



Farook Training College Innovative Academia (FTCIA)
Online Collaborative Learning Project (OCLP)

Pre-Edited Version of Study Materials.

(Chance for minor errors)

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Online Collaborative Learning Project (OCLP)

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M Ed. IV. Sem. MED 15.2 Environmental Education

Module 1

Introduction to Environmental Education

- Origin and development of the concept.
- Need and significance, need of a green curriculum.
- Method and strategies of EE at elementary, secondary and higher education.



ENVIRONMENTAL EDUCATION



According to UNESCO :

“Environmental education is a learning process that increases people’s knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address the challenges, and fosters attitudes, motivations and commitments to make informed decisions and take responsible actions.”



Components of environmental education :

1. Awareness (awareness about environment and its problems)
2. Knowledge(basic knowledge about the environment)
3. Attitude(a sense of responsibility towards the environment)
4. Skill(skills to solve environmental problems)
5. Participation(participate in programs related to environment)

Origin and development of environment education

- The roots of environmental education can be traced back as early as the 18th century when Jean- Jacques Rousseau stressed the importance of an education that focuses on the environment in *Emile: or, On Education*
- Several decades later, Louis Agassiz, a Swiss-born naturalist, echoed Rousseau's philosophy as he encouraged students to "Study nature, not books."
- These two influential scholars helped lay the foundation for a concrete environmental education program, known as Nature study, which took place in the late 19th century and early 20th century.

- Jean-Jacques Rousseau at 18th cent., introduced a philosophy on environmental education in his work, Emile.
- A new type of environmental education, Conservation Education, emerged as a result of the Great Depression and Dust Bowl during the 1920s and 1930s.
- The first article about environmental education as a new movement appeared in Phi Delta Kappan in 1969, authored by James A. Swan.
- A definition of "Environmental Education" first appeared in Educational Digest in March 1970, authored by William Stapp
- In 1971, the National Association for Environmental Education (now known as the North American Association for Environmental Education) was created to improve environmental literacy by providing resources to teachers and promoting environmental education programs..

OBJECTIVES OF ENVIRONMENTAL EDUCATION

- To create awareness among the students about the environment and its problems.
- To enable the students to understand the environment and its inter relationship with man.
- To enable the students to acquire basic knowledge about the environment.
- To identify the social values which are in harmony with the environmental quality.
- To create positive attitude among the students towards environment.

OBJECTIVES OF ENVIRONMENTAL EDUCATION

- To develop skills among the students for evaluating environmental measures and educational programs.
- To develop skills among the students with a view to solve environmental problems.
- To create a sense of responsibility towards the environment.



NEED FOR ENVIRONMENTAL EDUCATION

- Some form of environmental pollution affects each and every nation though the issues differ
- Some of the most urgent environmental threats to be dealt with now and in the future
- Educational institutions all over the world have been making intense efforts to meet the challenges arising from politics, science and public opinion towards integrating environmental concerns

SIGNIFICANCE OF ENVIRONMENTAL EDUCATION

- EE is very important for the child and adult for self-fulfillment and social development. It helps in maintenance of life and health. In self-preservation and in the preservation of human race.
- It helps to understand different food chains and the ecological balance in nature.
- It helps to understand and appreciate how the environment is used for making a living and for promoting a material culture.

- EE helps in appreciating and enjoying nature and society.
- It stimulates concern for changing environment in a systematic manner for the long run as well as the immediate welfare of mankind.
- It directs attention towards the problems of population explosion, exhaustion of natural resources and pollution of the environment and sheds light on methods of solving them.

PRINCIPLES OF ENVIRONMENTAL EDUCATION

- EE should be continuous and compulsory.
- It should have an interdisciplinary approach by including physical, chemical, biological as well as socio-cultural aspects of the environment.
- EE should promote the value and necessity of examining the major environmental issues from the local and national point of view.
- EE should emphasize the importance of sustainable development. i. e, economic development without degrading the environment.

- EE should enable learners to include environmental impact analysis in proposed developmental projects in order to minimize environmental damages.
- EE should help the learner to discover the symptoms of and real causes of environmental problems.
- EE should emphasize the necessity of seeking international co-operation in environmental prevention and control of environmental problems.

Green Curriculum

Nowadays environmental education must be designed and developed as human rights education, in particular the right to a clean, preserved environment, to health, life and peace, as education for sustainable development and shaping the green society.

Greening the curriculum means ensuring that students are capable of taking on the 21st century challenges of global warming and climate change (the most serious threat ever to face humanity), social inequities, unsustainable lifestyles, and the urgent need to switch to a renewable energy-based economy.

Green Curriculum includes resources that help students gain skills and knowledge about: Generating renewable energy Recycling existing materials Energy efficient product manufacturing, construction, installation, and maintenance Education, compliance, and awareness Natural and sustainable product manufacturing.



Going green means to pursue knowledge and practices that can lead to more environmentally friendly and ecologically responsible decisions and lifestyles, which can help protect the environment and sustain its natural resources for current and future generations.



Method and strategies of Environment Education



PROVIDING ENVIRONMENTAL EDUCATION AT DIFFERENT LEVELS OF EDUCATION

Level	Objectives
Primary education	Awareness of environment (Knowledge)
Secondary education	Relevance for real-life situation of environment (Understanding)
Higher secondary education	Conservation of natural resources of environment (Skills)
College & University Education	Sustainable development by solving problems of environment (Attitude and Evaluation)

Pre-School Level

- Moral stories and rhymes concerning the worth of nature and environment.
- Proper knowledge about the things around us.
- Personal Hygiene and environmental Cleanliness Awareness through colourful pictures and posters and diagrammatic representations.
- Made to show love and compassion for all the living organisms.

Elementary School Level

Objective – Building up awareness among the children

- Real-life situation and conservation
- Sensitize the child about the concept of environment
- Main focus: environmental cleanliness
- Made to understand that the environment is surrounded by air, land, water and various kinds of animals and plants
- Role of environment is brought out through story telling and poem reading
- Content : surrounding from home to school to outdoor situations

Secondary School Level

According to the syllabus framed by the NCERT

- Objective : Real-life experience, awareness and problem identification
- Content : Used at Primary school supplemented with general science
- Human dependence on nature, adaptability of animals and man to their environments, ecological succession and eco-crisis, population and conservation, health and hygiene are included from simple to complex order

Higher Secondary Level

- Emphasis must be conservation, assimilation of knowledge, problems identification and action skills
- Content : Science-based and action-oriented work
- Separate supplementary text is issued by Tamil Nadu state
- Concerned with pollution ecology, population ecology and the role of science and technology in eliminating or minimizing the various environmental problems

ENVIRONMENTAL EDUCATION TECHNIQUES

- OBSERVATION
- NATURE GAMES
- NATURE WALK
- QUIZ
- ROLE-PLAY
- BRAINSTORMING
- SURVEY
- DRAMATIZATION
- PUPPETRY
- CASE STUDY

OBSERVATION

- Improves concentration about environmental issues.
- Encourages pupils to explore and learn local environment.
- Imagination and enthusiasm are heightened.
- Biophobia and nature deficit disorder decline.
- Responsible action is taken to better the environment.
- It helps to identify major environmental problems

NATURAL GAMES

- Playing in our natural playscape which makes use of our land resources to provide entertainment and physical activity.
- Creating and maintaining community gardens.
- A heightened interest and excitement in environment.
- Play in diverse natural environment reduces or eliminates anti-social behaviour such as violence, bullying, vandalism.
- Games provides new and interesting way to convey information which is easy to learn.

NATURE WALK

- A nature walk will also give more peace and quiet
- Walking with nature is very relaxing and well worth a daily trip.
- Reducing loneliness.
- To find natural problems.
- Natural beauty can actually increase immune function.
- To identify environmental issue

QUIZ

- Focus student's attention on a particular topic.
- Environmental quizzes helps to understand major problems in environment
- It creates environmental awareness.
- Quizzes improve or expanding knowledge of things in specific area.
- It promotes a healthy debate amongst participants in order to learn from each other.

ROLE PLAY

- Role play are a simple and low cost method.
- Focuses right on the problem and helps learners deal with it.
- It throws considerable light on crucial environmental issues within a short period of time.
- It does not require much material or much advance preparation.
- Role playing process provides a live sample of human behaviour that serves as a vehicle for students to gain insight in to their attitudes, values and perceptions.

BRAINSTORMING

- Creativity, fresh ideas, and innovation can be promoted.
- Brainstorming helps to understand the recent problems in environment.
- Team spirit acquires through brainstorming techniques.
- Brainstorming techniques helps to increase knowledge about environmental education.

SURVEY

- Surveys help to elicit opinions, feelings, and attitudes of individuals on various environmental issues or problems.
- Learn more about the environmental problems.

DRAMATIZATION

- The use of drama can greatly enhance and reinforce learning in environmental education.
- Drama can thus consolidate and extend students direct experience of the natural world and foster the empathy that is essential if students are to appreciate and ultimately protect it.

PUPPETRY

- Puppets are making using environment polluted materials like plastics.
- Puppet show makes awareness about nature.

CASE STUDY

- Case study explores student action for a sustainable future.
- Case study provides students with knowledge about the history of environmental sustainability and prepares them for a career in a global industry that is increasingly focusing and implementing environmental initiatives.
- Case study helps to take remedial measures for environmental problems.
- Case study helps detail study for environment.

ROLE OF TEACHERS IN ENVIRONMENTAL EDUCATION

- To arouse the children's interest in the environment and to raise challenging problems
- To discuss the approach to problems or topics
- To arrange visits
- To provide materials needed for practical work
- To arrange for visiting speakers
- To initiate and develop discussion and debate
- To provide facilities for displays and exhibitions of the work carried out.

QUESTIONS

2 Marks Questions

1. Define environment education?
2. What is green curriculum?
3. Explain the need and importance of environment education in the primary school curriculum of kerala?

5 Marks Questions

1. Differentiate between ecology and environment education?
2. Explain the need and significance of environment education?
3. Describe green curriculum and write a note on its significance?

15 Marks Questions

1. Explain various method and strategies of EE at elementary, secondary and higher education?

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Module 2

Eco concepts on Environmental Education

- **Eco literacy**
- **Ecological intelligence**
- **Naturalistic intelligence**
- **Eco tourism**
- **Eco pedagogy**



Ecological Literacy



Eco literacy (Ecological literacy)

- The term was coined by American educator **David W. Orr** & Physicist **Fritjof Capra** in 1990s.
- Eco literacy is the ability to understand the natural systems that make life on earth possible.
- To be ecoliterate means understanding the principles of organization of ecological communities and using those principles for creating sustainable human communities.

Why eco literacy??

Through eco literacy we learn that,

- **Life is cooperative. The patterns and networks of species, communities, and systems sustain each other.**
- **Life needs to be diverse. Diversity means that we can change.**
- **Every living and non-living thing is connected. Life is about relationships. Ecosystems are communities. Species work with each other in relationships. And yes, this sometimes means that they eat each other. That's a relationship too.**
- **Everything starts with the sun. This is what feeds the plants that sustain life on earth.**

Cont....

- **Matter cycles. Every piece of sand and drop of water has been here forever, and it will always be here, albeit in a different form.**
- **Ecosystems do not have waste. Waste is always food for another organism. If an animal poops, something has to eat that!**
- **People need nature to survive. We need clean air, water, and soil. We need plants and other animals to work with us and sustain us.**

Role of teacher

Teacher should

- Foster a sense of wonder for natural world and encourage students to explore that world, both freely and as of structured projects.
- Helps the students to understand nature and their place in nature.
- Work hard to develop empathy for all forms of life among students.
- Make an awareness among students about how nature sustains life.

Water Literacy



Water Literacy

- It means education and awareness of water as a resource.
- Being 'water literate' means having an understanding of the significance of water in life, and understanding of where water comes from and how to use it sustainably.
- It is a key tool in water resource management.

Objectives

- To promote behavioral change on water use and water conservation.
- To promote water sector careers in school universities and provide opportunities for youth to pursue careers in the water sector.
- To raise awareness of water and climate change to the public at large.



Growing concerns in present scenario

- **No substitute for water, unlike oil.**
- **Water is essential for survival.**
- **Availability reduces due to population growth and climate change.**
- **Global economy grows, so will thrust on water.**
- **Low water use efficiency.**
- **Uneven availability of water in space and time: leading to water scarcity.**

Strategies to promote water literacy

- **Make it a part of academic syllabus in schools and colleges.**
- **Developmental activities to reduce gap between availability and utilisation such as rainwater harvesting, watershed development, ground water recharge etc.**
- **Use of print and electronic media campaigns, observation of Water Resources Day etc to have effective impact.**
- **Management practices to bridge gap between creation and utilisation facilities.**

Cont...

- **Implement policies such as National water policy, State water policy etc and revise them in accordance with these policies keeping in mind the basic concerns and principles.**
- **Research and development to mitigate gap between demand and supply.**

Role of teacher

- **Raise awareness among the students about the importance of water and water conservation.**
- **Conduct field visit to provide direct experience for the students to realize the tragic situation of water scarcity.**
- **Make aware the students about water pollution.**
- **Conduct small developmental activities along with students in the school itself for water conservation.**
- **Teach students about ground water and it's importance.**

Ecological Intelligence



Ecological intelligence

- ❑ In 2009, Daniel Goleman put forward
- ❑ According to Goleman, is centered on the ability to understand the impact of our actions on the environment.
- ❑ This suggests that someone with a low ecological intelligence will have a very poor understanding of the consequences of their actions on the environment, as well as a limited ability to change their behavior as a result of these consequences.

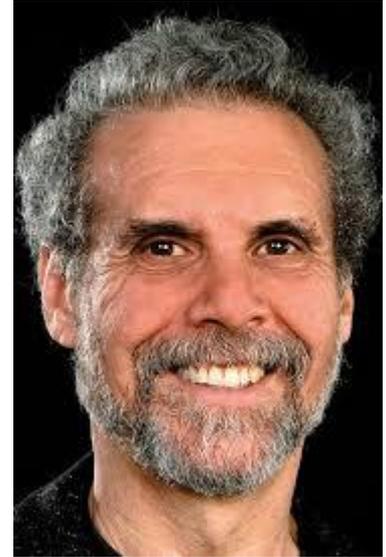
Definition of ecological intelligence

Daniel Goleman defines

“ecological intelligence” as individuals’ ability to apply what they learn about their impact on the environment to make changes in their behavior and live more sustainably.



- Goleman proposes that we should **start thinking more carefully about the impact of our actions.**
- According to him, every small gesture makes a difference.
- Buying organic products or clothing made from recycled materials can help reduce our “environmental footprint”, ensuring that our existence doesn’t threaten the long-term survival of our planet.



How to Develop Ecological Intelligence ???

Increase Awareness

The first step in developing our intelligence is to become more aware of what we do

Gather as much information as possible on our impact on the environment.

For various reasons, **most of us aren't aware of our lifestyles' environmental impact.**

We don't know how much it costs to produce the food we eat, the clothing we buy, or to upkeep our homes or our cars.

This means considering the small decisions we make on a daily basis and **how they affect our world and society.**

How to Develop Ecological Intelligence ???

Educating ourselves on the way in which our modern habits influence nature, and reflecting on those habits, will allow us to start developing our ecological intelligence.

Transform our lifestyles

Unless our habits are already faultless, we'll need to start making them more sustainable. This could take years and require us to completely transform our lifestyles. However, the rewards are unparalleled. We'll manage to create a better world for future generations to enjoy.

Naturalistic intelligence



Naturalistic intelligence

- ❖ It is one of the multiple intelligences
- ❖ By Howard Gardner in his theory of Multiple Intelligences.
- ❖ Frames of Mind (1983) —, in which Gardner defined seven types of intelligence and which earned him the Prince of Asturias Award in 2011
- ❖ Gardner proposed in 1983 that humans possessed seven areas of intelligence but increased that proposal to ten different areas over time.
- ❖ Gardner added an eighth branch to his model: naturalistic intelligence

Cont..

- This type of intelligence allows us to relate to the environment and other species.
- Naturalistic intelligence is deemed to be a person's interest in and relationship with the "natural" world of animals, plants, and the natural world around them.
- This modality includes people who feel inherently drawn to working in fields that involve animals, plants, geology, etc.

A woman wearing a wide-brimmed hat, a light-colored long-sleeved shirt, and dark pants is kneeling in a garden. She is surrounded by various green plants, including leafy greens in the foreground. The background shows more garden beds and trees under a bright sky. A stylized sun icon is positioned above the text.

People with
naturalistic intelligence
are immensely fond of
hiking, gardening, and
exploring nature.

People with Naturalist intelligence

- People with Naturalist intelligence have a sensitivity to and appreciation for nature.
- The Naturalist intelligence focuses on how people relate to their natural surroundings.
- Naturalists have a special ability to grow plants, vegetables and fruit. They have an affinity for animals and are good at training and understanding them.
- People with Naturalist intelligence are inspired and rejuvenated by nature.
- Gardner notes that "such persons with a high degree of naturalist intelligence are keenly aware of how to distinguish the diverse plants, animals, mountains, or cloud configurations in their ecological niche."



Characteristics of Naturalist Intelligence

- Physically/emotionally adverse to pollution
- Intense interest in learning about nature
- Dramatic enthusiasm when in contact with nature
- Powers of observation in nature
- Awareness of changes in weather
- Interested in subjects such as botany, biology and zoology.
- Good at categorizing and cataloging information.
- May enjoy camping, gardening, hiking and exploring the outdoors.

