The components of the environment are all closely connected and depend on one another for their survival, creating an ecosystem that has evolved into a system of checks and balances. Sadly, rapidly increasing human population combined with mindless use of technological advancements have had an adverse impact on the environment. However, while the environment has the power to recover itself, it is necessary for us to know what affects it, and to build knowledge and skills to address this complex challenge so that we can collectively reduce our impact on the environment and maintain its health.

This lesson explains the concepts in environment and ecology.

4.1 LEARNING OUTCOMES

After studying this lesson, the teacher-pupil will be able to:

- describe environment and ecology;
- explain ecological concepts;
- describe the importance of forest, biodiversity, water, land, air, energy in the context of human environment interaction and interdependence;
- explain structures and types of ecosystems;
- appreciate interrelatedness and interdependence among various components of the environment
- explain ecosystem services; and
- analyse how environment has been an intrinsic part of people's culture and traditions in India.

4.2 ENVIRONMENT

Environment refers to "the sum total of living, non-living components; influences and events, surrounding an organism and their interactions and inter-dependence with one another."

It can be defined as the set of physical (e.g. sunlight, temperature, precipitation, nature of soil, fire, water currents etc.), chemical (e.g. percentage of water and air in soil, salinity of water, oxygen dissolved in water, nutrients present in soil etc.), biological (e.g. Flora and fauna diversity) and social factors (human interaction with the environment and with one another, use of resources etc.) in which living organisms and human beings exist. These factors can affect or can be affected by changes in any of their characteristics. The definition of 'environment' could be also based on the perspective of the work or discipline one is studying. For example, one may speak about the natural environment, or social environment, or rural environment or cultural environment or work environment etc.

The environment comprises of the living (biotic) components like plants and animals; and the non-living (abiotic) components like water, air, nutrients and solar energy.

Biotic components can be classified as either producers or consumers, depending on how they get their food.

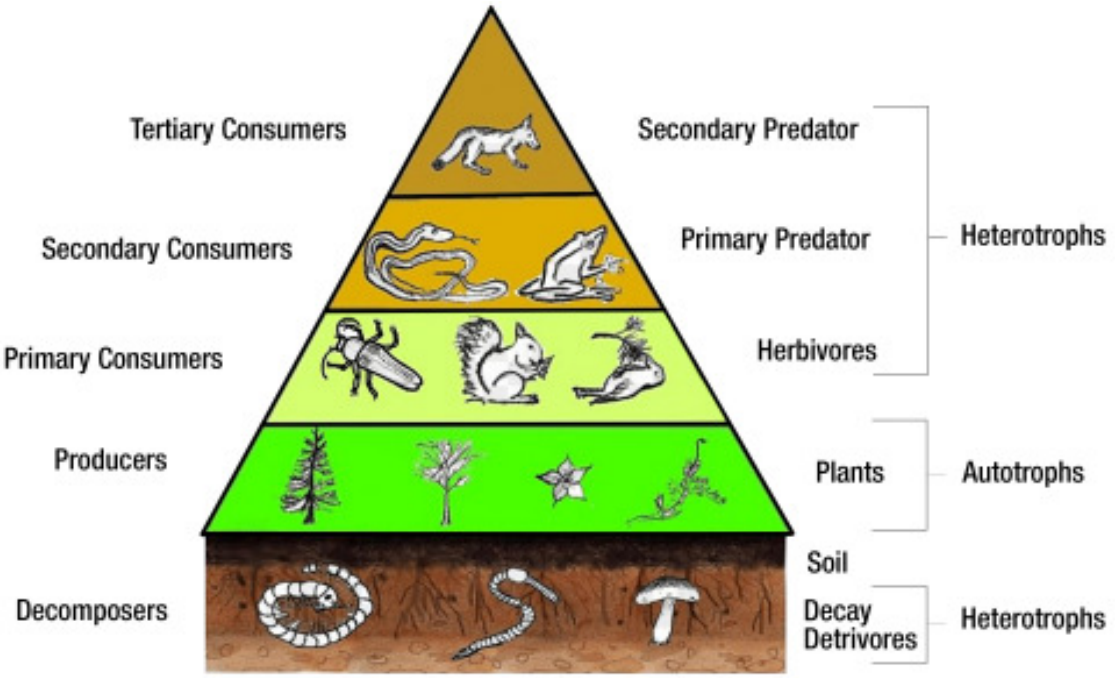
Producers (autotrophs) make their own food using simple inorganic compounds available in their environment. Producers include green plants on land and the small green algae in aquatic ecosystems.

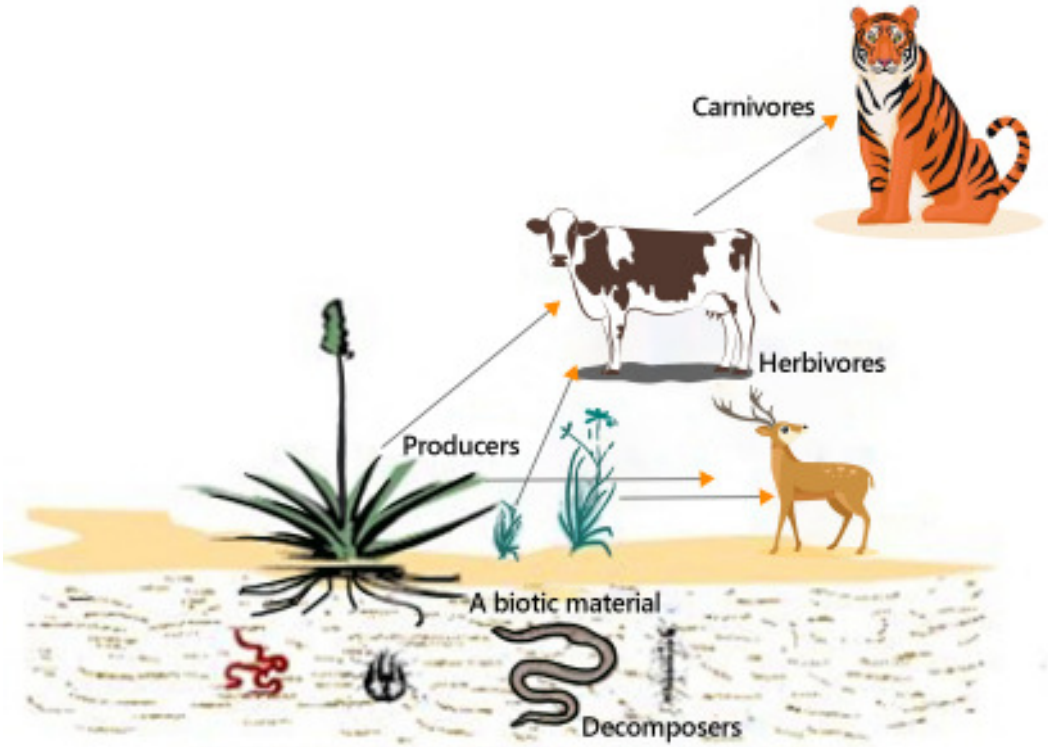
Consumers (heterotrophs) are organisms that directly or indirectly depend on food provided by producers. Consumers, depending on their food habits, can be further classified into four types:

- **Herbivores**, such as deer, rabbits, cows, buffaloes, etc. are plant eaters and they feed directly on producers. They are known as Primary Consumers.
- **Carnivores,** such as lions, tigers, wolves, snakes, etc. are meat eaters and they feed on herbivores (primary consumers). They are known as Secondary Consumers. Carnivores may also become tertiary consumers when they eat other smaller carnivores. Thus the same animal can be a secondary or a tertiary consumer. e.g. flower > nectar > butterfly > chameleon > snake > jackal. Here the Jackal becomes tertiary. However, if the chain is nuts > rabbits > jackal than jackal is a secondary consumer. Lion, tiger, leopard are tertiary consumers.

  Scavengers : They feed on the dead remains of other animals. E.g. Vulture which is an exclusive scavenger and jackal, mangoose, trutle etc. Which are opportunistic, part -time scavengers.

Note





Grassland Ecosystem Showing Component Parts

- **Omnivores,** such as bears, pigs, rats, cockroaches, humans etc. eat both plants and animals.
- **Decomposers** (Microconsumers) digest and convert the complex organic molecules in dead organic matter into simpler inorganic compounds. They absorb the soluble nutrients as their food. Some examples are bacteria, fungi and mites.

Abiotic components or non-living components include all physical and chemical factors that influence living organisms or any part of their life. These are also called the ecological factors. Light, air, soil, and nutrients form the abiotic components of an ecosystem. Non-living components are essential for the living world. With no sunlight, water, air and minerals, life cannot exist.

4.3 ECOLOGY

Ecology is the study of systems that includes interactions among and between the organisms and also their interaction with non-living components. It deals with ways in which organisms are adapted to their surroundings, how they make use of these surroundings, and how an area is altered by the presence and activities of organisms.

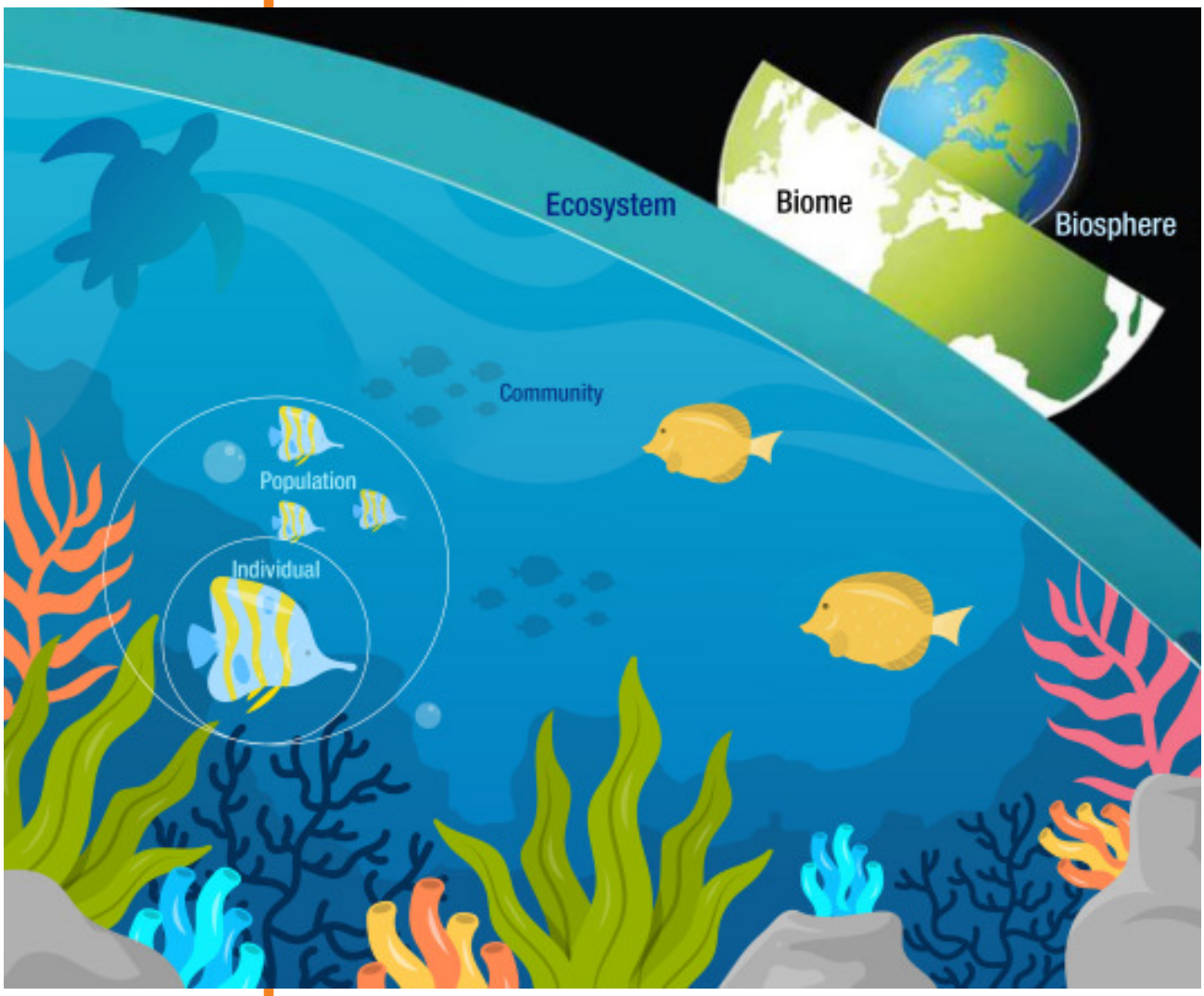
There are intricate connections between the various components of nature. From tiny viruses and bacteria, to large mammals, and fungi, the diversity and complexity of interconnections are important for our planet's survival. All organisms, dead or alive, are potential sources of food for other organisms. The herbivores eat plants or algae which are the primary producers of food, the carnivores eat the herbivores. When the herbivores die, they are consumed by the decomposers who turn them into dead organic matter. This sequential chain of eating and being eaten is called a Food Chain. In nature, there are a number of food chains that connect various organisms to one another.

Ecology and Environment

Often, we use the terms ecology and environment as synonyms. But there is a difference between these two terms – while ecology limits itself to connections, processes and phenomena occurring in the natural world, environment means 'me and my surroundings' and hence not only includes the natural part of the surroundings, but also those elements that have been created by humans.

4.3.1 Levels of organisation in nature

There are different levels or hierarchies of organisation in nature. These are: organisms (individuals), species, populations, communities and ecosystems. Interactions with the physical environment (energy and matter) at each level produces characteristic functional systems. Each level has its special features which help us understand their place in the complex hierarchy.



Biosphere : Sum total of all the ecosystems on Earth, which includes all the earth's living organisms interacting with the physical environment as a whole to maintain a steady-state ecosystem.

Biome : The total complex of biotic communities occupying and characterising a particular area or zone, such as a desert or deciduous forest

Ecosystems : Community of organisms in a dynamic network of biological, chemical and physical interactions between themselves and with the non-living components. Such interactions help the ecosystem sustain and be resilient to changing conditions.

Communities: Populations of various species occupying a particular area and interacting with each other form an ecological community. For instance, the community of the Banni grasslands of Kachchh, refers to all the various populations, could be the population of the Acacia species, the population of variety of grasses, the Banni Buffalo population, the Kankrej cow population etc and populations of all kinds of birds, animals, plants and micro-organisms present there. Thus, a community comprises several species interacting with each other.

Populations : A group of individuals of the same species occupying a given area at a given time. So, this could be a population of tigers, or a population of nilgai etc. in a given area.

Species : Groups of organisms that resemble one another in appearance, behavior, chemistry and genetic structure and can breed with one another form a species. For instance, all human beings (*Homo sapiens*) resemble one another in their body structure, body systems and they all have similar genetic structure. Thus, they are grouped together under the species sapiens.

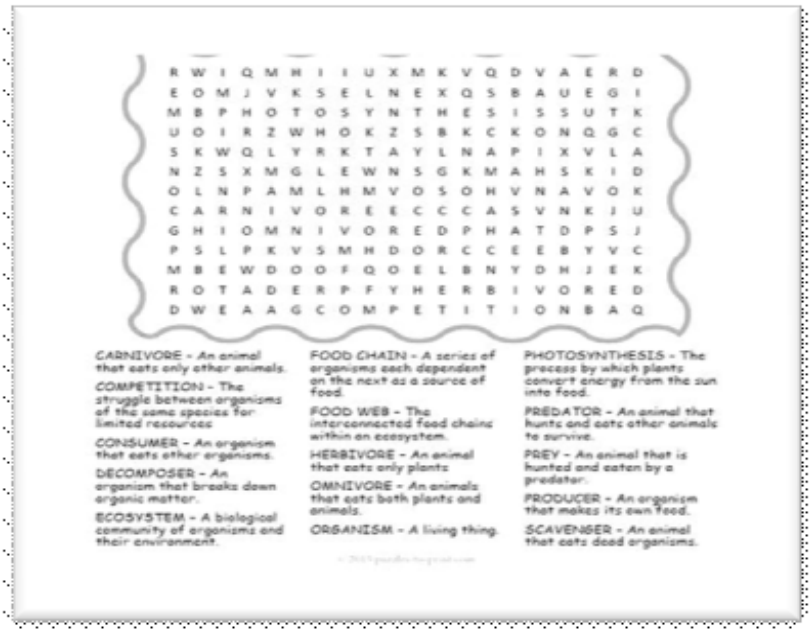
Organisms : A variety of organisms of different sizes and shapes are found on earth. These can be simple single-celled creatures such as the amoeba, the paramecium, or green algae or large ones such as the whales, creepers or trees such as the banyan.

ACTIVITY-1

Food Chain

Make a puzzle of various biotic and abiotic components and link them using a hierarchical order. The components should include all levels – ranging from producers to decomposers. The image below indicates how various ecological terms are jumbled up and are traced reading right to left or left to right.

SOLVE FOOD CHAIN PUZZLE



FIND FOOD CHAIN WORDS

V	U	E	F	O	I	P	L	A	N	I	X	W
X	E	L	F	N	A	S	L	A	M	I	N	A
U	R	E	S	O	P	M	O	C	E	D	R	Y
O	E	B	E	R	O	V	I	B	R	E	H	Z
L	W	N	O	M	N	I	V	O	R	E	Q	O
K	V	M	E	W	P	R	O	D	U	C	E	R
R	V	L	M	R	U	A	D	W	J	L	X	P
S	V	F	C	I	G	Z	V	E	T	R	L	X
A	A	D	B	Q	D	Y	S	Z	I	K	V	V
N	R	E	M	U	S	N	O	C	Q	Z	D	Q
Y	E	R	O	V	I	N	R	A	C	H	G	A
K	F	O	O	D	C	H	A	I	N	G	V	G
K	T	R	C	J	E	O	O	B	H	H	E	L

energy *carnivore*
consumer *animal*
plant *producer*
omnivore *gecomposer*
herbivore *food chain*

ACTIVITY – 2

Match the items in the left column to their level of organisation in the right.

1. Brahminy Kite a. Community

2.	Forest and wild animal in Kaziranga Sanctuary	b.	Ecosystem
3.	Earthworm	c.	Species
4.	An estuary	d.	Population
5.	Spotted deer	e.	Organism

Ans : 1-c; 2-a; 3-e; 4-b; 5-d

4.3.2 Species

Species have certain characteristics that help us differentiate them from populations and communities. Some of these are:

Ecological niche: An Ecological Niche is the physical space which is occupied by a species depending upon its characteristics and role in the community. Factors such as temperature, moisture, pH of water, soil type etc. determine which species would make the physical space on its own. Each species has a well-defined and unique role in the ecosystem and hence no two species in the same general category, such as tigers and lions, can occupy the identically same ecological niche for long. Each species has a particular niche based on its interaction with its environment.

Species evolution and species extinction: In nature, species get extinct and new ones evolve. This process of evolution is slow and takes place over a long period of time. When taking place naturally without interference, the process of extinction and evolution of new species keeps pace with the changes in the environment. In recent times, though, the rate of extinction of many species is higher than the rate at which new species can evolve. This has happened owing to human interference and has resulted in the complete disappearance of many species. As discussed earlier, when species go extinct, the web of life of which they were an intrinsic part is impacted. It is important, therefore, to ensure that human actions become more responsible and responsive to the environment.

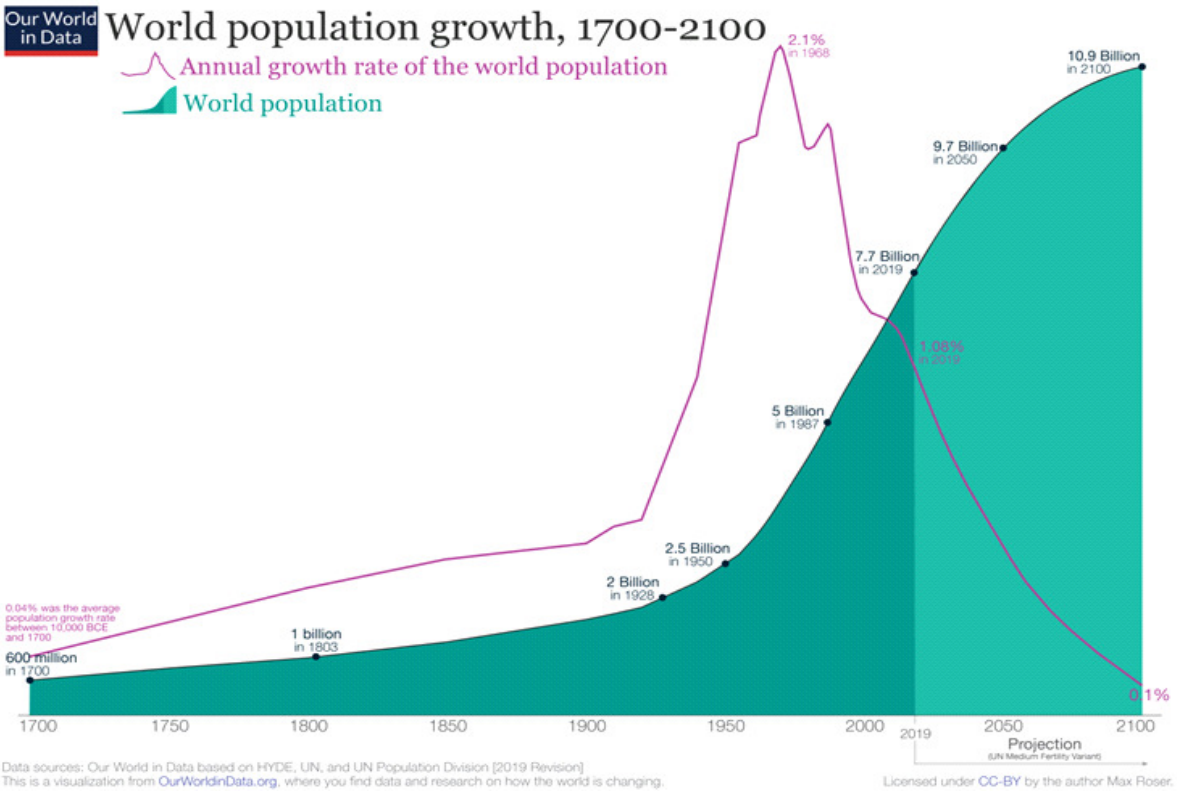
At the Convention on Conservation of Migratory Species 2020 – an international treaty to protect endangered species throughout their range countries, three species from India, the Great Indian Bustard, Asian Elephant and the Bengal Florican will be included in a special global list for protection.

4.3.3 Population

Ecologically, a population is a group of individuals of the same species, occupying a given area at a given time.

Functions of a population: An ecosystem or a community can have many populations, each of them with a defined function. For example, population of green plants are the 'producers' population, that of deer are 'herbivore' population depending on the food production and consumption by these organisms.

Growth of a Population: A population of a species grows when the area they have begun living in provides them with a suitable environment to proliferate. Nature keeps checks and balances of various populations to ensure that various species can survive. Depending upon how much resources are available, healthy competition and interference from other species, the population of a species stabilises. In natural conditions, nature itself has created the limits to growth of a particular species population to ensure stability in the environment.



4.3.6 Understanding Carrying Capacity

There is just one earth, which is of a finite size and has finite resources. The Carrying Capacity in terms of ecology is defined as the number of individuals of a given species that can be sustained indefinitely in a given space/ area. The carrying capacity of a system can be affected by a number of factors such as abundance or scarcity of food available, competition in and between species, migration of species, catastrophic events which could be natural or caused by human actions. Simply put, if one carries more weight than one's ability to carry weight it would result in the person crumbling under it, and not carry on for very long. Similarly, carrying capacity of a system if stretched beyond its ability to sustain life would impact the system's ability to survive.

Earth Overshoot Day: Reminds us of our exceeding the earth's carrying capacity

According to the Global Footprint Network, The Earth Overshoot Day marks the date when humanity has exhausted nature's budget for the year. For the rest of the year, we are maintaining our ecological deficit by drawing down local resource stocks and accumulating carbon dioxide in the atmosphere. Over the past 20 years, it has moved up three months to July 29 in 2019, the earliest ever. This means that humanity is currently using nature 1.75 times faster than our planet's ecosystems can regenerate. (www.footprintnetwork.org)

Earth's carrying capacity with respect to Humans refers to the maximum number of humans that an environment can support indefinitely. Every species has a carrying capacity, even humans. However, it is difficult to measure the human carrying capacity as humans are complex in terms of the resource utility, consumption and conservation.

CHECK YOUR PROGRESS 4.1

1. Explain Biotic and Abiotic Components of the Environment.
2. Ecology means 'me and my surroundings' and hence not only includes the natural part of the surroundings, but also those elements that have been created by Human beings. State True or False.
3. State True or False
   a. Organisms do not affect the environment
   b. Organisms of the same species can breed with one another and produce fertile offspring under natural conditions
   c. Niche of a species defines its place of living
   d. In nature, there is no process called species extinction; it is a phenomenon for which humans are solely responsible

e. Human beings are exhausting the earth's resources more than its budget for the year.

4.4 NATURAL RESOURCES

The life on earth has thrived and evolved over hundreds of years. The atmosphere around the earth protects it and maintains a climate conducive to life. Earth's natural resources such as the forests, its oceans, rivers and the biodiversity these foster, the land, air, water resources and energy, are unique to this planet and create a vibrant ecosystem of interconnections and interdependence. Human beings have over hundreds of years learnt to use these resources for food, clothing and shelter and as there was progress, for building towns and cities, for transportation, for communication and many other needs. Natural resources thus have and continue to play a critical role in human development.

What are natural resources?

Natural resources can be defined as the resources that exist on earth in their natural form, independent of human actions. Natural resources can be of two types:

a) ***Renewable:*** Resources that can be replenished or renewed in nature in a foreseeable and finite human timeframe, and therefore can be used repeatedly. These include living resources like forests or non-living ones like wind, water, solar energy.

b) ***Non-Renewable:*** Resources that are limited and whose availability may run out in the future, e.g. fossil fuels, minerals, etc.

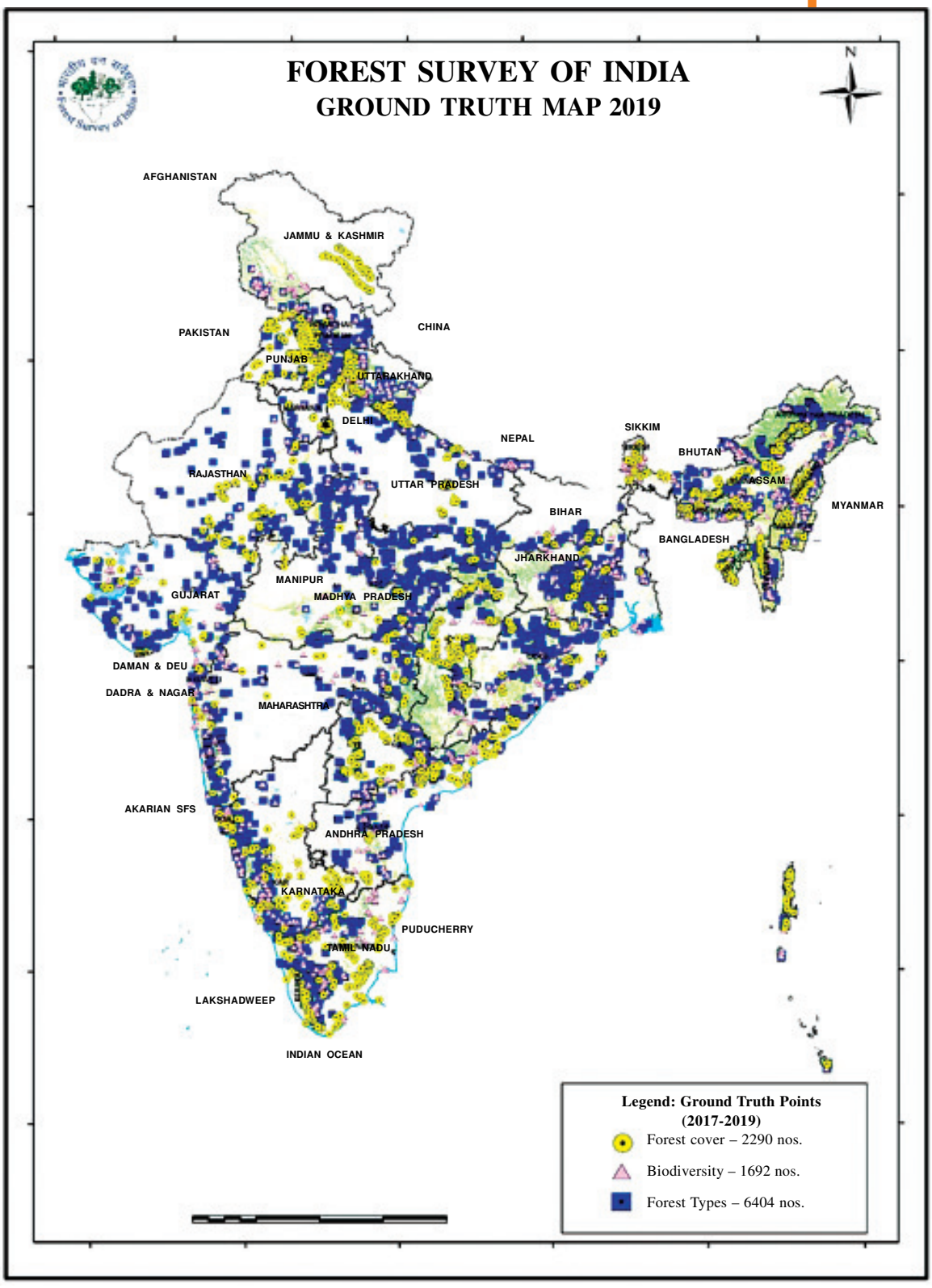
Let us briefly look at some of the important natural resources.