Children having naturalistic intelligence may exhibit some of the following characteristics:

- ❑ Have keen sensory skills - sight, sound, smell, taste and touch.
- ❑ Readily use heightened sensory skills to notice and categorize things from the natural world.
- ❑ Like to be outside, or like outside activities like gardening, nature walks or field trips geared toward observing nature or natural phenomena.
- ❑ Notice patterns easily from their surroundings -- likes, differences, similarities, anomalies.

Cont...

- ❑ Are interested and care about animals or plants.
- ❑ Notice things in the environment others often miss.
- ❑ Create, keep or have collections, scrapbooks, logs, or journals about natural objects -- these may include written observations, drawings, pictures and photographs or specimens.
- ❑ Be very interested, from an early age, in television shows, videos, books, or objects from or about nature, science or animals.
- ❑ Easily learn characteristics, names, categorizations and data about objects or species found in the natural world.

Activities that children with naturalistic intelligence will enjoy

- Collecting natural organisms, leaves, flowers etc.,
- Using scientific gadgets - telescope, microscope etc.,
- Environment related activities - recycling etc.,
- Learning about nature
- Visiting various natural locations

As a teacher, you can enhance and strengthen your students' naturalist intelligence by having them:

- Attending class outside
- Keep a nature journal to record changes or discoveries in nature
- Illustrate discoveries in nature
- Read books and articles about nature and the environment
- Write articles about nature (poems, short stories, news articles)
- Giving lessons on weather and nature
- Performing skits about nature and cycles
- Conduct research on local foliage

ECO TOURISM



ECO SYSTEM

"An ecosystem is a unit of biological organisation interacting with the physical environment such that the flow of energy and mass leads to a characteristic trophic structure and material cycles."

TOURISM

- World's largest industry
- Fastest growing economic sector
- Positive and negative impact on people's lives and environment

**Ecosyste
m**



**Touris
m**

Ecotourism

What is ecotourism???

"Responsible travel to natural areas which conserves the environment and improves the welfare of the local people"

(The Ecotourism Society)

"Responsible travel to natural areas that conserves the environment, sustains the well being of the local people and involves interpretation and education"

(The International Ecotourism Society)

Principles

- It is Non-consumptive/ Non-extractive
- Creates an ecological Conscience
- Holds eco-centric values and Ethics in relation to nature

Important Goals of Eco tourism

- Biodiversity conservation
- Sustainable development

Importance of ecotourism

- Utilises natural resources (landscapes, mountains, bio-diversity areas, rivers etc)
- Not a travel statement – message of our relationship with nature and its inhabitants
- Focus point: local cultures, wilderness, adventures and environment protection
- Ecological diversity
- Popularise secluded parts of the country
- Based on sustainable/eco-friendly tourism
- Tourism pressure degraded the ecologically fragile areas of the country
- Generate revenue without disturbing delicate ecosystem



Major Issues in India

Environmental issues

- Explores wilderness
- Tourist of prosperous strata
- Tour operators succumb to demands
- Artificial landscapes, resorts, luxury hotels and shopping centers

Social economic issues

- Ecotourism often owned by outside interests
- Carrying capacity of the host area is not calculated
- Breakdown of civil amenities during peak season

Impact over locals

- Tourism monoculture
- Insincere source of income

ECO PEDAGOGY



Ecopedagogy is a discourse, a movement and an approach to education that has emerged from leftist educators in Central and South America including Paulo Freire, Moacir Gadotti and Leonardo Boff that seeks to re-educate “planetary citizens” to care for, respect and take action for all life. Ecopedagogy's mission is to develop a robust appreciation for the collective potentials of humanity and to foster social justice throughout the world.

Ecopedagogy, or “Earth’s Pedagogy”, emerges now as a project for a New Ecologically-Sustainable Civilization that children and young people can undertake. Ecopedagogy is a new kind of scientific inquiry into how we can best produce a more just, more ecological and peaceful sustainable civilization.

As an educational interactive program, Ecopedagogy:

- Cultivates in students critical thinking, consciousness raising (conscientization), culture of dialogue and active democratic participation in society;
- Promotes new crucial eco literacies and socially responsible lifestyles, new sustainable policies;
- Educates critically students for taking action for sustainability and social justice in local and global society.

Ecopedagogy Principles

- **Social, Ecological and Climate Justice:** Not one or the other-but justice for all life, centering the voices of those who are most impacted by our current injustices.
- **Popular Education:** Ecopedagogy is an extension of Paulo Freire's seminal work, Pedagogy of the Oppressed. Many of the concepts of power and oppression are expanded to include the non-human world as oppressed as well.
- **Post-Issue activism:** Issues of social and economic justice, democracy and ecological integrity intersect and are interdependent. Ultimately none of the are possible without all of them intact.

- **Planetary Citizenship:** Our lived reality is becoming globalized, we should globalize our sense of community, responsibilities and our commitments as well.
- **Art Education:** Ecopedagogy encourages people to develop the capacity to feel, intuit, imagine, create, relate and express themselves.
- **Care:** Dis-care of each other and of the planet has contributed to our current planetary crisis. Care can “conjure the strength to search for peace in the midsts of conflict”.

Goals of ecopedagogy movement

- Creating opportunities for the proliferation of ecoliteracy programs, both within schools and society.
- Bridging the gap of praxis between scholars and the public (especially activists) on eco pedagogical interests.
- Instigating dialogue and self-reflective solidarity across the many groups among educational left, particularly in light of the existing planetary crisis.

Aspects of ecopedagogy

- Praxis
- Teaching ABOUT the social and natural environment
- Teaching IN the social and natural environment
- Teaching THROUGH the social and natural environment
- Teaching the connections of sustainability
- Urgency

ACTION-BASED ECOPELAGOGY

“**Prevent** – **Preserve** - **Build**”



An *Action-based Ecopedagogy Education and Socialization Programme* “**Prevent-Preserve-Build**” that aims at deep sustainable social transformation.

QUESTIONS

2 Marks Questions

1. Explain Eco- tourism?
2. What do you mean by eco pedagogy?
3. Write 2 major goals of ecotourism?
4. Define Ecological intelligence
5. Explain eco literacy?
6. Define water literacy in your own words?
7. Briefly explain any two developmental activities for promoting water literacy?

5 Marks Questions

1. Explain the meaning of eco pedagogy and its importance in present scenario?
2. Discuss the meaning and relevance of eco tourism?
3. What are the main principles in eco pedagogy?
4. What is Naturalistic intelligence as per Howard Gardner?
5. Explain the concept of ecological intelligence.
6. What is eco-literacy? Discuss the role of teacher in creating awareness.
7. Explain the need and significance of water literacy

15 Marks Questions

1. Explain the barriers of eco tourism in india?
2. Explain the concept of eco tourism and also discuss how it has helped in boosting economy of kerala?
3. What is water literacy? Explain it's growing concerns in the present scenario? Also suggest strategies to promote water literacy?

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Module 3

Sustainable Development

SUSTAINABLE DEVELOPMENT

- **Sustainable development can be defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Brundtland report, 1987).**

SUSTAINABLE DEVELOPMENT

- **Gro Harlem Brundtland** first introduced the concept of **sustainable development**.
- **Organizing principle for human life on our planet.**
- **Utilize resources optimally and rationally.**
- **Sustainability** is goal of sustainable development.

Sustainable Development

Improvement
of lifestyles
and well-being



Preserving
natural
resources and
ecosystems

Importance of Sustainable development:

1. Environmental conservation and proper utilization of natural resources
2. Increase funding for environmental development
3. Conservation of biodiversity
4. Pollution control
5. Population control and poverty elevation
6. Creating IGNOs and local groups for conservation
7. Conservation for future generations
8. Ecological diversification and its conservation

PRINCIPLES OF SUSTAINABLE DEVELOPMENT

- The principle of sustainable development which received international recognition as a result of **Brundtland Commission Report (1987)** was overwhelmingly supported by all the nations.
- Some of the salient principles which underlie the concept of sustainable development were spelled out in the **Rio Declaration, 1992 and Agenda 21.**

The principles are as follows:

- 1) Inter-generational equity;
- (2) Use and conservation of natural resources;
- (3) Environmental protection;
- (4) The precautionary principle;
- (5) The 'Polluter Pays' principle;
- (6) Principle of liability to help and co-operate;
- (7) Poverty eradication; and
- (8) Principle of 'public trust'

EDUCATION FOR SUSTAINABLE DEVELOPMENT

- Education for Sustainable Development (ESD) is defined as education that encourages changes in knowledge, skills, values and attitudes to enable a more sustainable and equitable society.
- ESD aims to empower and equip current and future generations to meet the needs using a balanced and integrated approach to the economic, social and environmental (ecological) dimensions of sustainable development.

- Sustainable development is generally thought to have three components: (1) Society, (2) Environment, and (3) Economy.



1. SOCIAL

- **Participation and inclusion of everyone**
- **Eradication of poverty and exclusion**
- **Food security**
- **Equitable distribution of resources**
- **Better life chances and opportunities**
- **Protection from exploitative**

2. ENVIRONMENTAL

- Protection of ecosystems and biospheres
- Increased quality of air, land, and water
- Better management of waste and pollution
- Respect and protection for all species- flora, fauna, marine species
- Measures to ensure resource sustainability

3. ECONOMIC

- Opportunities for growth
- Increased GDP and benefits
- System stability and security
- Green jobs and eradication of unemployment
- Prevention of practices which misuse resources
- Regulation of over exploitation and harmful externalities

SYMPTOMS OF NON- SUSTAINABILITY

- **Greenhouse effect and climate change**
- **Ozone depletion**
- **Atmospheric acidification**
- **Toxic pollution**
- **Biological species extinction**
- **Deforestation**

SYMPTOMS OF NON-SUSTAINABILITY

- **Fisheries depletion**
- **Land degradation and desertification**
- **Depletion of non- renewable resources like fossil fuels, top soil and minerals**
- **Urban air pollution and solid wastes.**

STRATEGIES FOR RENDERING ESD

1. National level strategies
2. Sub-national level strategies
3. Local level strategies

1. NATIONAL LEVEL STRATEGIES

- There is a strong tradition in most developing countries of preparing periodic national development plans, often covering a five-year plan.
- Such plan send to set out broad goals and include projects and activities to be funded from the annual recurrent and development budgets, economic or occasionally social.
- Strategies for reducing **HIV/AIDS, acute diseases** etc.
- Transport, agricultural, health and educational strategies.

- Countries can develop National visions should have the consensus of different groups of society including those of different political parties.
- **Poverty alleviation programme**
- The Programme and Policies should be country driven, be developed transparently with broad participation of elected institutions, stake holders including *civil society, key development co-operation agencies and regional development banks* and have a clear link with the agreed international level goals

2. SUB-NATIONAL STRATEGIES

- There should be strategic planning frame works at provincial and district levels such as *district environmental action plans and Local Agendas*.
- Under decentralization, district and municipalities can be given responsibility for sustainable development and are required to prepare and implement their development strategies and plans increasingly through participatory processes.

- **The upper institution should provide enough financial means to implement plans. Often such plans need to be passed upwards for harmonisation and approval at regional and national levels.**

3. LOCAL LEVEL STRATEGIES

- In developing countries, there is considerable experience of village-level planning. Such planning should be under taken in a strategic, participatory and transparent manner.
- The village has equal responsibility to prepare plans through identifying major problems, solutions and sources of required resources.

- **A variety of local level strategies are developed through mechanisms which are largely ignored by central government, but which could provide extremely important local pillars for a sustainable development strategy and its supporting co-ordination system.**
- **NGOs can play a vital role in mobilising local energies to combine socio- economic development and environmental conservation at the grass root level.**

CRITICISM ON THE CONCEPT OF SUSTAINABLE DEVELOPMENT

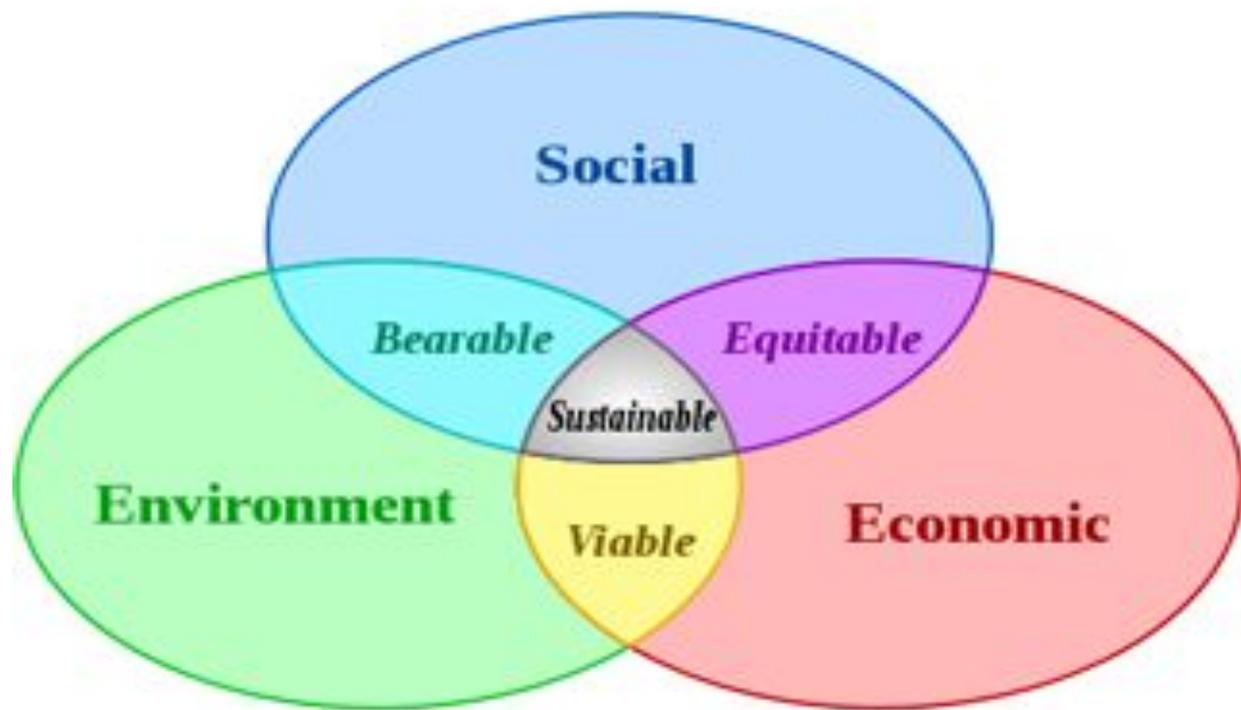
- ***Environmental economist Kerry Turner says...***

Sustainable development makes no sense to talk about the sustainable use of a non-renewable resource.

- ***It does not give a clear perception about non-renewable resource.***
- ***The term “sustainable development” is vague.***
- ***Cannot measure sustainability in any unit. There is no option to estimate and calculate needs.***
- ***So, it is difficult to meet the needs for the present generation as well as for the next generation.***

- ***Sustainable development is totally anthropocentric. It is deeply concerned about human being and its progress.***
- ***It comprises of complex activities that can be expected to improve the human condition in such a manner that the improvement can be maintained.***
- ***If there comes any breakthrough of the three pillars of sustainable development, viz, Economic development, Social development, Environmental protection, sustainable development cannot be fulfilled properly.***

- ***Sustainable development is contradictory as development and sustainability obey opposing logics.***
- ***Development favours the capitalist character, the other shows the collective character.***
- ***So, there is a conflict of two opposite words in together.***
- ***Sustainable development does not explain how a society or nation can get a viable, bearable and equitable situation.***



- ***Sustainable development is an integrative framework of Economic, Social and Environmental development.***
- ***Sustainable development has no subdivision for interconnecting these elements of it properly.***
- ***Framework does not mention specific things and issues.***

2 Marks Questions

1. **Define sustainable development.**
2. **What is meant by ESD?**
3. **Give a short note on non-sustainability.**
4. **What are the three pillars of sustainable development?**

5 Marks Questions

- 1. Discuss about the criticism on the concept of sustainable development.**
- 2. In what ways does education promote sustainable development?**
- 3. Briefly explain the concept of ESD**
- 4. Why sustainable development is important?**

15 Marks Questions

- 1. Explain the concept of ESD. What are the different strategies for rendering ESD?**

M Ed. IV. Sem. MED 15.2 Environmental Education

Module 4

Environmental Heritages and culture

Western Ghat

Meaning of the term Ghat

- Ghat means a stair or a passage leading down to a river or a mountain pass\ mountain ranges
- two mountain ranges forming the eastern and western edges, respectively, of the Deccan plateau of peninsular India.
- Western Ghats, also known as Sahyadri
- In Hindi ghat means “river landing stairs” or “mountain pass”
- It is a UNESCO World Heritage Site
- .It is one of the eight "hottest hotspots" of biological diversity in the world
- It is called the Great Escarpment of India
- It runs parallel to the West coast of India from the river Tapi in the north to Kanyakumari in the south.
- Western Ghats was declared as a world heritage site in 2012 by the United Nations Education, Scientific and Cultural Organisation (UNESCO).

Relevance of western Ghat- As UNESCO world Heritage Site

- ★ According to UNESCO, Western Ghats are older than Himalayan mountains. It also influences Indian monsoon weather patterns by intercepting the rain-laden monsoon winds that sweep in from the south-west during late summer.
- ★ It is a biodiversity hotspot that contains a large proportion of the country's flora and fauna; many of which are only found here and nowhere else in the world.
- ★ the mountain range extends over a distance of 1500- 1600 km from Tapti river in the north to Kanyakumari in the south with an average elevation of more than 600 m and traverses through Six States viz. Gujarat, Maharashtra, Goa, Karnataka, Kerala and TamilNadu. Its geology and geomorphology coupled with high rainfall makes the Western Ghats as one of the most ecologically diversified landscapes.

con

- Western Ghats is a magnificent mountain range.
- It is a biological treasure trove with a high degree of endemism (11% to 78%) and scenic beauty. This unique ecosystem has been threatened by continuously increasing habitat pressures and declared as one of the world's hottest hotspots of biodiversity.
- Realizing the need to protect and rejuvenate the ecology of and for sustainable development in Western Ghats, the Ministry of Environment and Forests (Moe) constituted a Western Ghats Ecology Expert Panel (WGEEP).
- The mandate of WGEEP was to demarcate ecologically sensitive zones and suggest measures to conserve, protect and rejuvenate the ecology of Western Ghats region.

con

Ecological diversity of WG that supports:

- (I) a wide range of forest types ranging from tropical wet evergreen forests to grasslands,
- (ii) some 4000 species of flowering plants with high degree of endemism and
- (iii) rich fauna with endemism ranging from 11% to 78% among different groups.

Western Ghats constitutes not only one of the hotspots of biodiversity in the world, but also one among world's eight hottest hotspots. It is the source of water for the entire Peninsular India, and also influences the monsoons.

con

- ★ Over 5,000 different plants occur in the Western Ghats. Around 1,700 of these are found nowhere else in the world . • This includes the wild relatives of many economically important species, such as grains (including rice and barley), fruits (mango, banana and jackfruit), and spices (black pepper, cinnamon, cardamom and nutmeg) , as well as numerous medicinal plants , such as the highly threatened white damor (*Vateria indica*). The fragrant resin and seed oil of this large evergreen tree can be used in medicines, as well as in soap and candle manufacturing .
- ★ It is classified as evergreen forest as it receives as much as 350 inches of rain every year. 77% of amphibians, 0.2% of reptiles located in the Western Ghats are not found anywhere else in the world. Up to 320 endangered species survive here.
- ★ It covers 25% of India's biodiversity and new flora and fauna species are discovered every year here.
- ★ The Western Ghats intercept the westerly monsoon winds, consequently receiving high rainfall on the western side. The high rainfall over the Western Ghats feeds the rivers of India, with major river systems flowing in an easterly direction due to the gradient of the land and draining out into the Bay of Bengal.

2 Marks Questions

1. What you mean by Ghat ?
- 2.

5 Marks Questions

Describe about western Ghat.

15 Marks Questions

Explain the relevance of western ghat

Threats to WG

- ★ LIVESTOCK GRAZING
- ★ ILLEGAL HUNTING.
- ★ HUMAN-WILDLIFE CONFLICT
- ★ .EXTRACTION OF FOREST PRODUCTS
- ★ FUELWOOD AND FODDER EXTRACTION.
- ★ PLANTATIONS
- ★ MINING
- ★ ENCROACHMENT BY HUMAN SETTLEMENTS
- ★ POLLUTION
- ★ HYDROPOWER PROJECTS & LARGE DAMS
- ★ DEFORESTATION
- ★ CLIMATE CHANGE

Con

Livestock grazing :-Livestock grazing within and bordering protected areas by high densities of livestock (cattle and goats) is a serious problem because it causes habitat degradation. Growth in livestock densities often accompany human population growth, resulting in serious conflicts between villagers and forest department officials.

Illegal hunting :-Illegal local hunting driven by tradition or demand for wild meat is pervasive across the Western Ghats. Hunters employ guns as well as a wide array of traditional methods such as poisoning, snaring and trapping. Wild meat is a nonessential part of the diet of hunters who frequently have access to alternative sources of animal protein.

Human wildlife conflict :- human-wildlife conflicts are common. Very high human population densities in several parts of the hotspot further exacerbate the intensity of conflict.

Con

Extraction of forest products :-Human communities living within and adjacent to protected areas in the Western Ghats hotspot are frequently dependent on the extraction of non-timber forest products (NTFP) to meet a diversity of subsistence and commercial needs.

Extraction of fuelwood and fodder :-The extraction of fuelwood and fodder constitutes a significant and pervasive consumptive use within the Western Ghats. Overall, extraction of wood from both live and dead plants represents a serious threat negatively affecting canopy gaps, regeneration (lower fruit and seed production), stand density, basal area and population structure. Extraction also results in the local extinction of overharvested, preferred species. There is significant habitat degradation for the first several hundred meters into most forest fragments in the Western Ghats.

Con

Plantation :-Agroforestry systems in the Western Ghats are today dominated by tea, coffee, rubber and monocultures of various species, including the recently introduced oil palm. Large-scale planting of coffee in the Western Ghats began in 1854 . Over the years, plantations of cash crops have displaced extensive patches of natural forests throughout the Western Ghats and are frequently associated with encroachment of surrounding forest areas. Plantations owned by private individuals and corporate sector continue to grow in the Western Ghats and constitute an important source of fragmentation of natural habitat within the hotspot. With ecological restoration and other appropriate interventions, they could become potentially important corridor areas for certain wildlife species.

Mining:-With a steep increase in iron ore prices and demand for lower grade ores, mining activities have grown rapidly especially in Goa and often in violation of all laws, resulting in serious environmental damage and social disruption.Sand mining has emerged as a major threat in Kerala. Unsustainable mining has increased vulnerability to landslides, damaged water sources and agriculture, thus negatively affected the livelihoods of the people living in those areas

cn

Encroachment by human settlements: Human settlements where legal and/or traditional rights of land ownership occur both within and outside protected areas all across the Western Ghats and represent a significant landscape level threat.

Pollution: The unrestricted use of agrochemicals in the vicinity of forests, particularly in tea and coffee estates, causes serious damage to aquatic and forest ecosystems

.Hydropower projects and Large dams: Large dam projects in Western Ghats have resulted in environmental and social disruption despite cost benefit analyses and environmental impact assessments being done by the government and companies

Deforestation: Conversion of forest land into agricultural land or for commercial purpose like tourism, illegal logging for timber have had significant negative effects on biodiversity.

Climate change: The changes in land use and deforestation have led to big variations in the duration and intensity of rainfalls. Climate change has been considered as a cause of floods in many regions in recent past.

5/ 15 mark questions

What are threats to affect WG -explain ?

ROLE OF WESTERN GHATS IN CONTROLLING CLIMATE OF KERALA

- The Western Ghats perform important hydrological and watershed functions. Approximately 245 million people live in the peninsular Indian states that receive most of their water supply from rivers originating in the Western Ghats. Thus, the soil and water of this region sustain the livelihoods of millions of people. With the possible exception of the Indo-Malayan region, no other biodiversity hotspot impacts the lives of such a large population.

- In the western Ghats wind plays a major role in governing the climate as it determines the alteration of seasons. In summer they bring large masses of water, the condensation of which cause the monsoon rains. They are also responsible for the drying up and cooling of the peninsula in winter.

- Lying on the windward side of the Western Ghats and being the first state to be hit by the monsoon winds, Kerala receives copious rainfall. Almost 85% of the rains received in Kerala is contributed by the monsoons. The slopes of the Western Ghats are among the places in India which receives the highest amount of rain.

- The circulation system around the Western Ghats is complex as the case of any other mountain environment. The average height of the mountain in present study area is about 1200 meters and the entire mountain stretch in this area is divided by two passes like Aryankavu Pass and Pal ghat Gap.
- Even-though the Aryankavu Pass is not comparable to Palghat Gap in topographical specialties, even then it controls the weather and climate of the adjoining areas of Aryankavu and Punalur in the western side and also the part of Madurai district in the eastern side.

- Similarly the places like Pollachi, Coimbatore and Cdumelpet in the eastern side and Palghat and Malappuram Districts in the western side of the Western Ghats is also under the control of the major Gap of Palghat. This shows the impact of the mountain on the wind pattern and the effect of these Gaps in controlling the Kerala climate very clearly.

- The Western Ghats strongly influences the rainfall pattern of Kerala state in the Indian subcontinent.
- In the western side of the Western Ghats, the maximum rainfall is getting along the Konkan coast and the Eastern side becomes a rain shadow region. Thus Kerala comes under the heavy rainfall regime and Tamilnadu falls in the rain shadow region.

- The analysis of the observed rainfall pattern over the region has been done with the climatological data set of India Meteorological Department. In the case of Kerala rainfall, is considered as Northern Kerala and the rest is taken as Southern Kerala.

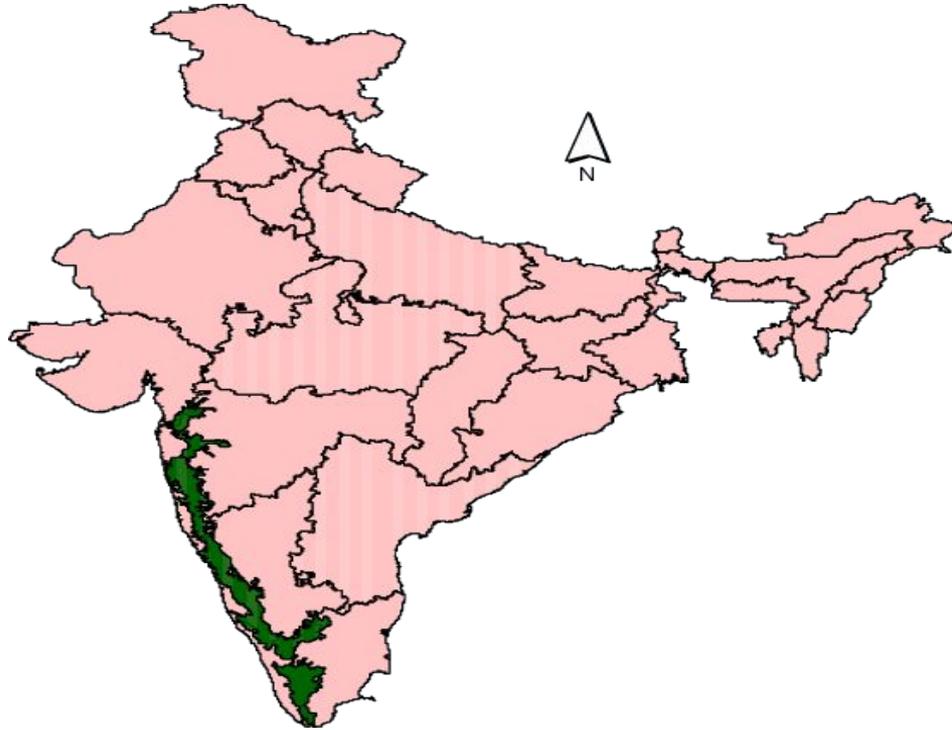
- The monthly variation of Kerala rainfall shows more rainfall in south Kerala than north Kerala except June, July and August. But in the major rain giving months of south-west monsoon periods, North Kerala dominates with the rainfall. In the month of July a maximum of 85 cms of rainfall is getting in the North Kerala while it is below 60 cms in South Kerala.

- Tamilnadu is getting a maximum of 20 cms of rainfall in the month of November which comes under the north-east monsoon period. Only in December Tamilnadu rainfall exceeds that of Kerala. During that month only about 5 cms rainfall is getting in Kerala while it is about to 20 cms in Tamilnadu. The rain shadow effect due to the mountain in the eastern side is very clear from the mean monthly observed rainfall pattern.

5&15 Marks Questions

- How Western Ghats control the climate of Kerala?
- Impact of Western Ghats in controlling climate of Kerala?
- Discuss the relationship between Western Ghats and climate of Kerala?

BIODIVERSITY OF WESTERN GHATS



INTRODUCTION

- The earth is home to a rich and diverse kind of living organisms, whose genetic diversity and relationships with one another and with their physical environment constitute biodiversity.
- Biodiversity or biological diversity generally refers to the variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems.
- Thus, biodiversity is the totality of genetic, species, ecosystem and habitat diversity in a region that has evolved through millions of years of evolutionary history.
- It changes across environmental gradients like, latitude, altitude, depth, aridity, etc.

- **Inventorying and monitoring of biodiversity is done at different organisational levels from genes to ecological systems (landscapes), and at different spatial scales from a few square meters to continents.**
- **Hence, the recognition and characterisation of biodiversity depends critically on taxonomy, genetics and ecology.**
- **Taxonomy provides the reference system and depicts the pattern or tree of diversity for all organisms.**
- **Genetics gives a direct knowledge of the gene variations found within and between species.**
- **Ecology provides knowledge of the varied ecological systems in which taxonomic and genetic diversity is located, and of which it provides the functional components.**

Origin of Life

The origin of life is a consequence of pre-biotic evolution of organic material to cellular forms. The present complexity that life has developed by successive evolutionary optimization took 3.5 to 4.0 billion years (earliest fossil record of life on earth is 3.6 billion years ago). An estimated 1.7 million species have been described to date, and conservative estimates suggest that around 12.5 million species must be existing on earth. This rich diversity is facing various threats for its very survival. Even before we fully describe the species richness, we are losing many species, due to the alarming rate of extinction. It is hard to develop a measure of extinction rates of the entire flora and fauna due to the scant knowledge of the species pool before the impact. Even though, speciation and extinction processes (as many as 12 mass extinctions have taken place so far naturally) are part of the evolutionary process, extinction is overtaking speciation. Humankind has to realise that *what is lost is lost for ever*, and cannot be brought back.

Human development should be without interfering with natural ecosystems that exist, rather should be in harmony with nature, conserving it for the future generations.

The loss of biodiversity could be attributed to: the expanding human population activity by way of habitat destruction through fragmentation and degradation, overexploitation of species for human use, introduction of exotic species, increased spread of disease, predators and many other complex unexplored factors. The habitat changes (physical, chemical and biological) have altered inextricably interwoven complex relationship between species and habitat, resulting in species extinction (an irreversible process). The natural disturbances (in small amounts) in ecosystems dominated by late successional communities, like forests, will result in increased diversity. The healthier the ecosystem is, the more diversity it will contain, capable of finding an alternate pathway if one is destroyed and continue to provide ecosystem services.

The adverse effects of human impacts on environment are increasing dramatically and threatening the very foundation of sustainable development. Unless actions are taken to protect biodiversity, the opportunity of reaping its full potential benefit to mankind will be lost forever. This necessitates a balanced exploitation and conservation of the nation's wealth, especially plant and animal wealth. It has become imperative to explore for obtaining an inventory of floristic elements and to identify plants that have potential ecosystem importance. This biodiversity is the natural biological capital of the earth, and presents important opportunities for all nations, especially India.

India has a unique combination of living species, habitats and ecosystems, which together makes it a diversity rich country in the world. The Indian region with varied bio-climatic zones, altitudinal zones, edaphic condition and other accompanying micro-climatic conditions nurture rich and diverse flora which in turn have bestowed upon it the distinction of being the sixth among the 12-mega biodiversity zones of the world. India is recognized as a country rich in all aspects of biodiversity, ecosystem, species and genetics. India harbours two mega-biodiversity regions the North Eastern hill regions and the Western Ghats. India, while following the path of development, has been sensitive to the needs of conservation. India's strategies for conservation and sustainable utilization of biodiversity in the past have comprised of providing special status and protection to biodiversity rich areas by declaring them as national parks, biosphere reserves, sanctuaries, ecological fragile and sensitive areas. One such area is the Western Ghats, which runs parallel to the west coast of India.