4.4.1 Forests

Forests and trees make vital contributions to both people and the planet, bolstering livelihoods, providing clean air and water, conserving biodiversity and responding to climate change. Forests act as a source of food, medicine and fuel for more than a billion people who driectly depend on forest sources. In addition to helping to respond to climate change and protect soils and water, forests hold more than three-quarters of the world's terrestrial biodiversity, provide many products and services that contribute to socio-economic development and are particularly important for millions of people in rural areas, including many of the world's poorest.

As per the Food and Agriculture Organization, Forest is a land with tree cover of more than 10 percent and an area comprising more than 0.5 hectare (1.235

acres). Over 30 percent of the earth's surface is covered with forest. The Global Forest Resources Assessment (FRA), coordinated by FAO, found that the



world's forest area decreased from 31.6 percent of the global land area to 30.6 percent between 1990 and 2015, but that the pace of loss has slowed in recent years (www.fao.org). According to the India State of the Forest Report 2019, the total forest and tree cover of India is 24.56 percent of the geographic area of the country against the global standard set for 33% of forest coverage. (www.fsi.nic.in). There are broadly five types of forests in India. They are named as Tropical evergreen forests, Tropical deciduous forests, Tropical thorn forests, Montane forests and Swamp forests.

Some of the large forests in India include the Gir Forest in Gujarat, Sundarbans in West Bengal, Forests of Khasi Hills in Meghalaya, Kaziranga Forest in Assam, Forests in Arunachal Pradesh, Nilgiri Biosphere Reserve in Tamil Nadu, Vandalur Forest Reserve in Tamil Nadu, Jim Corbett National Park, Uttarakhand, Keibul Lamjao National Park in Manipur, and Kanha National Park in Madhya Pradesh. In terms of forest cover as percentage of total geographical area, the top five states are Mizoram (85.4 percent), Arunachal Pradesh (79.63 perrcent), Meghalaya (76.33 percent), Manipur (75.46 percent) and Nagaland (75.31 percent) (https://pib.gov.in).

Tribals and other communities who live in or around the forests have been the custodians of these resources. Their life, their livelihoods, food and cultural practices are closely linked to the forests. The forests are valuable resources for non-timber forest products such as honey, fruits and nuts, resins, barks and fibres etc. and are a source of livelihood and sustenance for these communities. Around 33 percent of rural communities are involved in collection and provisioning of forest products, and depend on them for some part of their subsistence. Further, the cooperatives formed on non-forest timber produce such as Honey Collectors cooperative etc. help tribals to get their livings from managing and selling of these produces. These are also an important safety net for the poor in times of crisis.

CHECK YOUR PROGRESS 4.2

What is the role of forests to enable well being of the planet?

4.4.2 Biodiversity

The term biodiversity was first coined by Walter G. Rosen in 1986 where, "Bio" means Life; "Diversity" means Variety. The Biological diversity represents the sum total of various life forms such as unicellular fungi, protozoa, bacteria and multicellular organisms such as plants, fishes, birds, reptiles, amphibians, mammals and other animal groups, of various biological levels including genes, habitats and ecosystems.

Biodiversity can be described at three levels: genetic, species and ecosystem diversity.

Genetic biodiversity: The diversity of genes with a species, passed down the generations is known as genetic biodiversity. Increased genetic diversity is attributed to the adaptive capacity of a species. We therefore find a large variety of the same species. It is this type of diversity that gives rise to the different varieties of rice, maize, mangoes, brinjals, chillies, potatoes and many species. For example, there are over 300 varieties of the brinjal in India alone. Some variations are easy to see, such as size or colour, taste or flavor and can be perceived by our senses; and some others, such as susceptibility to disease, are not obvious to the senses.

Little or no genetic diversity makes a species very susceptible to widespread disease. Cheetahs are a threatened species. Low genetic diversity and resulting poor sperm quality has made breeding and survival difficult for cheetahs. Loss of genetic diversity within a species can result in the loss of useful and desirable traits eg. resistance to parasites.

Species Biodiversity: Species is a unit to classify the many life forms on earth. Each species is distinct from every other species. Horses and donkeys are distinct species, as are lions and tigers. What unites members of a species is the fact that they are genetically so similar that they can produce fertile offspring.

Ecosystem Biodiversity: An ecosystem is a set of life forms (plants, animals, micro-organisms) interacting with one another and with non-living elements (soil, air, water, minerals etc.). Ecosystem diversity is therefore, the diversity of habitats which include the different life forms within. The term also refers to the variety of ecosystems found within a biogeographical or political boundary.

India is one of the world's 12 megadiversity countries. India contributes 7.8 percent of the world's biodiversity on 2.5 percent of the earth's surface. It is estimated that around 47000 wild species of plants and over 89450 wild species of animals occur in our country. India has a tremendous range of ecosystem, species and genetic diversity and has almost every major type of habitat and climatic condition – from alpine heights to coasts and plains; from areas of the heaviest rainfall to dry deserts. India has at least 166 species of crops and 320 species of wild relatives of crops and a great diversity within the species. Many varieties of fruits and vegetables, spices, different breeds of cattle, sheep, goats etc. represent a fascinating biodiversity in the country.

4.2.2.1 Benefits of Biodiversity

From a human consumption point of view, biodiversity has many benefits. But it is important to move away from an anthropogenic view point, whereby the biggest benefit of biodiversity is that it supports a variety of life forms in an ecosystem and helps maintain temperature, and balance in the ecosystem.

Consumptive value: These are direct use values where the biodiversity products can be harvested and consumed directly, for e.g. fuel, food, drugs, fibre etc.

- Food - A large number of wild plants are consumed by human beings as food. About 80,000 edible plant species have been reported from the wild. About 90% of present-day food crops have been domesticated from wild tropical plants for eg. maize, rice.
- Fuel – Our forests have been used since ages for fuel wood.Many people living in and around forests and areas with vegetation still collect fuelwood. Fossil fuels like coal, petroleum and natural gas are also products of fossilised biodiversity.
- Drugs and Medicine – About 75 percent of the world's population depends upon plants or plant extracts for medicines. The wonder drug Penicillin used as an antibiotic is derived from a fungus called Penicillium. Likewise, we get Tetracycline from a bacterium. Quinine, the cure for malaria is obtained from the bark of Cinchona tree. Taxol is a chemotherapeutic agent derived from the bark of the Pacific Yew (Taxus brevifolis).

Non-consumptive value: This refers to all of the "functions" or "services" or "products" of the natural system which have a market value associated with it.

- Productive value – These are the commercially usable values where the product is marketed and sold. These include animal products like tusks of elephants, musk from musk deer, silk from silkworm, wool from sheep, the paper industry, plywood industry, railway sleeper industry, silk industry, textile industry, ivory-works, leather industry, pearl industryetc.
- Traditional value/ Social value – These are the values associated with the social life, customs, religion and psycho-spiritual aspects of the people. Many of the plants are closely linked to religious ceremonies in our country like Tulsi (holy basil), Peepal, Lotus etc. The leaves, fruits or flowers of these plants are used in worship.
- Aesthetic value – Great aesthetic value is attached to biodiversity. People

from far and wide spend a lot of time and money to visit wilderness areas where they can enjoy the aesthetic value of biodiversity. Ecotourism is based on providing such experiences to people.

- Ecosystem Services value – This is a non-consumptive use value related to self-maintenance of the ecosystem and various important ecosystem services. It refers to the services provided by ecosystems such as prevention of soil erosion, prevention of floods, maintenance of soil fertility, cycling of nutrients, fixation of nitrogen, cycling of water, their role as carbon sinks, and pollutant absorption. (For details refer to the 1.3.2 Section)

ACTIVITY 3

Local - Wildlife Study

Choose a study area and document the following species in the table. Also write notes in the description section about the shape, size, colour, where you saw the organism etc. You may choose to visit a park nearby, or a small (1m x 1m) forested area if you live close to such an area. The larger the variety you find, the more biodiverse the area is.

Local wildlife	Numbers	Description/Notes
Spiders		
Bugs & beetles		
Grasshoppers		
Butterflies and moths		
Ants		
Bees and wasps		
Dragonflies		
Other insects		

ACTIVITY4

Biodiversity in your food

Biodiversity and Food we eat!

Objective:

- Link different types of foods consumed to biodiversity
- Explain reasons why biodiversity is important for agriculture and for people

Materials:

- Notebook or paper, pencil
- Prepare a sample food log table

Breakfast	Ingredients	Meal	Ingredients	Dinner	Ingredients
Paratha		Rice Dal		Palav	
Poha		Paratha		Chapati	
Upma		Alu sabji		Cabbage sabji	
Dosa		Methi sabji		Buttermilk	
Khichdi		Rice & Sambar		Rice & Sambar	

Procedure

- Engage students on the activity and explain the food log table
- Ask students to fill the food log for three days
- After three days students work in 4-5 groups and analyse the food log

Discussion

- The students in sub group and analyse the food log and answer the following questions
- Types of food consumed
- Variety of ingredients used in food preparation
- Sources of ingredients
- Why there is diversity of ingredients

CHECK YOUR PROGRESS 4.2

How is biodiversity an important resource for human being? How is variety of agricultural crops essential for us?

4.4.3 Water

It is said that life started in water. Water on our planet is available in the atmosphere, the oceans, on land and within the soil and fractured rock of the earth's crust.About three-fourths of the earth's surface is covered by water.

This is the earth's hydrosphere. It consists of water in the oceans, lakes, streams, rivers, swampson the surface of land and under the ground. It also consists of water frozen as ice and snow – in icebergs, glaciers, polar ice, on mountains and in the frozen layers of the soil- and as water vapour in the atmosphere. While there seems to be abundance of water, and if we think of the entire water in the hydrosphere as 100 litres, only half a teaspoonful is available to us as fresh water. About 97 percent is in the oceans and is salty, the rest is locked up as ice and snow. The fresh water is mainly from rain, snow and hail, and is stored in the ground in aquifers or in lakes, rivers and streams as surface water.

Water is continually changing from liquid, to solid, to gas, through the Hydrological cycle is caused by the energy from the sun whereby ocean water gets heated and water is evaporated to form a vapour in a gaseuous form. This vapour rises and circulates in the atmosphere, cools and converts back into a liquid form. These tiny droplets of water in the atmosphere accumulate to form clouds, which in turn return the water to Earth as precipitation in the form of rain or snow.

Water played a predominant role in governing the distribution of humans across the surface of the earth. In fact, the earliest civilisations have been known to settle on the banks of perennial rivers.

4.4.4.1 Importance of water

Water is essential for all life processes on Earth. From a single-celled organism to complex ones including humans, all our bodies contain water. It is the universal solvent, circulator and carrier of materials and nutrients; it flushes wastes, and maintains temperatures suitable for biological processes. Its importance and uses can be briefly summed up as follows:

- **Sustaining Life**: Life began in water and water is a basic component of every living cell. It acts as a medium for important life processes and chemical reactions, and transports food and waste products.
- **Agriculture:** Water is the basic input for agriculture. All crops and livestock need water. Agriculture is one of the prime users of water.
- **Industry:** Almost all industrial processes need water. It is needed for the manufacturing or processing of ores, textiles, chemicals, paper, food, etc. Water is used for fabricating, processing, washing, diluting, cooling, sanitation needs within the manufacturing facility.
- **Power:** Almost all modes of power generation require water – from hybrid power where falling water turns turbines to produce power, to thermal and nuclear power, where water is used as a coolant.

- **Domestic Uses:** Cleaning, cooking, washing, bathing, sanitation, all these require water.
- **Medium of transport:** Boats, ships and sailboats carry humans and materials from one place to another across bodies of water.

Stress on Water

Water has become the most valuable resource of 21st century and is facing huge stress from multitude of factors. These include water intensive agriculture and the run-off of chemical pesticides and fertilizers, industrial water use and pollution due to waste water disposal into water bodies. The rise in population and changing lifestyles are causing greater stress on fresh water especially ground water. There is an intense competition for water usage among various sectors namely– agriculture, industry and domestic sector. All these affect our ground water table and river waters.

Women bear the brunt of water stress. Women and girls in the family generally take the responsibility of collecting and storing water. In many places with less or access nearby to water, they have to walk long distance to fetch a pot-ful of water. Precious time which which the women could have used to look after children's education, health etc. is spent in this task. Girls too end up looking after their younger sibilings and lose out on thier own needs.As groundwater resources are under increasing pressure due to over-reliance and unsustainable consumption, wells, ponds and tanks can also regularly dry up, escalating the water crisis and placing a greater burden on women. Access to unsafe drinking water also results in the spread of water-borne diseases. And women are often the first victims of both water scarcity and water pollution.

Did you Know?

Fresh water crises in India

- India has just 4% of the world's fresh water but has 16% of the global population.
- Across India as a whole, it is estimated that women spend 150 crore work days every year fetching and carrying, equivalent to a national loss of income of INR 1 crore
- 7.6 crore are without access to safe drinking water
- 21% of country's diseases are water related
- Over Lakh children under five died due to diarrhoea in India in 2015

- The total potential area to be brought under the micro irrigation (drip and sprinkler) in India is 4.22 crore hectares of land, however only 39 lakh hectare of land or 9.2% of the potential is currently under micro irrigation.

Source: http://www.ide-india.org/content/water-india-facts

ACTIVITY 5

Water – Every Drop Counts

Fill the following calculation sheet and know your daily water consumption.

Based on your calculation you will be able to know the daily water consumption by your family. Think about your water use and discuss ways in which you may want to reduce consumption.

Date	Total family members	Activities involving water	Number of buckets	Water consumed in litres	Source of water	Per person consumption
E.g. 10/12/19	6	Drinking, Cooking, Washing clothes, Vessels, Bathing	10+8+6+3= 27	27*20= 540 litres	Well	540/6= 90 litres per person

* Assuming 1 Bucket= 20 litres

CHECK YOUR PROGRESS 4.3

Which are the Freshwater resources found on the earth?

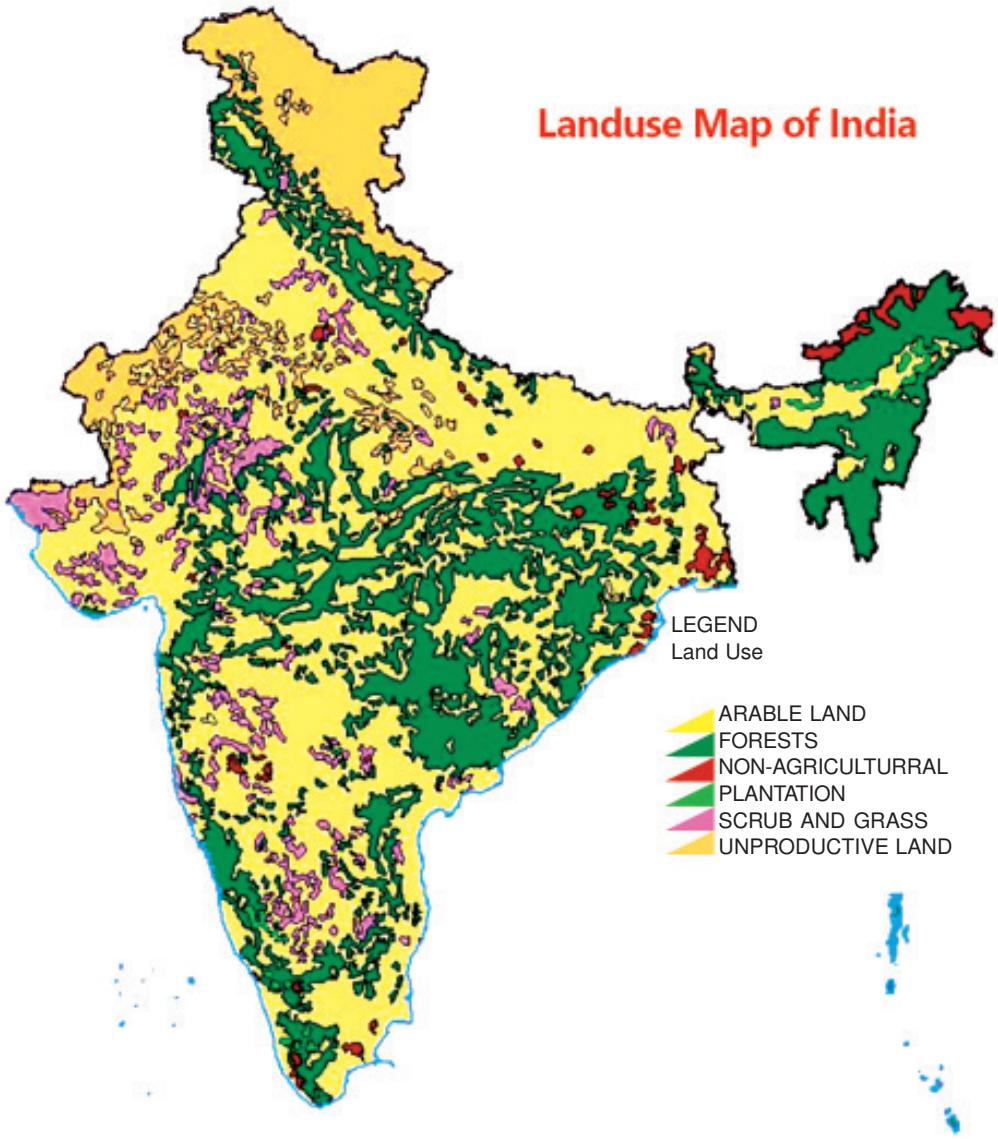
4.4.4 Land

The term 'land' generally refers to the surface of the earth. A variety of physical processes such as earthquakes and volcanoes, shifts of rocks and sediments, and flows of river and ice have shaped and continue to shape the earth's surface. Human beings through their activities also change the land surface.

Large-scale changes in landscape began taking place after human beings domesticated plants and animals over 10,000 years ago. These included clearing of land for agriculture, to build settlements, industry and other use by humans. Land resources in India are primarily divided into agricultural land, forest land, land meant for pasture and grazing, and waste land.

In India, about 51 percent of the land is under cultivation, 21.81 percent under

forest and 3.92 percent under pasture. Built up areas and uncultivated land occupy about 12.34 percent. (National Institute of Hydrology (2009) Land use map of India, www.indiawaterportal.org).



4.4.4.1 Importance of land use

Land is an important resource to human beings as their survival depends on it. The land is used by human beings for various purposes such as farming, grazing, forestry, wildlife, tourism, building houses and roads, industries, and other environmental functions. However, land use is determined by physical factors such as topography, soil, climate, minerals and availability of water. Human factors such as population and technology are also important determinants of land use pattern.

Land is used mainly for the following purposes:

- Agriculture–food production
- Transport and communication — roads, railways, and airports.
- Residential and institutional—housing, setting up institutions of various types
- Industrial and Commercial — businesses and factories, retail outlets, markets etc.
- Recreational — parks and other entertainment areas
- Protected Areas – Some areas such as National Parks and Sanctuaries provide limited access and minimum interference. Ecotourism provides an opportunity for people to experience nature in its vibrant form in such areas.

Gender and Resource Management in Rural Areas

In rural areas, women and men have varied knowledge, and have been taking on specific roles and responsibilities in managing natural resources. Although it varies from regions, societies and cultures, it is seen that gender wise division of labour is similar in most of the society e.g. in agriculture, it is seen that men are engaged in clearing land, harvesting of crops while women help in planting and tending crops. In case of livestock management, it is often seen that men take care of larger animals and cattle take them out to graze, look after their health and treatment when required while women nurture smaller animals like poultry and collect fodder for large cattle, bathe and feed them: Generally, men are engaged in traditionlly considered as physically tougher work such as fishing in the sea, tilling agricultural land, logging for timber requirement while the women help in sorting and drying of fishes, planting of crops, collect fuel wood for household requirement.

ACTIVITY 6

Mapping the land use pattern of your locality

Objective: To map and know the land use pattern in the locality

Steps:

1. Draw a map of your locality showing the location of the school on a sheet with grid.

2. Students as a group take a walk in the locality to know the various land uses such as roads, garden, market, pond etc.

3. After a walk, students further are divided into smaller groups to locate specific land uses such as:

   a. Park / Open spaces

   b. Living spaces – houses

   c. School and office building

   d. Agricultural practices

   e. Water sources – ponds, canals etc

   f. Industries

   g. Shops

   h. Roads

   i. Railway track

   j. Bus stand

4. Each sub group visits the locality and map the above land use pattern and mark them in different colors.

5. The mapped land use pattern is shared with students for discussion such as area and percentage of land use for different purposes.

CHECK YOUR PROGRESS 4.4

Land is of great importance to us. Explain.

4.4.5 Air

Air is all around us and is a mixture of different gases. The air in Earth's atmosphere is made up of approximately 78.084 percent nitrogen and 20.974 percent oxygen and small quantities of other gases such as argon, carbon dioxide etc. Traces of water, in the form of water vapours, dust particles etc. are also present in the atmosphere. Though earth's gravity keeps the air close to the earth, the air is not static. As it absorbs heat from the earth, it expands and rises. When its heat is radiated into space, the air cools, becomes dense, and flows toward the earth. As the air circulates due to heating and cooling, it also moves horizontally over the surface of the earth as the earth rotates on its axis. The combination of all air movements creates the wind patterns characteristic of different regions of the world.

The atmosphere is divided into troposphere where most of the weather of earth is created, and stratosphere which has the ozone layer. This layer of a special form of oxygen gas prevents harmful ultraviolet rays of the Sun from reaching the earth's surface and harming life. Carbon dioxide plays an important role in stabilising the surface temperature of the earth and preventing heat loss, especially at night time. This gas, comprising 0.03 percent of the atmosphere, covers the earth like a quilt preventing heat from dissipating into the upper layers of the atmosphere. However, if the amount of carbon dioxide were to increase beyond this, the temperature of the earth would increase excessively, impacting the climate's stability and posing a serious threat to living beings.

4.4.5.1 Importance of air

- Air is important to sustain life & growth. It is important for:
  - Respiration – breathing of animals and plants through oxygen.
  - Photosynthesis – main means of production of food in plants
- Carbon dioxide in the air helps in maintaining the temperature of the earth.
- Ozone in stratosphere protects us from harmful UV rays and prevents global warming.
- Air supports burning or combustion required for cooking food, running industries and vehicles.
- Air supports seed dispersal and therefore propagation of plants.

ACTIVITY 6

Air and Floating

Collect paper, balloon, feather, pebbles, cotton, leaves, etc. Drop these one by one from a height and see what happens. While the pebbles would fall straight to the ground, the other things would float in the air before falling to the ground. This is what happens to some seeds which have features that help them float for distances through wind and thus help them reach a suitable place for germination.

CHECK YOUR PROGRESS 4.5

1. What protects the earth from UV rays?
2. Carbon dioxide is important to life but its increase in the atmosphere can be a threat to existence of life on earth. Explain.

4.4.6 Energy

Energy is essential to life, all living organisms and for all activities on earth. The sun, directly or indirectly, is the main source of all the energy available on Earth. Primary producers such as plants and algae use energy from sunlight to make food through a process of photosynthesis. This becomes the source of energy for all organisms connected through the food chains.

As human beings evolved, they learnt to harness and use energy and convert it into different forms which enabled progress and developments as we see today. Various sources of energy which are being harnessed by human beings include the fossil fuel and gas extracted from the earth, nuclear energy, wind, sun, water. Animal and human muscle power has also been an important source of energy to carry out tasks.

Energy sources can be classified into Non-renewable and Renewable sources, depending upon the time period over which they will be replenished.

Non-Renewable Sources: Fossil fuels are organic materials, which have, through the process of fossilisation over millions of years, become coal, oil and natural gas. They cannot be renewed over timescales relevant for humans. They are therefore non-renewable resources. Nuclear fuels are also non-renewable sources of energy. These resources are available in the earth in fixed quantities and are being steadily depleted.

Renewable Sources: These sources of energy rely on natural energy flows and sources in the environment and thus have the potential of being continually replenished. These include-forest, water, biomass, animal and human muscle power.

"India now ranks third amongst the coal producing countries in the world. Being the most abundant fossil fuel in India till date, it continues to be one of the most important sources for meeting the domestic energy needs. It accounts for 55 percent of the country's total energy supplies" (www.indiaenergyportal.org). In India, conventional forms of energy such as diesel, petrol etc. have also been important sources of energy use. Concerns over depleting fossil fuel sources and increasing economic and environmental costs have increased the focus on renewable forms of energy such as solar and wind in India.

4.4.6.1 Importance of Energy:

Energy has been universally recognised as one of the most important inputs for economic growth and human development. There is a strong two-way relationship between economic development and energy consumption. Key sectors energy is used include:

- Power generation: thermal (using coal, gas, diesel), hydro and nuclear sources are used for generating electricity. India has the advantage of abundance of sun and wind which can be harnessed for power generation.
- India's electricity consumption accounts for about 4 percent of the world's total electricity consumption and it is growing at the rate of 8-10 percent per year.
- Electricity powers our homes, our businesses and industry, and various other activities through lighting, running our machines, growing of food, keeping us cool or warm etc.
- Fossil fuel energy such as diesel and petrol fuel our automobiles, airplanes etc. which enables faster transportation from one place to another.

Energy Management and Women India

In rural India, women primarily shoulder the responsibility of managing the domestic energy requirements for their families. The key resource for domestic energy requirement is derived from biomass resources. Hence women have close symbiotic relationship with their surrounding natural resource system. Though regional variations exist throughout India, rural women play a management role in the domestic energy systems by procuring and processing fuel for their household requirements.

In the cooking energy systems in rural areas, men,women and even children play very distinct and definite roles.In rural areas, though some variations can be observed across agro-climatic regions, the pattern of responsibility sharing is, by and large, the same. The matrix in Table 1 lists out various activities involved in fuel preparation and segregates them on the basis of gender.

The majority of tasks in the cooking energy system are carried out by women.

Task/fuel	Fuelwood	Dung-cakes	Crop residue
Production	Natural Resource	By-product of cattle rearing	By-product of farming activity (M,W)
Procurement	Collection (W,C)	Daily collection (W)	Collection and transportation to home (M,W)
Processing	Chopping (W)	Making dungcakes(W)	Chopping (W)
Use	Cooking food(W)	Cooking food (W)	Cooking food (W)

M: Task typically performed by men W: Task typically performed by women C: Task typically performed by children

ENERGIA News 4, October 1997: Role of Women in Rural Energy Programmes: Issues, Problems and Opportunities by Soma Dutta

ACTIVITY 7

Energy in our life

Look at each item listed here and write about why we need it as a source of energy, and how we use its energy:

Sun, Fruit or vegetable, Vegetable Oil, Firewood, Coal, Petrol, Mortar and Pestle, Bullocks, Firewood, Dung cakes, Battery, Wind

CHECK YOUR PROGRESS 4.6

Match the following:

A.	Biomass	a.	Non-renewable
B.	Electricity	b.	Renewable
C.	Oil	c.	Renewable
D.	Coal	d.	Commercial
E.	Wind	e.	Non-renewable

4.5 ECOSYSTEMS

The term "Ecosystem" was first coined by A.G. Tansely, an English botanist, in the year 1953. Ecosystem is the system formed as a result of the interaction of a community of organisms with their environment. Changes in the environment have been known to impact species and their evolution on the planet. Even today, the non-living environment affects lifeforms of the earth and these together with the interactions taking place between the living and the non- living world give rise to a variety of Ecosystems. Therefore, an ecosystem is a community of organisms involved in a dynamic network of biological, chemical and physical interactions between themselves and with the non-living components. Such interactions are crucial for sustaining the system and allowing it to respond to changing conditions.

4.5.1 Types of Ecosystem

An ecosystem can be as small as a flower patch in our garden, or as big as

an ocean, spanning thousands of miles. There are two types of ecosystems: Terrestrial Ecosystem and Aquatic Ecosystem

4.5.1.1 Terrestrial Ecosystems: are exclusively land-based. There are different types of terrestrial ecosystems distributed around various biogeographical zones. Biogeographical zones are formed as a result of the distribution of species, organisms, and ecosystems in geographic space and through geological time. They are as follows:

Forest Ecosystems: comprise of the forests with a diverse variety of flora and fauna. These again vary according to the climate, land type etc.

Grassland Ecosystems: These ecosystems mainly comprise of grasses with a few trees and shrubs. These are home to a variety of grazing animals, herbivores, and insectivores. Elephants, bisons, cheetahs, gazelles, lions, and tigers are some of the large animals living in these ecosystems. Rabbits, many birds, lizard and snake species are some of the small animals that live there as well.

Mountain Ecosystem: These include a dispersed and diverse range of habitats. The higher altitudes are characterised by harsh environmental conditions and areas with less vegetation. Lower altitudes can have dense forests. These are also some of the biodiversity rich areas with an amazing variety of flora and fauna.