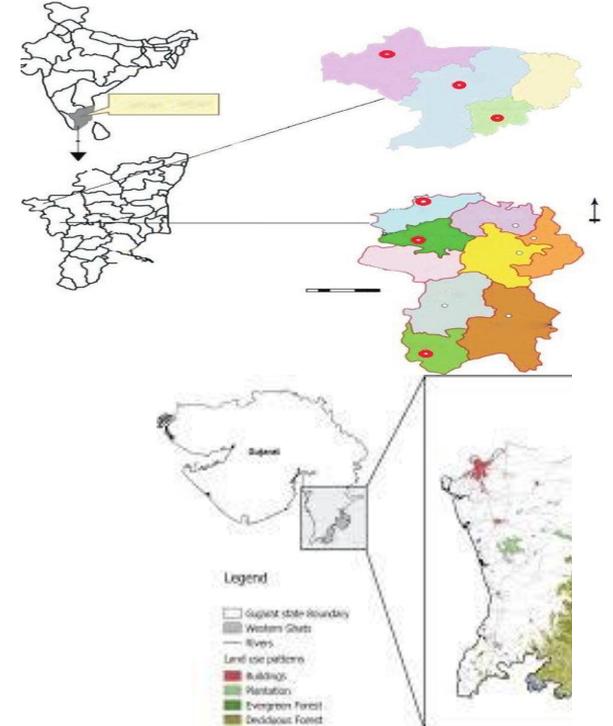
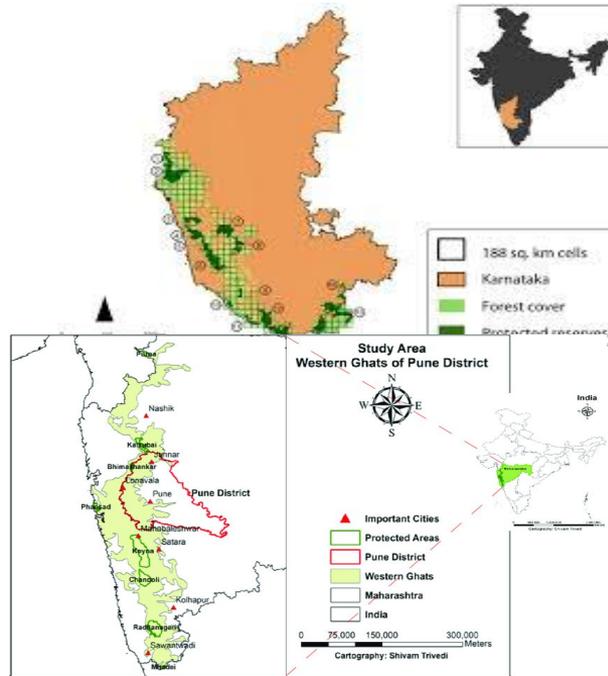
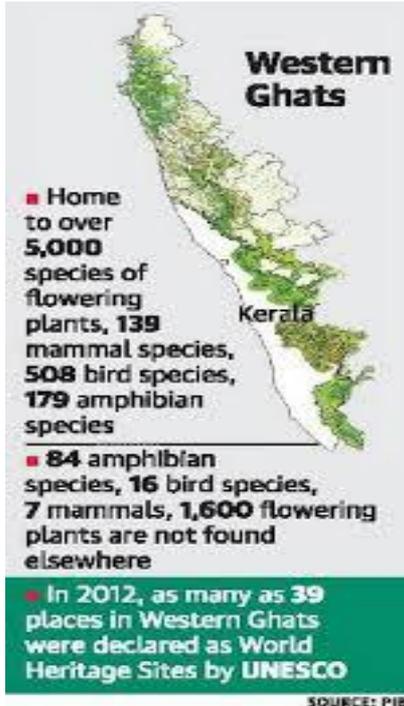
The Western Ghats covers of six states namely Gujarat, Maharashtra, Karnataka, Kerala, Goa and Tamil Nadu. It has a wide range of vegetation and topographical features. Biogeographically, the hill chain of the Western Ghats constitutes the Malabar province of the Oriental realm, running parallel to the west coast of India from 8° N to 21° N latitudes, 73° E to 77° E longitudes for around 1600 km. Rising up from a relatively narrow strip of coast at its western border, the hills reach up to a height of 2800 m before they merge to the east with the Deccan plateau at an altitude of 500-600 m. The average width of this mountain range is about 100 km.

The Western Ghats (known as Sahyadri ranges in Sanskrit) has to its credit a wide range of species diversity, 4500 plant species out of which 35 percent are endemic. Levels of endemism in this area are high – nearly 2000 species of higher plants, 84 species of fishes, 87 species of amphibians, 89 species of reptiles, 15 species of birds and 12 species of mammals are endemic to the Western Ghats (Daniel, 1997). This bioregion is highly species rich and under constant threat due to human pressure and has within it many hotspot (region recognised to hold diverse life forms which requires conservation) regions like the forests of Mahabaleshwar, hills of Coimbatore, Pulneys, Tirunelveli, Nilgiris, places like Nagarahole, Silent Valley etc. These are some of the places that harbour rich diversity of endangered species both in the aquatic and terrestrial ecosystems. The plant and animal species known to be from the Western Ghats that are categorized by the IUCN (International Union for Conservation of Natural Resources) as endangered and vulnerable. Hence, there is an urgent need for the conservation of these species before they get vanished into the air.

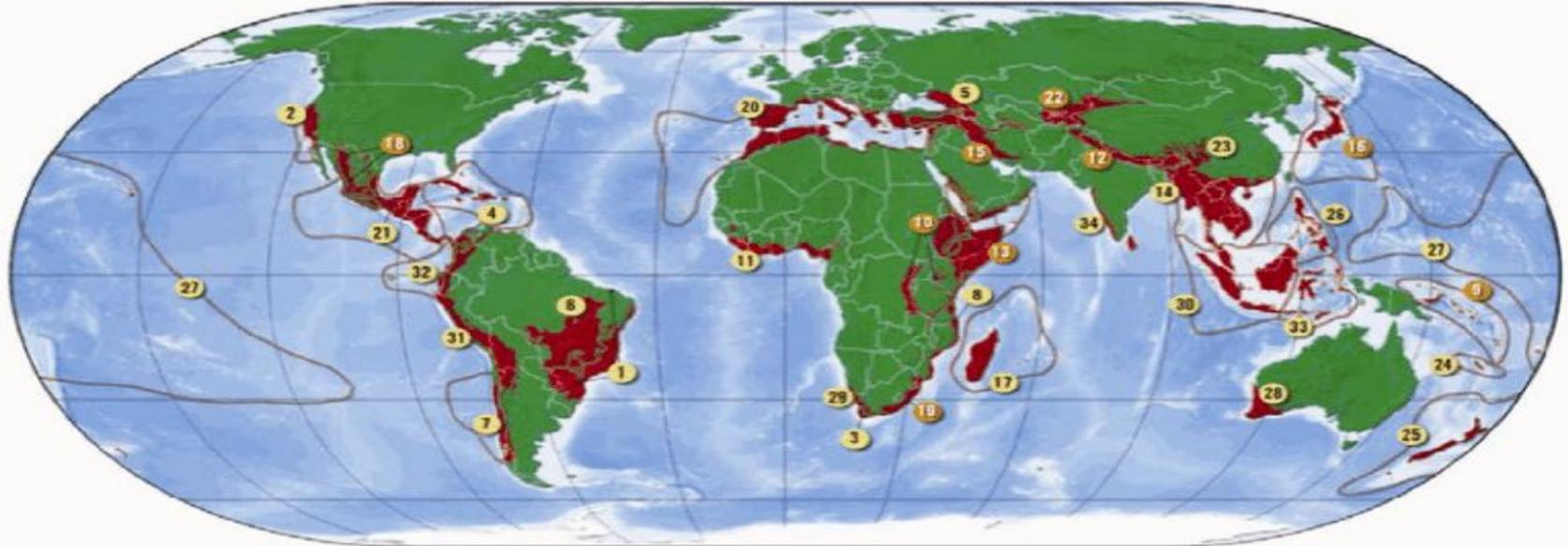
Conservation can be achieved in big way by proper dissemination of information. The spread of information and the diversity of life on earth has always remained striking features. This diversity in life is popularly referred to as biodiversity, the information for which is scattered among different people, regions, books and traditions. Over the last few decades, computers are playing a very important role in the field of biology. The current decade faces the information revolution. Data from different sources when processed forms information. Computer assisted data management leads to the development of information system. Information System contains a discrete set of information organized for the collection, processing, maintenance, transmission, and dissemination, in accordance with defined procedures. A systematic recognition of data and its organization has become the requirement of the day. The information needs for biodiversity are many and varied, and the state of knowledge is all too unsatisfactory for proper evaluation to be made (Heywood 1997). Hence, the modern technology now makes it possible for the management of this kind of biodiversity data using computer technology. An information system that provides knowledge about the biodiversity of the region, the conservation and management practices needed to sustain these resources is referred to as the Biodiversity Information System. The Sahyadri: Western Ghats Biodiversity Information System is developed with the aim to aid decision makers in conservation endeavour with the organised spatial information.

GHATS

The Western Ghats, also known as Sahyadri (Benevolent Mountains), are a mountain range that covers an area of 140,000 square kilometres (54,000 sq mi) in a stretch of 1,600 kilometres (990 mi) traversing the states of Kerala, Tamil Nadu, Karnataka, Goa, Maharashtra and Gujarat.



- It is a UNESCO World Heritage Site and is one of the eight “hottest hot-spots” of biological diversity in the world.



Biodiversity Hotspots

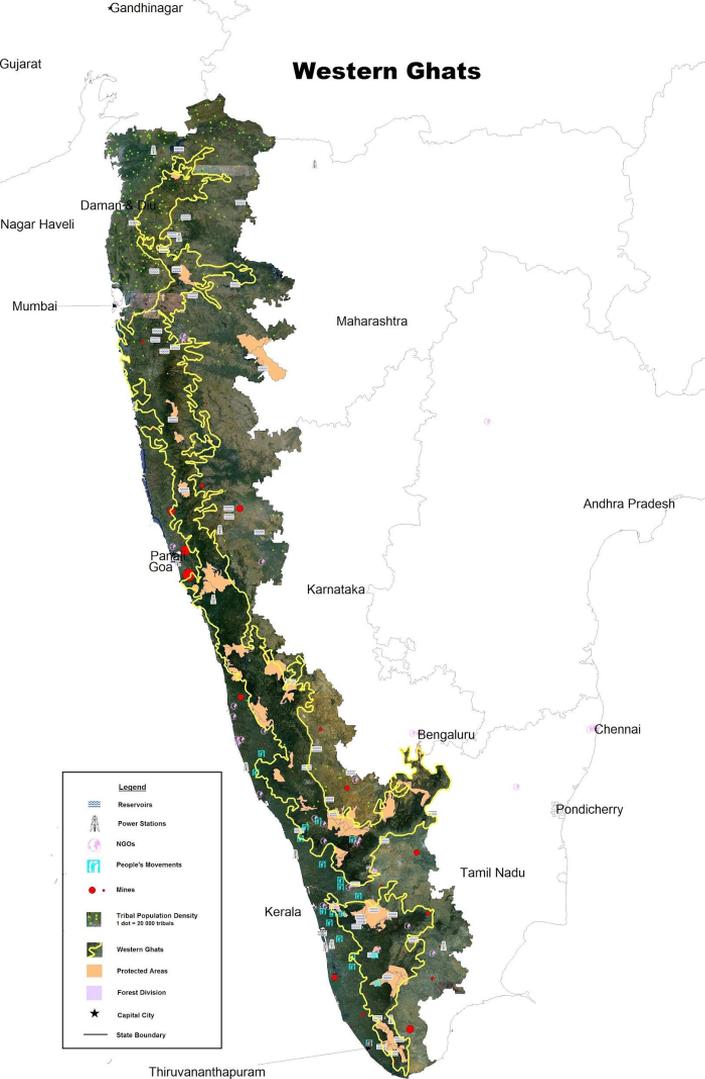
Earth's biologically richest places, with high numbers of species found nowhere else. Hotspots face extreme threats and have already lost at least 70 percent of their original vegetation.

- 1 Atlantic Forest
- 2 California Floristic Province
- 3 Cape Floristic Region
- 4 Caribbean Islands
- 5 Caucasus
- 6 Cerrado
- 7 Chilean Winter Rainfall-Valdivian Forests
- 8 Coastal Forests of Eastern Africa

- 9 East Melanesian Islands
- 10 Eastern Afromontane
- 11 Guinean Forests of West Africa
- 12 Himalaya
- 13 Horn of Africa
- 14 Indo-Burma
- 15 Irano-Anatolian
- 16 Japan
- 17 Madagascar and Indian Ocean Islands

- 18 Madrean Pine-Oak Woodlands
- 19 Maputaland-Pondoland-Albany
- 20 Mediterranean Basin
- 21 Mesoamerica
- 22 Mountains of Central Asia
- 23 Mountains of Southwest China
- 24 New Caledonia
- 25 New Zealand
- 26 Philippines
- 27 Polynesia-Micronesia

- 28 Southwest Australia
- 29 Succulent Karoo
- 30 Sundaland
- 31 Tropical Andes
- 32 Tumbes-Chocó-Magdalena
- 33 Wallacea
- 34 Western Ghats and Sri Lanka



- **A total of thirty-nine areas in the Western Ghats, including national parks, wildlife sanctuaries and reserve forests, were designated as world heritage sites in 2012 – twenty in Kerala, ten in Karnataka, five in Tamil Nadu and four in Maharashtra.**

In 2006, India applied to the UNESCO Man and the Biosphere Programme (MAB) for the Western Ghats to be listed as a protected World Heritage Site. In 2012, the following places were declared as World Heritage Sites

- Kali Tiger Reserve, Dandeli, Karnataka
- Indira Gandhi Wildlife Sanctuary and National Park, Tamil Nadu
- Mundigekere Bird Sanctuary, Sirsi, Karnataka
- Kalakkad Mundanthurai Tiger Reserve, Tamil Nadu
- Thattekad Bird Sanctuary, Kerala
- Shendurney Wildlife Sanctuary, Kerala
- Neyyar Wildlife Sanctuary, Kerala
- Peppara Wildlife Sanctuary, Kerala
- Periyar Tiger Reserve, Kerala
- Srivilliputtur Wildlife Sanctuary, Tamil Nadu
- Eravikulam National Park, Kerala
- Grass Hills National Park, Tamil Nadu and Kerala
- Karian Shola National Park, Karnataka
- Sathyamangalam Wildlife Sanctuary, Tamil Nadu
- Chinnar Wildlife Sanctuary, Kerala
- Silent Valley National Park, Kerala
- Mukurthi National Park, Tamil Nadu
- Pushpagiri Wildlife Sanctuary, Karnataka
- Brahmagiri Wildlife Sanctuary, Karnataka
- Mookambika Wildlife Sanctuary
- Talakaveri Wildlife Sanctuary, Karnataka
- Aralam Wildlife Sanctuary, Kerala
- Kudremukh National Park, Karnataka
- Someshwara Wildlife Sanctuary, Karnataka
- Kaas Plateau, Maharashtra
- Bhimashankar Wildlife Sanctuary, Maharashtra
- Koyna Wildlife Sanctuary, Maharashtra
- Chandoli National Park, Maharashtra
- Radhanagari Wildlife Sanctuary, Maharashtra
- Parambikulam Wildlife Sanctuary, Kerala
- Pambadum Shola National Park, Kerala
- Anamudi Shola National Park, Kerala
- Chimmony Wildlife Sanctuary
- Peechi-Vazhani Wildlife Sanctuary, Kerala
- Wayanad Wildlife Sanctuary, Kerala
- Mathikettan Shola National Park, Kerala
- Kuringjimala Sanctuary, Kerala
- Karimpuzha National Park, Kerala
- Idukki Wildlife Sanctuary
- Ranipuram National Park
- Megamalai Wildlife Sanctuary, Tamil Nadu
- Palani Hills Wildlife Sanctuary and National Park, Tamil Nadu
- Kanyakumari Wildlife Sanctuary, Tamil Nadu
- Bandipur National Park , Karnataka
- Nagarhole National Park, Karnataka
- Nilgiri Biosphere Reserve, Tamil Nadu

VISIT this site(complete database available) for more information and images

http://wgbis.ces.iisc.ernet.in/biodiversity/database_new/

WESTERN GHATS

biodiversity hotspot

area
160,000 km²



140 mammal species



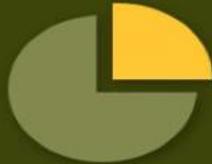
510 bird species



260 reptile species



180 amphibian species



25%
of India's
biodiversity



new flora and
fauna species
discovered
every year



great source
of water and
fresh oxygen
down south

Along the south-western coast of India lies the Western Ghats mountain range. These ranges are known for their rich biodiversity and natural heritage. The mountains intercept the rain-bearing westerly monsoon winds, and are consequently an area of high rainfall, hence known also as Monsoon Mountains. The Western Ghats are home to some amazing bio-diversity. These mountain ranges run all the way from southern tip of India in Kerala up to Maharashtra while Karnataka falls in the middle. The mountain ranges are one of the prime sources of fresh water to the state and also play an important role in the climate.

The rain gives Western Ghats its flavor and richness. Some areas receive as much as 350 inches of rain every year, making it one of the wettest places on earth. Agumbe area in Karnataka receives the highest rainfall in India. This also makes most part of the Western Ghats evergreen. The evergreen forests are abundant in flora and fauna.



The Western Ghats are home to more than 5000 species of plants and about 35% of these are endemic to this area. Some plants have been discovered very recently in the last decade. The *Semecarpus kathalekanensis* is among them. The Ghats are also home to special kind of fresh water swamps known as Myristica swamps. An indicator of these swamps is an endemic palm found along the stream. One of the interesting adaptation of plants found here are the aerial roots called stilt roots which spring out of the main trunk providing support to swamp trees in soft soil.



A huge variety of orchids and endemic flowers are also found here. One of the very special flowers of the Western Ghats are impatiens, they are usually found close to small streams on the hill slopes.



A large number of herbivores also make the Ghats their home due to this abundant vegetation. And the endangered Lion-tailed Macaque (*Macaca silenus*) is one of them. These primates now exist in very small numbers due to human influence and have become a rare sight. Though their main diet is fruits, they are omnivorous and forage for seeds, fresh leaves, flowers and insects. They are mostly arboreal, and seldom get down from the trees. And are often mistaken for the more common Nilgiri Langur as that too is dark in color.



There are other species which are bright in color and the rufous colored Malabar Giant Squirrel (*Ratufa indica*) is among them. They too are arboreal and their huge bushy tail which can grow up to 2 ft helps them balance on the precarious tree tops.



Though the thick forests of Western Ghats is well suited for canopy dwellers, there are some predators who have used this to their advantage. And one such predator, a master of stealth is the Leopard.



While most animals are shy and are hidden in the thick forests, the Malabar whistling thrush (*Myophonus horsfieldii*) is probably the most elusive. Most often one can only hear their calls in the morning.



While the thrushes are found mostly on the ground and much below the canopy, some birds are found mostly on the canopy overlooking the evergreen forests. One flagship bird of the Western Ghats, the Malabar pied Hornbill (*Antracoceros coronatus*) is found mostly on treetops of fruiting trees. Though figs form a major part of their diet, they do sometimes feed on fish and small mammals.



Some birds are also found in the coffee plantations. One such bird, the Orange Minivet (*Pericrocotus flammeus*) feeds on the small insects that come to feed on the coffee fruit. Birds are not the only habitants of plants and bushes in the rainforest. A group of frogs known as bush frogs are mostly found on sitting on leaves and calling for their mates. 9 bush frogs have been discovered in the year 2011 alone.



The Blue-eyed bush frog (*Philautus luteolus*) is one of the prettiest bush frogs and was recently discovered in the Western Ghats.



Another bush frog, the Ponmudi bush frog (*Philautus ponmudi*) gets its name from a small hill station in Kerala where it was first recorded. There are frogs found higher up in the tree too. These tree frogs are slightly bigger in size and have webbed feet that allow them to leap from branch to branch. One such tree frog is the Malabar Gliding frog (*Rhacophorus malabaricus*). There are several other similar ones to look out for.



Where there are frogs, there are bound to be snakes. And one common yet beautiful non-venomous snake of the Western Ghats is the Green Vine Snake (*Ahaetulla nasuta*).



The venomous Malabar Pit Viper (*Trimeresurus malabaricus*) is another beautiful snake from the Western Ghats which uses its heat sensing pits to track and hunt prey.



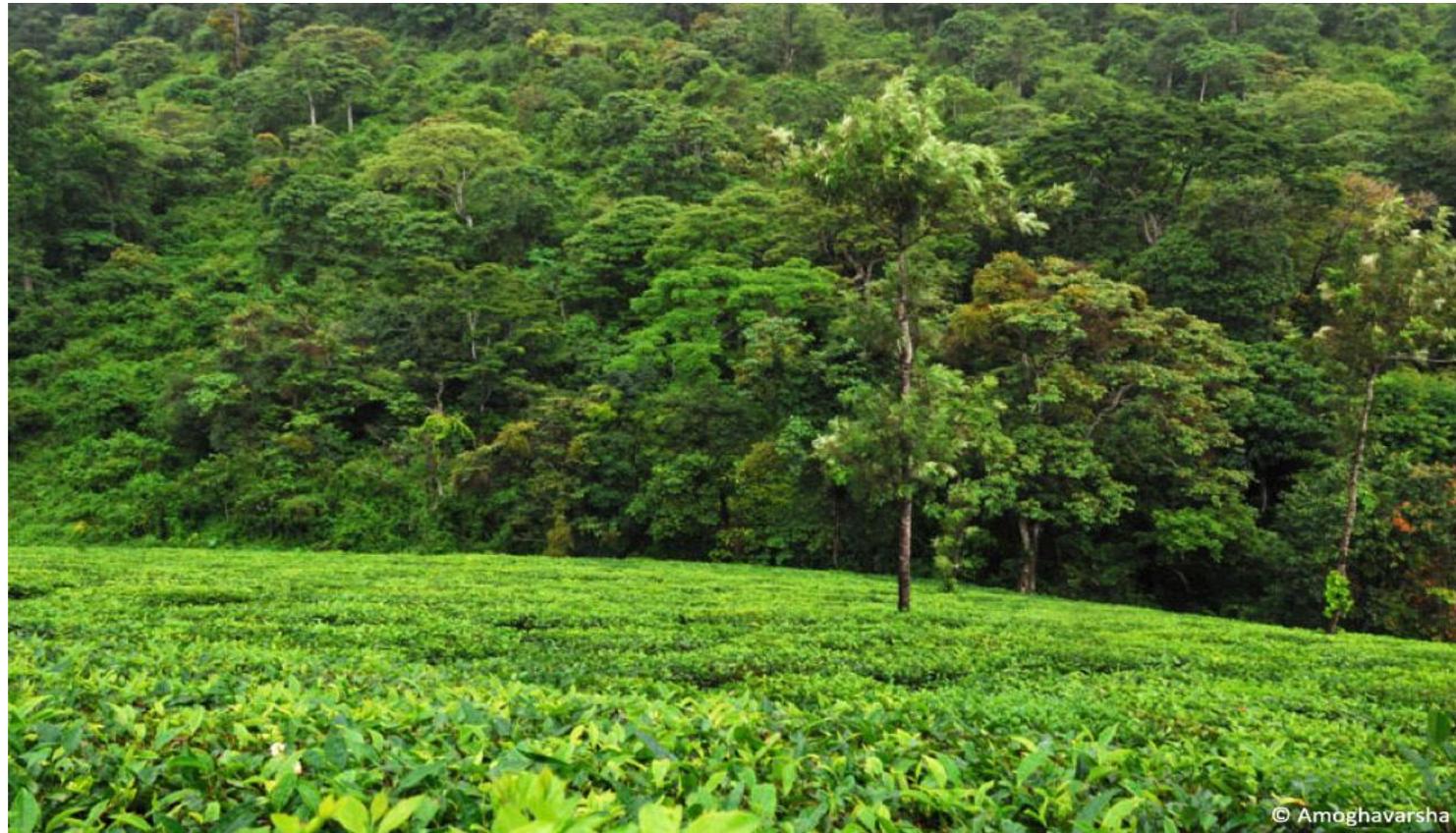
But the flagship species of the Western Ghats is the King Cobra (*Ophiophagus hannah*). Growing up to 15ft and weighing up to 10kgs, it is the world's longest venomous snake. The snake derives its scientific name from the fact that it feeds only on snakes. They've recently been documented to be cannibalistic too.



The Ghats have also been home to several indigenous tribes for centuries. Venkatappa is a Goudlu tribal. The Goudlu tribe is one of the last traces of pure Malnad culture in the Indian Western Ghats, farming is their primary occupation. The tribe is no longer protected from urbanization, the plastic sheet he wears has replaced the traditional rain blanket “Kambli”. All is not lost, “Muttale” – the arecanut leaf headgear still remains.



As urbanization creeps into these beautiful habitats, the forest suffers. As forests make way to towns and tea plantations, the Western Ghats face a bleak future.



As more roads cut across the forests, the animals have to make way for the traffic at the cost of their lives



These Ghats that are home to several species of animals are also life giving. They refresh the atmosphere with the oxygen they produce. The Ghats also account for most rivers that feed our towns and cities. The loss of these forests have far reaching consequences than we can comprehend now.



BIODIVERSITY

The term biodiversity encompasses the variety of all life on the Earth. It is identified as the variability among living organisms and the ecological complexes of which they are part, including diversity within and between species and ecosystems.

Biodiversity manifests itself at three levels:

- 1. Species diversity** which refers to the numbers and kinds of living organisms.
- 2. Genetic diversity** which refers to the genetic variation within a population of species.
- 3. Ecosystem diversity** which is the variety of habitats, biological communities and ecological process that occur in the biosphere.

Biological diversity affects us all. It has direct consumptive value in food, agriculture, medicine, industry. It also has aesthetic and recreational value. Biodiversity maintains ecological balance and continues evolutionary process. The indirect ecosystem services provided through biodiversity are photosynthesis, pollination, transpiration, chemical recycling, nutrient cycling, soil maintenance, climate regulation, air, water system management, waste treatment and pest control.

Biodiversity is not distributed equally among the world's 170 countries. A very small number of countries, lying wholly or partly within tropics, contain a high percentage of the world's species. These countries are known as megabiodiversity countries. Twelve countries have been identified as megabiodiversity countries. These are : India, Brazil, Colombia, Ecuador, Peru, Mexico, Madagascar, Zaire, Australia, China, Indonesia and Malaysia. Together, these countries contain as much as 60 to 70 percent of the world's species.

India is one of the 12 megabiodiversity centres of the world. The country is divided into 10 biogeographic regions: Trans Himalayas, Himalayas, Indian desert, Semi-arid zone, Western Ghats, Deccan peninsula, Gangetic plains, North-East India, islands and coasts.

In India we have 320 million hectares of land and 200 million hectares of exclusive economic zone in the sea, within which are distributed some 1,20,000 known and perhaps 4,00,000 as yet undescribed species of microbes, plants and animals. Biogeographically, the hill chain of the Western Ghats constitutes the Malabar province of the Oriental realm running parallel to the west coast of India. Rising up from a relatively narrow strip of coast at its western borders, the hills reach up to a height of 2,695 m before they merge to the east with Deccan plateau at an altitude of 500-600 m. The average width of the mountain range is about 100 km. This bioregion is highly species rich and is under constant threat due to human pressure.

The rain forests of the Western Ghats are unique vegetation formations as they exist in an environment where there is considerable seasonality in distribution of the rainfall. These forests are found in the areas where the rainfall is distributed from 4 to 10 months, as a consequence, there are 2 to 8 dry months in a year. Of this, most of the precipitation takes place during a 3 month period of June to August.

The orographic effect of these mountain ranges brings in considerable variation in precipitation. The total rainfall along the coast is in the region of 3,000 mm and it touches its maximum around 7,500 mm per annum in certain places on top of these ranges and there is abrupt fall in the rain on leeward side. The high altitudinal zone also gives rise to a kind of forest which has primarily Lauraceous vegetation.

The tropical rain forests of the Western Ghats have considerable diversity in vegetation types both with respect to their altitudinal locations and also because of edaphic and altitudinal variations. There is a school of thought that the parent rocks in these areas have given rise to such good soils which are rich in nutrients and have a very high moisture holding capacity which has given rise to these rainforests.

Global Biodiversity Hotspots in India

Hotspots are areas that are extremely rich in species, have high endemism and are under constant threat due to human pressure. Among the 18 Hotspots of the world, two have been identified in India; the Eastern Himalayas and the Western Ghats. These are particularly rich in floral wealth and endemism, not only in flowering plants but also in reptiles, amphibians, swallow-tailed butterflies and some mammals.

Of India, 15,000 plant species with 5,000 endemics (33%), there are 4,050 plants with 1,600 endemics (40%) in a 17,000 sq. km strip of forest along the seaward side of the Western Ghats in Maharashtra, Goa, Karnataka, Tamil Nadu and Kerala. Forest tracts up to 500 m in elevation, comprising one fifth of the entire forest expanse are mostly evergreen, while those in the 500-1500 m range are semi-evergreen. There are two major centres of diversity, the Agasthyamalai Hills and the Silent Valley/New Amarambalam Reserve basin.



Flora and

Fauna

FLORA AND FAUNA

- **These hills cover 160,000 km² (62,000 sq mi) and form the catchment area for complex riverine drainage systems that drain almost 40% of India.**
- **The Western Ghats block southwest monsoon winds from reaching the Deccan Plateau. The average elevation is around 1,200 m (3,900 ft).**
- **The area is one of the world's ten "hottest biodiversity hotspots" and has over 7,402 species of flowering plants, 1,814 species of non-flowering plants, 139 mammal species, 508 bird species, 179 amphibian species, 6,000 insects species and 290 freshwater fish species.**
- **The area has an estimated 3,00,000 hectare (37%) under forest cover and is characterised by a rich diversity of flora and fauna.**
- *** The region has about 4,500 species of flowering plants. Of these about 1,700 are endemic to the Western Ghats. Nearly a third are rare or threatened and several are believed to be extinct.**

○

Fauna

1. Mammals
2. Reptiles
3. Amphibians
4. Fish
5. Birds
6. Insects
7. Molluscs





* **Mammals:** The forests of the area have large herbivores such as gaur, spotted deer, sambar, barking deer, elephant, etc. Carnivores are represented by tiger, leopard, jungle cat, leopard cat, fishing cat, Malabar civet, brown palm civet, small Indian civet, two species of mongoose and wild dog.

Several genera of mammals are endemic and representatives include slender loris, the Lion-tailed macaque, 2 species of mongoose, 2 species of civet, Nilgiri langur, Nilgiri tahr, grizzled giant squirrel and the rusty spotted cat.



* **Reptiles:** Dense forests of the region are the home of the King Cobra and Rock Python apart from other smaller reptiles. Many species of tortoises including the endemic cane turtle, and terrapin are also found in the Western Ghats. The marsh crocodile or mugger was once widely distributed in swamps and larger water bodies of the forested areas.





* **Amphibians:** Over 117 species belonging to 21 genera are recorded in the forests and coastal areas of this region, of which 76% are endemic to the region.



* **Fish:** The fish fauna of both fresh water montane and lowland river streams and water bodies as well as coastal lagoons and backwaters are very many and varied in this region. There is large commercial coastal fishery of finfish and shell fish in this region.



* **Birds** : About 508 species of birds occur in the Western Ghats (590 if sub-species are included). Among these about 16 species are endemic. Many endemic birds are exclusive to evergreen and Shola forests.





* **Invertebrates:** A large variety of insects including some of the spectacular butterflies and moths occur in the dense evergreen highland and lowland forests. It is estimated that India has over 1,400 species of which the Western Ghats harbour nearly 320 species including 37 endemics and 23 others shared with Sri Lanka. The area is host to a large variety of fresh water mollusca, some of which are specific to the region.





Molluscs

Seasonal rainfall patterns of the Western Ghats necessitate a period of dormancy for its land snails, resulting in their high abundance and diversity including at least 258 species of gastropods from 57 genera and 24 families. A total of 77 species of freshwater molluscs (52 gastropods and 25 bivalves) have been recorded from the Western Ghats, but the actual number is likely higher. This include 28 endemics. Among the threatened freshwater molluscs are the mussels *Pseudomulleria dalyi*, which is a Gondwanan relict, and the snail *Cremnoconchus*, which is restricted to the spray zone of waterfalls. According to the IUCN, 4 species of freshwater molluscs are considered endangered and 3 are vulnerable. An additional 19 species are considered data deficient.

Flora

1. Aquatic flora
2. Terrestrial flora
3. Endemic flowering plants of northern Western Ghats
4. Medicinal plants

Aquatic flora

Aquatic flora of the Western Ghats Aquatic macrophytes play an essential role in the ecology and biogeochemistry of wetlands in the Western Ghats region. However, there is little published information specifically on these aquatic species. Monocots, dicots, ferns and fern allies and algae are all present displaying varying life histories and growth forms including floating, submerged and emergent habits.

AQUATIC PLANTS OF WESTERN GHATS

- Aquatic plants (building blocks of wetland ecosystems) provide services such as water filtration and nutrient recycling.
- Western Ghats, one of the best representatives of non-equatorial tropical evergreen forests in the world.
- A total of 608 species of aquatic plants are identified (IUCN 2001).



Aponogeton satarensis
in ephemeral pool.
Image courtesy: Sanjay Thakur

- The most speciose were the Cyperaceae (146 species), Gramineae (82 species), Eriocaulaceae (61 species) and Scrophulariaceae (42 species).
- 54 species of aquatic plants are threatened whereas 517 species are assessed as least concern. 29 species of aquatic plants have been assessed as Data Deficient.
- All threatened species are endemic to the Western Ghats region except *Farmeria metzgerioides*.



Wiesneria triandra in a lateritic pool.
Image courtesy: Ashok Captain

Endemic flowering plants of northern Western Ghats

There are 159 flowering plant taxa belonging to 81 genera and 31 families found to be strictly endemic to the Sahyadri Ranges. The genus *Ceropegia* has the largest number (17) of endemic species. Five monotypic genera are restricted to the Sahyadri Ranges. Most of these endemic taxa are restricted to small biogeographical areas and are rare in occurrence. Field assessment has shown that 34 endemic taxa fall into IUCN category Critically Endangered, 18 into Endangered and 20 into Vulnerable. A large number of endemic taxa (34) are known only by their type collection, which could not be recollected even after repeated field explorations undertaken by several workers in their habitat of occurrence in last two decades.



Impatiens oppositifolia
Family: Balsaminaceae
Location: Lohagad
Month: August



Impatiens balsamina
Family: Balsaminaceae
Location: Manikgad
Month: August



Begonia crenata
Family: Begoniaceae
Location: Tung
Month: July



Begonia conchata
Family: Begoniaceae
Location: Tung
Month: July



Adenocaryum malabaricum
Family: Boraginaceae
Location: Lohagad
Month: August



Gloriosa superba
Family: Colchicaceae
Location: Naneghat
Month: August

7,402 species of flowering plants in the Western Ghats. Among them, the study shows that 5,588 species are native or indigenous to the Western Ghats. Of the rest, 376 are exotics naturalized and 1,438 species are cultivated or planted as ornamentals. Among the indigenous species, an analysis shows that 2,253 species are endemic to India and of them, 1,273 species are exclusively confined to the Western Ghats. The work also provides details about 593 subspecies and varieties. Altogether, hence, it accounts for 7,995 kinds of flowering plants for the entire bio geographical area of the Western Ghats.

Medicinal Plants in Western Ghats:

- Treasury House for medicinal plants.
- More than 2000 medicinal species .
- Medicinal plants represents lichen, algae, herbs, shrubs, climber and trees, which are annuals to perennials.
- 50 species holds a very high value in the folk and herbal health forms for the treatment of different forms of ailments.