Desert Ecosystem: Deserts are characterised by an annual rainfall not more than 25mm, intense sunlight, extremely high temperature, and low availability of water. Flora and fauna adapted to this climate thrive in such an ecosystem.

4.5.1.2 Aquatic Ecosystems: are ecosystems present in a body of water. These can be further divided into Freshwater Ecosystems and Marine Ecosystems.

Freshwater Ecosystem: These are divided into three basic categories:

- Lentic, which includes slow-moving or still water such as lakes, ponds, and pools.
- Lotic, which includes fast-moving water like rivers and streams.
- Wetlands, which include environments where the soil is saturated with water for a considerable period of time.

Freshwater ecosystems are the smallest of the three main types of ecosystems and include small fish, amphibians, a variety of insects, birds as well as plants and huge freshwater residents like dolphins, marsh crocodiles, water monitors etc.

Marine Ecosystem: These cover about 71 percent of the Earth's surface and contain about 97 percent of all the Earth's water. The Marine Ecosystem is the largest among the ecosystems and is home to a large number of organisms, big and small. Marine ecosystems can be divided into three main categories:

- Nearshore systems which include the salt marshes, mudflats, seagrass meadows, mangroves, rocky intertidal systems and coral reefs.
- Offshore systems, such as the surface ocean, pelagic ocean waters
- Deep sea and the sea floor.

There is a large diversity of flora and fauna inhabiting each type of the marine ecosystem. Various fishes, amphibians, crustaceans, reptiles, plants form the vibrant ecosystem of our seas and oceans.

4.5.2 Ecosystem Services

Ecosystem services are the benefits people obtain from ecosystems. These include provisioning, regulating, and cultural services, which directly affect people, and supporting services needed to maintain the other services.

- **Provisioning services:** The products obtained from ecosystems, including, for example, genetic resources, food and fibre, and fresh water.
- **Regulating services:** The benefits obtained from the regulation of ecosystem processes, including, for example, the regulation of climate, water, and some human diseases.
- **Cultural services:** The non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experience, including, e.g., knowledge systems, social relations, and aesthetic values.
- **Supporting services:** Ecosystem services that are necessary for the production of all other ecosystem services. Some examples include biomass production, production of atmospheric oxygen, soil formation and retention, nutrient cycling, water cycling, and provisioning of habitat.

Source: https://ecology.fnal.gov/ecosystem-services/

CHECK YOUR PROGRESS 4.7

1. What are the different kinds of ecosystems and how are they important?
2. Explain the Ecosystem services nature provides?

4.6 INDIAN TRADITION AND ENVIRONMENT

The worship of trees, animals, forests, rivers, and the sun, and Mother earth itself as Mother Goddess, are part of age-old Indian traditions. Myths, folklore, religion, arts and cultural practices have environmental protection as an intrinsic part of people's day-to-day life. Ancient scriptures and texts mention the importance of interdependence and inter-connectedness among the various species in nature and the need to recognise every species' role in the ecosystem.

I

"The environmental concept of interdependence shows the relationships between all living things (including humans) and their physical environment. A useful way of looking at the environment is to view it as a set of interrelated systems – the biophysical, social, economic, and political systems. The biophysical system provides life-support systems for all life. A social system provides rules and structures that enable people to live together. An economic system provides ways of producing and exchanging goods and services. Through a political system, people make decisions about how social and economic systems use the biophysical environment." – Jerry Gregory

There is a lot to learn from our traditions in environmental protection for wise use of resources and live sustainably. This section briefly touches upon these aspects.

4.6.1 Traditional beliefs and practices in environmental protection

Evidence from early civilisations such as the Indus Valley civilisation suggests that nature was an important part of their life. Seals from that period have been found to have images of animals. Their systems of water management and use of material for various purposes indicate a way of life close to the environment.

In many parts of India, communities dedicated a part of land or forests to a deity or a village God. These areas were protected and as a result were rich in biodiversity. Known as "sacred groves", these are found all over India, along the Western Ghats, the west coast, and in several parts of Kerala, Karnataka, Tamil Nadu, Maharashtra and in Northern India.

Hinduism, Buddhism, Jainism, Christianity, Islam, and other faiths place great emphasis on the values, beliefs, and attitudes that relate to respect for nature and the elements that constitute the universe. Many plants and animals have from historical times been considered sacred in India by various communities. Some of these include the peepal tree (*Ficus religiosa*), the banyan tree (*Ficus benghalensis*), or the khejdi tree (*Prosopis cineraria*) etc. These have been traditionally revered and therefore not cut. More than a hundred such species of trees/plants in India are considered sacred by various communities and religious faiths. These include the sandalwood tree, betelnut, palm, neem, coconut palm, juniper, champa, lotus, tulsi, pepper, etc.

Many animals are considered sacred and worshipped by several communities, and have thus received protection for centuries. For example,

- The peafowl is not hunted by several communities

- The blue rock is pigeon protected in the Bengal region and present-day Bangladesh.
- In Buddhist mythology, the Jatakas or the stories of Buddha's previous lives are replete with several incarnations of the Bodhisattva as an animal.

Indian painting, sculpture, architectural ornamentation, and the decorative arts are replete with themes from nature and wildlife reflecting love and therefore the ethics of conservation. A wide range of images of forests, plants, and animals are found in Indian miniature paintings and sculpture. Tribal art forms such as the Warli art on the walls of the homes in parts of Maharashtra, the Madhubani paintings of Bihar all have used the nature and its close connection with people's life. Architectural marvels like the Taj Mahal and many of the Mughal architecture uses leaf and flower motifs as decorative elements in the monuments.

Madhubani and Warli paintings that reflects / people's life and connection to nature in their art forms

Feeding birds and animals is considered an important part of Indian tradition. In many parts of the country, especially in dry and arid regions, communities constructed chabutras or bird feeders and water troughs or sites allocated for drinking water for birds and animals. These signify a close relationship of human beings with other components of nature.

Chabutra or bird feeder in Ahmedabad

Architecture and construction practices in the past were informed by the climatic conditions and the natural resources available. For example, communities in flood prone areas have homes built on stilts, in dry and hot areas,

construction is such that there is a movement of air.

Jaali or windows with stone or wooden perforated or latticed screen for air circulation

Many of the traditional practices and customs such as celebrating festivals are about celebration of nature, be it the beginning of fishing season, or the

harvesting season. These practices come from a deep understanding and respect for nature and to seek blessings for health and prosperity.

4.6.2 Indian Traditions and Sustainable Living

Indian traditions provide an insight into the value for conservation. Such sustainable practices have come up as a result of co-evolution between humans and their natural resources over a long time. Sustainable living refers to an individual or society's lifestyle that can be sustained within the capacity of

natural resources.

Traditionally people used local material to build their homes as these were easily available, for example, locally available wood, bamboo etc.were used for constructing these homes using local skills. Climate conditions, social norms and the needs of the family too determined the way these homes were constructed. The Bhungas (round huts) of Kachchh), traditional homes in Kerala and other parts of the country have inspired modern architects to construct sustainable housing. The Bhungas of Kachchh did not collapse during the Gujarat earthquake in 2001 possibly owing to their unique constructon and material used.

India's diversity in clothing provides insights into the way climate conditions have formed the way people dress, besides availability of raw material in that area. While advent of textile industry and availability of a variety of human-made material has influenced the way we wear our clothes today, the traditional cotton saree is still a much favoured dress for the Indian woman. Even in the

saree, there are amazing ways in which women from different parts of India wear it.

An important aspect of sustainable living is the food we eat, where we procure it from and how we cook and consume it. Consuming seasonal fruits and

vegetables during that season was how our food practices evolved. Our festival celebrations too were closely linked to the seasonal variety of food that could be prepared. Technological advancements in the refrigeration and ease of transportation have made these available now through the year, at the same time using up more energy and resources.

Several traditional communities owing to their intrinsic understanding of how their life is dependent and connected closely to nature, have evolved their lifestyle in sync with it. Communities such as the Bishnois in Rajasthan have since generations protected their environmental resources at times at the expense of their lives. They protect and manage the sacred groves or orans and the wildlife within them. This practice followed almost like a religion has helped conserve biodiversity and water sources in these areas, and also been a part of their cultural and religious identity.

ACTIVITY 8

Present and Past

At home, talk to your parents and grandparents if living with you and ask them the following questions to compare lifestyles during their time and your time:

You can make your list of practices you could compare and analyse which ones were more sustainable in terms of using less resources, were more in sync with nature etc.

Role of Women in Conservation of Environment in India

Women being the natural protectors and nurturers have played a very important role in protecting nature, making it a part of the way they interacted with it. Following are examples where women have played a pivotal role in environmental conservation. Few of these are:

Activities/Practice	Grandparent	Parent	You
Sourcing/ buying vegetables	Grew them at home/ bought from a local vegetable vendor	Bought from a vegetable shop near home	Buy from a mall/ order online
Cooking			
Celebrating festivals			
Clothes			

1. **Amrita Devi:** The first recorded instance of a woman trying to safeguard the environment relates to about 300 years ago when, in Rajasthan, Amrita Devi protested the felling of trees for building a palace for the Maharaja of Jodhpur. She died in the attempt, which was followed by large-scale protests by the local villagers. As the story goes, the king promised never again to ask the local villagers to supply timber. Amrita Devi belonged to the Bishnoi community, which is known for its love of nature.

2. **Gaura Devi:** The Chipko movement started under the leadership of Gaura Devi who organised the women to hug the trees and prevent people from cutting them. She was the head of the Mahila Mangal Dal, at Reni village in Uttarakhand. The day the lumbermen were to cut the trees, Gaura Devi led 27 women to confront the men who were asked to cut the trees. She initially tried to talk them out of it, but soon the men resorted to abusing and threatening. The women thus decided to hug the trees to stop them from being felled. They guarded the trees all night until the men surrendered and left. News of the movement soon spread to neighbouring villages and people joined in. Same acts were repeated in other parts of Uttarakhand with women playing an active part in providing environmental solutions.

3. **Medha Patkar:** A popular environmentalist, she is known for her active

role in the Narmada Bachao Andolan (NBA) – a powerful mass movement against the construction of a large dam on the Narmada River. She formed the NBA in 1989 to work for the rights of people being displaced by the dam. The proposed Sardar Sarovar Damwas supposed to displace more than 320,000 people. She formedthe NBA in 1989, and has been involved since. As a peaceful means to protest, she tookup fasting several times. NBA has subsequently created high level awareness.

4. **Vandana Shiva:** She is well known for her efforts to protect forests, organise women's networks, and conserve local biodiversity. She initiated Navdanya, a national movement to protect the diversity of living resources, in 1991. Since its 20 years of existence, more than 2000 varieties of rice have been conserved and 34 seed banks established in 13 states nationwide.

5. **Sugathakumari:** A poet and environmentalist, Sugathakumari have dedicated most of her writings to Mother Nature. She has been at the forefront of environmental and feminist movements in Kerala, South India. She founded the Prakriti Samrakshana Samithi and also participated in the 'Save Silent Valley' protest, a social movement aimed at the protection of Silent Valley, an evergreen tropical forest in the Palakkad district of Kerala.

6. **Radha Bhatt:** She was actively involved in the Uttarakhand Nadi Bachao Abhiyan in 2008 to oppose the construction of a series of hydel power projects that not only threatened the flow of the Ganga and most of its tributaries but imperilled the fragile, heavily deforested ecosystem of the Himalayan state, Radha Bhatt led a 2000 kilometres march to raise voice for people's water rights.

Source : ROLE OF WOMEN IN ENVIRONMENT CONSERVATION by *Dr. P. Mago, 1Dr. I. Gunwal

4.7 LETS SUM UP

- Environment and ecology mean different things. While ecology limits itself to connections, processes and phenomena occurring in the natural world, environment means 'me and my surroundings' and hence not only includes the natural part of the surroundings, but also those elements that have been created by Humans.
- It is important to understand that all components in the ecosystem are interdependent and interconnected. Impact on one component can cause an impact on the other components that are linked to it through a

complex web.

- There are levels of organisation in nature and various species interact according to where they are in the hierarchy of the organisation. The earth's abundant resources in the form of forests, biodiversity, water, land, air, and energy have been a boon to human existence. These resources are used by us for various purposes from eating food, to building our homes, keeping ourselves warm, and living itself. These services that nature gives us are also called ecosystem services.
- It is also important to note that our ancestors lived in close association with nature. Environment has been an intrinsic part of people's culture and traditions in India and these helped create a value for nature and its resources, thus protecting them. Women being the natural protectors and nurturers have played a very important role in protecting nature, making it a part of the way they interacted with it.
- We need to understand that there is just one planet Earth with a finite size and resources which sustains life. Conserving our earth's resources is critical to survival of all species including human beings.

4.8 UNIT-END EXERCISES

In what way are India's cultural practices and traditions important for environmental conservation?

4.9 SUGGESTED READINGS AND REFERENCES

- A.K.Pandey, YC Tripathy, Ashwani Kumar (2016) *Non Timber Forest Products (NTFPs) for Sustained Livelihood: Challenges and Strategies*, Research Journal of Forestry, 10, 1-7)Centre for Environment Education (2016) Paryavaran Mitra Teacher's Handbook
- (S.Kumar, B. Bhattacharya, VK Gupta (2014), *Present and Future Energy Scenario in India*, Journal of the Institution of Engineers (India): B 95, 257-254.)
- Kiran B. Chhokar, Mamata Pandya and Meena Raghunathan (Eds) (2004), *Understanding Environment*, Sage Publications
- Shivani Jain, (2005), Basics of Ecology and Life Support System, *Green Teacher Module 1,* Centre for Environment Education and Commonwealth of Learning
- National Institute of Hydrology (2009) Land use map of India, www.indiawaterportal.org

www.footprintnetwork.org

www.fao.org

- Jody L. Davis, Jeffery D. Green, Alison Reed (2009)

Interdependence with the environment: Commitment, interconnectedness, and environmental behavior, Journal of Environmental Psychology

29(2):173-180

DOI:10.1016/j.jenvp.2008.11.001

Notes

UNIT 5 ENVIRONMENTAL ISSUES AND CONCERNS

STRUCTURE

5.0 INTRODUCTION

India is no exception to the global phenomenon of environmental degradation brought about by developmental activities. Rapid industrialisation, growing urbanisation, intensive cultivation, and other developmental activities, coupled with increasing biotic pressure have had a very adverse impact on India's environment.Increasingly longer drought seasons, severe storms, cyclones, flooding episodes, degradation of soil, depletion of natural resources are some of the impacts seen as a result of the human interference in the environment.

In the earlier lessons, we have dealt with the importance of environment and the ecosystems, wealth of natural resources these provide and how intrinsically human life is connected to the environment. While environmental conditions shape our lifestyles, the way we live and use resources has an impact on the environment. It is important therefore to understand what impact humanity has

on the environment. At the same time, it is important to also understand what impact environmental degradation has on the poor, especially women.

Climate change and degradation of natural resources impact the poor who are dependent on the environment for their food and living life in general. The impact is more severely felt by women who traditionally take on the role of caretakers of their families - growing food, gathering water and fuel, therefore connecting them closely with available natural resources. Impact on natural resources impacts their lives and increases their hardships. Poor women are affected first and worst, becoming more vulnerable owing to societal inequalities that lead to silencing their voice and neglecting their needs.

5.1 LEARNING OUTCOMES

After studying this lesson, the teacher-pupil will be able to:

- identify environmental issues and concerns, their cause and effect; and
- describe impacts of issues at micro to macro level (in termsof urbanisation, agriculture,industrialisation, pollution, climate change)especially in the context of gender.

5.2 URBANISATION

Over half of the world's population lives in urban areas. In India, around 34 percent people live in the urban areas. Urbanisation is a process that leads to the growth of cities due to industrialisation and economic development, and that leads to urban-specific changes in specialisation, labour division and human behaviour.

"Urbanization is not a side effect of economic growth, it is an integral part of the process. As in most countries, India's urban areas make a major contribution to the country's economy. Indian cities contribute to about 2/3 of the economic output, India's towns and cities have expanded rapidly as increasing numbers migrate to towns and cities in search of economic opportunity."(Urbanization in India, 2011, www.worldbank.org).Hence accompanying India's rapid economic growth will be a massive transformation of the country from a largely rural population to at least 50per cent becoming urban. This would pose unprecedented challenges to India's growing cities and towns in providing housing and infrastructure (water, sewerage, transportation etc.). The Sustainable Development Goal 11 focuses on making cities and human settlements inclusive, safe, resilient, and sustainable where environmental concerns and reduction of impact of urbanisation, lack of sanitation, human habitation, solid waste and pollution are highlighted.

Source: https://in.one.un.org/page/sustainable-development-goals/sdg-11/

5.2.1. Urbanisation – Environmental Concerns

The key issues of urban India today have to do with the quality of life of urban dwellers. The poor are the most vulnerable and they face several challenges in terms of access to health and nutrition, education, opportunities for livelihoods, and their basic human rights as citizens. Between 2000 and 2014, the proportion of the global urban population living in slums dropped from 28.4 per cent to 22.8 per cent. However, the actual number of people living in slums increased from 807 million to 883 million.(https://sustainabledevelopment.un.org/sdg11). While cities provide opportunities for growth, these are also challenged by the growing number of people moving into cities.Women, especially poor women face immense challenges of exposure to poor sanitation, poor air quality, and safety against crime owing to the conditions they are forced to live in. Infrastructure services such as roads, transport, water supply, availability of toilets, public spaces, street lights etc. are not designed keeping specific needs that women may have. For example, roads without adequate street lights can jeopardise women's safety; community-based water supply versus a household connection has an impact on the time girls and women spend on fetching water. Poor nutrition too often makes women more vulnerable to diseases and therefore, poor access to healthcare affects their well-being.

Some of the issues created due to urbanisation and having an impact on the environment are discussed in brief below:

- **Increasing resource consumption**: With economic growth, the purchasing power of people increases, leading to higher consumption of resources. Smaller shops are giving way to aggregators and malls. Online shopping has become a trend especially could be seen as a useful and convenient option for those who are pressed for time or unable to visit a market to buy their household supplies. All of this requires huge amount of resources such as packaging, transportation and fuel needed to transport raw material and products across cities. Malls need air conditioning and vast amounts of electricity, water, sanitation services etc. The way people consume has changed from the small and home-based and neighbourhood store with limited options to a large enterprise with many options to choose from through the year.
- **Pressures on infrastructure**: Population density in urban centres has been increasing more rapidly than the infrastructure and services to sustain it, such as housing, water supply, garbage disposal and sanitation, roads and transportation. This has led to polluted, overcrowded and unhealthy living conditions for many urban dwellers, congestion of vehicular traffic and it affects quality of life of rich and poor alike. The poor may be more vulnerable to disease due to poor sanitation, but if the disease becomes an epidemic, it affects everyone.
- **Public spaces and assets**: People need public spaces that provide them with a space for recreation, meet other people, or just to enjoy being with themselves. Cities have such assets in the form of parks, wetlands and waterbodies which besides being spaces for people to come to, serve a valuable function of provision of ecological services such as recharging groundwater, supporting urban biodiversity and controlling temperature. The Delhi Ridge, Mumbai's Sanjay Gandhi National Park are some examples of such spaces that are very valuable. With the increasing demand for land, many such assets in cities face the threat of conversion to residential or commercial use. Wetlands and waterbodies are built upon, green areas are cleared to build more homes or set up industries. As cities grow, public spaces must be part of the planning too.
- **Loss of cultural heritage**: Cultural heritage, both material (such as monuments, crafts, landmarks) and non-material (such as cuisine, festivals, institutions), is an important aspect of people's identity and self-esteem. Rapid urbanisation tends to erode it. The built heritage – an integral part of a city's identity – is sacrificed in favour of new, commercially 'viable' developments, depriving citizens of the cherished symbols of civic pride. Older havelis (mansions) and homes give way to multi-storeyed apartments. Changing physical environment affects the social and cultural cohesion in these areas.

- **Air pollution**: Polluted air is a growing problem in cities and a major cause of respiratory ailments. This is mainly due to exhausts and emissions from motor vehicles and industries which do not conform to the prescribed pollution-control standards. Some of the world's most polluted cities in terms of air quality are in India. Indoor air pollution due to use of coal, biomass residues,or even plastic and rubber waste in poorly ventilated homes of the poor is also a concernaffecting women who are directly exposed to the polluted air.Suspended particulate matter such as dust, and other particles from vehicle exhaust get aggravated in urban areas especially during winters.

- **Water availability and pollution**: Most urban areas suffer from a lack of access to safe drinking water especially to the poor. Surface water bodies such as the rivers, lakes and ponds are polluted when untreated sewage and industrial effluent is released in these water bodies. This disturbs the natural biochemical processes that keep the water bodies clean. The Ganga, regarded as the holiest of Indian rivers has the longest stretch that is polluted in terms of biological oxygen demand. As the Yamuna flows through the city of Delhi, drains discharge water into it, turning it into almost a sewerage drain. Domestic sewage and industrial waste water also pollute ground water which is the only source of drinking water in many cities.A number of cities have stressed water resources which would further be stressed as the cities grow. Many of the cities have to cut down on the water supply to manage the already dwindling resource. Pollution and Overconsumption seem to be major areas of concern with regards to water. Since women areclosely connected with managing water resources in the family, they are adversely affected when water availability becomes a concern. In slums where there are community connections, girls and women could spend hours in getting water. Also, a challenge is their exposure to unhygienic and polluted surroundings where waste water systems are stressed or non-existent. Poor infrastructure such as community toilets or even individual toilets at home can be a big health hazard in water-stressed slums.

- **Solid waste**: All urban towns and cities are facing the challenge of dealing with growing mountains of solid waste. According to an article in *Down to Earth* (2018), India produces about 5.31 million tonnes of waste each year. As consumption grows, the proportion of non-biodegradable waste (plastic, fused materials such as Tetra Pak, and other packaging material) in the overall waste stream has been increasing. Segregating waste at source remains a challenge in most cities, and landfills are still the final destination for the city's mixed waste. This puts great pressure on the cities to source for additional land for landfills which is often in rural areas

outside the city affecting their quality of life. There have been protests by rural communities in cities like Bangalore against the creation of landfill near their villages and these conflicts would grow. Conventional methods of solid waste management also use a large amount of energy in transporting waste from source to the disposal sites. As these sites are mainly dumping areas, these leach toxic chemicals into the soil. Growing quantities of solid waste, over consumption, and lack of systems for segregation of waste at source and creating the linkages for the various types of waste to be recycled or disposed responsibly are key areas of concern for cities today. The informal sector especially women play a large role in solid waste management. Almost 20 percent of the waste produced in cities is recycled by waste pickers. There are lakhs of women who pick recyclable waste from garbage dumps and sell this for a living. They are directly exposed to highly toxic and dangerous mixed waste which leads to many of them suffering from skin and lung infections. Some suffer injuries from sharp objects like blades and needles, broken glass or bulbs in the waste. Though contributing to the city's economy, waste pickers earn very little, and havelittle access to healthcare. They arenotrecognised for the role they are playing.

- **Noise pollution**: The increasing number of vehicles on the road, the proliferation of industrial activity within the city, and the use of loudspeakers at religious, public and social events are some factors resulting in the increasing ambient noise levels in the city. Continuous exposure to high levels of noise leads to both mental and physical health problems.Elderly people, traffic police personnel, factory workers and others who have an exposure to high decibel noise can be affected.

- **Change of land use**: As they grow, urban areas spread out into adjacent rural areas, consuming croplands for buildings and roads. Productive agricultural lands get converted to static urban use. It is not only the land which changes but the livelihoods and lifestyles of the inhabitants are disrupted as an area urbanises. Often natural waterbodies such as wetlands and lakes are reclaimed for building projects, resulting in the permanent loss of catchments for rainwater and natural sinks for surface run-off. This in turn causes floods in the cities in heavy rains. Such reclamation also disrupts a vital means of groundwater recharge. Along with the wetlands, ecosystems which harbour a host of life forms – mainly resident and migratory birds are lost. The impact of such disruption is felt most by women, who are immediately connected with natural systems to feed their families, for water, and for livelihood, weakening their resilience.

- **Vegetation**: Shrubs, grasses, trees and other forms of natural vegetation are usually the first victims of urbanisation. Vegetation is crucial for

absorbing air pollution, releasing oxygen, cooling the air as water evaporates from the leaves, mitigating noise pollution, providing habitats for wildlife, and enhancing environmental aesthetics. It also helps to reduce soil erosion.

- **Heat Island effect**: The creation of heat islands through excessive use of materials such as concrete, asphalt, bricks etc. leads to absorption and reflection of energy different to vegetation and soil. Cities remain warm in the night when the countryside has already cooled. Presence of green areas and water bodies in cities help to keep the temperatures lower compared to concrete jungles. Such a phenomenon greatly affects people who work outdoors, live in houses that cannot reflect the heat back into the atmosphere, have low resilience and weak immunity.

ACTIVITY 1

Creative solutions

Objective: To help teachers and students reflect on urbanisation and its impact, and discuss possible solutions.

Material required: Newspapers, scissors, gum, chart paper or a large sized blank sheet of paper

Take a newspaper and identify news about urbanisation and its impact on the environment. These should include any news items that cover issues faced by women in cities. Also look for positive stories that talk about action being taken on these issues.

Cut these news items and keep aside. Now create a story based on what you find in the news and how you think these issues could be tackled.

Take a blank chart paper or any large sized blank sheet of paper. Make a collage with the newspaper cuttings. You may use some of the letters, headlines etc. from the newspaper to make your collage interesting. Once your collage is ready, share the story with others.

ACTIVITY 2

Waste Audit

Objective: To sensitise students and teachers to the amount and type of waste generated at home and reflect on possibility of reducing.

Material required: Waste Audit chart, pen/pencil, gloves (if touching garbage)

In your home, carry out a survey of types of waste generated over a week.

Fill out the findings in the waste audit chart. The description of waste and its quantity where possible could be mentioned. A possible scenario is filled in for understanding.

Day	Paper	Glass	Plastic (polythene bags, broken plastic items)	Packaging	Kitchen waste	Other (used batteries, used medicines, bulbs, e-waste, sanitary napkins, used cotton/gauze etc.)
Monday	Wrapping paper from present -1, paper shreds	Broken glass -1	Polybags – 5	Chips packet -1	Vegetable peels, fruit peels	Broken tubelight
Tuesday						
Wednesday						
Thursday						
Friday						
Saturday						
Sunday						

Answer the following questions after filling the charts over the week:

1. What kind of waste was generated more?
2. Is there any waste that could have been avoided with an alternative use of material?
3. Was there anything that you could have completely avoided buying?
4. Was there anything you could have donated or given to someone instead of throwing away?
5. Can you take the audit again after a month and see if there is a change in the type and amount of waste you generate?

CHECK YOUR PROGRESS 5.1

1. What are the impacts of urbanisation on the environment?
2. Mention fivefactors in urbanisation that impact women.

5.3 AGRICULTURE

Agriculture contributes 15.4 percent to India's Gross Domestic Product (GDP)

and provides employment to 50 percent of the country's workforce. India is the world's largest producer of pulses, rice, wheat, spices and spice products. India initiated the Green Revolution in the 1960s as a part of which high-yielding varieties of rice and wheat were introduced to increase food production and alleviate hunger and poverty. India has the second-largest agricultural land in the world, with 20 agro-climatic regions and 157.35 million hectares of land under cultivation. Thus, agriculture plays a vital role with 58 percent of rural households depending on it even though India is no longer an agrarian economy. Post-Green Revolution, the production of wheat and rice doubled due to initiatives of the government, but the production of other food crops such as indigenous rice varieties and millets declined. This led to the loss of distinct indigenous crops from cultivation, causing some to become extinct. Constant use of chemical-based inputs like fertilisers, pesticides, herbicides and mechanised farming have led to over-exploitation of natural resources, especially groundwater and soil to the extent that most of the farming enterprises have turned out to be environmentally unsustainable (Eliazer Nelson, A.R.L., Ravichandran, K. & Antony, U. The impact of the Green Revolution on indigenous crops of India. J. Ethn. Food 6, 8 (2019). https://doi.org/10.1186/s42779-019-0011-9).

"Globally more than 400 million women engage in farm work, although they lack equal rights in land ownership in more than 90 countries. Women worldwide engage in non-mechanised farm occupations that include sowing, winnowing, harvesting, and other forms of labour-intensive processes such as rice transplantation.According to Oxfam (2013), around 80 per cent of farm work is undertaken by women in India. However, they own only 13 per cent of the land. Statistics released by the University of Maryland and the National Council of Applied Economic Research (NCAER, 2018) state that women constitute over 42 per cent of the agricultural labour force in India, but own less than two per cent of farmland.

Women in agriculture are affected by issues of recognition and in the absence of land rights, female agricultural labourers, farm widows, and tenant farmers are left bereft of recognition as farmers, and the consequent entitlements.

According to the India Human Development Survey (IHDS, 2018), 83 per cent of agricultural land in the country is inherited by male members of the family and less than two per cent by their female counterparts."

(The invisibility of gender in Indian agriculture: Why policy paralysis in granting entitlements to women in agriculture and farm widows needs to be addressed

By Swasti Pachauri

Last Updated: Tuesday 19 February 2019 - Blog in Down to Earth)

5.3.1 Agriculture Environmental Concerns

Impact of use of chemical fertilisers and pesticides: High amounts of pesticides and chemical fertilisers are used in agriculture to get higher yields and protect the crops from pests. These have an adverse impact on the soil and water resources both ground water and surface water when these leach into the water bodies releasing toxic elements into these.