Endemic Species of Medicinal Plants in Western Ghats

KARNATAKA	TAMIL NADU	KERALA	MAHARASHTRA
Aglaiia elaeagnoidea(Juss.) Benth	Artocarpus hirsutus Lam.	Artocarpus hirsutus Lam.	Artocarpus hirsutus Lam.
	Cinnamomum wightii Meisner	Cinnamomum wightii Meisner	Ervatamia heyneana Cooke.
Artocarpus hirsutus Lam.	Diopyros paniculata Dalz.	Diopyros paniculata Dalz.	Rauvolfia serpentina (L.) Benth. Ex Kurz.
Cayratia pedata (Lam.) Juss. Ex Gagnep	Garcinia gummi-gutta (L.) Robs.	Garcinia gummi-gutta (L.) Robs.	
Diopyros paniculata Dalz.	Garcinia indica Choiss	Rhododendron arboreum (Zenk.) Tagg.	
Mucuna pruriens (L.) DC.	Michelia nilagrica Zenk.		
Tabernamontana heyneana Wall.	Rhododendron arboreum (Zenk.) Tagg.		



THREATS

- Habitat fragmentation;
- Land use change in the catchment areas;
- Flow regulation, Interlinking of river basins;
- Overharvesting;
- Introduction of invasive alien species;
- Pollution &
- Disease outbreak.



M Ed. IV. Sem. MED 15.2 Environmental Education

Module 5

Environmental issues

- ❑ Concept of homeostasis.
- ❑ Role of individuals in the prevention of pollution, climate change, global warming, acid rain, ozone depletion.
- ❑ Role and responsibility of individuals and institution in the management of e-waste, nuclear waste, medical waste , plastic waste. Waste management, public private participation.
- ❑ Public participation in conservation of nature:
 1. Importance
 2. Measure to ensure public participation, role of media, governmental and non governmental agencies.
 3. Contributions of environmental activists in bringing public participation.
 4. Environmental ethics.
 5. Environmental citizenship as the ultimate goal of environmental education.



HOMEOSTASIS

- Physiologist Walter Cannon coined the term "homeostasis" in the 1920s, expanding on previous work by late physiologist Claude Bernard.
- The term derives from Greek roots meaning "similar" and "a state of stability."
- Homeostasis is the ability to maintain a relatively stable internal state that persists despite changes in the world outside. All living organisms, from plants to puppies to people, must regulate their internal environment to process energy and ultimately survive.



Homeostasis in Plants

- Plant cells work best if they have the correct
 - Temperature
 - Water levels
 - Mineral concentration
- The maintenance of a constant environment in the plant body is called Homeostasis.

Why homeostasis is important???

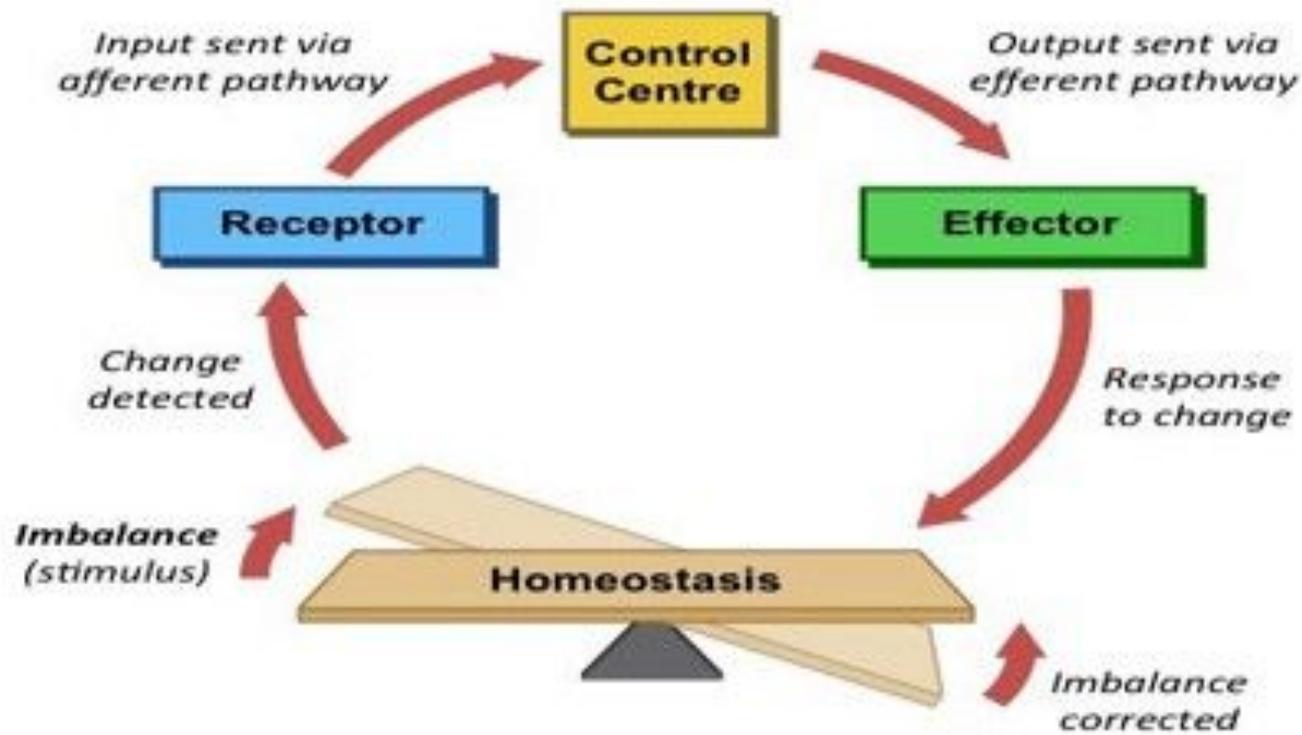
In general, homeostasis refers to the balance within a system that keeps it operating within a range of conditions. Homeostasis helps animals maintain stable internal and external environments with the best conditions for it to operate.

It is a dynamic process that requires constant monitoring of all systems in the body to detect changes, and mechanisms that react to those changes and restore stability.

→ There are three components to homeostatic regulation in animals:

the receptor, the control center, and the effector.

- Receptors are constantly surveilling conditions and detect changes that take conditions outside the normal range, away from a set point.
- The control centers receive and process the information from the receptors and give commands to the effectors on how to respond.



Environment protection has been burning issue in last half century.Effort by each individual at his or her level can have a significant effect on global level. It has been aptly said “charity begins at home”.



ENVIRONMENTAL POLLUTION

Environmental Pollution can be defined as any undesirable change in physical, chemical, or biological characteristics of any component of the environment i.e. air, water, soil which can cause harmful effects on various forms of life or property.

Pollution: The term pollution can be defined as influence of any substance causing nuisance, harmful effects, and uneasiness to the organisms



WATER POLLUTION

Water Pollution can be defined as alteration in physical, chemical, or biological characteristics of water through natural or human activities and making it unsuitable for its designated use. Fresh Water present on the earth surface is put to many uses. It is used for drinking, domestic and municipal uses, agricultural, irrigation, industries, navigation, recreation. The used water becomes contaminated and is called waste water.



AIR POLLUTION

Air pollution is the introduction of chemicals, particulate matter, or biological materials that cause harm or discomfort to humans or other living organisms, or cause damage to the natural environment or built environment, into the atmosphere. A substance in the air that can cause harm to humans and the environment is known as an air pollutant.



LAND POLLUTION

Land pollution is the demolition of Earth's land surfaces often caused by human activities and their misuse of land resources. It occurs when waste is not disposed properly. Urbanization and industrialization are major causes of land pollution.



NOISE POLLUTION

Noise pollution is excessive, displeasing human, animal, or machine-created environmental noise that disrupts the activity or balance of human or animal life. Sound becomes undesirable when it disturbs the normal activities such as working, sleeping, and during conversations. World Health Organization stated that “Noise must be recognized as a major threat to human wellbeing”



ROLE OF AN INDIVIDUAL IN PREVENTION OF POLLUTION

- Individuals should reuse items whenever possible.
- Use gunny bags made of jute instead of plastic bags.
- Use water resources efficiently.
- Use renewable resources by installing equipment such as solar heaters and using solar cookers.
- Dispose potentially harmful products such as cells, batteries, pesticide containers, etc properly.
- Spread awareness and inspire other people to prevent pollution. Individuals should be encouraged to acquire information and innovations from world over and implement them locally.

- Organize drives to clean streets and clean drains with help of other people of locality.
- Avoid making noise producing activities such as listening to loud music.
- Individuals should prefer walking or use cycles instead of using motor vehicles, especially when distances to be travelled are small.
- Individuals can make considerable contribution by using mass transport (buses, trains, etc) instead of using personal vehicles.
- Take part in environment conservation drives such as tree planting drives

CLIMATE CHANGE

“ It is a change which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparative time periods”



CAUSES OF CLIMATE CHANGE

☐ NATURAL CAUSES

- Volcanic eruptions
- Ocean currents
- Earth orbital changes
- Solar Variation

☐ HUMAN CAUSES

- Deforestation
- Coal Mining
- Burning of Fossil Fuels
- Industrial processes

Some Effects of Climate Change

- An average increase in Earth's temperature during the last century
- Melting of polar ice—polar bears and other animals are drowning .
- Migrating birds are forced to change their time and place of migration.
- Melting of glaciers will lead to higher sea level, which will cause floods and put many low-elevation regions at risk of disappearing under water.
- Longer summers can disrupt animal habitation.
- New and widespread diseases because of warm climate
- Damaged crops due to sudden climate change and floods
- Average precipitation increase around the world
- Droughts, heat waves, extreme winters and storms, hurricanes, typhoons
- More wildfires

ROLE OF AN INDIVIDUAL IN PREVENTION OF CLIMATE CHANGE

- Make Your Commute Green
- Be More Conservative with Energy Usage
- Get Active
- Recycle
- Educate Yourself and Others
- Encourage the use of renewable energies

WHAT IS GLOBAL WARMING???

Global warming is the ongoing rise of the average temperature of the Earth's climate system and has been demonstrated by direct temperature measurements and by measurements of various effects of the warming.



CAUSES OF GLOBAL WARMING

Natural causes are causes that are created by nature. One natural cause is a release of methane gas from arctic tundra and wetlands. Methane is a greenhouse gas and a very dangerous gas to our environment. A greenhouse gas is a gas that traps heat in the earth's atmosphere. Another natural cause is that the earth goes through a cycle of climate change. This climate change usually lasts about 40,000 years.

Man-made causes probably do the most damage to our planet. There are many man-made causes of global warming. Pollution is one of the biggest man-made problems. Pollution comes in many shapes and sizes. Burning fossil fuels is one thing that causes pollution. Fossil fuels are fuels made of organic matter such as coal, or oil. When fossil fuels are burned they give off a green house gas called CO₂. When you dig up the fossil fuels you dig up the methane as well letting it escape into the atmosphere.

ROLE OF AN INDIVIDUAL IN PREVENTION OF GLOBAL WARMING

- Boosting energy efficiency
- Greening transportation
- Phasing out fossil fuel electricity
- Managing forests and agriculture
- Developing and deploying new low-carbon and zero-carbon technologies
- Ensuring sustainable development
- Exploring nuclear
- Revving up renewables

What is Acid Rain ???

Rainfall made sufficiently acidic by atmospheric pollution that it causes environmental harm, typically to forests and lakes. It means that it possesses elevated levels of hydrogen ions (low pH). It can have harmful effects on plants, aquatic animals, and infrastructure.



How is it caused ???

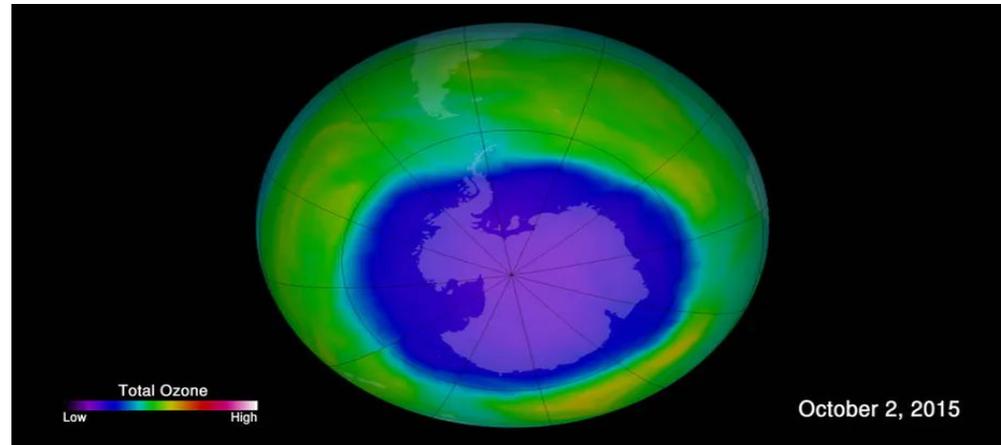
Acid rain is caused by emissions of sulfur dioxide and nitrogen oxide, which react with the water molecules in the atmosphere to produce acids. Nitrogen oxides can also be produced naturally by lightning strikes and sulfur dioxide is produced by volcanic eruptions. The chemicals in acid rain can cause paint to peel, corrosion of steel structures, and erosion of stone statues.

ROLE OF AN INDIVIDUAL IN PREVENTION OF ACID RAIN

- Vehicle emissions control reduces emissions of nitrogen oxides from motor vehicles.
- Fluidized bed combustion also reduces the amount of sulfur emitted by power production.
- A wet scrubber is basically a reaction tower equipped with a fan that extracts hot smoke stack gases from a power plant into the tower.
- Lime or limestone in slurry form is also injected in to the tower to mix with the stack gases and combine with the sulfur dioxide present.

OZONE DEPLETION

Ozone depletion consists of two related events observed since the late 1970s: a steady lowering of about four percent in the total amount of ozone in Earth's atmosphere, and a much larger springtime decrease in stratospheric ozone around Earth's polar regions. The latter phenomenon is referred to as the ozone hole.



Causes of Ozone depletion

- ❑ Release of harmful gases like: CFC, HCFC, Methyl Bromide, Used in Air-conditioners, Refrigerators, fire extinguishers.
- ❑ VOC(Volatile organic compounds) , Emitted by vehicles.
- ❑ Natural Disasters: Volcanic eruption
- ❑ Sun Spots and Stratosphere winds.
- ❑ Low Temperature.
- ❑ Harmful gases reach stratosphere, get exposed to UV rays then breakdown to free chlorine which reacts with ozone causing ozone depletion

Effects of Ozone depletion

- Ozone depletion in the stratosphere will result in more UV radiation reaching the earth especially UV-B(290-320 nm)affecting DNA & photosynthetic reactions causing skin cancer.
- Easy absorption of UV rays by the lens & cornea of eye will result in increase in incidents of cataract.
- Fair people will be at a greater risk of UV exposure.
- Phytoplanktons are sensitive to UV exposure.
- Yield of vital crops like corn,rice, soyabean, cotton, bean, pea,sorghum & wheat will decrease.
- Degradation of paints, plastics 7 other polymers will result in economic loss.

ROLE OF AN INDIVIDUAL IN PREVENTION OF OZONE DEPLETION

- ❑ Exposure to sun with precautions:
 - Must use sunscreen to protect skin.
 - Must use sunglasses to protect eyes.
- ❑ Plant more trees and avoid usage of pesticide.
- ❑ Buying and using recycled products
- ❑ Harmful gases ban:
 - Alternative to CFC, HCFC must be introduced by the manufacturers of AC, Fridge etc.
 - Protocols should be introduced on provincial and federal level to keep check on use of such gases during industrial processes.

What is E-waste ?

- ❑ E-waste comprises of waste electronics goods which are not fit for their originally intended use.
- ❑ Such electronics goods may be television, telephones, radios, computers, printers, fax machines, DVDs and CDs etc.
- ❑ Electronics products like computers and cell phones contain a lot of different toxins.



DEFINITION

There is no generally accepted definition of e- waste

Unwanted, obsolete or unusable electronic products such as computers, computer peripherals, televisions, VCRs, DVD Players, stereo equipment, hand cell phones are commonly referred to as 'electronic waste'.

Waste become obsolete due to

- change in fashion, style and status
- nearing the end of their useful life.

E-waste Management

The major components of E-waste Management are

- E-waste collection, sorting and transportation
- E-waste recycling

In industries, management of E-waste is done by

Waste Minimization Techniques. It involves:

- Inventory management
- Production-process modification
- Volume reduction
- Recovery and reuse

Responsibility and Role

Industries

- Manufacturers, distributors, and retailers should undertake the responsibility of recycling/disposal of their own products.
- Manufacturers must be responsible for educating consumers regarding the potential threat posed by their products.
- Companies should adopt Waste Minimizing Techniques.

Responsibility and Role

Citizens

E-wastes should never be disposed with garbage and other household wastes.

Customers should opt for upgrading their electronic items to the latest versions rather than buying new.

While buying electronic products consumers should opt for those that:

- are made with fewer toxic constituents
- use recycled content
- are energy efficient.