Change in landuse: Farmers increasingly opt for cash-crop varieties such as cotton, sugar cane, cumin etc.as these give higher returns. Also, wheat and rice which are soil depleting crops have replaced local crop varieties including pulses which are soil building crops.

Loss of genetic diversity: Traditional agricultural systems encourage diversity in crop breeds. Monocultures of crops and varieties have replaced the once mixed and rotation of diverse native varieties suited to the soil, water and climatic conditions of the area. The crops become more vulnerable to outbreaks of disease and other adverse natural conditions. The major crops cultivated in the era preceding the Green Revolution were rice, millets, sorghum, wheat, maize, and barley, and the production of rice and millets were higher than the production of wheat, barley, and maize combined all together. But the production of millets has gone down, and the crops that were once consumed in every household became a fodder crop in just a few decades after the Green Revolution. Meanwhile, a number of traditional rice varieties consumed prior to the Green Revolution have become non-existent, and the availability of local rice varieties have decreased to 7000 and not all of these varieties are under cultivation. Thus, India has lost more than 1 lakh varieties of indigenous rice after the 1970s that took several thousand years to evolve. This loss of species is mainly due to the focus given to the production of subsidised high-yielding hybrid crops and the emphasis of monoculture by the government (Eliazer Nelson, A.R.L., Ravichandran, K. & Antony, U. The impact of the Green Revolution on indigenous crops of India. *J. Ethn. Food* **6,** 8 (2019). Source : https://doi.org/10.1186/s42779-019-0011-9)

Intensive irrigation: Irrigation practices that use groundwater to irrigate water intensive crops have an impact on the available resources as well as on energy used for pumping this water. Flooding of the fields with water with no consideration for its drainage can impact the quality of soil causing salinisation which can lead to desertification.

Intensification of inequity: The intensive inputs and technologies required for agriculture, such as new seeds, more fertilisers and pesticides, tractors and other agricultural machinery, and irrigation are not affordable for small farmers. Traditionally access to many agricultural inputs was free or affordable or traded in non-monetary terms. Farmers traditionally kept seeds from the earlier

harvest to sow in the next year therefore also maintaining the crop genetic pool. In the absence of access to credit on affordable terms, and equipment, small and marginal farmers get into a cycle of poverty. Farmer suicides have increased and that has pushed women into taking on more responsibility and made them increasingly vulnerable to exploitation in a male-dominated society.

Climate Change & Greenhouse Gas Emissions: Agriculture, with the use of livestock (that emit methane), and chemicals like fertiliser and pesticides (that can emit greenhouse gases like nitrous oxide and carbon dioxide) – contribute to climate change.

Deforestation: For agriculture, land is cleared to make way for expansion of crops or pasture – this is one of the major reasons for deforestation.

Impact on nutrition: India has one quarter of the hungry population of the world with 195.9 million undernourished people lacking sufficient food to meet their daily nutritional requirements; 58.4 percent of children under the age of five suffer from anemia, while in the age group of 15–49, 53 percent of women and 22.7 percent of men are anemic; 23 per centof women and 20 percent of men are thin, and 21 percent of women and 19 percent of men are obese (Eliazer Nelson, A.R.L., Ravichandran, K. & Antony, U. The impact of the Green Revolution on indigenous crops of India. *J. Ethn. Food* 6, 8 (2019). Source : https://doi.org/10.1186/s42779-019-0011-9).

ACTIVITY 3

Objective: To sensitise students and teachers to the changing diversity in food owing to impact on agriculture.

Material required: Notebook, Pen/pencil

Make a note of the food you eat, its ingredients such as the cereals, pulses, spices, oil/ghee etc. Do a similar exercise with your parents and then the elderly in your family or neighbourhood. Compare the food and ingredients used by the three generations. Are they different? Try to find out why are these different? Are these ingredients available now? If yes, why has the family changed its eating pattern? If no, then find out what happened? Was it because these were no longer grown or available? Or were cheaper varieties of crops available?

Climate Resilient Farming in Marathwada, Maharashtra

Marathwada district of Maharashtra state in India is drought prone and has faced a high incidence of droughts over the years. An organisation, Swayam Shikshan Prayog (SSP) found through discussions with women's groups they worked with, that while women are extensively involved in farming,

the decisions on crop selection, cultivation, and consumption were taken exclusively by men. According to the group, men tended to choose single-strain cash crops like soya, cotton, and sugarcane which need a large amount of chemical inputs that are expensive and detrimental to the soil and water quality. SSP initiated a women-centred climate resilient farming model to help the communities deal with consequent droughts and food insecurity. Women became the sole decision makers on what to grow, what to consume and how much to sell. Starting with cultivation on small family land, women started cultivating food crops, including cereals, pulses, oil seeds, vegetables, animal fodder. Their innate knowledge and training by the organisation helped them follow resilience building practices including use of bio-fertilisers, preservation and exchange of local seeds, increasing crop diversity, increasing of crop cycles, choice of drought resistant and water efficient crops, water conserving irrigation techniques, and tree plantation. This has helped improve food and nutrition security of the households, reduced the cost of cultivation, increased productivity, and rendered other social, economic, and environmental benefits.

Source: https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2018GH000163

CHECK YOUR PROGRESS 5.2

1. What are some of the problems caused because of use of chemical pesticides and fertiliser in agriculture?
2. Why is genetic diversity important in agriculture?
3. What role do women play in agriculture?

5.4 INDUSTRIALISATION

Industrial and technological revolutions and economic growth have been regarded as major contributors to the development and growth of the world's economy. On the flip side, unprecedented industrial growth has adversely impacted environmental well-being owing to pollution caused by this sector. The air, water, and land have been increasingly affected by pollution which has had life-threatening consequences in many cases. Industries need water, land and energy resources to function which place an enormous pressure on the natural resources available for all dependent on theseespecially women.

According to a report by the International Labour Organisation (ILO), there are about 26.5 per cent less number of women employed in the labour force as compared to men. A large percentage of women work in the unorganised

or informal sector, which is not accounted for when the total number of people working is calculated. In addition, despite the legal requirement in India of paying equal wages, women tend to be paid less as compared to men.

5.4.1 Industrialisation - Environmental Concerns

Pollution: Industrial waste when released into the water bodies or on land in the form of solid waste and air in the form of gases, affects their quality. The nature and composition of these pollutants depends on the type of industry. When untreated waste from the industries is released into the environment it releases hazardous chemicals which cause great harm to the environment.

Over-extraction of raw materials: Extraction and mining of raw materials needed to produce goods by an industry degrade land, cause deforestation. For example, if limestone is to be mined to produce cement, large tracts of land will be degraded.

Energy use and impact of transportation: Transportation of goods require energy use and also have an impact on the air quality, use of fossil fuel to produce the energy, which has an adverse impact on the use of resources.

Input costs: Industries need water and power to run their business of production. These put pressure on these resources owing to high consumption rates in the industries.

ACTIVITY 4

Complete the story

Objective: To get students and teachers to reflect on the issue of industrialisation and consequences.

A pesticide making industry is the main supplier of pesticide to the entire state. It is located near agricultural lands of nearby villages. The waste water from the industry pollutes the water bodies nearby and has been a problem for the village communities, as the ground water too has been polluted. This has caused many health problems for the communities living in these villages. The Pollution control authorities have given a warning to the industry to ensure that they do not release polluted water in the water bodies and treat the water. But it seems this is not yet being done as it will mean a lot of expense to the industry. In the meanwhile, the industry may face closure if they do not comply to the Pollution Control Board's warning. The workers at the industry do not want it to close down as they will lose their jobs. It is a complicated situation.

Complete the story in your words to reflect if there could be a solution that would help the industry cause less or no pollution and also ensure that the workers do not lose their jobs.

CHECK YOUR PROGRESS 5.3

1. What are the various kinds of impacts that industries can have on the environment?

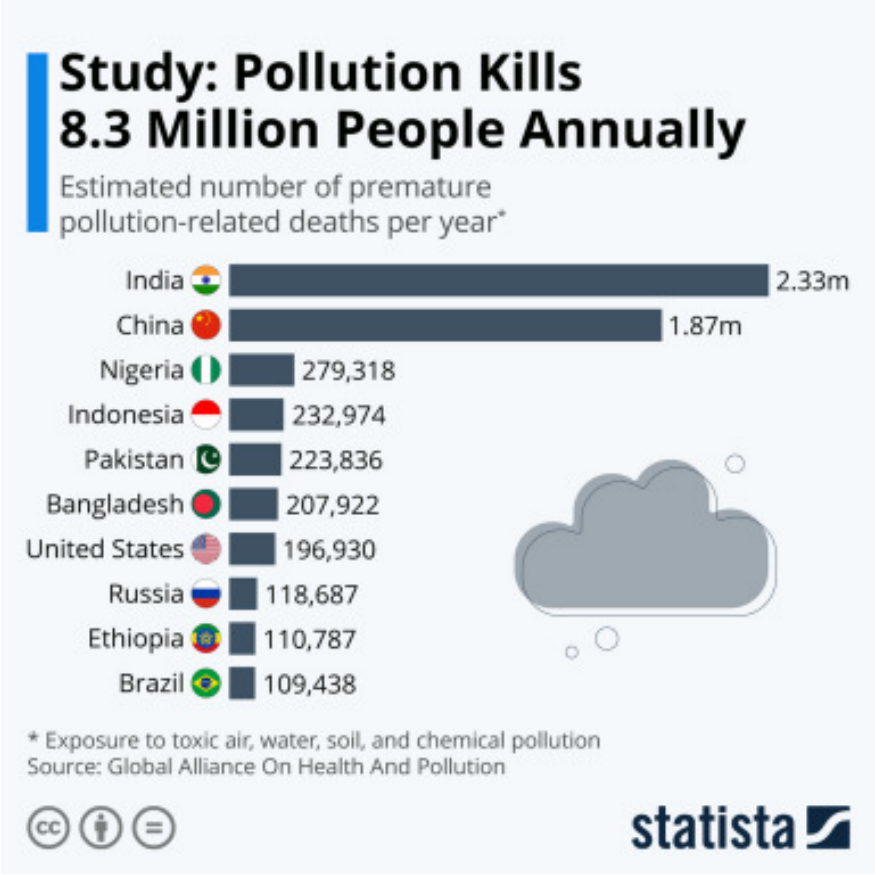
5.5 POLLUTION

The word 'pollution' is derived from the Latin word *pulluere* which means 'to soil or defile'. Any alteration to air, water, soil, or food that threatens the health, survival capability or activities of humans or other living organisms, is called pollution. Pollution has been around for a long time – in fact, as long as humans have been around. In the past, it was not a problem. Most of the waste from human activities could be handled by the earth's natural systems. Air and water were able to dilute and disperse pollutants. Much of the solid waste thrown on the land, being made of natural materials decomposed easily. Also, there were fewer people, so the total amount of waste created was not too large. This is not so anymore, as increasing population, change in the kind of materials being used and ever-increasing consumption create pollution beyond the capacity of the natural systems of nature to process.

The effects of pollution may vary depending on a number of factors such as:

- The nature of the pollutant i.e. how active and harmful it is to living organisms
- The concentration of the pollutant, i.e. the amount per unit volume of air, water, soil or unit of body weight. When there is too much of a pollutant, or when it is piling up too fast, it starts having harmful effects.
- The persistence of the pollutant, i.e. how long it stays in the air, water, soil or bod

(Source: https://www.statista.com/chart/20360/premature-pollution-related-deaths/)



5.5.1 Types of pollution

Air pollution: Gases, liquids or solids present in the atmosphere in high enough levels to harm humans, other organisms or material are called air pollutants. Some sources include vehicular emissions, industrial processes, coal-based power stations, burning of fuels in the homes etc. Indoor air pollution poses a great risk to a large number of women who still cook on stoves or fires, many a times using hazardous material as fuel, that fill a badly ventilated room with thick smoke from polluting fuels. It seems the extent of exposure is equal to being in a room where 400 cigarettes are being smoked every hour. Exposure to household air pollution can cause diseases major respiratory and heart diseases.

Water pollution: SDG 6 refers to clean water and sanitation for all, but the UN World Water Development Report 2020 found that about three out of 10 people in the world, i.e. 2.1 billion people did not have access to safely managed drinking water at home in 2015.The pollution in water impacts its usefulness, affects health or renders it offensive to the senses of sight, taste and smell. Water pollution includes surface water pollution (rivers, lakes, ponds), groundwater pollution and marine pollution. Women tend to be affected more as they need to use water for cooking and washing, collect water,

use water to wash animals etc. Polluted water if left untreated can cause severe health issues, especially in children affecting the mother's work and earning potential.

Some common water pollutants are:

— disease causing organisms such as bacteria, viruses, protozoa and parasitic worms that enter the water from domestic sewage and animal wastes and cause water borne diseases.

— oxygen-demanding wastes which are organic matter needing oxygen-requiring bacteria for their decomposition. Large numbers of such bacteria deplete the dissolved oxygen in water causing fish and other aquatic organisms to die.

— inorganic chemicals such as acids, salts and soluble compounds of toxic metals like mercury and lead, make the water unfit to drink, harm fish and aquatic life, affect crops and corrode materials.

— inorganic plant nutrients such as water-soluble nitrates and phosphates cause excessive growth of algae and other aquatic plants causing reduction in dissolved oxygen in the water.

— Heat and warm water when released from industries and power plants raises the water temperature and affects the health and lifecycle of the aquatic organisms.

— Radioactive substances from mining and refining processes of radioactive material can cause adverse health effects

— Organic compounds or synthetic chemicals such as pesticides, solvents, industrial chemicals and plastics

— Sediment or suspended matter such as insoluble particles of soil and other solids that become suspended in water as a result of soil erosion, run-off from agricultural fields, dumping of debris from building sites, solid wastes, strip mining and construction etc.

Soil pollution: Soil is polluted through contamination by chemicals, particulates and solid waste, and mining activities. The main source of soil pollution are agriculture, industrial activities, mining and solid waste dumping**.**

CHECK YOUR PROGRESS 5.4

1. What are the different types of pollution?
2. What is the impact of pollution on women?

5.6 CLIMATE CHANGE

Earth's climate is a result of complex interactions between the sun, atmosphere, oceans, land and biosphere. Due to the complexity of the atmospheric and ocean current interactions this warming may increase the frequency and intensity of storms, droughts, floods and other weather events.

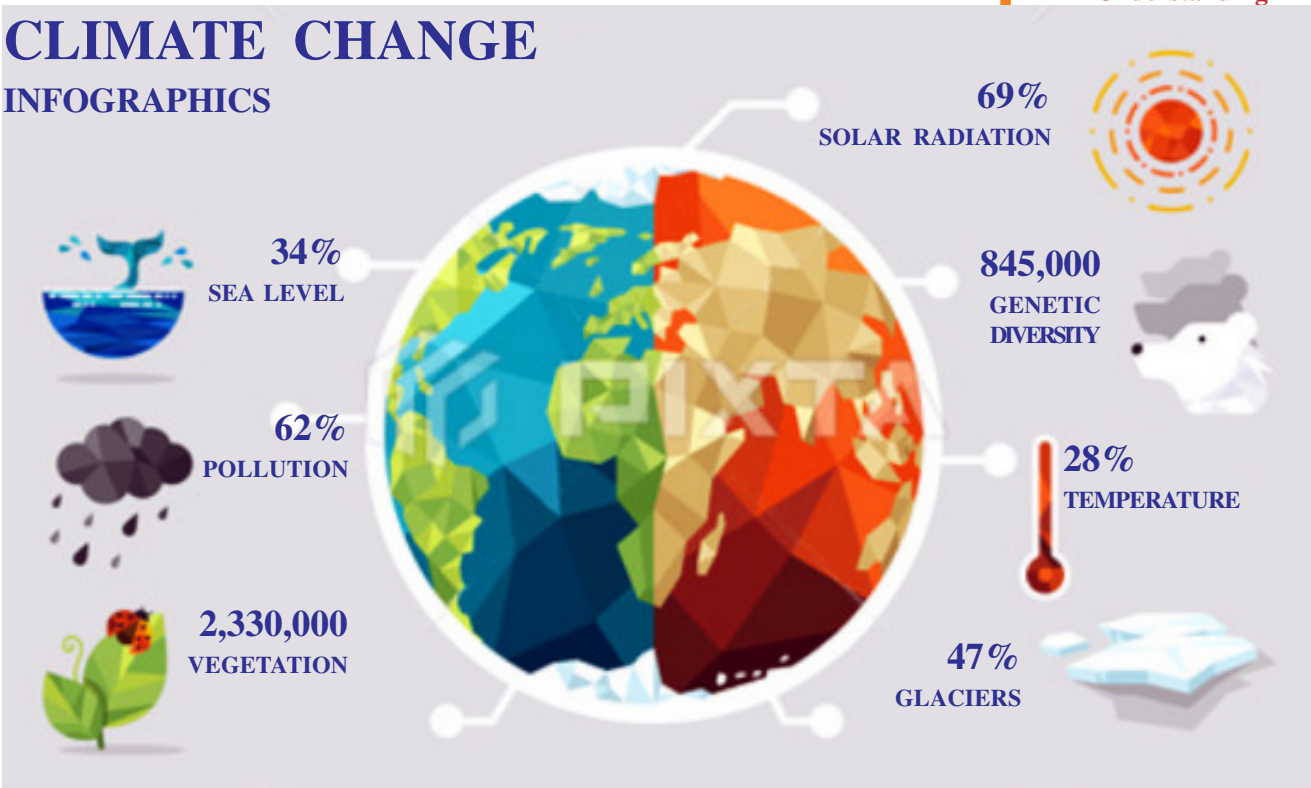
The Green House Gases (GHGs) added to the atmosphere by human activity can significantly affect the amount of heat trapped in the atmosphere over time. Most of these gases have fairly long lifespans, ranging from 10 years to thousands of years. What we put in the atmosphere today will, therefore, continue to warm the planet for a long time to come.

Carbon dioxide (CO2) is responsible for more than 5 percent of the current global warming from GHGs produced by human activities. The main sources (75 percent) are burning of fossil fuels, particularly coal, and, increasingly, motor vehicle exhaust. Deforestation and biomass burning contribute 25 percent. CO2 remains in the atmosphere for around 200 years.

Methane (CH4) accounts for 16 percent of the increase in GHGs. It can trap 20-25 times more heat than CO2. It stays in the atmosphere for only 10-12 years. Methane is produced by the decomposition of organic matter in rice paddies, natural wetlands, landfills, the intestines of cattle, sheep and termites. Methane is also produced in natural gas leaks. Its concentration has doubled since pre-industrial times.

Nitrous Oxide (NO2) accounts for 6 percent of the human input of greenhouse gases. It is released during nylon production, from burning biomass and fossil fuels like coal, from the breakdown of nitrogen fertilisers in the soil, livestock wastes, and nitrate contaminated ground water. Its lifespan in the atmosphere is 120 to 190 years and it traps about 200 times as much heat per molecule as CO2. Its concentration is growing by over 0.25 percent every year.

Chlorofluorocarbons (CFCs) are believed to be responsible for 24 percent of the human contribution of greenhouse gases. CFCs are entirely man-made greenhouse gases. They can trap 1,500 to 1,700 times more heat than CO2 and remain in the atmosphere for several thousand years. The main sources are leaking refrigerants, industrial solvents, aerosol propellants and the production of plastic foams. CFC substitutes such as Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs) and Sulphur hexafluoride (SF6) have the potential to contribute significantly to global climate change owing to their ability to trap heat.



5.6.1 Climate change – Environmental Concerns

Weather extremes: can cause some places to become warmer while some will become colder. Some places will become drier while some will become wetter. The fluctuating climate induces extreme and violent weather events increasing the threat of heatwaves, drought, floods and intense storms.

Rise in sea level: As we continue to add greenhouse gases into the atmosphere, oceans have absorbed 90 percent of these gases. Average sea levels have swelled over 8 inches (about 23 cm) since 1880, with about three of those inches gained in the last 25 years. Every year, the sea rises another 0,13 inches (3.2 mm) (nationalgeographic.com/environment/global-warming/sea). The change in sea levels is linked to three primary factors, all induced by ongoing global climate change. This includes thermal expansion – which is water heats up and expands; melting glaciers creating an imbalance between run off and ocean evaporation; and, loss of Greenland and Antarctica's ice sheets.Rise in sea levels is seen to have devastating effects on coastal habitats, causing destructive erosion, aquifer and agricultural soil contamination with salt, and loss of habitat for fish, birds, and plants. Increase in natural disaster events such as typhoons and hurricanes can happen. Flooding in low lying coastal areas forces people to migrate to higher ground and many people become vulnerable to flood risk and other climate change effects. Small island countries such as Maldives or Vanuatu in the Pacific are dealing with the possibility of being obliterated off the world map owing to flooding due to sea level rise.

In India, several coastal areas are battling erosion and flooding during heavy rains.

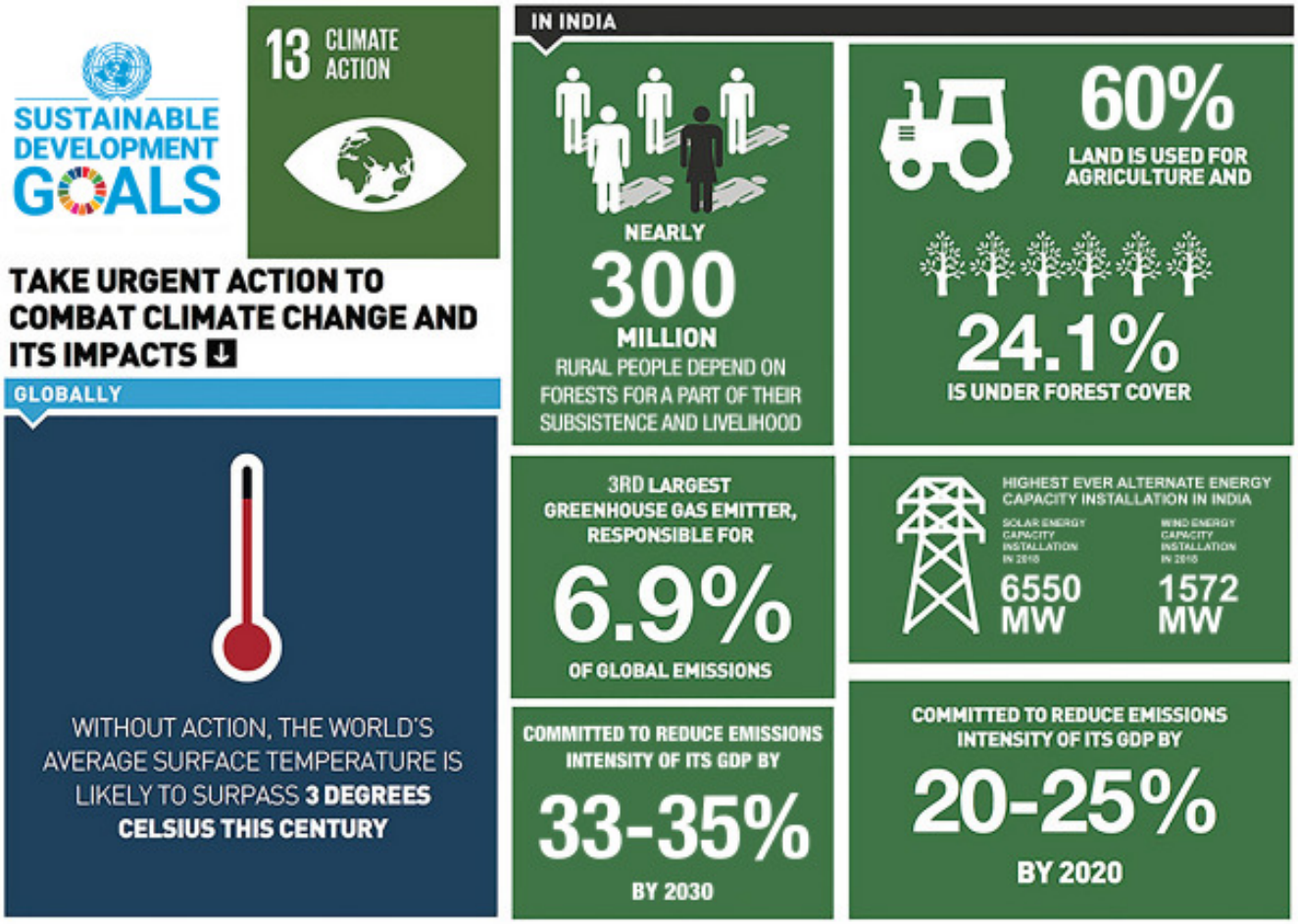
Impacts on water resources: Climate change manifests itself primarily through **changes in the water cycle.** Water and weather, the delicate balance between evaporation and precipitation, is the primary cycle through which climate change is felt. As climate changes, droughts, floods, melting glaciers, rise in sealevel and storms intensify or alter, often with severe consequences.

Agricultural production: Changes in weather patterns have far-reaching effects on agriculture. Owing to seasonal variations taking place more frequently, cropping patterns are affected adversely. Unseasonal rains have destroyed standing crops in many areas of the country since some years. Changing temperatures are making colder regions more conducive to agriculture. For example, in Himachal Pradesh, the apple orchards are now being grown higher up compared to the earlier years when they were grown in lower areas of the mountains. Increasing temperatures in warmer areas give rise to pest infestations, cropdiseases etc.

Loss of ecosystems and biodiversity: There is a huge impact on biodiversity of plants and animals who are forced to migrate to keep up with the shifting climate. Marine ecosystems, especially tropical corals which grow at a slow rate would be affected by climate change. Fish would die as temperatures increase in streams and lakes. Forest areas would disappear, drier climates would cause wildfires such as the one in Australia in 2019-20.

Adverse effects on human health: Heatwaves and other extreme climatic conditions can cause harm to human health, even death. Fluctuating climatic conditions would encourage spread of water-borne and other diseases.

Disasters, Conflicts and refugees: The climate change triggers several disasters such as drought, heavy rainfall, and floods etc. The sudden events could trigger migration of people to find safer places. Influx of migrants into these places could put a stress on available resources.People displaced due to such events become extremely vulnerable economically and otherwise. The term climate refugees is used to denote people who have been displaced due to climate related events. Conflicts too can create stress and cause migration or uncertainty about safety and access to basic services.Frequency of climate related disasters such as flood events and others has increased in the last few years impacting lakhs of people and their lives.



ACTIVITY 5

Answer the quiz on climate change.

1. Wasting less food is a way to reduce greenhouse gas emission. True or False
2. Which of the following is a greenhouse gas?
   a. Methane – CH4
   b. Carbon dioxide – CO2
   c. Water vapour
   d. All of the above
3. Which of the following are consequences associated with climate change?
   a. The ice sheets are declining, glaciers are in retreat globally, and our oceans are more acidic than ever.
   b. Surface temperatures are settling new heat records each year.
   c. More extreme weather like droughts, heat waves, and hurricanes

d. Global sea levels are rising at an alarmingly fast rate – 17 centimeters (6.7 inches) in the last century alone and going higher.

e. All of the above

Source : https://www.earthday.org/the-climate-change-quiz/

1. True. More than a third of food produced globally never makes it to the table. Some of this wasted food spoils in transit, while consumers throw some of this food out. During the production, harvesting, transporting, and packaging of the wasted food, more than 3.3 billion metric tons of carbon dioxide is emitted.

2. All of the above. Greenhouse gases may be a natural occurrence or human activity. These gases include water vapour, carbon dioxide, methane, nitrous oxide, and ozone. Fluorinated gases are also considered to be greenhouse gases.

3. All of the above. All of these are problems associated with climate change. The majority of scientists agree that many of these effects are caused by human contribution to the greenhouse effect. Extreme weather events, droughts, heat waves, and rising sea levels will have devastating effects on the world's poorest countries and communities

CHECK YOUR PROGRESS 5.5

1. State two impacts of climate change.

2. How does climate change impact women? Explain.

5.7 LETS SUM UP

- India is no exception to the global phenomenon of environmental degradation brought about by developmental activities. Rapid industrialisation, growing urbanisation, intensive cultivation, and other developmental activities, coupled with increasing biotic pressure have had a very adverse impact on India's environment. In the earlier lessons, we have dealt with the importance of environment and the ecosystems, wealth of natural resources these provide and how intrinsically human life is connected to the environment. While environmental conditions shape our lifestyles, the way we live and use resources has an impact on the environment. Climate Change and degradation of natural resources impact the poor who are dependent on the environment for their food and living life in general. The impact is more severely felt by women who traditionally take on the role of caretakers of their families - growing food,

gathering water and fuel, therefore connecting them closely with available natural resources. Impact on natural resources impacts their lives and increases their hardships. Poor women are affected first and worst becoming more vulnerable owing to societal inequalities that lead to silencing their voice and neglecting their needs.