Legislation

- Basel convention for regulating trans-boundary movement
- The hazardous waste (management and handling) rules, 1998 as amended in 2008
- Municipal solid waste management and handling rules for non-toxic content
- The Environment Protection Act - Biomedical Wastes (M&H) Rules 1998, Batteries (M&H) Rules 2001, etc.



Nuclear wastes are wastes that contain radioactive material. Nuclear wastes are usually by-products of nuclear power generation and other applications of nuclear fission or nuclear technology.

NUCLEAR WASTES CLASSIFICATION

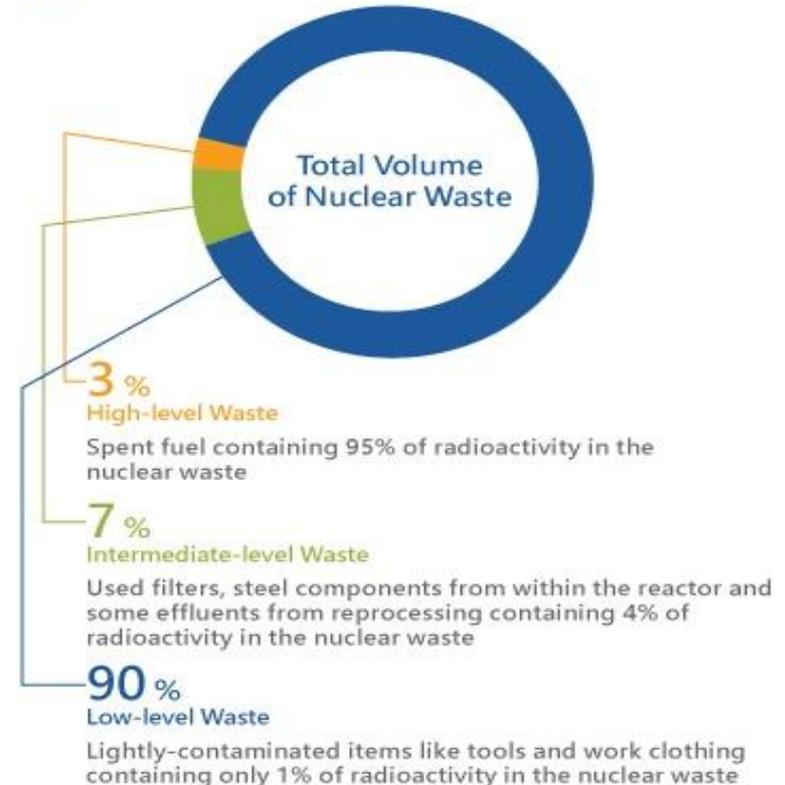
Nuclear wastes categories

- ❑ Solid wastes
- ❑ Liquid wastes
- ❑ Gaseous wastes

Classification on the basis of radioactivity

- ❑ High level wastes
- ❑ Medium level wastes
- ❑ Low level wastes

Types of Nuclear Waste



Ways for Management of Wastes

Liquid Waste - The disposal of liquid wastes is done in two ways:

1. Dilution

The liquid wastes are diluted with large quantities of water and then released into the ground. This method suffers from the drawback that there is a chance of contamination of underground water if the dilution factor is not adequate.

2. Concentration to small volumes and storage

When the dilution of radioactive liquid wastes is not desirable due to amount or nature of isotopes, the liquid wastes are concentrated to small volumes and stored in underground tanks. The tanks should be of assured long term strength and leakage of liquid from the tanks should not take place otherwise leakage of contents, from the tanks may lead to significant underground water contamination.

Gaseous Waste

Gaseous wastes can most easily result in atmospheric pollution. Gaseous wastes are generally diluted with air, passed through filters and then released to atmosphere through large chimneys.



Solid Wastes



Solid wastes consist of scrap material or discarded objects contaminated with radioactive matter. These wastes, if combustible, are burnt and the radioactive matter is mixed with concrete, drummed and shipped for burial. Non-combustible solid wastes are always buried deep in the ground.

Disposal of low level wastes

Low level radioactive waste consists of:

- Contaminated solids
- Liquids
- animal carcasses
- small sealed sources



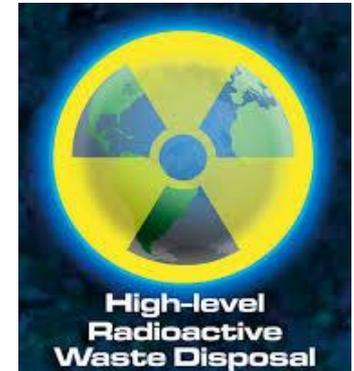
- ❑ Radioactive animal car casses are either incinerated or buried on site.
- ❑ The nuclear wastes is cast in cement in steel drum and are buried either or kept at the bed of oceans.
- ❑ 90% of wastes are of low level quality.

Disposal of medium level wastes

- ❑ Medium level waste requires shielding when being handled.
- ❑ 7% volume of wastes.
- ❑ Dependent on the amount of activity it can be buried in shallow repositories.
- ❑ These wastes are mainly contaminated with neutron activation product isotopes.

Disposal of high level wastes

- ❑ High level waste has a large amount of radioactive activity and is thermally hot.
- ❑ 3% volume of waste
- ❑ 95% of radioactivity
- ❑ Current levels of HLW are increasing about 12,000 metric tons per year.
- ❑ Most HLW consists of Pu-238, 239, 240, 241, 242, Np-237, U-236



ROLE AND RESPONSIBILITY

Proper method of disposing radioactive waste

- waste still has some level of radiation
- it cannot be disposed in the same way as normal waste
- waste should be stored in heavy and thick concrete containers
- no easy ways of disposing -professional assistance should always be sought

Proper storage

- no harm and can minimize cases of accidental leakage
- such substances should be stored in radiation proof containers to ensure no seeping or leakage during handling

Proper labeling

- in order for one to use protective gear when handling them.

Banning of nuclear tests

- the tests done to perfect the energy contribute greatly to the overall presence of radioactive substances

Alternative energy sources

- focus on alternative and environmentally friendly energy sources – like renewable sources of energy namely Solar, hydro-electric and wind power

Reusing

- it can be recycled and used for other purposes like in another reactor as fuel thereby protecting the environment.

Medical Waste

Medical waste is any kind of waste that contains infectious material (or material that's *potentially* infectious).

Waste generated by healthcare facilities like

- Physician's offices
- Hospitals
- Dental practices
- Laboratories
- Medical research facilities
- Veterinary clinics.



Waste categories as identified by the WHO

Waste Categories	Description and Examples
1. General Waste	No risk to human health eg: office paper, wrapper, kitchen waste, general sweeping etc.
2. Pathological Waste	Human Tissue or fluid eg: body parts, blood, body fluids etc.
3. Sharps	Sharp waste eg: Needle, scalpels, knives, blades etc.
4. Infectious waste	Which may transmit bacterial, viral or parasitic disease to human being, waste suspected to contain pathogen eg: laboratory culture, tissues (swabs) bandage etc.
5. Chemical waste	Eg: Laboratory reagent, disinfectants, Film Developer
6. Radio-active waste	Eg: unused liquid from radiotherapy or lab research, contaminated glasswares etc.

Waste Categories	Description with examples
7.Pharmaceutical Waste	Expired outdated drugs /chemicals
8.Pressurized container	Gas cylinder,aerosal cans etc
9.Genotoxic Waste	Waste Containing Cytotoxic Drugs(often Used In Cancer Therapy)

As propageted by CDC,Atlanta under US classification,Pathological waste,and Sharp waste also come under 'INFECTIOUS WASTE"

**Types and nature of hospital waste depends upon the service available in hospital and nature of the hospital.

ROLE AND RESPONSIBILITY

Know the healthcare waste laws

- Healthcare waste is regulated by the DOT, EPA, OSHA, and the DEA
- It's vital to be aware of all guidelines from each agency when preparing, transferring, and disposing of hazardous waste.

Classify medical waste correctly

- Identifying the kind of waste you're dealing with is the first step in properly disposing of it.

Separate the waste by type

- separated out into the different categories, including sharps, pharmaceutical, chemical, pathological, and non-hazardous.

Use the right medical waste containers.

- Some waste can go in certified cardboard boxes
- other waste gets put in special tubs or even locked up for transit.

Prepare the containers properly.

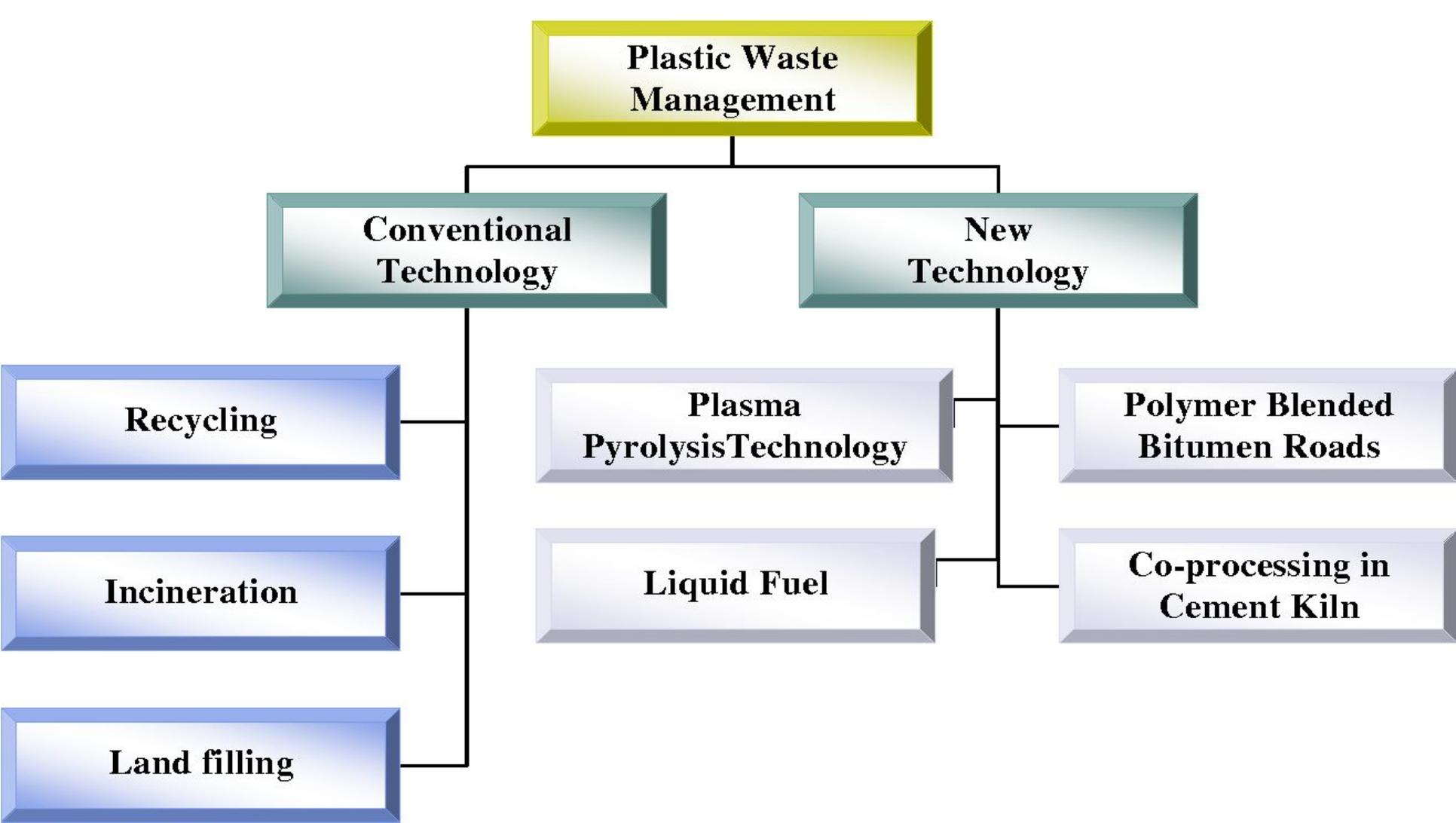
- Containers should be stored in a secure, dry area before pickup or shipping. It's essential to properly label all waste before transport as well.

Use the medical waste disposal color code.

- Biohazard waste in red bags and containers
- Yellow for trace chemo waste
- pharmaceutical waste into black containers for hazardous materials and blue for all others.
- Radioactive wastes in shielded containers marked with the *radioactive* symbol.

Plastic waste management





Recycling of plastics

- **Selection:** The recyclers/reprocessors have to select the waste /scrap which are suitable for recycling/ reprocessing.
- **Segregation:** The plastics waste shall be segregated as per the codes mentioned in the BiS guidelines.
- **Processing:** After selection and segregation of the pre consumer waste (factory waste) shall be directly recycled. The post consumer waste (used plastic waste) shall be washed, shredded, agglomerated, extruded and granulated.



Landfilling

- A well-managed landfill site results in limited immediate environmental harm beyond the impacts of collection and transport, although there are long-term risks of contamination of soils and groundwater by some additives and breakdown by products in plastics, which can become persistent organic pollutants

Incineration

- Reduces need landfill. there are concerns that hazardous substances may be released into the atmosphere in the process.
- can be used with recovery of some of the energy content in the plastic.
- The useful energy recovered can vary considerably depending on whether it is used for electricity generation, combined heat and power, or as solid refuse fuel for co-fuelling of blast furnaces or cement kilns.

Polymer blended bitumen road

- The process of road laying using waste plastics is designed and the technique is being implemented successfully for the construction of flexible roads at various places



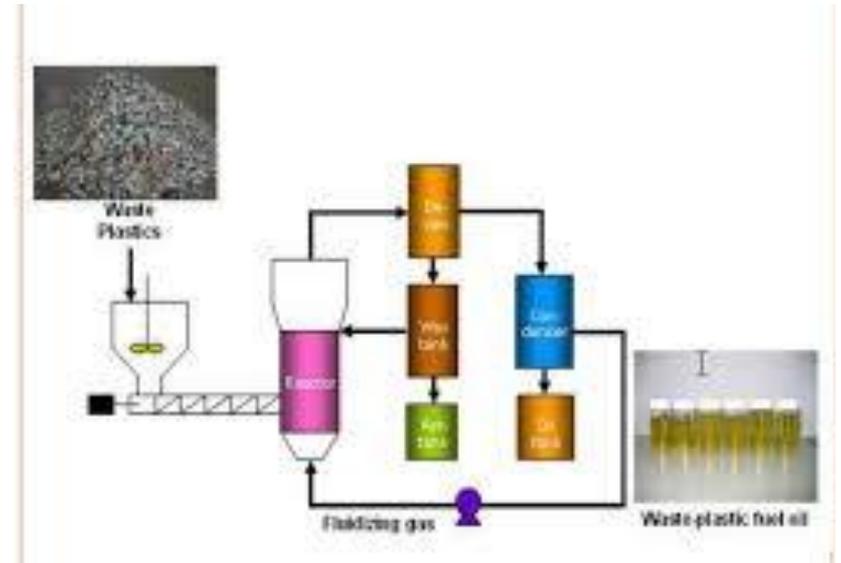
Co-processing of Plastic waste in Cement Kiln

- Co-processing of plastic waste as Alternative Fuel and Raw Material (AFR).
- Co-processing indicate substitution of primary fuel and raw material by waste.
- Waste material such as plastic waste used for co-processing are referred to as alternative fuels and raw material (AFR).
- One of the advantage of recovery method used in existing facility is eliminating the need to invest on other plastic waste practices and to secure land filling.

Plasma pyrolysis technology (PPT)

Plasma pyrolysis or plasma gasification is a waste treatment technology that gasifies matter in an oxygen-starved environment to decompose waste material into its basic molecular structure.

Conversion of plastics waste into liquid fuel 



ROLE AND RESPONSIBILITY

- Stop using plastic straws, even in restaurants. If a straw is a must, purchase a reusable stainless steel or glass straw
- Use a reusable produce bag. A single plastic bag can take 1,000 years to degrade. Purchase or make your own reusable produce bag and be sure to wash them often!
- Buy boxes instead of bottles. Often, products like laundry detergent come in cardboard which is more easily recycled than plastic.
- Purchase food, like cereal, pasta, and rice from bulk bins and fill a reusable bag or container. You save money and unnecessary packaging.
- Reuse containers for storing leftovers or shopping in bulk.
- Use a reusable bottle or mug for your beverages, even when ordering from a to-go shop
- Make your own cleaning products that will be less toxic and eliminate the need for multiple plastic bottles of cleaner.

- Don't use plasticware at home and be sure to request restaurants do not pack them in your take-out box.
- Ask your local grocer to take your plastic containers (for berries, tomatoes, etc.) back. If you shop at a farmers market they can refill it for you.
- Use cloth diapers to reduce your baby's carbon footprint and save money.
- Make fresh squeezed juice or eat fruit instead of buying juice in plastic bottles. It's healthier and better for the environment.
- Pack your lunch in reusable containers and bags. Also, opt for fresh fruits and veggies and bulk items instead of products that come in single serving cups.
- Bring your own container for take-out or your restaurant doggy-bag since many restaurants use styrofoam.
- Use matches instead of disposable plastic lighters or invest in a refillable metal lighter.
- Avoid buying frozen foods because their packaging is mostly plastic. Even those that appear to be cardboard are coated in a thin layer of plastic. Plus you'll be eating fewer processed foods!