- Urbanisation leads to increasing resource consumption, places pressure on the city's infrastructure, impacts availability of public spaces and assets for people, loss of cultural heritage and impact on the social fabric of the city, air pollution, issues of water availability and water pollution,increase in solid waste generation, noise pollution, changes in land use to more concrete jungles, decrease in vegetation and the resultant heat island effect.
- Agriculture is an important part in India's success story in terms of self-sufficiency in production of food grains. However, unsustainable agricultural practices such as use of chemical fertilisers and pesticides, monoculture cropping and moving away from traditional crops causing a loss of genetic diversity, intensive irrigation leading to overdrawing of water and deterioration of soil quality, change in landuse causing deforestation, impact on nutrition especially among the poor - women and children. Access to technology and costs of chemical fertilisers and pesticide are not easily available to marginal and small farmers. They are most vulnerable especially in the context of Climate Change.
- Industrialisation is the other aspect of India's growth and development. At the same time, these have major environmental impacts. Industrial emissions and effluents cause pollution. The production processes require extraction of raw materials, over extraction of which have led to destruction and degradation of large areas of land. Industries require energy for its production processes, they use water and other raw material to produce products, and transport these to and from the industry using fossil fuel.
- Pollution of theair, water and soil owing to human activities has been a major environmental concern for all humanity. Various activities of people living in the city cause pollution. To mention a few, these would be vehicular emissions, industrial emission and effluent, pesticide use, solid waste, etc. Pollution has an impact on our life to a great extent.
- Climate Change impacts are being felt in the form of weather extremes, rise in sea level, dwindling of water resources, loss of agricultural production, loss of ecosystems and biodiversity, adverse effects on human health, disasters, conflicts and refugees.

- The various issues elucidated in the Lesson bring us to the need to ensure that we lead sustainable lives, conserve and protect our resources to ensure longer life to our earth. There have been major efforts by the world, the Government of India, various organisations and several individuals towards environmental conservation. Lesson 3 will touch upon some of these aspects to inspire action.

5.8 UNIT-END EXERCISES

1. What are the benefits and concerns of urbanisation? Bring these out in the context of gender.
2. What is the impact of unsustainable agriculture on environment?
3. The poor especially women face the brunt of pollution in the environment. Discuss the statement based on the understanding you have developed after going through this module.
4. Industrial development has led to economic growth. State its impacts on the environment.
5. Write an essay on climate change, mentioning how climate change is linked to other environmental issues mentioned in this lesson. Use an example of a climate event in the country to discuss these with a special reference to its impact on women.

5.9 SUGGESTED READINGS AND REFERENCES

- Kiran B. Chhokar, Mamata Pandya and Meena Raghunathan (Eds.) (2004), *Understanding Environment*, SAGE Publications
- Eliazer Nelson, A.R.L., Ravichandran, K. & Antony, U. *The impact of the Green Revolution on indigenous crops of India*. *J. Ethn. Food* **6,** 8 (2019). https://doi.org/10.1186/s42779-019-0011-9 *Urbanization in India* (2011),www.worldbank.org

  https://in.one.un.org/page/sustainable-development-goals/sdg-11/

  https://sustainabledevelopment.un.org/sdg11
- *The invisibility of gender in Indian agriculture: Why policy paralysis in granting entitlements to women in agriculture and farm widows needs to be addressed:* Swasti Pachauri

  Last Updated: Tuesday 19 February 2019 - Blog in Down to Earth)

  https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2018GH000163

UNIT 6 ENVIRONMENTAL CONSERVATION

STRUCTURE

6.0 INTRODUCTION

The lesson aims to focus attention on the efforts towards conservation of the environment. It briefly touches upon the milestones in this direction and some of the key people's movements that have centred on the issue of the environment and its close connection with people's lives.

6.1 LEARNING OUTCOMES

After studying this lesson, the teacher-pupil will be able to:

- describe environmental laws and legislations for environmental protection;

- explain current conservation practices (role of different sectors-Government, industries, civil society, educational institutions, citizens)
- analyse environmental action at individual, school and community level

6.2 ENVIRONMENTAL LAWS AND LEGISLATIONS

Environmental Conservation was always a way of life for people in India. It is enshrined in the Constitution of India which clearly states that it is the duty of the state to 'protect and improve the environment and to safeguard the forests and wildlife of the country'. It also states that it is the duty of every citizen 'to protect and improve the natural environment including forests, lakes, rivers and wildlife'. As the country moved towards growth and development, environmental conservation became very important and is more so in today's context. Dedicated Ministry was formed, several legislations and policies were enacted by the Government of India for environmental protection and conservation. Several people's movements aimed at environmental protection have been an important contribution to the environmental conservation efforts in India.

Some important milestones in the path of environment conservation are:

1972 - The National Committee on Environmental Planning and Coordination (NCEPC) was set up to serve as a high level advisory body to the government.

1972 - The Wildlife Protection Act was passed (and subsequently amended in 2002) for setting up National Parks and Sanctuaries, regulation of hunting and trade in wildlife, and recognition of endangered categories of species.

1973 - The Wildlife Protection Rules were passed for the protection of all bird and animal species irrespective of their habitat. As a result, conservation projects were launched for endangered species which have contributed in a large measure to the increase in wildlife in India especially Project Tiger.

1974 - Water (Prevention and Control of Pollution) Act provides institutional safeguards for the prevention and abatement of water pollution. This act resulted in the setting up of the Central Pollution Control Board.

1977 - Water (Prevention and Control of Pollution) Cess Act provides for levy and collection of cess from water consuming industries and establishments.

1980 - The N.D. Tiwari Committee was appointed which recommended the setting up of an independent Department of Environment under the Government of India

1980 - Forest Conservation Act of 1980 for protection of all types of forests and prevention of non-forest activities in forest areas was amended in 1998.

1981 - Air (Prevention and Control of Pollution) Act of 1981 defined air pollution in the atmosphere and measures to curb air pollution including noise pollution.

1985 - Department of Environment became a full-fledged Ministry of Environment and Forests

1986 - The Environment (Protection) Act of 1986 was a comprehensive legislation covering all aspects of protection of the environment. This act was passed by Parliament after the Bhopal Isocyanate gas tragedy of December3, 1984. This Act was amended in 1991.

1991 - The Coastal Regulation Zone Notification regulates all activities in the coastal areas including construction and seeks to safeguard backwaters and river estuaries.

1999 - Environment Rules for siting of Industrial projects were passed

2002 - The Biological Diversity Act of 2002 laid down clear guidelines for conservation of the biological diversity of the country.

2006 - The Prevention of Cruelty to Animals Act of 1960 was amended to Animal Welfare Act

2005 - The State /Union Territory Minor Forest Produce (Ownership of Forest Dependent Community) Act was a landmark legislation which recognized the legitimate rights of the forest dwellers to the use of forest produce.

2010 - The National Green Tribunal Act of 2010 which enables creation of special tribunals to create a focus on the environment and for expeditious disposal of cases involving environment.

Environmental rules and notifications have been made to enforce the provisions in the Acts. These get amended and new notifications and rules get made depending on the need for environmental protection. These cover a gamut of areas from water, forest, energy, solid and liquid waste management, coastal zone areas, mobility and road safety to mention a few.

6.2.1 Establishment of MOEFCC

The Ministry of Environment & Forests (MoEF), set up in 1985 and now known as the Ministry of Environment, Forest and Climate Change (MoEF&CC), implements the various environment protection laws all over the country through the Central and State Pollution Control Boards. MoEF&CC has the mandate to:

- Monitor and control pollution especially in industries,
- Increase the forest cover in the country,
- Conserve and increase wildlife and the rich biodiversity of the country,
- Support research in Environmental Science and Technology.

6.2.2 Major Citizen-led Environmental Movements in India

6.2.2.1 Movement to save Khejari trees by the Bishnoi

The Bishnois of Rajasthan are known to rever their natural environment – birds and animals, and protect it fiercely. The story of Amrita Devi, a Bishnoi woman from the Khejarli village who led a campaign for saving the Khejari trees from being cut by the then King's orders, is an important one which has inspired many citizens movements later. She along with many women hugged the trees and encouraged others to do the same. 363 Bishnoi villagers, many of them women lost their lives in this movement. The movement resulted in the King designating the Bishnoi state as a protected area and it is followed to this day.

6.2.2.2 Chipko Movement (1973)

The movement got its name Chipko from the act of the community members hugging the trees to protect them and fight for the rights of people dependent on these forests. Sunderlal Bahugana inspired the village communities to take initiative for protection of their natural assets.The women of Advani village of Tehri-Garhwal tied a sacred thread around trunks of trees and hugged them. The main demand of the people in these protests was that the benefits of the forests (especially the right to fodder) should go to local people.The sustained campaign resulted in the rights of the communities being restored to them.

6.2.2.3 Save Silent Valley Movement (1978)

The Kerala State Electricity Board (KSEB) proposed a hydroelectric dam across the Kunthipuzha River that runs through Silent Valley. In February 1973, the Planning Commission approved the project which many feared would submerge 8.3 sq. km of untouched moist evergreen forest and with it its

biodiversity. Several NGOs led by the Kerala Shastra Sahitya Parishad (KSSP)opposed the project and urged the government to not go through with. In January 1981, bowing to unrelenting public pressure, then Prime Minister Indira Gandhi declared that Silent Valley will be protected.. In November 1983, the Silent Valley Hydroelectric Project was called off. In 1985, Prime Minister Rajiv Gandhi formally inaugurated the Silent Valley National Park.

6.2.2.4 Jungle Bachao Andolan (1982)

The tribal communities of Singhbhum district of the then Bihar (Now Jharkhand) began the protest when the government decided to replace the natural Sal forests with the highly-priced teak, a move which would affect their livelihoods that were closely connected to the Sal forests existing in this area. Later this movement spread to Jharkhand and Orissa.

6.2.2.5 Appiko Movement (1983)

Locals embraced the trees which were to be cut by contractors of the forest department in Western Ghats of Karnataka State. Several outreach activities such as foot marches in the interior forest, slide shows, folk dances, street plays etc were organized by the local community to create awareness on the importance of trees. This was followed by promotion of planting activities in denuded forests areas. This movement resulted in motiving local communities to move towards use of alternative energy therefore reducing pressure on forest resources.

6.2.2.6 Narmada Bachao Andolan (NBA) (1985)

The movement focused on issues of rehabilitation and resettlement of people affected by the building of the Sardar Sarovar Dam on the Narmada, and the environmental impact due to submergence of forests. As a result of persistant efforts, the Dam height was kept lower than originally planned, therefore minimizing the land being submerged to an extent.

6.2.2.7 Tehri Dam Conflict (1990s)

Tehri dam on the Bhagirathi river was at the centre of major protests during the 1980s and the 1990s. The site's seismic activity and vulnerability alongwith submergence of forest areas and the old Tehri village leading to displacement of the entire community, were key objections to it. Despite the support from other prominent leaders like Sunderlal Bahuguna, the movement failed to gather enough popular support at national as well as international levels.

Notably a lot of these movements were led by individuals, many of these were women, who inspired a whole community to bring attention to important

environmental conservation issues, and the impact environmental degradationwould have on people living in the vicinity. Women have traditionally been closely connected with nature and have an intrinsic value for nature in our life. Individual and collective efforts by women's groups have inspired modern-day environmental movements and efforts at conservation of the environment.

There are many individual stories like that of advocate M.C. Mehta who effectively used the provision of the Public Interest Litigation to secure far-reaching judgements to protect and assert the right of citizens to a clean and healthy environment. Notable among them is his crusade to convince the Supreme Court to either mover or shut down the iron foundaries, glass factories and the Mathura Petroloum Refinery situated in the vicinity of the Taj Mahal, which were corroding the monuments marble surface.

Important movements that are largely driven by women are Deccan Development Society in Telangana started in the year 1983 that works in sustainable agriculture; Self-Employed Women's Association (SEWA) of India, a collective of over two million poor women, working to adopt small-scale clean technologies, such as clean cook stoves and solar lanterns; Navadanya which means 'nine seeds' focuses on biodiversity and traditional seed banks. All these are women centred movements for the protection of environment, livelihoods and for biological and cultural diversity.

Source : (http://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/S000456WS/P000859/M019314/ET/1486099597QUAD-1.pdf)

CHECK YOUR PROGRESS 6.1

1. What are three key legislations focused on environmental conservation?
2. What role do movements such as the Chipko Andolan and Tehri Dam play in environmental conservation?

6.2.3 Global Milestones in the Journey of Environmental Conservation

1972 – United Nations Conference on the Human Environment, Stockholm, Sweden

1977 – International Conference on Environmental Education, Tbilisi, Georgia

1992 – UN Conference on Environment and Sustainable Development (UNCED also called Riio Earth Summit), Rio de Janeiro, Brazil

– Conventionss on Climate Change, Desertification and Biodiversity

2000 - 2015 – Millenium Development Goals were established through the UN focusing attention on 8 goals such as eradicating extreme poverty and hunger, achieving universal primary education, promoting gender equality and empowering of women, reduction in child mortality, improving of maternal health, combating HIV/AIDS, malaria and other diseases, ensuring environmental sustainability.

2002 – World Summit on Sustainable Development, Johannesburg, South Africa

2005 – UN Decade of Education for Sustainable Development

2016-2030 – Sustainable Development Goals are 17 goals with 169 targets for all countries to achive by 2030.

UNEP: The United Nations Environment Programme (UNEP) is the leading global environmental authority that sets the global environmental agenda, promotes the coherent implementation of the environmental dimension of sustainable development within the United Nations system, and serves as an authoritative advocate for the global environment.

The mission is to provide leadership and encourage partnership in caring for the environment by inspiring, informing, and enabling nations and peoples to improve their quality of life without compromising that of future generations.

Source : https://www.unenvironment.org/about-un-environment/why-does-un-environment-matter

ACTIVITY 1

Loss of Habitat

Take a A4 size sheet of and assume it to be an ecosystem of your choice (eg- Land, Water, Wetland etc.

Now list down all the activities by humans that would affect an ecosystem

Every time you list an activity, shade a portion of the paper you think would be affected or fold the paper . (e.g.: Consider a forest ecosystem, human activity like construction of roads would destroy a portion of the forest coming in line with the development activity. Shade off the required portion or fold the paper of the sheet). At the end, see how much of the ecosystem is left. What could an individual or a community do about this?

6.2.4 Environmental Conservation Action

Environmental Education and Awareness plays a big role in developing environmental consciousness among children, youth and all people to take cognizance of the impact of human activities on the environment. Environmental Education is compulsory in our formal education system to ensure that this consciousness permeates what we learn and the way we learn. Along with the formal education system, non formal approaches such as the National Green Corps of the MoEF&CC involve over 1,20,000 schools in co-curricular activities and projects through eco-clubs across all states in India. Children and youth led action projects through eco-clubs in several schools and colleges are influencing a large number of young minds creating awareness about the importance of the environmentand its conservation. Number of organisations such as the Centre for Environment Education, Centre for Science and Environment, The Energy Resources Institute, World Wide Fund for Nature India and others including corporate groups such as Wipro, Infosys involve youth in environmental conservation action through a variety of programmes.

Initiatives such as the Swachh Bharat Abhiyaan in the area of Solid Waste Management, the National River Conservation Programme, the forming of the Jal Shakti Ministry to focus on water conservation, National Biodiversity Authority, National Missions on Climate Change etc. are important steps towards environmental conservation and development.

Many organisations and individuals are involved in a variety of ways towards making a difference in the way we lead our life to reduce our impact on the earth. The Centre for Environment Education works with women's Self Help Groups and women Panchayati Raj members in Jasdan block of Rajkot district to increase their involvement and engagement in way water use is managed in their villages. Women have been able to ensure improved water managementin their village. Some of these women are taking bigger roles in the Panchayat, with men too realizingtheir contribution.There are several examples of non-governmental organizations, citizen led groups and others who are creating their own stories of successful conservation action in their areas.

Traditional roles of women in managementof natural resources provide us with a number of learnings in going about environmental conservation. Seasonal food, festivals and celebrations, rituals that protect forests and water have been a way of life for people in India. Women have played an intrinsic part in keeping these traditions alive. These learnings need to be integrated into our lifestyle where tradition blends with the modern to leapfrog towards sustainable way of life.

Many individuals have done inspirational work in environmental action that continues to motivate and inspire many.

Let us see some examples of collective and individual efforts at environmental action:

Aabid Surti was concerned about water beingwasted by dripping taps. Now he has visited over 13,000 homes in the suburbs of Mumbai to fix leaks. Aabid Surti's nonprofit has worked with residential buildings in suburban Mumbai to save lakhs of litres of water. (www.csmonitor.com)

"2019 saw the rise of youth making a strong case for protecting the planet. With Greta Thunberg becoming the face of youth activism for climate action, the involvement of young people in the global climate narrative became more pronounced.

Kartik Chandramouli, attended the UN climate conference in Madrid, Spain, where he found that youth participation has witnessed a rise and young people world over are demanding further inclusion in decision-making.

11-year-old Ridhima Pandey held the Uttarakhand government accountable for inaction on climate change after witnessing the Uttarakhand floods.

A young woman farmer in Uttarakhand is experimenting with agricultural technology to become a change agent.

The Chhattisgarh government in August 2019, declared nearly 2,000 square km as an elephant reserve, promising to not permit any mining activity.

In Chennai, as the city recovered from a water crisis in 2019, the city administration along with nonprofits and citizens, have been working to restore the city's water bodies.

In another case of concerted action by citizens, with support from the district administration, the waterways in Coonoor were cleaned up.

The budget, another highlight of 2019, mentioned Zero Budget Natural Farming, giving a boost to small farmers like Asha in Haryana who has been practicing natural farming in her three-acre farm.

The forest guard with the Assam forest department, Dimbeshwar Das received accolades for his work protecting the rhino haven Kaziranga National Park and regional forest officer Seema Adgaonkar worked with Maharashtra's Mangrove Cell to protect Mumbai's natural defenders against climate change.

Environmental consciousness was not restricted to national parks and green zones alone as sustainability was evident in urban lifestyles too. As high-end designers turned to sustainable fashion the benefits trickled down to the weaving and associated communities with many reporting better health and higher income. The revival of traditional and climate-resilient grains was seen

in an unlikely space – craft breweries that are mixing millets in their beer recipes.

Northeastern India is home to two ape species: eastern and western hoolock gibbons. In several of these gibbon habitats, local people are leading conservation efforts that are deeply informed by local circumstances.

In Tamil Nadu, a village of palmyra climbers has embraced sustainable fishing practices, after realising that trawl nets were destroying the corals that were homes to the fish.

As many as 121 species of plants thrive in Bengaluru's sacred sites such as temples and *kattes*, contributing to the city's urban biodiversity, finds a study that suggests that such spaces could enhance the green infrastructure in megacities.

The Athalye family is continuing a two-decade long tradition: planting native trees in populated suburban Mumbai. They have also setup a butterfly park at Aarey.

The Mysore City Bird Atlas has mapped 192 species of birds in the city. About 60 volunteer birders pooled in their time, effort and bird-watching skills. There are about 400-500 bird atlases in the world but this is the first one in India.

Cotton farmers residing between the Pench and Satpuda tiger reserves, practice organic farming which helps improve soil and water quality and in turn, preserves the critical tiger habitat.

For two decades, Kolkata's Sumita Banerjee, a citizen-activist, has mobilising citizens and taking on authorities and rule-breakers to save the Rabindra Sarovar, the only lake in Kolkata enlisted as a lake of national importance".

A dose of eco-optimism: Stories of hope and inspiration in 2019

by Aditi Tandon on 31 December 2019

Source : https://india.mongabay.com/2019/12/stories-of-hope-and-inspiration-in-2019-good-news-environment/

There are many such examples from remote villages to cities, where individual agency has led to many inspiring stories. Environmental conservation action begins with oneself, one's family and then the community. It requires more than awareness creation – a change in mindset. Long-term sustained change can happen only when mindsets change. The many examples given in this chapter demonstrate this aspect – a will to make change happen and the perseveranceto follow this path.

CHECK YOUR PROGRESS 6.2

What actions would you take for environmental conservation, to be a role model for others?

Take Action in your daily life:

1. Ensure that whatever resources you use, are used judiciously and not wasted. Follow the 9 R principle.
2. Use efficient technology such as energy efficient bulbs, water saving taps etc.
3. Buy only what you need.
4. Donate additional clothes, stationery etc. if not used.
5. Try growing your own food.
6. Try eating traditional varieties, and food that is in season.
7. Learn from others who are making environmentally friendly choices and living eco-friendly lifestyles.
8. Ensure waste is segregated at source. Try making compost out of your wet waste.
9. Think before you purchase, avoid buying products with packaging that adds to the waste, if alternatives are available.
10. Create a group of friends to start a movement of environmental crusaders.
11. Write to local authorities and make representation in case of issues in your environment.

In your school:

1. Donate your old books to your friends
2. Start an environment club or join one
3. Start a recycling programme
4. Conduct environmental audits and share findings with your teachers, principal
5. Participate in environmental rallies/ outreach campaigns
6. Write about your environmental action in your school journal/ magazine
7. Make posters or use your creativity to spread environmental awareness

8. Mark environmentally important days by taking action and inspiring others to do so.
9. Start a recycling programme
10. Grow your own vegetable garden

Some Environmentally Important Days: (Box)

February 2	World Wetland Day
February 20	National Science Day
March 22	World Water Day
April 22	World Earth Day
May 5	World Environment Day
September 15	World Ozone Day
October 3	World Habitat Day
October 1-7	World Wildlife Week
October 13	International Day for Natural Disaster Reduction

In your community:

1. Begin from your home – reduce, reuse, recycle
2. Carry out awareness activities with the help of other young people in your neighbourhood
3. Support a composting or a recycling programme in your neighbourhood
4. Make representation to your society chairperson about the status of environment in the society

CHECK YOUR PROGRESS 6.3

1. Does being aware lead to action? Please state your response and reason.
2. Make a 'I can do – we can do' list and list out 5 changes in your daily routine that you and your family can do to conserve environment.

6.2.5 LETS SUM UP

- The Ministry of Environment, Forest and Climate Change was set up in 1985 with a focus on environmental conservation in the country. India has a number of laws and legislations for the protection of the environment

from the overall environment, to specific aspects such as water, air, solid waste management, forests, pollution etc.

- Environmental conservation value has been intrinsic in the Indian culture and tradition and people centuries ago too have fought to protect it from being destroyed. The examples of Bishnois in Rajasthan and later many recent examples of communities especially women taking a lead in movements for protecting their natural resources on which their lives depended.
- The United Nations Environment Programme (UNEP) leads the environmental protection initiatives globally. Environmental movements globally too have moved from being only about nature to look at the sustainability aspect along with human and planet's well being. The UN SDGs encompass a gamut of these aspects to set a goal for 2030 for a sustainable planet.
- A number of individual initiatives can inspire us to take action on issues that we feel strongly about and make a difference. It is important that we start with oneself, and change starts to happen with perseverance. Reflect, think, choose wisely and smartly.

6.2.6 UNIT-END EXERCISES

1. Look for inspiring individuals who have helped conservation of the environment. They could be in any sector such as water, waste, biodiversity conservation etc. Visit the website www.betterindia.org to read about many such initiatives. Which one of these would you like to emulate and why?
2. Create a poster to create awareness in your society about water conservation.
3. How will you develop a biodiversity garden in your school/nearby area? Mention key aspects that you would take care of.
4. Do a self-assessment of your behaviors using the following statements:
   a. I reduce in every way possible the use of paper, plastic, metal
      i. All the time
      ii. Some times
      iii. Not doing as of now
   b. I reuse all the paper, plastic, metal, glass possible
      i. All the time

ii. Some times

iii. Not doing as of now

c. I switch unnecessarylights and fans when I leave a room

i. All the time

ii. Some times

iii. Not doing as of now

d. I use my own shopping bag and don't take bags from shops

i. All the time

ii. Some times

iii. Not doing as of now

e. I walk or cycle short distances

i. All the time

ii. Some times

iii. Not doing as of now

f. I make an extra effort to consume seasonal fruits and vegetables

i. All the time

ii. Some times

iii. Not doing as of now

g. I avoid wasting food on my plate

i. All the time

ii. Some times

iii. Not doing as of now

h. I avoid using bottled water

i. All the time

ii. Some times

iii. Not doing as of now

i. If I see someone throwing a wrapper on the road instead of in a bin, I stop them and raise this with them

i. All the time

ii. Some times

iii. Not doing as of now

j. I speak with my family about environmental concerns

i. All the time

ii. Some times

iii. Not doing as of now

6.7 SUGGESTED READINGS AND REFERENCES

- http://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/S000456WS/P000859/M019314/ET/1486099597QUAD-1.pdf
- https://www.unenvironment.org/about-un-environment/why-does-un-environment-matter

Module 3
Teaching and Learning about Gender, Environment and Sustainable Development

Contents

UNIT 7 UNDERSTANDING SUSTAINABLE DEVELOPMENT

STRUCTURE

7.0 INTRODUCTION

The Industrial Revolution brought with it a new model and pace of development. Fast economic growth in some parts of the world made them more prosperous than others. But soon, the repercussions of this ill-planned and fast-paced development began to show in the environment all around, putting into question the model of development being followed. Almost a century later, a variety of global debates and discussions led to the realisation that the human community needs to rethink the way it is 'developing', and that it needs to move to models and strategies which will reorient 'development' to 'sustainable development (SD)*. In this lesson we will learn about sustainable development in detail.

* to learn more about the Industrial Revolution, you may use the internet. One of the sites providing this information is https://www.britannica.com/event/Industrial-Revolution

Notes

7.1 LEARNING OUTCOMES

After studying this lesson, the teacher-pupil will be able to:

- describe sustainable development;
- explain the three dimensions/pillars of SD; and
- analyse sustainability of any product/activity/practice on the basis of the dimensions of SD.

7.2 REDEFINING DEVELOPMENT

The Oxford dictionary describes 'development' as growth or advancement. The word is used in different contexts, one such context being the development of nations or societies. Traditionally, a country with higher income will be classified as a developed economy. It would also be technologically advanced and its citizens would enjoy a relatively higher standard of living. In most cases, countries with high Gross National Income (GNI), defined by the World Bank as the sum of value added by all resident producers plus any product taxes (less subsidies) not included in the valuation of output, plus net receipts of primary income (compensation of employees and property income) from abroad.). Countries with higher GNI are termed as "high income/developed countries," while a developing economy is one which progresses towards achieving this growth so as to give the same standard of living to its citizens.

As you try to understand the above, do remember (from Module 2) that Nature is indeed the source as well as the sink of all economic as well as other human activities. Every resource we consume, every product we manufacture and every service we use, ultimately comes from one or the other natural resource. Similarly, every time we consume or manufacture a product, the waste generated in that process also ultimately reaches a natural system (land, water or air). Hence, the more we produce and consume, the more resources we withdraw from Nature and more waste we add to Nature. Thus, the human-centric development model/approach negatively impacts other living beings as well as the life-support system of the Earth.

Should national income and economic growth be the only criteria to define nations as developed? Till very recently, GNI was indeed generally accepted as the indicator of development. Even today, richer countries are often called 'developed' countries while poorer countries are referred to as 'developing' countries. It has been so, because in traditional economic thinking, the goal was always economic growth, with the belief that an increase in economic growth necessarily implied an increase in human well-being. Do you think this is always the case?

Take a few minutes and write your thoughts on the following statement:

Economic development is the sole criteria to measure prosperity.

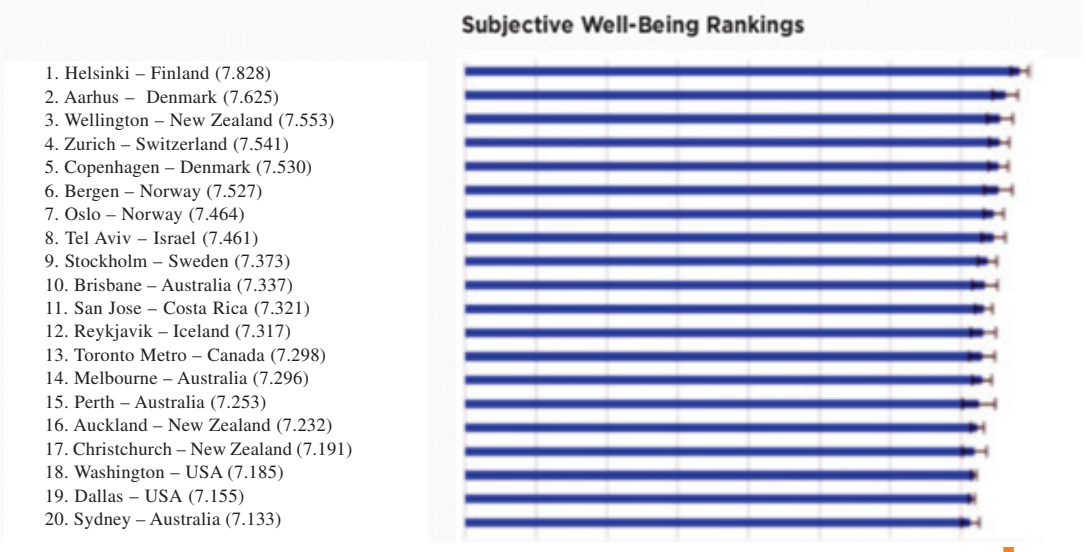
Think about a few things like:

- Are all rich people happy?
- Are all well-employed and highly paid colleagues and friends of yours happy?
- Are children from wealthier families more happy/content and satisfied than those coming from a less affluent background?
- Are all 'literate'[2] people better behaved than those who may not have had education?
- If you were to give up 24 hours of your day against getting all the riches, would you make that deal?
- When do you feel the most happy—with your friend/spouse/child or when you are in your office, earning money?
- What is your vision of life?

Some of the data, especially over the last three decades, shows that more money does not necessarily mean more happiness. Thus, economic development alone cannot assure human development.

Lets us look at some of the happy nations.[3]

Figure 3.1: Global Ranking of Cities — Current Life Evaluation (Part 1)



2 https://data.worldbank.org/indicator/NY.GNP.PCAP.PP.CD

3 Helliwell, John F., Richard Layard, Jeffrey Sachs, and Jan-Emmanuel De Neve, eds. 2020. World Happiness Report 2020. New York: Sustainable Development Solutions Network

Notes

These are not necessarily the top ten nations, GDP-wise. So, GDP alone cannot be equated with happiness!

The above implies that there are many ways to qualify development, and not just economic progress. Holistic development would mean not just high GDP, large cities, wide roads, tall buildings, but parameters such as, safety, waste management, spread of education, health of human beings and of the ecosystem. It would include behavioural parameters like, tolerance for diversity within human communities and respect for women and men.

Such a view of development of nations and human society is referred to as sustainable development. It is so because any development based on economic progress alone usually brings in only short-term gains and cannot be sustained for long. Narrow parameters of development bring economic progress only for a few but loss/problems for most.

You must have many thoughts and questions about sustainable development.[2] Why should one worry about human well-being, environmental well-being, quality of life or even overpopulation and overconsumption? Why has the world started discussing these concepts? How does the world define sustainable development?

Sustainable development is complex, and is contextual. There have been many different definitions of sustainable development.

"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

Our Common Future

Brundtland Report, also called Our Common Future, released in 1987 by the World Commission on Environment and Development (WCED) introduced the concept of sustainable development and described how it could be achieved. Sponsored by the United Nations (UN) and chaired by Norwegian Prime Minister Gro Harlem Brundtland, the WCED explored the causes of environmental degradation, attempted to understand interconnections between social equity, economic growth, and environmental problems, and developed policy solutions that integrated all three areas. In 1983, in response to mounting concern surrounding ozone depletion, global warming, and other environmental problems associated with raising the standard of living of the world's population, the UN General Assembly convened the WCED, an international group of environmental experts, politicians, and civil servants.

(Source: *Our Common Future*, 1987)

Sustainable development is using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained and the total quality of life, now and in the future, can be increased.

7.3 DIMENSIONS OF SUSTAINABLE DEVELOPMENT

The main features that many definitions of sustainable development have (either explicitly or implicitly) are:

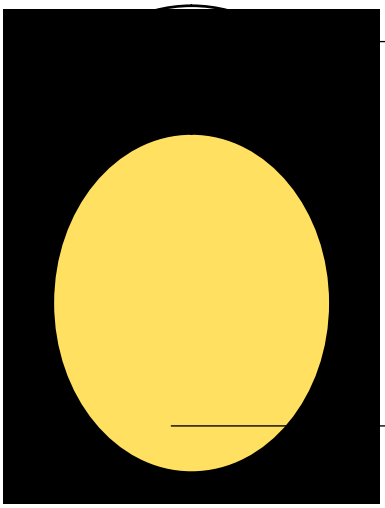
- A desirable human condition: a society that people want to sustain because it meets their needs
- A durable ecosystem condition: an ecosystem that maintains its capacity to support human and other life
- Equity: between present and future generations; and, within the present generation

The three pillars of sustainable development include:

- Environment
- Society
- Economy

There are several models and philosophies to explain what makes development sustainable, but a widely used model is the metaphor developed by the IUCN (1997) —the "egg of sustainability." In this model, the yolk or yellow part of the boiled egg represents people (society and economy) and the white of the boiled egg represents the ecosystem (environment). It captures the essence of sustainable development. The image clearly expresses the interrelationships between the human and ecosystems and the need to assess human and ecosystem well-being together with the whole system as well as the parts. A society is thought to be sustainable when both the human condition and the condition of the ecosystem are satisfactory or improving. The system improves only when both improve.

Like the way a healthy egg always has a healthy egg white as well as a healthy egg yellow, similarly for development to be sustainable, health of both the parts of the egg need to be maintained.



Egg of Sustainability

ENVIRONMENT: Includes the ecosystems, species, interactions within Nature, the rivers, oceans, deserts, glaciers, etc.

It is this part of the egg which defines the ultimate limits and boundary of development.

SOCIETY: Includes people, culture, lifestyle, economy, health, education, gender, happiness, safety, crime, etc.

While this is the goal of economic development, it is important to remember that the yellow of the egg is defined by the egg white and hence must ensure the health of the white of the egg as well.

CHECK YOUR PROGRESS 7.1

1. Define the egg of sustainability.
2. What do the egg white and the egg yellow symbolise?

TEACHER'S CORNER

Now that you have introduced the concept of sustainable development to your pupils, you may wish to conduct the following activity in your classroom of pupil-teachers:

Read the following story and answer the questions.

Long, long ago on a little island far, far away, there lived happy people. Their island, Karu, had everything they needed: Coconut trees for food and drink, magnificent spreading tomano trees for shade, abundant bird life and on ocean full of fish. Two hundred years ago, an English sailor discovered Karu and called it Pleasant Island.

Another century passed before an expedition was carried out to Karu. It was then discovered that the island had one of the richest piles of phosphate rock on the globe. For most of this century, millions of tonnes of phosphate were shipped to other countries, where they fertilised fields and farms.

Karu is a small island, a little over 20 square kilometers. The population includes 7,000 Karuan natives and another 3,000 imported workers.

Karu has only one road around the island, but the average Karuan family has at least two vehicles. They also have microwave ovens, stereo equipment and multiple televisions per family. Nine out of every ten Karuans are obese, and young men can weigh more than 135 kilos. Why? Because their native food was replaced by imported foods which are subsidised by the government. Meat brought from another country more than 3,200 kilometers away is cheaper in Karu than it is in that country. Today, Karuans even import fish! The changed diet habits are showing their ugly effect on Karuans. A person on the island can be expected to live only for about 55 years. Diseases like hypertension, heart disease and diabetes are common on the island.

Karuans receive their housing, power supply, water, telephones, education and medical services free or for a nominal charge. The tiny island has two hospitals, and Karuans needing specialist treatment are flown at government expense to other countries.

Where does all this wealth come from? From phosphate mining. What, then, is the problem? The phosphate reserves could run out before the next century. The government is now desperately searching for more phosphate even as the interior of the island lies ravaged by mining. They even plan to demolish the President's residence in their search. Karuans continue to tear their island apart, live and spend as if there is no tomorrow. At this rate there may not be one.

CHECK YOUR PROGRESS 7.2

1. What do you think of the kind of development happening in Karu? Is it sustainable? If not, why?
2. How would you have planned Karu's development?
3. Are there examples of unsustainable practices where you are living? List some of them.

DEBRIEFING

Any development model which is based on a single resource and uses and extracts that resource in a manner that the resource pool cannot replenish itself, can never be sustainable.

Now, recall the previous two Modules: Module 2 on ecology and environment and Module 1 on Gender and development. Can you see the link and connection between the two? A progressive society will need to strike a balance between health of its natural resources as well as the happiness and well-being of social resources! In simple terms, ensuring environmental and social safety is at the core of practicing sustainable development!

7.4 WHY REDEFINE DEVELOPMENT AS SUSTAINABLE DEVELOPMENT?

Environmental pollution, destruction of forests, pollution of oceans, extinction of species, diseases, pandemics, child abuse, crime, injustice, exploitation of women, weakened economies, energy shortages, poverty, armed conflicts and nuclear power debates are some of the enormous challenges we face as our social, economic, and environmental resources are damaged and depleted due to unplanned and short-sighted development. These problems prevail in practically all domains of human society and are interconnected (Module 1). Thus, finding solutions to these concerns is not easy. The interdependencies of the economic, environmental, and social justice elements of our world requires new ways of thinking about things and taking action that will truly create a future where human society and Nature coexist with mutual benefit, and where the suffering caused by poverty and natural resource abuse is eliminated. Sustainable development calls for improving the quality of life for all of the world's people without increasing the use of our natural resources beyond the Earth's carrying capacity.

Carrying Capacity: Living within limits

In ecological terms, the carrying capacity of an ecosystem is the size of the population that can be supported indefinitely upon the available resources and services of that ecosystem. Living within the limits of an ecosystem depends on three factors:

- Availability of resources: the amount of resources available in the ecosystem;
- Pace of consumption: the amount of resources each individual is consuming; and
- Population size: number of individuals of a population.

A simple example of carrying capacity is the number of people who could survive in a lifeboat after a shipwreck. Their survival depends on how much food and water they have, how much each person eats and drinks each day, and how many days they are afloat. If the lifeboat makes it to an island, how long the people survive would depend upon the food and water supply on the island and how wisely they would use these resources. A small desert island will support far fewer people than a large continent with abundant water and good soil for growing crops.

In this example, food and water are the natural capital of the island. Living within the carrying capacity means using those supplies no faster than they are replenished by the island's environment: using the 'interest' income of the natural capital. A community that is living off the interest of its

community capital is living within the carrying capacity. A community that is degrading or destroying the ecosystem on which it depends is using up its community capital and is living unsustainably.

Thus, in the context of sustainability, carrying capacity is the size of the population that can be supported indefinitely upon the available resources and services of supporting natural, social, human, and built capital.

Source: http://www.sustainablemeasures.com/node/33

However, in recent centuries, the way we grow our food, we manufacture and produce our goods, the way we offer services, have changed so much that it has taken the lifestyle of an average Earth's citizen beyond the carrying capacity of the Earth. This means that today, the pollution we create, the waste we generate and the pace at which we consume natural resources, have all overtaken the ability of our about 4.5 billion-year-old planet to replenish and/or regenerate resources. One of the world's estimates suggest that if we continue to live the way we live today, we would need at least 1.7 times of the Earth to sustain the about seven billion humans and their lifestyle!

7.5 FEATURES OF SUSTAINABLE DEVELOPMENT

7.5.1 Quality of Life

In the context of development you would have often heard or read about the term, standard of living. What does this mean? How does it relate to development?

Standard of living refers to the consumption of goods and services by an individual. Thus, an individual spending more money on him or her will be said to have higher standard of living. Standard of living relates directly to economic development.

In the context of sustainable development, a term that is more holistic in its scope is, quality of life. Quality of life refers to a combination of attributes that provide sustained human experience of physical, mental, spiritual and social well-being. These would include many of the earlier mentioned elements of holistic development like access to basic goods and services, social and mental security, sense of equity and justice, healthy human relations, equal opportunities, peace of mind, freedom of expression, a healthy environment, etc. It may not possible to put economic value to many of these attributes.

Further, as discussed at the beginning of this chapter, through the Happy Planet Index, a higher standard of living may not necessarily guarantee a better quality of life. Quality of life is increasingly being recognised as the essential ingredient of development. Today, international agencies take into account several of the above factors to derive indices like the Human Development Index (HDI), Gross National Happiness (GNHI) etc. which has resulted in different rankings of nations than what came from just economic or standard of living criteria.

7.5.2 Population and Consumption

Consider this:

- USA has 4.7 per cent of the world's population. India is home to 16 per cent of the world population (India has 3.4 times more people than the USA).
- In 1991, the energy consumption per capita in the USA was equivalent to 7,681 kg of oil. India's per capita energy consumption during the same period was 337 kg.
- USA produces at least 25 per cent of the world's pollution and waste, including 18 per cent of the global emissions of greenhouse gases and 22 per cent of ozone-destroying CFCs.
- India produces about 3 per cent of the world's pollution and waste,

including about 4 per cent of global emissions of greenhouse gases and 0.7 per cent of ozone-destroying CFCs.

Which country has more population? Which country consumes more resources? Which country generates more waste? What do you think are the environmental impacts of USA and India?

Several conclusions can be derived from these statistics. While an average Indian consumes much less than an average American, the larger population of India seems to have a significant negative impact on the natural environment. However, due to extremely high per capita consumption of natural resources in the USA, all Indians put together still cause less pollution than the much smaller population of America.

Another significant aspect is the quality of life of people. A majority of Indians live in undesirable conditions, with poor access to basic facilities such as sanitation, education and health facilities. This leads to a more direct adverse effect on the environment and also limits opportunities for a better quality of life.

On the other hand, in USA there are fewer people with affluent lifestyles. Though they are not many in number, because of their lifestyle, they consume considerable resources and produce considerable pollution and waste. So, it becomes obvious that when we think of environmental degradation, we have to simultaneously think of population load as well consumption patterns and hence, both terms become relative.

CHECK YOUR PROGRESS 7.3

1. Write a brief definition of carrying capacity of the Earth.
2. In your words, define overconsumption.

7.6 ECOLOGICAL FOOTPRINT: AN IDEA BASED ON CARRYING CAPACITY

7.6.1 How much does each human being need?

Recall the concept of carrying capacity discussed in the previous section. How does one find out whether we are living within the carrying capacity of the Earth, or have exceeded it? Ecological footprint (like the image of our feet that we leave behind as we walk), is a tool to calculate how much of the natural resources we are consuming.

Ecological footprint can be explained as the impact of human activities

Notes

measured in terms of the area of biologically productive land and water required to produce the goods consumed and to assimilate the wastes generated. More simply, it is the amount of natural resources consumed to produce the goods and services necessary to support a particular lifestyle.

Ecological footprint is rooted in the fact that all renewable resources come from the Earth. The total footprint for a designated population's activities is measured in terms of global hectares. A global hectare is one hectare (2.47 acres) of biologically productive space with an annual productivity equal to the world average. Currently, the biosphere has approximately 11.2 billion hectares of biologically productive space corresponding to roughly one quarter of the planet's surface. These biologically productive hectares include 2.3 billion hectares of ocean and inland water and 8.8 billion hectares of land.

Dividing the 11.2 billion hectares available by the global population indicates that there are, on an average, 1.8 bioproductive hectares per person on the planet. By comparing the Footprint measure with the actual bioproductive capacity of individual nations it is possible to determine if that country is in an ecological deficit (using more than it has) or has an ecological reserve.

7.6.2 Significance of Footprints

National governments, with the use of the concept of ecological footprint are able to:

- Assess the value of their country's ecological assets;
- Monitor and manage their assets;
- Identify risks associated with ecological deficits;
- Set policy that is informed by ecological reality and make safeguarding resources a top priority;
- Measure progress toward their (national) goals.

7.7 EFFORTS BEING MADE TO SUSTAIN HUMAN DEVELOPMENT

The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by all United Nations Member States in 2015 as a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030. The Sustainable Development Goals are the blueprint to achieve a better and more sustainable future for all.

The 17 SDGs are integrated—that is, they recognise that action in one area will affect outcomes in others, and that development must balance social, economic and environmental sustainability.

Through the pledge to Leave No One Behind, countries have committed to fast-track progress for those furthest behind first. SDGs are a bold commitment to finish what nations of the world started, and tackle some of the more pressing challenges facing the world today. All 17 Goals interconnect, meaning success in one affects success for others. Dealing with the threat of climate change impacts how humans manage our fragile natural resources, achieving gender equality or better health helps eradicate poverty, and fostering peace and inclusive societies will reduce inequalities and help economies prosper. In short, this is the greatest chance that human civilisation has to improve life for future generations.

SDGs coincided with another historic agreement reached in 2015 at the COP21 Paris Climate Conference. Together with the Sendai Framework for Disaster Risk Reduction (you will learn more about this in the next Unit) signed in Japan in March 2015, these agreements provide a set of common standards and achievable targets to reduce carbon emissions, manage the risks of climate change and natural disasters, and to build back better after a crisis.

The SDGs are unique in that they cover issues that affect all—all nations and all humans. They reaffirm nations' international commitment to end poverty, permanently, everywhere. They are ambitious in making sure no one is left behind. More importantly, they involve all nations to build a more sustainable, safer, more prosperous planet for all humanity. The 17 SDGs deal with issues pertinent to sustainability on our planet.

Today, the Division for Sustainable Development Goals (DSDG) in the United Nations Department of Economic and Social Affairs (UNDESA) provides substantive support and capacity-building to nations for helping them realise SDGs. DSDG plays a key role in the evaluation of UN's systemwide implementation of the 2030 Agenda and on advocacy and outreach activities relating to the SDGs. In order to make the 2030 Agenda a reality, broad ownership of the SDGs must translate into a strong commitment by all stakeholders to implement the global goals. DSDG aims to help facilitate this engagement.

Sustainable Development Goals

7.7.1 What can we do about Sustainable Development?

Making Wise Choices

What exactly does sustainability mean to us as individuals? What can we do to become more responsible? Do we all need to do the same thing? What should we do first, save the environment or eradicate poverty? What comes first, our health or the Earth's? Difficult questions never have easy answers.

Today, 16 per cent of the world's richest people consume nearly 80 per cent of the planet's natural resources. Think about it: USA makes up six per cent of the planet's population but consumes a staggering 30 per cent of its resources. The wealth of the world's 225 richest individuals equals the annual income of the bottom 47 per cent of the world's population, or 2.5 billion people. Talking about distribution, many people think that the planet is not producing enough to feed its population. Wrong. Unequal distribution of food is the main reason why there are 800 million undernourished people in the world today.

Sustainable consumption (SC) is an issue in a continuing state of evolution and the answers are rarely black and white. Nevertheless, there are a number of basic elements that make up the whole picture.

If we continue our current patterns of consumption, the future will not be bright. At the moment, estimates show that our planet is losing an area of fertile land about the size of Ireland every year as a result of overgrazing and deforestation. How long can this go on?

SC is about finding workable solutions to imbalances – social and environmental – through more responsible behaviours from everyone. In particular, SC is linked to production and distribution, use and disposal of products and services and provides the means to rethink their lifecycle. The aim is to ensure that the basic needs of the entire global community are met, excess is reduced and environmental damage is avoided.

Consuming Efficiently

Any definition of SC highlights how consuming less is often a priority, but not always. Consuming differently and efficiently is the key challenge. In many cases, redistributing the chance to consume is what is needed.

"Many people - almost 2 billion - in the world need to consume more just to survive. Many others may need to make more responsible choices. In the end, this will mean that fewer resources are needed and fewer emissions are generated, while still serving the needs and wishes of the world's population." [UNEP, Youth and Sustainable Consumption, Nairobi/Paris, October 1999]

SC is complex and its definition is sometimes hard to pin down. Most definitions have the following common features:

- Satisfying human needs
- Favouring a good quality of life through decent standards of living
- Sharing resources between rich and poor
- Acting with concern for future generations
- Looking at the 'cradle-to-grave' impact when consuming
- Minimising resource use, waste and pollution

In simple terms, we as citizens need to become aware of our lifestyle choices like how frequently to take the car out, when to use a bus, what brand of shoes to wear, where to dispose of used batteries, whether or not to use a buy-back option, how to ensure not to throw any waste on the streets, what brand of clothes to buy etc. These are actions and choices that can help reduce our

4. For more information and updates on SDGs, follow DSDG on Facebook at www.facebook.com/sustdev and on Twitter at @SustDev.

5. http://edition.cnn.com/US/9910/12/population.cosumption/

footprint (use footprint calculator: https://offset.climateneutralnow.org/footprintcalc) and make our living more sustainable.

TEACHER CORNER

To highlight the above concept, you could carry out the following activity with your pupils.

All about my food!

Ask your students to :

- List down all the dishes they have had in the last meal (breakfast/lunch)
- List out the key ingredients that were used in preparing these meals in the next column alongside
- Against each ingredient, write the name (based on what you think), where these are primarily grown and produced
- Log on to Google Earth, locate the capital/main city of the countries where these items are produced
- With the help of the ruler tool, measure the distance between your city and the city where the ingredient was likely to have been grown. Write the distance in the column next to it
- After you have found the distance of each ingredient, add these to get you the total

Dish	Ingredients	Location of cultivation	Distance from where I ate it
Sambhar	Tur Dal	UP	175 km
	Salt	Gujarat	1111 km
TOTAL distance			

Debriefing

Your pupils would be excited to track the miles/kilometers that each of these ingredients is likely to have traveled before reaching their kitchens and platters! The total distance traveled by their meal (breakfast or lunch) to reach them would provide children a revelation on how much energy is spent on ensuring them a meal of their choice.

Ask pupils the possible ways in which they can eat good food, yet reduce total distance to their tables, thereby reducing the energy spent in getting their food.

You will need to guide them through this. There are many ways to achieve this. For example, they may review their food choices and go for locally grown food, or opt for seasonally appropriate food, reducing the need of cold storages and saving energy, or they may get creative in trying some newer and energy-lighter menus!

7.8 LETS SUM UP

- Economic development is one of the domains of overall human and social development.
- Using GDP alone as the criteria to measure development may not always give the correct picture of overall development of a society or a nation.
- In order to gain a holistic understanding of development, development needs to be redefined as sustainable development.
- Sustainable development is a composite and complex concept which includes ecological conservation, social well-being of all, and economic development.
- In order to realise sustainable development in reality, governments, citizens as well as other professional organisations need to come together and work.
- UN has identified 17 Sustainable Development Goals in varied areas like gender, education, health, energy, agriculture, etc.. These are globally agreed upon and committed targets for 2030 on issues pertaining to global socio-economic as well as ecological development.
- Individuals, by making well-informed and judicious decisions, can become a part of the sustainable development fraternity.

7.9 UNIT-END EXERCISES

1) Define sustainable development (SD). Describe at least two features of SD.
2) Explain the Egg of Sustainability concept. List at least three indicators each for the white and the yellow parts of the egg of sustainable development.
3) What are sustainable development goals? Is there any SDG that discusses gender matters? If yes, write its title.
4) Define Ecological Footprint. Calculate your footprint using any of the online footprint calculators and find out two or three ways in which you can bring down your footprint.
5) Can individuals help make a nation or a society sustainable? List at least three ways in which individuals can make their living more sustainable.

Notes

UNIT 8 GENDER AND ENVIRONMENT: THE CONNECT

STRUCTURE

8.0 INTRODUCTION

Gender and environment are deeply interlinked. You have learnt about sustainable development and how development, per se, is a composite concept with multi-dimensional aspects. Gender (a social aspect) and environment (an ecological aspect), are two important dimensions within the concept of sustainable development. This lesson will help you as a teacher to not only briefly understand this relationship between gender and environment, but will also enable you to deal with similar concepts and connections in your classroom.

8.1 LEARNING OUTCOMES

After studying this lesson, the teacher-pupil will be able to:

- illustrate the connection between gender and environment-related issues; and
- enumerate key efforts being made by our government as well as the United Nations Organisation (UN) in this area.

8.2 WOMEN: HOUSEWIVES OR EARNING MEMBERS?

India is primarily an agrarian economy. Agriculture, animal husbandry and aquaculture form the foundation of our economy. Do you think Indian women play any role in the Indian economy? If yes, then to what extent?

8.2.1 Agriculture

In agriculture, women lead a number of primary activities such as sowing, transplanting, weeding, irrigation, plant protection, harvesting, winnowing, storing, etc. Even allied activities, like cattle management, fodder collection and milking are done largely by women. Thus, women play an important role in agricultural development, through ensuring the food security and preserving the local agro-biodiversity. As per the Food and Agriculture Organization:

1. Women are involved in 48 per cent of agriculture-related employment;
2. Around 7.5 crore women are playing a significant role in milk production and livestock management;
3. The Agriculture Census (2010-11) shows that out of an estimated 118.7 million cultivators, 30.3 per cent were females. Similarly, out of an estimated 144.3 million agricultural labourers, 42.6 per cent were females;
4. According to Census 2011, there has been a 24 per cent increase in the number of female agricultural labourers between 2001 and 2011;
5. Participation of both men and women in agriculture has declined, with the rate of decline faster among men than among the women. While the women as cultivators reduced in number their numbers as agricultural labourers have increased.
6. Similarly, women in fishing communities take care of everything in the industry except actually going to the sea. In terms of pre-fishing work, their contribution includes making and mending nets, baskets and pots, baiting hooks and providing services to fishing boats such as ensuring supply and stock of food, drinking water, etc.
7. Women's most prominent role in fisheries is in the post-harvest processing and marketing stages. They are there when the catch is landed on the beach, and they sort, clean, dry and smoke fish and take it to market. They have the chance to keep unmarketable or lower value species for the family. Up to 80 per cent of seafood is marketed by women. If women aren't selling their fish in markets early in the morning, they are usually processing it.

8. A large number of women carry out fishing for subsistence purposes, often from canoes and in areas close to their settlement. They also collect prawn larvae and catch fingerlings to stock aquaculture ponds.

The above illustrations, and many more similar livelihood activities carried out by women make them equal partners to their male counterparts as earning members. Over and above their contribution to livelihood practices, women double up to be home and family managers and caretakers.

ACTIVITY I

Name a few livelihood activities where a large number of Indian rural women remain equal contributor to the activities.

8.3 ARE GENDER AND ENVIRONMENT LINKED?

The social, familial and economic roles played by women in Indian society (such as the ones stated above), lead to building up of tremendous knowledge of ways to protect, use and sustain natural resources. With a stronger role in connecting natural resources and traditional practices, and with an abundance of knowledge at their disposal, women are more cautious about introducing new methods or processes that threaten the sustainability of these resources.

In Indian society, the traditional responsibilities of women as food growers, water and fuel gatherers and caregivers connect them intimately to natural resources and climate, making them more vulnerable to environmental hardships, especially in adverse environmental conditions.

Although women play a critical role in sustaining communities and managing natural resources, their contributions are often undervalued and neglected. Women are thus more likely than men to live in poverty, and are more vulnerable to the impacts of environmental disasters, biodiversity loss and climate change. Let us look at some examples of how women are affected by environmental disasters.

1. Roles as primary caregivers and providers of food and fuel make them more vulnerable during flooding and drought;

2. Being in charge of arranging domestic fuel, fresh water, etc, women and girls have to walk farther to find these increasingly scarce resources. More and more unpaid hours are spent, which could otherwise have been spent on remunerative tasks or for education, rest and personal care;

3. UN figures indicate that 80 per cent of people displaced by climate change are women;

4. Every year, indoor air pollution kills 4.3 million people, most of them women and children, because three billion people rely on inefficient cooking technology like wood, charcoal or animal waste;

5. It is not just women in rural areas who are affected. Globally, women are more likely to experience poverty, and to have less socioeconomic power than men. This makes it difficult to recover from disasters which affect infrastructure, jobs and housing.

6. In case of natural disasters like floods, tsunamis, cyclones etc, rehabilitation can be a long, time-consuming process. All in the community need support and help to eventually return to normalcy and to slowly make up for the losses incurred. However, lack of proof of land rights lead to limited ability to get financial credits making women particularly vulnerable and underprivileged. They find it harder to bounce back.

7. Climate change is a slow but deep disaster. Its slow pace makes it seemingly lesser traumatic than a tsunami or an earthquake. However, the repercussions of climate change are much deeper and more difficult to reverse. The severest of these impacts—both ecological and social—are felt by women and girls first.

CHECK YOUR PROGRESS 8.1

State whether True or False:

1. Climate change impacts men and women differently.

2. Women play a negligible role in the fishing industry.

3. Compared with women, men are likely to have better knowledge about natural resources and their conservation.

8.4 WOMEN AND POLICY FORMULATION

Fulfilling roles and responsibilities keep women directly connected with natural resources. This enables them to gain knowledge about nature and natural processes, making them a repository of information and knowledge about natural science. There is clear evidence that women, with their knowledge and skills, are key contributors to conservation and judicious use of natural resources. Their voices thus become significant at various levels of policy discussions and formulations.

Their opinions, views and participation in policy formulations can thus make policies more sustainable and holistic. Unfortunately, the socially assigned gender and gender roles of a woman do not allow much participation by women

in the policy and decision-making processes. This gender-based deprivation can be seen at multiple levels—homes, families, villages as well as other professional set-ups. It is so because culturally, it is not considered 'appropriate' for women to attend public meetings and to participate actively. Even when progressive laws and legislation bring women as members of decision-making bodies, they are often made only titular heads with key roles and decisions being made by men husbands, brothers, fathers or male colleagues.

The UN has highlighted the need for gender-sensitive responses to the impacts of climate change, yet the average representation of women in national and global climate negotiating bodies is below 30 per cent.

In the best-case scenarios, if a woman is able to join meetings, she is often discouraged from speaking in front of elders and males. The ideas of a woman go unheard, queries remain unanswered and suggestions are not acknowledged or accepted.

Thus, despite having relevant and significant experiences about natural resource management, it is gender that hinders women from making meaningful contribution and participation in society. Their limited participation renders several policies and programmes unsustainable. However a change is full setting in whereby women have begin participating in local body forms. It is occuring at a very slow pace.

8.5 WOMEN AND DEVELOPMENT

Effective models of good and sustainable development require participation and progress of all. A nation or society which leaves women and girls out of development planning and does not engage with their experiences and needs tends to lose out on precious experiences, knowledge, and human resources of a section of the population that has invaluable ground knowledge.

More than ever, the world is realising that the sustainable development goals are not stand-alone targets but rather a holistic approach to a more connected, engaged and inclusive world.

As you have already learnt, the United Nations (UN) has identified globally pertinent and significant domains of development on the radar of progress and growth. The 17 UN Sustainable Development Goals (UN SDG) signify these.

The UN SDG 5 is focused to, "Achieve gender equality and empower all women and girls."

1. Source: https://www.bbc.com/news/science-environment-43294221
2. https://sustainabledevelopment.un.org/?menu=1300

According to it, "Understanding the links between gender inequality and environmental degradation, and taking responsive actions can accelerate positive dynamics and promote sustainable development outcomes."

Some relevant targets and indicators as stated under the UN SDG 5 are:

TARGETS

5.4: Recognise and value unpaid care and domestic work through provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate.

5.A: Undertake reforms to give women equal rights to economic resources, as well as access to ownership and control over land and other forms of property, financial services, inheritance and natural resources, in accordance with national laws.

INDICATORS

5.4.1: Proportion of time spent on unpaid domestic and care work, by sex, age and location

5.A.1: (a) Proportion of total agricultural population with ownership or secure rights over agricultural land, by sex; and,

(b) Share of women among owners or rights-bearers of agricultural land, by type of tenure

Countries are making varied efforts to improve quality of life for women and girls. Women need more opportunities to share their priorities, needs and experiences to get the recognition they deserve as key agents in managing natural resources and stewards of biodiversity so crucial to their families, communities and culture.

Since 2017, India celebrates 15 October as Rashtriya Mahila Kisan Diwas in India. The United Nations observes the day as International Rural Women's Day to highlight the contribution of rural women to the world's economic development. The 2015 Paris Agreement has made specific provision for the empowerment of women, recognising that they are disproportionately impacted.

We need to recognise the key role that women play in taking care of our communities, as they bear the brunt of environmental changes to a greater degree.

When we empower women by supporting equal access to land, agricultural

extension services, financial inclusion and education, we give them the tools to become rightful custodians of our natural resources and environment.

CHECK YOUR PROGRESS 8.2

1. State the UN SDG which deals with gender and related matters.
2. Give, as an example, a target within the gender-related UN SDG, to illustrate that women and their rights are well reflected in the SDG.

FROM SHY VILLAGE WOMEN TO ENTREPRENEURS

When Udia Devi, Kumia Devi, Sitli Devi, Rajni Devi and Lalpari Devi were married in their teens, they had no idea of the world outside the four walls of their homes. Their entire life revolved around the husbands and children and they were convinced that the only work they could do well was cooking, cleaning and looking after their families.

Today, they know better. Take the case of Udia, the only woman in her village cooperative committee whose directives are followed by men without any questions asked, or Kumia, now a successful entrepreneur earning Rs 50,000 a month. How did these seemingly ordinary women manage to transform their lives so radically?

Today, all of them are in their fifties and they have shed their shy and reticent demeanour to emerge as capable, vocal community leaders and astute businesswomen.

It all began a decade ago when Poorest Area Civil Societies (PACS) programme, an initiative of the UK government's Department for International Development (DFID) aimed at reducing poverty in some of India's backward districts, collaborated with Watershed Support Services and Activities Network (WASSAN) and Revitalizing Rain-fed Agriculture (RRA) Network to encourage women in Bihar's Madhubani district to engage in small-scale fishery activities. The programme was implemented by Sakhi, a local non-governmental organisation working with women's Self Help Groups.

PACS and WASSAN decided to introduce local women to fish farming because developing fisheries in small waterbodies or reservoirs offers immense scope to earn a livelihood, and ready access to quality nutrition.

In fact, as per a representative of WASSAN, women play a vital role in the fishery sector and comprise 72 per cent of the workforce. There is huge potential for them to develop their skills and increase participation despite the fact that customary resources, norms, laws, and unfavourable policies have confined them to the lower end of the supply chain.

So, their first task was to clean up the waters for which they cajoled the men in the community to help. "It took us 10 days of grinding hard work by 25-30 people to make all the ponds conducive for fish farming," elaborates Udia Devi. Since the fishery work was to be done jointly by the SHGs, a 10-member committee was set up and Udia Devi was nominated as its head. All decisions pertaining to this activity were taken by the committee members and everyone in the community accepted them wholeheartedly.

Later, under the able leadership of Udia Devi and Sitli Devi from Bataua village, the women were able to lease 24 additional ponds officially, taking the total count to 150.

Ten years on, these women have turned into hardcore entrepreneurs who understand the finer nuances of conducting business efficiently. During their extensive training programmes, they were made to understand the importance of equality and partnership between women and men, in managing the household as well as their finances. They even got the opportunity to travel not just out of their district, but their state.

With experience and exposure, they have learnt how to multiply their income by planting fruit trees like papaya, coconut and banana. Their hard work is literally bearing fruit.

There are visible signs of progress and prosperity in both Usrar and Bataua. The houses that once had thatched roofs are now made of brick and cement. Where the women themselves have never seen the insides of a classroom, their children are diligently getting quality education. Many, including Udia Devi, have sent their children to boarding schools in a nearby town. And while some of them are investing in buying jewellery, others have purchased land.

Udia Devi no longer likes to take things lying down and she has the power to support her children in what is right and fair.

"My daughter's husband used to trouble her, so we decided to file for divorce. Despite his family's threats, we pursued the case and eventually got her free from that pathetic man. We have also made sure that he pays her a maintenance allowance," says the strong mother. Like Udia, other women around her find no shame or stigma in standing up to violence or intimidation any more.

Consequently, the men have learnt to respect them and their opinions. Where earlier they would rebuke women for interfering in family matters, these days they seek their advice particularly where financial issues are concerned.

Around 250 families in Usrar and 150 in Bataua are involved in fish farming,

Source: https://www.thebetterindia.com/20579/how-fishes-have-transformed-shy-village-

and a part of cooperatives formed under the WASSAN and PACS programme. From each pond, these cooperatives harvest more than 800-1,200 kilos of fish per acre. The production cost is around Rs 25,000 per acre, and the fish sell for anything upwards of Rs 300 per kilo. Clearly, what began as a humble livelihood enhancement initiative has changed the average Madhubani woman's outlook towards work and life.

CHECK YOUR PROGRESS 8.3

Read the above case study and respond to the following:

1. In your opinion, what was the trigger for this change in the position and power of women?
2. Do you think that positive change in the quality of life of a woman is a catalyst for change in the overall family and even the next generations? Explain your answer.
3. Is economic independence linked with the power of decision-making? Justify your answer with examples from the above case study.

8.6 LETS SUM UP

- Gender and environment though two separate disciplines, are very much interlinked with respect to mutual relationship in the context of scope and impact on the survival of human life. The sustainability of future civilizations largely depend on the harmony of inter-relationship between gender and environment. A strong mutual relationship is the basis of the sustainable future of mankind.
- Women play a multifarious role through their contribution in productive reproductive and community activities.
- Among all the sectors of economy, women form the bulk of labour in agriculture, fisheries and allied sectors through direct and indirect involvement in primary and subsidiary activities such as operations production and marketing of the produce
- The traditional role of women as food growers, fuel gatherers and caregivers has resulted in women as the power house of knowledge information and action on environmental protection and conservation.
- Women suffer the ecological and social brunt of climate change ar environmental degradation with a direct impact of their health and everyday survival of self and the family.

- The response to climate change can be more effective if the traditional wisdom of women is included in policy making and action programming.
- The 17 Sustainable Development Goals formulated by the UN apply to all the countries for a connected, engaging and inclusive world. The countries are working to improve the quality of life of women through equal access to resources, financial inclusion and education & recognition of work.
- Emergence of leadership among women is important for their economic and social empowerment. The Self Help Group movement in India has empowered the women over the years.

8.7 UNIT - END EXERCISES

1) What percentage of women is engaged in farming in India? List some key roles they play as farmers.

2) List at least three examples to show that environmental problems impact women in a manner different from the impact on men.

3) What is the UN Sustainable Development Goal 5? State at least two targets under this goal, and corresponding indicators which relate with women, livelihoods and their rights.

Notes

UNIT 9 TEACHING-LEARNING APPROACHES FOR GENDER AND ENVIRONMENT

STRUCTURE

9.0 INTRODUCTION

Gender and environment are composite disciplines. Neither can be categorised primarily under Science or Arts. It is so because the content of both these topics comprise a combination of a variety of subjects such as Sociology, Physics, Psychology, History, Geography and Biology. If the content that we wish to transact in our classrooms is so multidisciplinary, then the approaches we use for the teaching-learning of gender-environment should also be able to accommodate open-ended, multidimensional views.

9.1 LEARNING OUTCOMES

After studying this lesson, the teacher-pupil will be able to:

- analyse the significance of 'social constructivist' approach for gender-environment related teaching-learning; and
- design effective teaching-learning strategies for gender and environment.

9.2 TEACHING-LEARNING ABOUT GENDER & ENVIRONMENT

As you know, there are a variety of theories that guide us about how humans learn. Among the many schools of thought, the one that is relevant and appropriate for a subject such as Gender & Environment Education is the theory of sociocultural learning.

There are several psychologists who have been proponents of this theory. Lev Vygotsky pioneered this school of thought. Vygotsky believed that social interaction plays a fundamental role in the development of cognition and learning. Vygotsky (1978) states: "Every function in the child's cultural development appears twice: first, on the social level, and later, on the individual level; first, between people (inter-psychological) and then inside the child (intra-psychological). This applies equally to voluntary attention, to logical memory, and to the formation of concepts. All the higher functions originate as actual relationships between individuals."

Two major principles that provide the essence of this theory are:

- Cognitive development is limited to a certain range at any given age
- Full cognitive development requires social interaction

Thus, Vygotsky's view is that every learner constructs her/his own learning and meanings from the various experiences that s/he makes, especially through interaction with others around. This is popularly known as the theory of 'social constructivism' or the 'social development' theory. You would have learnt details of this school of psychology in your B.Ed/M.Ed course.

So why is it that this philosophy of social development is found to be appropriate for gender-environment related teaching-learning processes? It is so because learning about environment and gender is a multidisciplinary process. Environment and gender studies is a composite study area, drawing learning experiences/contents from physical, biological, chemical, social, cultural and other dimensions of study.

CHECK YOUR PROGRESS 9.1

1. State whether true or false: Vygotsky's view states that all learners construct the same meaning from an experience.
2. State two key principles of socio-cultural learning.

Also, Gender and Environment is a dynamic and contextual area of study. Its deeper nuances and details change with time, space or location. Women and

men, their roles, environment, environmental degradation and its impacts are not absolute concepts. Instead, they are defined, interpreted and understood on the basis of stakeholders' context, experiences and their perspectives.

Unlike other subjects of school learning, say History, where a dated event in human history and the associated details and explanations will remain the same whether it is being discussed in a hill station or in a coastal town, the concepts, views, opinions and practices in gender and environment will change from place to place, time to time. Similarly, a scientific explanation, say, properties of water, will be the same, irrespective of the time and location where a teacher is explaining it. This may not be the case with Gender and Environment education. Most concepts in teaching-learning of Gender and Environment will vary from place to place and time to time. For example, teaching and learning about livelihoods and status of women, cannot follow the same plan and approach in different locations — a city or a small island. So, it is important for us to appreciate that gender and environment, as an area of teaching-learning, is extremely contextual. It is so because the perceptions and understanding of environment, social, industrial, and economic problems and issues change with reference to the context — from place to place, time to time and even community to community. And all these are very important domains within the process of learning about gender and environment.

9.3 CREATING AN OPEN LEARNING ENVIRONMENT

9.3.1 THE ROLE OF A TEACHER

It is for the above reasons that an effective teacher needs to create a learning environment and provide relevant experiences and stimuli so that learners construct their own learning. An effective teacher now needs to move into the role of a facilitator, and begin to use open-ended teaching-learning techniques.

However, if learners are not used to operating in such an open-ended learning environment where there are no right or wrong answers and where the onus of learning is on them and not on the teacher, it can be stressful for them. It is stressful when learners and teacher are not used to operating in open-ended, peer-driven learning processes. As an educator, it is thus important for the teacher to ensure that s/he builds the capacity of her/his learners in skills essential for operating in an open-ended learning process.

The skills learners need for open-ended learning that address gender and environment in relation to sustainable development fall under six headings:

- **Skills of information management:** receiving, expressing and presenting information; organising and processing information, evaluating information.

- **Skills of critical thinking:** critically evaluating data; creative thinking; problem solving; making ethical judgments; decoding and deconstructing media messages; decision making; systemic/ relational thinking; seeing the particular as part of the whole.
- **Skills of action:** change agency/advocacy; campaigning; involvement literacy (critical evaluation of action choices); adaptation/risk avoidance.
- **Skills of interaction: c**onsensus building and negotiation; assertiveness; listening; cooperation; conflict management; empathising and demonstrating solidarity.
- **Futures-oriented skills:** envisioning; extrapolating; forecasting; backcasting (the ability to think backwards from a point in a desirable future).
- **Personal skills:** congruence (the ability to discern and act on inconsistencies between attitudes/values and actual behaviour); emotional coping; centering (harmonising emotional, intellectual, physical, and spiritual aspects of the self); living simply.

Thus, by using a social constructivist approach, if an educator is able to create a learning environment which is open-ended, real-life inspired, and peer-interactive, learners are then able to comprehend and appreciate the dynamic nature and complex connects within the area of gender and environment.

9.4 EXAMPLES OF OPEN-ENDED TEACHING-LEARNING APPROACHES

9.4.1 MULTIPLE VIEWPOINTS: The Five-Corner Activity

Get your learners into an open area (an area where they can move about freely, where there are not many furniture restrictions). Now, tell the group that this activity has no rights and no wrongs; and that the activity is all about helping individuals: (a) frame their individual opinions on a matter of concern; (b) listen to and understand others' views on the same matter; and (c) appreciate that most matters related to gender and environment are not clearly compartmentalised. Instead, they are contextual and change from person to person, time to time.

Let learners know that you are writing the numbers 1, 2, 3, 4, 5 with chalk (on the floor; if it is carpeted, you can print these numbers on an A4 sheet in big font size and place them on the floor). Tell them that each number defines a position/point of view/standing that they may keep or hold with regard to an issue related with gender and environment and that you will share these issues with them through written statements.

Tell them that 1 implies, 'strongly agree'; 2 implies, 'agree'; 3 means, 'do not know' or 'am neutral'; 4 means, 'disagree' and 5 means, 'strongly disagree'. Tell the learners that as you open a statement on Gender-Environment, they need to decide their position based on their agreement or disagreement, and move to the position they believe in, based on the numbers that you have written on the floor.

Once learners have taken their final positions within their group, they should discuss their reasons for being in that position/spot/viewpoint. After two minutes, call for all groups' attention and ask them the reasons for being where they are. Go through the groups (1, 2, 3, 4, 5 or any other order that you may find appropriate) and ask each group now to share their reasons for taking a certain position. Let all listen to each of the different groups and during this whole process if any individual gets convinced by any other group's logic and reasoning and wishes to change her/his her position, then s/he may.

Encourage learners to keenly listen to one another, and notice the divergent views that people keep with regard to matters of gender and environment. Reiterate that Gender and Environment education is a rather dynamic subject and that views, perceptions, experiences change from person to person and place to place. Reiterate that there is no right or wrong position. It all depends on the individual's experiences and learnings. Some of the statements related to gender and environment that you may use for this activity are:

- Women are more caring than men ;
- Teaching is the best profession for women;
- Technology will provide answers to all problems related to environment;
- Women make better leaders

Learners should be encouraged to frame their own open-ended statements relevant for learning and put those forward as well. However, for use in this activity, caution must be taken not to put statements which have only one right answer like, sex and gender are different. Instead, only such statements should be used where multiple viewpoints and multiple valid responses are possible. Such activities help you as a teacher to build an open-ended learning environment in your classroom which is needed for Gender and Environment education.

9.4.2 PROBLEM-BASED LEARNING

The Social Development Theory greatly supports the use of a problem-based approach to learning (commonly known as Problem-Based Learning, or PBL). As you may have learnt during the B.Ed/M.Ed programme, PBL is an approach

of teaching-learning where the learners are confronted with a challenge that is as authentic as possible and encouraged to work as a group to identify solutions.

The activity provided in the previous section is indeed an example of PBL. Provided below is another example of PBL that can be used for Gender-Environment Education.

A Story from Bangladesh

Tell your learners that the story provided below is real. Ask learners to read the story and think about how they would introduce this woman to others in the class. As a whole class, discuss possible questions that you could ask the people featured in the stories (such as questions beginning with what, why, how, where, when, etc.).

People living in the island community of Char-Atra (in Bangladesh) have had huge problems from their land being lost due to erosion as the river floods. There were very bad floods in 2007. This makes growing crops harder. Hasina Begum is one of the members of this community.

She says: "Eight months ago, I was living where the river is now. Since the time I got married, I have had to move to new locations six times because of the land erosion by the river. This is now happening more frequently. Women and children have to suffer the most."

"Earlier, we used to stay for three or four years in one place but during the last five years we have been forced to move every year. Six years ago, we owned some land but that became a river and now we are landless. Women need to work hard to get daily earnings, and being landless, we cannot establish our homes the way we wish to. I hope we will be safe this year but we can't predict where the land erosion will happen after the flood."

Extreme weather disasters also cause loss of life, housing loss, and outbreaks of diseases. Diarrhoeal disease is the second-leading cause of death worldwide in children under five years old. Around 5,25,000 children die from it every year."

ESSENTIALS OF PBL

Problem-Based Learning (PBL) means cooperative learning starting off with a problem. The problem is in the centre and should foster a process among the students of assessing and discussing the issues of the problem. The goal is to activate prior knowledge of the students and to help them to start a learning process by reconstructing their knowledge and making new sense of it.

The seven steps are:

1. Clarifying terms
2. Defining the problem
3. Brainstorming
4. Structuring and hypothesis
5. Learning objectives
6. Searching for information
7. Synthesis

PBL is an approach for structuring curriculum content, facing students with problems from practice, which provides a stimulus for self-directed learning of students following defined steps. PBL is effective in Gender and Environment education. PBL challenges students to cooperate and work. It prepares students to think critically and analytically, and to find and use appropriate learning resources.

CHECK YOUR PROGRESS 9.2

1. Define PBL.
2. Write the seven-step process that PBL approach follows.

9.4.3 CASE STUDY METHOD FOR GENDER AND ENVIRONMENT

The case study is one of the popular teaching-learning techniques these days, especially in higher school grades and in higher education. Like PBL, case study also brings real-life learning experiences into the classroom. It's a qualitative research method. The case study approach allows in-depth, multi-perspective analysis of complex issues. Hence, it has high relevance in learning gender and environment issues. Case study analysis increases students' ability to:

- Re-create the bird's eye view
- Deduce conclusions from a piece of information
- Establish co-relation between various events of real life
- Read between the lines

Source: Problem-based Learning by Dejan Bokonjic, Mladen Mimica, Nurka Pranjic, et al

- Conduct in-depth analysis
- Extrapolate

However, case studies may not work very well if your learners are not accustomed to independent peer group work. To practise an example of using case study, let us pick up a case in Environmental Conservation.

The Case: News Report

Indigenous Groups Resist Biodiversity Park

Malaysia, BIDOR, Apr 17 (IPS): In the thick rainforest outside this town, about 150 km north of the national capital, the guileless Semai aborigines, famous to anthropologists for their for non-aggressiveness, are falling sick from stress brought about by sudden land development that threatens to uproot them.

One day in March, tractors and earthmovers suddenly appeared in their settlement near this town and began mowing down fruit trees and rubber plants the Semai people had planted for a livelihood.

"It was sudden and without any warning," Tijah Yok Chopil, a Semai woman said in Malay during a meeting with IPS at their Kampung Chang village. "We were told to tally our trees, fruits and animals because all these had to make way for a new project."

"Our people are rapidly being stressed-out and are falling sick. They get fever, stomach ache and cramps," Tijah said. "These are the symptoms of our people when we feel threatened."

"Falling sick is our way of protesting," she told IPS.

The Semai people, numbering just 15,000 in the world, are all settled in the central highlands of the country. They have been studied by European and American scholars who are invariably attracted to what one American scholar described as a total lack of violence in traditional Semai society.

However, human right activists and opposition lawmakers say while lack of violence is admirable, such values are taken advantage of by greedy "outsiders" who dupe the Semai and take away what rightly belongs to them.

Today the Semai are semi-settled with some surviving as hunter gatherers while others subsist on the cultivation of manioc and rice, fishing, hunting, and trading jungle produce like rattan.

A few run small farms growing fruits and rubber for sale in nearby towns like Bidor. They exchange meat and fish in the town for basic provisions like salt,

rice, sugar, tobacco and tea.

But living at the edge of the town is constantly fraught with danger. As the towns expand and encroach into Semai settlements, land-hungry developers use political clout to drive indigenous people like the Semai from their settlements.

"Semais are easily taken in by promises made by government officials and developers as more forest reserves come under the axe for housing, golf courses and mines," said opposition lawmaker Kula Segaran who raised the plight of the Semai people in the federal Parliament last week. "Government policies pay scant attention to the long-term welfare of not only the Semai people but all indigenous people in the country. To them golf courses, housing development and theme parks are more important than the welfare of the original people of the land."

Previously the Semai, numbering about 1,000 here, had to make way for large-scale oil palm plantations.

This time the threat to their way of life comes from a cause that even the Semais say is good — an arboretum called the National Botany Park covering 300 hectares, half of it eating into Semai reservations.

The project to protect Malaysia's rich biodiversity, preserve rare species from extinction, and collect seeds for a seed bank has the personal support of Prime Minister Abdullah Badawi.

"We are all for the National Botany Park but locate it somewhere else where people are not affected," said Ridzuan Tempek, a Semai activist fighting to preserve the Semai heritage. "It is unfair to just arrive and claim a big chunk of our ancestral land for a project without first informing us or consulting the Semai elders."

He said the project will take away nearly half of the Semai ancestral land. "It is not just a question of losing area for gathering food and jungle produce. Without the ancestral land our people's collective memory will be lost."

In Semai culture every stone, stream, and tree tells a story. "Each item in the jungle is part of our collective memory. This project, if it goes ahead, will sever us from our heritage," Ridzuan told IPS.

"If we are moved again we will end up as strangers in a strange land," he said.

Semai elder Semah Ah Yin, 51, said: "The forest is our home. Now we live with the forest and without hurting it. But under the Botany project a large area will be fenced off and we will be banned from entering our home. How can we survive without our forest? This is an insult," she said. "We are helpless and surrounded by hostile forces."

The government, unused to determined opposition from indigenous people, is stung by the criticism and opposition from the Semai elders. Its argument is that the Botany Park project will preserve rare plants and trees from extinction and will eventually benefit the Semai — though they are not buying.

"The Semai can find employment in the park," said R. Ganesan, a local government leader in the area. "They now only earn about Ringgit Malaysian 200 (60 US Dollars) a month —they can double that income."

After the Semai protest hit the news, officials have slowed earthworks and rushed in with offers of opportunities to earn more cash from home-stay programmes, work in the construction of chalets for tourists who will visit the nursery, and permits to set up stalls to sell food and trinkets.

"They have to look at the long-term benefits of the project for their future generations," Ganesan said.

But the Semai people are adamant and refuse to be sweet-talked into parting with their land and their heritage. "We are not taken in by the promises — our people have been cheated before," said Tijah. "We might consider a written agreement that puts our people's welfare first before all other considerations."

Tijah took care to say that "contrary to some news report we have not given our approval for the Botany park project — they must get our permission first. So far we have rejected the project."

1. Ask your learners to read the above case. Discuss, based on the following questions, and prepare a seven minute presentation of their work and responses.
2. What did the title suggest to you? Does it contradict or support what is in the report?
3. What does biodiversity mean to the Semais and to the local government?
4. Why do Semais feel that their collective memory will be lost? What does the government mean by long-term benefits of project?
5. How would you define development, based on this case?

CHECK YOUR PROGRESS 9.3

1. List the advantages and limitations of using the case study approach of learning.
2. Mention whether true or false: While applying open-ended learning approaches in the classroom, the teacher needs to become a facilitator of learning.

9.4.4 COLLABORATIVE/COOPERATIVE-LEARNING APPROACHES

Before we begin our exploration of using cooperative learning approaches, let us understand what we mean by Cooperative Learning (CL). Here are two comprehensive definitions by experts. Read both, discuss with a colleague at school, and keep referring to the definitions as you implement CL in your class. CL involves learning through teamwork. Teamwork is the basis of our family life and community life as well. Thus, conducting group work in the class is a natural way of teaching-learning, and falls very well within the theory of social development and constructivist learning. CL approaches and Gender and Environment education blend beautifully. They both encourage teachers to:

- Go beyond the boundaries of a single subject or a grade
- Go beyond the normative philosophy of teaching-learning concepts
- Appreciate the social context of learners
- Appreciate that people are different and that diversity is quintessential for any progressive and sustainable society
- Empower young learners
- Transform a 'teacher' into a 'facilitator'

Challenges in CL

Though CL situations may appear to be unplanned, conducting CL involves a lot of planning. Defining the need and then the objectives of a particular CL session is essential. Establishing curriculum links, and planning for pre- and post-session discussions by the teacher require time and plan of action, especially with regard to assessment of each child/learner. As a teacher, it is thus important that you understand the subject or topic being taught and learnt and that you are aware of real life issues of not only the subject but also of your learners. The following teaching-learning idea will help you discuss the need for responsible consumption and behaviour with your learners.

Give the following worksheet to the participants. It aims to compare the efficiency of resources used at different times. Ask participants to think about the various activities mentioned under the Activity column of the worksheet, and the practice of resource use for fulfilling these activities at different points in the generational calendar by them, by their parents and by their grandparents. Give them five minutes to think and fill up the sheet.

Worksheet

No	Activity	Grandparents' time	Parents' time	Current generation	Improving resource use efficiency
1	Cooking				
2	Buying Vegetables				
3	Transport (within a city/town)				
4	Long distance transportation				
5	Grinding spices, etc. for kitchen chores				
6	House lighting and cooling				
7	Hot water bath				
8	Marriage ceremony				
9	Brushing teeth, shaving, etc				

Discussion

Ask the participants to share their findings and observations. Can the participants think of ways to improve resource efficiency for performing the different activities listed?

Techniques that make learners active participants rather than passive recipients of information are crucial for the teaching-learning of complex and composite subjects such as Gender and Environment as these allow learners to learn on their own. Thus, in cooperative learning, the role of a teacher is to provide an optimum learning environment instead of creating guided learning practices.

Students work with classmates who have different learning skills, cultural backgrounds, attitudes, and personalities. Heterogeneous groups promote student learning. These differences compel them to deal with conflicts and interact with others. Social interaction improves communication skills that become a necessity to functioning in society.

The role of the teacher is important in cooperative learning. To have an effective cooperative learning group, teachers must know their students well. Grouping of students can be a difficult process and must be handled with care. Teachers must consider the different learning skills, cultural backgrounds, personalities, and even gender when arranging cooperative groups.

9.5 LETS SUM UP

The practical nature of gender and environment makes it a multi-disciplinary subject that comprises the knowledge and information from subjects as diversified as Sociology, Psychology, History, Physics and Biology. The wide ranging scope of gender and environment necessitates the teaching-learning experience to be a myriad mix of inter-personal and human skills of significance.

- The study of gender and environment requires a humane and inter-personal approach of teaching and learning.
- Theory of Socio-cultural Learning is the most relevant approach of learning gender and environment whereby contextual understanding is facilitated and it is easy to understand across varying socio-cultural setups.
- The role of the teacher is very dynamic in the teaching-learning process of gender and environment. They need to adopt open learning approach with focus on skills such as information management, future orientation, action and critical thinking etc.
- The Social Development theory is another effective approach for the study of gender and environment. Its focus is on problem-based learning that begins with an identified problem and goes on to the synthesis of the solution by a group of learners.
- Case study approach is important for the in-depth understanding and a sustainable solution of the problem.
- Collaborative learning approach helps in addressing the problem in a holistic manner that ranges from the problem itself to its relation with other impacting factors around.

9.6 UNIT - END EXERCISES

1) How does Vygotsky explain the process of learning? List the two fundamental principles of learning as per him.

2) List at least three examples of teaching-learning approaches that help create an open-ended and participatory learning environment. Detail each.

3) Define the role of teacher in enabling effective learning. Learning about Gender and Environment demand contextual, dynamic, and open-ended learning. How can a teacher achieve this?

UNIT 10 ASSESSING LEARNING IN GENDER AND ENVIRONMENT

STRUCTURE

10.0 INTRODUCTION

You are familiar with the objectives of teaching-learning of this course in Gender and Environment. As a tutor, how would you come to know which students have understood a concept and who has not? How does a facilitator decide where exactly a student needs help to improve awareness of gender and environment? The answer is, through assessment. When a single tutor is teaching many students, assessment provides essential feedback to the tutor about the effectiveness of the learning process followed.

Based on the findings of the assessment, the tutor takes important decisions about the progress of students.

10.1 LEARNING OUTCOMES

After studying this lesson, the teacher-pupil will be able to:

- identify gaps in understanding concepts and realising objectives ;
- interpret quantitative assessment of the number of learners at a particular level of progress ;
- extend feedback to students about their progress ;
- develop further remediation measures ;
- review the aim of assessment with reference to learning in gender and environment;
- make use of effective strategies for assessment of learning in gender and environment.

10.2 ASSESSING LEARNING ABOUT GENDER AND ENVIRONMENT

Assessment is a vital part of a student's learning environment in school. Assessment can be a cause of much happiness or distress for a child and the parents. Assessment is the process of gathering, interpreting, recording, and using information about a learner's responses to an educational task.

In the last chapter, we understood how teaching-learning of gender and environment is a multidisciplinary and dynamic process, because these two subjects are composites. Then, what kind of assessment strategies could work well for the same?

In this course, as discussed in the previous chapter, tutors tend to become facilitators and provide open-ended learning experiences to their learners; therefore, assessment of learning (in the formal education set-up) also needs to be reviewed and revised, as the traditional universal (one for all) test-based, score-based examination methods may not be applicable here.

So, how should a tutor view and revise assessment methodologies when it comes to gender and environment? The sustainability educator needs to use the mixed-bag approach.

CHECK YOUR PROGRESS 10.1

1. List the purposes of assessment.
2. Does assessment of learning in Gender and Environment need to be different from that of other subjects?

10.3 MAKING ASSESSMENTS MEANINGFUL

Assessment is often scary for a student. Examinations and tests are assessments and it is a fact that students often feel scared of these. There would hardly be any person who does not get uneasy at the thought of being assessed! That is because assessment generally involves comparison with others and one is labelled as good or bad on the basis of assessment results. Therefore, not only students but even their parents feel apprehensive about assessment. A large part of this experience of labelling is gained during schooling. How will it be if schooling happens without the scary labelling associated with assessment?

Assessment needs to be carried out with sensitivity. It is possible and is largely in the hands of the tutor and the school to ensure that students do not fear assessment and take it in their stride. If assessment is not perceived as something fearful, learning can be enjoyable.

A sensitive tutor emphasises the following things in assessment:

- Generally, assesses the content taught in class
- Discourages answering based on rote memory
- Encourages different ways of thinking by students and accepts answers accordingly
- Sees to it that the student is not excessively tense before, during and after assessment
- Encourages each student by verbalising her/his strengths are noticed.
- Avoids labelling students, instead providing specific feedback about what is assessed and how a learner can improve her/his performance. For example, rather than calling Meena untidy, says that writing can be more tidy or that Reena observes details well; Tara writes each letter separately; Mohan describes in full sentences, and so on.

Diagnostic and guidance purpose of assessment

Assessment helps the tutor to diagnose problem areas in teaching-learning. This may include misconceptions, lack of comprehension or gaps in learning. This is one of the purposes of assessment, but not the end. A good assessment process must go beyond diagnosis to remedy. This means that once you, as a tutor, facilitator and co-learner have diagnosed strong and weak areas of learning among your students, your effort should now be towards guiding each student in her/his further learning. Accurate diagnosis provides guidance to the tutor about necessary remediation. Thus, guidance is the second important purpose of assessment.

A good tutor uses assessment for both diagnostic and guidance purposes. S/he takes immediate corrective action following assessment so that learning continues; becomes effective and efficient.

Assessment tells us about teaching, too

We get feedback on students' learning through assessment. We come to know which Gender and Environment course learning objective has been achieved and to what extent. Assessment also tells us about how a tutor has taught.

Continuous and Comprehensive Assessment

Learning is a continuous process. So should be the assessment of learning. Assessment helps the tutor diagnose gaps and difficulties in learning. If these are addressed as soon as they are noticed, the flow of learning can continue making the learning process efficient and effective. Classroom assessment should be geared for accomplishing this job for every pupil. Thus, good assessment should be continuous.

An effective tutor should provide opportunities to learners to use not only their cognitive abilities, but also logical thinking, creative thinking as well as to develop and express their feelings. Consequently, assessment should be based on learning taking place through all the five senses, logical thinking, imagination and the feelings.

The tutor may use oral, written and performance modes to assess each child's learning. S/he will need to sometimes assess each child individually, but at other times assess groups or assess the whole class together. The tutor should not overemphasise any one form of assessment, be it written or oral or activity-based. Such diverse and balanced assessment makes assessment comprehensive.

10.4 APPROPRIATE ASSESSMENT TECHNIQUES

Learning gender and environment necessarily requires a rich and varied assessment system. If there are only information-based questions with short answers, tutors will not see why they should do anything else in the class that does not get assessed. With the help of classroom observations, we will be able to see how the tutor's questions can trigger learning and enquiry. Questions can be used potentially to make learners think and engage with concepts.

10.4.1 Formal and Informal

Assessment of learning in gender and environment demands a comprehensive

assessment process. Assessment should be carried out by self, peers, tutor, parents or occasionally by other school staff. This helps to create a holistic picture of the child's development.

It is thus required that a tutor use more than one approach of assessment. So, a tutor may actually need to use different assessment approaches at a given point in time. Let us look at the following examples:

A tutor is correcting a learner's written response about greenhouse gases.

The same tutor is now listening to a conversation between two learners where they are discussing the comparatively poor rate of enrolment of girls in schools in India.

The above examples illustrate different types of assessment being used by a tutor—formal and informal respectively. Both formal and informal assessments help a tutor understand learners' progress. Irrespective of the type of assessment, it is important for the tutor to be aware of the purpose of learning in gender and environment, and the rationale underlying the process of assessment.

10.4.2 Formative and Summative

Let us consider two sample assessments based on one of the major purposes of gender and environment education: To realise the close connection between needs, wants and luxuries and also the connection between consumption and carbon footprint.

I) A tutor was on an outdoor visit with her students. A week before that, she in her class, had discussed about responsible consumption. During the visit, she saw Ahmed, a boy who studied in her class, using a soft drink can. She talked to him and found that it is the domestic help who buys all these commodities for his family and that his family does end up buying overtly packaged items leading to a high quantity of non-degradable waste. The tutor asked Ahmed if he was convinced about improving his lifestyle in order to reduce his ecological and carbon footprint. He said, "Very much. I would like to improve my lifestyle and make it more sustainable."

   This timely assessment provided the essential feedback to the tutor about a gap between learning about 'production and consumption' and implementing it through 'responsible consumer behaviour. This is an example of formative assessment.

   The tutor could take immediate remedial action for removing obstacles in learning. In discussion with the school principal, she planned and carried

out a climate awareness event for parents of her class. Formative assessment thus helped the tutor diagnose impediments to learning and take an immediate corrective action.

II) This instance is about a chapter-end test in her gender class. The tutor asked a written question to understand how well the students have understood the implications of gender disparities in access to facilities and infrastructure. Besides a written test, the tutor also organised a group discussion which helped her in summative assessment.

This assessment of students' performance, at the end of one of the Gender units, helped the tutor to know the number and names of students who lacked an understanding of Gender disparities and its impact on a society. It also provided information regarding the attitude of students towards gender disparities and their values. This summative assessment helped the tutor to diagnose major gaps in the students' knowledge and understanding. The tutor found that while all the forty students had understood the importance of including gender issues in planning; fourteen had not understood why plans needed to be put in place to bridge gender gaps if we wanted a more equitable society. On realising this, the tutor arranged a talk by a gender expert and also arranged for a film screening on the topic.

10.4.3 Learning-Centered Assessment

Till now we have been talking of assessment being 'learning centered' in various ways. It means that a tutor needs to use assessment with a focus on learning. To bring it into practice, the tutor can use various modes of assessment. Some of these can be:

- self-assessment
- peer assessment
- cumulative anecdotal records
- assessment through projects
- extent and quality of participation

10.4.4 Self-assessment and Peer assessment

There are different modes of assessing what a child has learned. Occasionally the child and her/ his peers need to assess the learning, and the tutor should make it an important part of the learning process. During a class presentation, teacher Mathew asked every child to describe an animal or bird that they have

actually observed. After that, he asked each child to list two good things and one aspect that needed improvement in their own presentation. This was a form of self-assessment. For different topics, he continued the self-assessment every week for a month and asked the children to notice gradual improvement in the same aspects where one needed improvement. Would you like to try this out in your class? What will be the benefits of this kind of self-assessment?

When a child appreciates the map of the school premises drawn by a friend, it is peer assessment. The tutor can ask each child to appreciate a special skill of the classmate sitting alongside and record it as peer assessment.

Various kinds of self-assessment as well as peer assessment can add much value to the overall assessment process. Appreciation by self and classmates makes the child feel better about self. It can help the child build self-esteem. During cooperative learning, group members are often asked to rate the positive social behaviour of other members, such as helping and encouraging. A word of caution, the tutor needs to take care so that self and peer assessment become a tool of neither excessive praise nor undue criticism for any child.

10.4.5 Assessment through Projects

Projects make an integral part of teaching learning gender and environment. Two aspects of learning can be assessed through projects. One is their learning of the content and the other is the general objectives like analytical skills, teamwork ability and social skills. When learners carry out a group survey of a local community and their practices vis a vis gender, the tutor can assess a variety of aspects related to not just the content but also other skills, such as:

- Ability to effectively communicate with local communities
- Presentation quality of the project report
- Quality of participation: Students can be asked questions such as (i) name the group members who often helped one another (ii) name friends in your group (iii) were you able to resolve differences of opinion during the group work? (iv) did you share resources?
- Ability to think and analyse processes and relations in real-life situation

10.4.6 Cumulative Anecdotal Records

Teacher Masoomi often uses anecdotal records in assessment. She always carries her small diary and a pen with her, ready to note down significant and interesting details of students' behaviour. One day, she happened to see in her class that a student named Bittu gave a pack of CDs to Rahman, whose parents

could not afford to buy the same. During a visit to an all-women bakery with her students, she noticed Fatima asking many questions about self-employment, the local livelihood generation that the bakery provides, and its economics.

Masoomi noted both incidents in brief in her diary and also in the learners' portfolios.

CHECK YOUR PROGRESS 10.2

Read the above example and reflect: Can you think of reasons why Masoomi takes note of such incidents? How do you think she can use these records?

10.5 LETS SUM UP

The common understanding about the process of assessment is that it helps in scoring the performance of learners. However, good and effective assessment is meant for the facilitator/tutor to be able to learn how effective the teaching process has been and what the learners assimilated.

Good assessment techniques provide feedback to the tutor to help remedy her/his teaching techniques. These remedies are thus the closing step in the circular loop of assessment.

- Assessment is the process of observation, recording, interpreting and acting upon the process of teaching-learning with a view to attune learning to the learners' needs and focus;
- The focus of assessment of learning is, learning and the process of teaching-learning;
- For assessment to be effective, tutor needs to be sensitive to learners' fears and apprehensions about examinations and tests;
- Tutor should make the best attempt to not make assessment a scary process for the learner;
- For composite subjects like Gender and Environment, the tutor should use mixed-bag approach of assessment;
- Remedial action is the last step in the cycle of assessment of learning.

10.6 UNIT-END EXERCISES

1) Review some of the assessment interactions that you had with your learners during the year. Highlight the types of assessment you used. Critique each one of them for effectiveness.

2) Share your experiences of assessing a pupil's learning in a groupwork situation. What key criteria did you use?

10.7 SUGGESTED READINGS AND REFERENCES

1. Environmental Education in Schools, Module III, Green Teacher Diploma; COL and CEE; 2005

2. Learning Environmental Studies at Primary Level, Course 505 of D. El. Ed; NIOS, 2012

CURRICULUM

Gender Green Teacher
(515)

1. Rationale

Environment and sustainable development are key concerns of the contemporary world. Though several strides have been taken to improve the planet and restore its glory for the future generations yet the natural and man-made calamities such as floods, earthquake and wild fires disturb the natural habitat and the corresponding environment.

A crucial concern the world over is that of gender inequality. It manifests in much lower status of women in development indicators like education, health and livelihood in comparison to men. There have been focused interventions to address gender inequality but there remains a lot to be done at the level of community and the society as a whole.

Women and environment have a symbiotic relationship based on inter-dependence mutual caring. While environment provides the resources for survival, the women use these to provide for human consumption. The issues of environmental quality have been globally discussed but the challenges exceed the efforts and the impact.

Education and learning can effectively address the issues of gender and environmental sustainability. The Sustainable Development Goals (SDGs) have included gender equality, education and environment as separate domains of action. The SDG4 is for education and its role in contributing to the SDG5 on gender equality and SDG13 for climate action. The integration of gender and environment in education can bring about sustainable development through behaviour change and action. The process can be facilitated by the teachers who are updated in domain knowledge and are trained in the techniques of mainstreaming the subject in teaching. The training of teachers is essential for an impactful learning by the learners.

NIOS in collaboration with Commonwealth of Learning (COL) has launched a teacher training project in the area of Gender and Environment. The Gender Green Teacher' (GGT) is an ICT enabled, in-service professional development training course for school functionaries with the broad aim of sensitising the teachers to integrate and mainstream gender and environment content in the teaching-learning process.

The programme is a mix of theory and practice. Besides providing theoretical knowledge on gender and sustainable development, the course develops teachers' skills for workshop-based activities and Practice Teaching based on action. The aim is to sensitise the learners on gender and environment and build their capacity to address the concerns.

This Course is being offered so as to enable more and more teachers to build in competencies in gender and environment. Teacher's success would contribute to students' learning emphasising on proficiency in competencies supported learning outcomes.

2. Programme Objectives

The major objectives of the programme are:

- enhancement of understanding and knowledge on gender and environmental issues;

- development of positive attitude among teachers for gender and environmental issues; and
- enabling teachers to develop appropriate strategies to integrate gender and environment concerns in the teaching-learning process.

3. Target Group and Eligibility Conditions

Gender Green Teacher (GGT) Project is an ICT enabled, in-service professional development course for school education functionaries.

4. Type of programme

Six month Certificate Course

5. Duration of the programme

The duration of the programme is six months.

6. Medium

The course is bi-lingual with both Hindi & English.

7. Curriculum Structure

The course is divided in three thematic modules. Each module has separate units based on the underlying theme.

Module	Unit	Contents
1. Gender	1. Understanding Gender	• Understanding Gender ▪ Sex vs. Gender • Gender Roles • Gender Identity • Gender Concepts • Underlying Reason for Gender Differentiation
	2. Gender & Society	• Socialisation ▪ Social Institutions/Agents • Gender and Family • Gender and School • Gender and Community • Status of Women and Girls • Challenges in Women's Empowerment • Women of Grit

	3. Indicators of Gender Inequality	• Concept of Gender Inequality ▪ Inequality in Education ▪ Inequality in Health ▪ Work and Gender ▪ Participation in Politics
2. Understanding Environment	4. Introduction to Environment & Ecology	• Environment • Ecology ▪ Levels of Organisation in Nature ▪ Species ▪ Population ▪ Understanding Carrying Capacity • Natural Resources ▪ Forests ▪ Biodiversity o Benefits of Biodiversity ▪ Water ▪ Land o Importance of land use ▪ Air ▪ Energy o Importance of Energy
	5. Environmental Issues & Concerns	• Urbanisation ▪ Urbanisation-Environmental Concerns • Agriculture ▪ Agriculture- Environmental Concerns • Industrialisation ▪ Industrialisation- Environmental Concerns • Pollution ▪ Types of Pollution • Climate Change ▪ Climate Change-Environmental Concerns
	6. Environment Conservation Practices	• Environmental Laws and Legislation • Establishment of MOEFCC • Major Citizen-led Environmental Movements in India ▪ Movement to save Khejari trees by the Bishnoi ▪ Chipko Movement (1973) ▪ Save Silent Valley Movement (1978) ▪ Jungle Bachao Andolan (1982) ▪ Appiko Movement (1983)

		▪ Narmada Bachao Andholan (NBA) (1985) ▪ Tehri Dam Conflict (1990s) • Global Milestones in the Journey of Environmental Conservation • Environmental Conservation Action
3.Gender, Environment & Sustainable Development	7. Understanding Sustainable Development	• Redefining Development • Dimensions of Sustainable Development • Why Redefine Development as Sustainable Development • Features of Sustainable Development ▪ Quality of Life ▪ Population and Consumption • Ecological Footprint: An Idea based on Carrying Capacity ▪ How much does each human being need? ▪ Significance of Footprints • Efforts being made to sustain human development ▪ What can we do about Sustainable Development
	8. Gender & Environment: The Connect	• Women: Housewives or Earning Members? ▪ Agriculture • Are Gender and Environment Linked? • Women and Policy Formulation • Women and Development
	9.Teaching-learning Approaches for Gender and Environment	• Teaching-Learning about Gender and Environment • Creating an Open Learning environment ▪ The Role of a Teacher • Examples of Open-Ended Teaching-Learning Approaches ▪ Multiple Viewpoints: The Five Corner Activity ▪ Problem-based Learning ▪ Case Study Method for Gender and Environment ▪ Collaborative/Cooperative Learning Approaches
	10. Assessing Learning in Gender and Environment	• Assessing Learning about Gender and Environment • Making Assessments Meaningful • Appropriate Assessment Techniques ▪ Formal and Informal

		▪ Formative and Summative ▪ Learning Centred Assessment ▪ Self-assessment and Peer Assessment ▪ Assessment through Projects ▪ Cumulative Anecdotal Records

8. Support System

NIOS is the nodal agency for the conduct of the programme. The entire course would becoordinated by a team of experts from NIOS.

9. Programme Structure

The following strategy would be adopted:

Month 1	Month 2	Month 3	Month 4	Month 5	Month 6
Self-study Module 1	Self-study Module 1 (cont.)	Self-study Module 2	Self-study Module 2 (cont.)	Self-study Module 3	Self-study Module 3 (cont.)
Self-assessment (worksheet)		Self-assessment (worksheet)		Self-assessment (worksheet)	
Assignment (TMA)	Module 1 online test	Assignment (TMA)	Module 2 online test	Assignment (TMA)	Module 3 online test

10. Programme Delivery Strategy

The open system of education requires a good quality of instructional and learning material to ensure an effective and impactful learning experience. This program has the following instructionalsystem:

• Self-instructional Material

• Activity (Self-assessment)

• Audio / Video recordings

• Community of Practitioners on Gender and Environment

11. Scheme of Evaluation

a. Assessment Criteria

There are 3 major criterions of evaluation:

- Comprehension- Understanding of basic concepts
- Contextualisation- How to learn to adjust to real life situations
- Analytical thinking- How to analyse the cause and promote it for action

b. Marking and Certification

The comprehensive weight-age scheme is as follows:

Module	Comprehension	Contextualising	Analytical thinking	Weight-age (Module end test)	TMA (Assignments)	Total Weight-age
1	6	6	8	20	10	**30**
2	6	6	8	20	10	**30**
3	6	6	8	20	20	**40**
Total	**18**	**18**	**24**	**60**	**40**	**100**

The learner's evaluation is a concurrent process on the basis of three major evaluations (MCQs) as Module- end Tests and TMAs (Assignments) scheduled during the course. The first evaluation would take place after the completion of 2 months of the course and the second at the end of 4th month and third after the completion of 6th month. The results of three online tests will be consolidated into a Term End Examination (TEE) on the completion of 6 months.

Tutor Marked Assignments (TMA) are to be uploaded online for each module prior to the Module-end test.

After the completion of the programme learners will be awarded a digital certificate.

Gender Green Teacher - 515

Sample Question Paper

Questions 1-40 comprise 1 Mark each. Choose the most appropriate option:

Module 1

1. Gender is a _____ construct.

- **a.** biological
- **b.** social
- **c.** sexual
- **d.** reproductive

Ans: (b)

2. Radha feels sexually attracted to other women. So, _____

- **a.** Radha should be condemned by people
- **b.** Society should isolate Radha and debar her from active social life
- **c.** Radha should be counseled to change her sexual interests
- **d.** Radha should have the freedom to lead the life of her choice

Ans: (d)

3. Choose the correct option.

- **a.** Sex can be changed, while gender cannot
- **b.** Sex is from birth, gender is learned
- **c.** Sex is dynamic, gender is static
- **d.** Sex and gender determine sexual orientation

Ans: (b)

4. There is only some bread left in the house for dinner. Radha's husband has returned from work, her boy and girl, Rahul and Tina are also hungry. How is Radha expected to divide the food?

- **a.** Radha eats all the bread herself
- **b.** Radha gives it to her husband and son
- **c.** She gives it to her husband and daughter
- **d.** Radha distributes the bread equally among all

Ans: (d)

5. A menstruating woman:

- **a.** is impure& polluting
- **b.** is undergoing a normal biological process
- **c.** is to be isolated from other people
- **d.** is not to enter places like kitchen, temple, etc.

Ans: (b)

6. Women's productive work includes:

- **a.** Paid employment
- **b.** Household/domestic chores
- **c.** Care of children, elderly and the sick
- **d.** All of the above

Ans: (d)

7. 'Ira wants to be an elected MLA for a district in the urban city of Kanpur.'In light of this statement, choose any one:

- **a.** Her parents should stop her from entering a man's domain
- **b.** Her community should not elect her as she will not make a good leader
- **c.** Her family, peers and community should encourage her to take up this role
- **d.** The local political party should not give her a contesting ticket

Ans: (c)

8. Violence against women is when:

- **a.** A woman is beaten
- **b.** She/her family is asked for dowry
- **c.** She is not allowed to go outfor work/leisure
- **d.** All of the above

Ans: (d)

Read the paragraph below and answer the questions (9-10) that follow:

Mr. and Mrs. Gupta have 2 sons and 2 daughters. One son lives with them, the other is in the army and both the daughters are married. Mr and Mrs Gupta had a car accident in which they suddenly passed away. Their property is left with the children and now needs to be divided.

9. What should happen?

- **a.** The property should be equally divided among the sons.
- **b.** The daughters should not claim the property as the dowry given at their wedding is their share.
- **c.** The property should be equally divided among the four children.
- **d.** The eldest son should get all the property.

Ans: (c)

10. Which legislation enables the daughters to claim their share of inheritance in family property?

- **a.** Maternity benefits Act, 1961
- **b.** Hindu Succession Act, 1956
- **c.** Hindu Marriage Act, 1955
- **d.** The Equal Remuneration Act, 1976

Ans: (b)

11. A teacher promotes gender equality in the classroom. Choose the statement that best supports this.

- **a.** Teacher asks only boys to arrange the class furniture
- **b.** Teacher asks the girls to decorate the wall notice boards
- **c.** Teacher encourages both boys and girls to play outdoors
- **d.** Teacher encourages only boys to ask questions

Ans: (c)

12. Household chores are the responsibility of the family. Choose the statement that best supports this.

- **a.** Child rearing is the mother's task
- **b.** Fetching goods from the market is the father's/son'stask
- **c.** Cooking, cleaning, washing are the mother/daughter's tasks
- **d.** All these tasks are interchangeable so any member may do any tasks

Ans: (d)

Module 2

13. In ecological terms, a Primary Consumer is:

- **a.** One who buys materials directly from the producer
- **b.** A species that feeds directly on plant materials
- **c.** One who consumes only basic level of materials, supplies and services
- **d.** A species that feeds only on raw minerals and elements in Nature

Ans: (b)

14. Biodiversity covers:

- **a.** the variety of species of flora & fauna
- **b.** the variety of ecosystems
- **c.** the variety of genes
- **d.** all the above

Ans. (d)

15. The traditional round hut structure built in the Kachchh region is called:

- **a.** bhunga
- **b.** bhinga
- **c.** dera
- **d.** jhonpri

Ans. (a)

16. The Sustainable Development Goals is a set of:

- **a.** 11 goals with a target date of 2050 for achievement
- **b.** 17 goals with 169 targets to be achieved by 2030
- **c.** 12 goals set up by the World Bank for sustainable development of the world
- **d.** Goals and milestones set for sustainability, by the Ministry of Urban Development

Ans. (b)

17. What fraction of the world population lives in urban areas?

- **a.** half
- **b.** less than half
- **c.** almost entire
- **d.** over half

Ans. (d)

18. Heat Islands means:

- **a.** zones that remain warm when surrounding areas cool down
- **b.** islands that are hot in climate
- **c.** pockets of hot air around islands
- **d.** areas of hot air in the upper atmosphere

Ans. (a)

19. Which of these is the oldest form of a conservation area?

- **a.** National Park
- **b.** Biosphere Reserve
- **c.** Sacred Forest
- **d.** Wildlife Sanctuary

Ans. (c)

20. Name a non-renewable resource that you use in daily life.

- **a.** Coal
- **b.** Crops
- **c.** Uranium
- **d.** Solar power

Ans. (b)

21. A Waste Audit is:

- **a.** An audit in which you check how much money is being wasted
- **b.** An audit in which you check the types and amounts of waste generated
- **c.** An audit which leads to some waste generation
- **d.** An accounting exercise to minimize wasteful expenditure

Ans. (b)

22. Which one of the following is not an example of recycling:

- **a.** Using your kitchen wastewater for garden plants
- **b.** Converting your kitchen wet waste into compost manure
- **c.** Using old paper to produce new paper
- **d.** Collecting waste food and making it into animal feed

Ans. (a)

23. Ecological Footprint refers to:

- **a.** Natural Resources
- **b.** Man-made Resources
- **c.** Renewable resources

d. None of the above

Ans. (a)

24. Match items of Column A with correct items of Column B:

	A		B
A.	Deer	i.	Secondary/ Tertiary Consumer
B.	Vulture	ii.	Decomposer
C.	Lion	iii.	Primary Consumer
D.	Fungus	iv.	Producer
E.	Grass	v.	Scavenger

a. (A)-iii (B)-v (C)-i (D)-ii (E)-iv
b. (A)-ii (B)-v (C)-i (D)-iii (E)-iv
c. (A)-iii (B)-iv (C)-i (D)-ii (E)-v
d. (A)-iii (B)-v (C)-ii (D)-i (E)-iv

Ans. (a)

25. Categorize the following resources under Renewable (R) or Non-renewable (Nr):

	Resource	Renewable/Non-renewable
A.	Coal	
B.	Crops	
C.	Petroleum	
D.	Uranium	
E.	Solar power	
F.	Timber	
G.	Hydropower	

a. (A)-NR (B)-NR (C)-NR (D)-R (E)-NR (F)-R (G)-NR
b. (A)-R (B)-NR (C)-NR (D)-NR (E)-NR (F)-R (G)-R
c. (A)-R (B)-NR (C)-R (D)-R (E)-NR (F)-R (G)-NR
d. (A)-R (B)-NR (C)-R (D)-R (E)-NR (F)-NR (G)-NR

Ans. (d)

Module 3

26. If you work in the field of achieving clean water and sanitation, you are addressing:
a. SDG 11
b. SDG 1
c. SDG 6
d. SDG 17

Ans. (c)

27. The Pillars of Sustainable Development are:
a. Environment
b. Society

c. Economy
d. All of the above

Ans: (d)

28. Sustainable Development Goals are applicable to:
a. Only Asia
b. Few Countries
c. All countries of the world
d. Only India

Ans: (c)

29. Choose the correct option:
a. SDGoal 5- Quality Education
b. SDGoal 5 – Gender Equality
c. SDGoal 4 – No Poverty
d. SDGoal 4 – Gender Equality

Ans: (b)

30. Choose the most appropriate statement which refers to the relationship between women and the environment:
a. Women conserve natural resources for future use
b. Women waste natural resources in household chores like cooking, cleaning, etc.
c. Women use natural resources based on traditional conserving knowledge and practices
d. Both a and c

Ans: (d)

31. During a natural calamity, like floods and drought, women are faced with:
a. Increased burden of household work due to reduced available resources such as clean water and food
b. No increased burden, as men do all the work
c. Increased violence due to lack of security
d. Both a and c

Ans: (d)

32. Sustainable environmental and climate change policies are effective only if:
a. Men are involved in policy making process
b. Women are involved in the policy making process
c. Both 1 and 2
d. None of the above

Ans: (c)

33. Vygotsky believed that:
a. Social interaction plays a fundamental role in the development of cognition and learning
b. Learning based on human interaction and experiences is vital

c. Socio-cultural learning is the basis of gender and environment education
d. All of the above

Ans: (d)

34. The relationship between gender and environment needs to be looked at in terms of local context. Because:

a. It varies across Geographies
b. It varies across socio-cultural situations
c. It varies across economic situations
d. All of the above

Ans: (d)

35. The discipline of gender and environment involves which of the following subjects?

a. Geography and Psychology
b. Sociology and Civics
c. Economics and Statistics
d. All of the above

Ans: (d)

36. Which of the following are the approaches used for learning gender and environment:

a. Case-study approach
b. Problem solving approach
c. Collaborative learning approach
d. All of the above

Ans: (d)

37. Decay and degradation of environment has a direct impact on:

a. women's health & wellbeing
b. men's health & well being
c. More impact on women's health than that of the men
d. None of the above

Ans: (c)

38. A teacher notices that on a picnic, students were carrying plastic bags, packets, cans, and other non-biodegradable materials. She saw that the picnic spot was also littered with such materials. After coming back from the picnic, she chose to teach them about biodegradable materials and environmental conservation. What are the possible ways to assess the student's learning post this session?

a. The teacher makes anecdotal records
b. Peer assessment
c. Discussion and debates
d. All of the above

Ans: (d)

39. Understanding the discipline of gender and environment requires the learner to be skilled in

a. Information & management skills

b. Skills of action
c. Skills of critical thinking
d. All of the above

Ans: (d)

40. Women dominate agriculture and allied activities in which of the following areas?
a. Production – Milk and cattle rearing
b. Protection – Storage and conservation for seeds for future use
c. Agricultural operations – Sowing, weeding, winnowing etc.
d. All of the above

Ans: (d)