WASTE MANAGEMENT



Waste Management is collection, transport, processing, recycling of disposal of waste material. This term usually relates to materials produced by human activity and is generally undertaken to reduce effect on health, the environment and aesthetics.

Practice of waste management may differ in developing nation to under developing nation, urban to rural area and residential to industrial setup

Waste management refers to the activities connected with the collection and disposal of wastes. Waste management comprises the following activities:

- Waste collection
- Waste transportation
- Waste segregation
- Waste recycling
- Waste disposal
- Waste minimisation & control

Current Practices in India





RECYCLE

REUSE

REDUCE

❑ **Reduce**

With individual efforts, we can reduce the waste we produce in the first place. For example – materials must be bought from the market only if it is necessary for us.

❑ **Reuse**

We can use the same thing again and again for different purposes. For example-

- We can use plastic jars of jams, pickles, oil, etc. for storing things like salt, spices, sugar etc.

❑ **Recycle**

We can reform glass, plastic, metal and paper objects and convert them into useful substances. This process is recycling. For example,

- We can recycle old newspapers, magazines, books, notebooks to make new paper or cardboard.
- Broken or discarded plastic items can be melted and remoulded to form other useful substances.

Public Private Participation In Waste Management



- Waste management infrastructure is a 'must utility' in Master Plans of all developed cities across the world.
- Waste management is no longer 'moral' or 'corporate social responsibility' – it is legal obligation in India.
- This legal obligation covers all waste generating establishments – both public & private in the country.
- This has caused and accelerated 'Public Private Partnership' in waste Partnership management sector in India.

- PPP, if handled professionally, can provide effective solutions for waste management & sustainable growth.
- The central and state governments need to give a big push to enable scientific management of 'waste' as per statutory requirements.
- We already have success stories in the country – however issues of risk allocation need to be addressed.



PPP MANAGEMENT

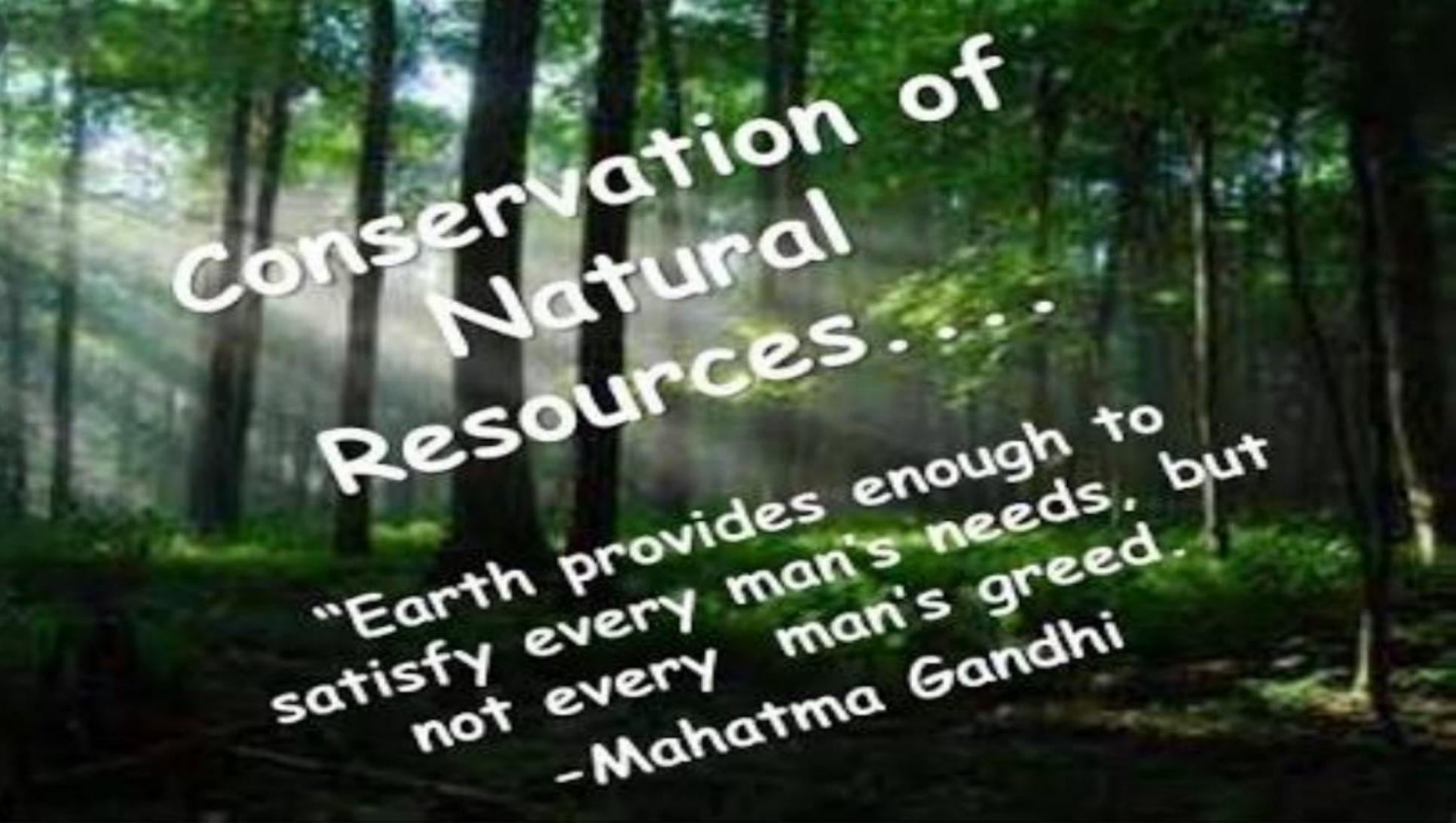
- PPP provides a mechanism wherein the private Operator brings in Capital, Technology & Manpower to establish and operate the waste management infrastructure.
- The Private Operator is engaged for typical period of 5 – 25 years on BOOT(Build, Own, Operate, and Transfer) basis through transparent bidding process.
- With proper monitoring, PPP ensures Innovation, Efficiency and improved level of Services together with compliance to Environment, Health & Safety(EHS).

- Since government is a stakeholder in the project, the project planning, permissions, execution are facilitated.
- Government plays the role of regulator ensuring performance standards by Operator through Penalties, Performance Guarantees, Escrow Accounts etc



Success of PPP in Waste Management Sector – Key Ingredients

- Political will at the highest level
- Clarity on purpose and objectives of privatization
- Leadership & committed administration
- Independent 'Regulator' & enforcement by 'Pollution Control Boards'. This will bring in Trust.
- Public acceptance of 'User Charges' and better services
- Professional attitude of ULBs in working with private 'Operator' Selection of private operator



Conservation of Natural Resources.....

"Earth provides enough to
satisfy every man's needs, but
not every man's greed."
-Mahatma Gandhi

Public participation in conservation of nature

The **public participation** has today become an accepted principle in the effective management of environment in general and sustainable development of **natural** resources in particular, under the well known concept of permanent sovereignty over **natural** resources.



IMPORTANCE OF PUBLIC PARTICIPATION

- ❑ Raising public awareness on environmental issues and specifically on each river basin environmental situation and local catchment by information and consultation processes
- ❑ Public acceptance, commitment, and support of decision-making processes
- ❑ More transparent and creative decision-making
- ❑ Fewer misunderstandings and delays and more effective implementation
- ❑ Avoiding potential conflicts, problems of management, and costs in the long term
- ❑ Promotion of goals associated with sustainable development
- ❑ Strengthening of decision-making procedures

Role of media

- Media brings people from different backgrounds together by making them understand that they have the same common problem, therefore creating a community whose main aim is to curb environmental degradation through mitigation and enhancing environmental conservation.
- Media also presents the best methods that the community can use to conserve and mitigate the effects of environmental degradation.
- Provides environmental awareness and participation by making information widely available through creating people's awareness about environmental protection and conservation of natural resources.

Cont....

- Media conducts research of environmental issues. This research is conducted with an aim of enhancing environmental management and protection.
- Media plays a role of linking the community and the government on environmental issues.
- Media makes community activities much more visible, whereby matters involving environmental concerns are simply being able to observe.
- Social media helps the activists to network and communicate better with one another and are no longer dependent on meeting or chance encounters.

Role of governmental agencies

- **Conduct various awareness programmes on the topic” Importance of conservation of nature “.**
- **Develop and implement different policies regarding nature conservation.**
- **Set up various schemes that promote nature conservation.**
- **Make strict rules related to nature conservation.**

Role of non -governmental agencies

- Conducting participatory rural appraisal.
- Being involved in the protection of human rights to have a clean environment.
- Protecting the natural resources and entrusting the equitable use of resources.
- Data generation on natural resources, timeline history of villages.
- Analysis and monitoring of environmental quality.

Cont....

- Organizing seminars, lectures and group discussion for promotion of environmental awareness.
- Helping the villages administrative officials in preparation, application and execution of projects on environmental protection.
- Transferring information through newsletters, brochures, articles, audio visuals, etc.

Environmental activist

An environmental activist is a person who is aware of the impact human actions have had —and still have— on the planet and its inhabitants, and advocates for the implementation of sustainable, environmentally sound methods towards the development of mankind.





SUGATHAKUMARI

- Born –1934 in Kerela.
- Poet, activist, committed conservationist environmentalist (forefront of environmental and feminist movements in Kerela).
- “**Save Silent Valley**” protest.
- Dharna against Athirappilly hydro electric project



SUNDERLAL BAHUGUNA



- Born-9th January 1927, Garhwali Environmentalist.
- Chipko Movement leader (1973,) in UP. (Gaura Devi; Birth of Chipko)
- Created the Chipko slogan “ Ecology is permanent economy”
- Led the Anti- Tehri Dam movement (1980-2004): We don't want the dam. The dam is the mountain's destruction”

Awards

1981: Padma Shri Award by government of India, but he refused it.

1987: Right Livelihood Award (Chipko Movement)

1986: Jamnalal Bajaj Award for constructive work.

1989: Honorary Degree of Doctor of Social Sciences was conferred by IIT Roorkee

2009: Padma Vibhushan Award by government of India for environment conservation



MEDHA PATKAR

- Born – 1st December 1954 in Mumbai.
- Led “ NBA “Narmada Bachao Andolan”(a 32 year`'s old social movement) in three states: Madhya Pradesh, Maharashtra Gujarat. justice for the people affected by the da m projects related to the Sardar Sarovar dams project.
- She was a commissioner on the World Commission on Dams,
- Founders of the National Alliance of People's Movements (NAPM),
- As members of working class GBGBA (Ghar Bachao Ghar Banao Andolan) in mumbai and fight for rights of slum-dwellers and those cheated by the builders in various rehabilitation and re-development projects.
- Played a pivotal role in driving out the Tata Nano plant from Singur and set up in Sanand, Gujarat (2008).

MADHAV GADGIL

- Born in 1942 in Maharashtra
- An Indian ecologist, academic, writer, columnist and the founder of the *Centre for Ecological Sciences*.
- The identification of the Nilgiris as the **first biosphere** reserve in India.
- Chairman of the *Western Ghats Ecology Expert Panel* (WGEEP), which later came to be known as the Gadgil Commission.
- Editor of “**Life Scapes of Peninsular India**”.
- Padma Shri
- Padma Bhushan
- Shanti Swarup Bhatnagar Prize for Science and Technology
- H. K. Firodia award
- Vikram Sarabhai Award



DR. SALIM ALI (*BIRDMAN OF INDIA*)

- 2 November 1896 – 20 June 1987 in Bombay.
- Indian ornithologist and naturalist.
- A key figure behind the Bombay. Natural History Society .
- Create the Bharatpur bird sanctuary (Keoladeo National Park) and prevent the destruction of what is now the Silent Valley National Park.
- Chiefly in the *Journal of the Bombay Natural History Society*.
- Books: *Book Indian birds/Fall of a sparrow*



SUNITA NARAYAN

- Born in 1961
- She is an Indian environmentalist and political activist as well as a major proponent of the **Green concept of sustainable development**.
- She is currently the director of the India-based Centre for Science and Environment and publisher of the fortnightly magazine, Down To Earth.
- In 2005, she was awarded the Padma Shri by the Government of India.
- In 2005 the Centre for Science and Environment under her leadership was awarded the Stockholm Water Prize.
- She was awarded an honorary Doctor of Science by the University of Calcutta in 2009.
- Raja-Lakshmi Award for the year 2009 from Sri Raja-Lakshmi Foundation, Chennai.
- In 2016 Narain was named to Time Magazine's list of *100 Most Influential People*.
- In 2016 Nairan received the IAMCR Climate Change Communication Research in Action Award

ARUNDHATI ROY

- Born-24th November 1961 in Shillong, Meghalaya.
- Indian novelist, environmental activist.
- Writings on various social, environmental and political issues have been a subject of major controversy in India.
- Fought against the Narmada valley dam project along with Medha Patkar.
- In response to India's testing of nuclear weapons in Pokhran, (Rajasthan).
- Booker Prize for her novel *The God of Small Things*.
- The Lannan Foundation's Cultural Freedom Award.
- Sydney Peace Prize.
- Sahitya Akademi Award,

Environmental Ethics

Environmental
Ethics



Recognize plant
and animal
rights.

Realize the
intrinsic worth of
nature.

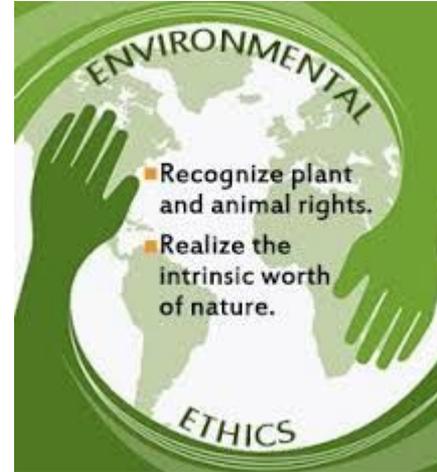
What is environmental ethics? ??

- ❑ Environmental ethics is a discipline in philosophy that studies the moral relationship of human beings to, and also the value and moral status of, the Environment and its non human-contents.
- ❑ Environmental ethics believe that humans are a part of society as well as other living creatures, which includes plants and animals. These items are a very important part of the world and are considered to be a functional part of human life.

Branches of environmental ethics

It is splitted into three different schools of disciplines.

- a. Anthropocentrism
- b. Biocentrism
- c. Ecocentrism



- ❑ **Anthropocentrism:** A human based ethic arguing that humans possess complete authority over decisions about the environment.
- ❑ **Biocentrism:** It states: “extend the status of moral object from human beings to all living things in nature.” ... All living organisms pursue their own "good" in their own ways. Human beings are not inherently superior to other living things.
- ❑ **Ecocentrism:** A term used in ecological political philosophy to denote a nature-centred, as opposed to human-centred, system of values.

Importance of Environmental Ethics

- Make us aware of indiscriminate and destructive human activities.
- Inculcate moral values towards nature and learn to respect various life forms through environmental ethics.
- Concerned with the issues of responsible personal conduct with respect to natural landscape, resources, species and non-human organisms
- Conduct with respect to person is, of course, the direct concern of modern philosophy.

Environmental citizenship

Environmental citizenship is the idea that we all should take responsibility for how we interact with the **environment**. The concept of **Environmental Citizenship** (EC) redefines the relationship of people and nature and reiterates that **environmental** conservation is everybody's sole responsibility at all time, based on one's life choices in minimizing **ecological** impact on earth.



2 Marks Questions

1. What is medical waste?
2. What is global warming?
3. “ultimate goal of environmental education is for environmental citizenship”.
explain?
4. What all are causes of climate change?

5 Marks Questions

1. What is climate change? How is pollution affecting the climate?
2. Describe briefly about environmental ethics?
3. Explain the concept of homeostasis and role of living and non living organism in maintaining homeostasis?
4. Explain the role played by various international agencies for the protection of environment?
5. Explain the effects of acid rain and ozone depletion?
6. What is global warming? Suggest some mitigation measures?
7. What is e-waste? Explain the role and responsibility of teachers in the management of e-waste?
8. Describe the importance of public participation in conservation of nature?

15 Marks Questions

1. Describe the issues in solid waste management. Explain the role and responsibility of individuals and institutions in the management of solid waste?
2. Explain the role played by various international agencies for the protection of environment?
3. “The ultimate goal of environmental education is for environmental citizenship”.discuss the importance of public participation in the conservation of nature with special reference to the role of media and governmental and non governmental agencies?
4. Describe the measures to ensure public participation in conservation of nature? Explain the role of media, governmental and nongovernmental agencies in ensuring public participation in conservation of nature?

M Ed. IV. Sem. MED 15.2 Environmental Education

Module 6

Disaster Management

Disaster management

Meaning

Disaster management can be defined as the organization and management of resources and responsibilities for dealing with all humanitarian aspects of emergencies (preparedness, response, mitigation, and recovery). The aim is to reduce the harmful effects of all hazards, including disasters. The environmental quality is lowered and deteriorated by these extreme events which are termed as 'hazards and disasters.' For example, earthquake, floods, cyclones and landslides, volcanic eruptions etc,...

Definition of disaster

“ A serious disruption of the functioning of society which poses a significant, widespread threat to human life, health, property or the environment, whether arising from accident, nature or human activity, whether developing suddenly or as the result of long term processes, but excluding armed conflict.”(International Federation of Red Cross/Red Crescent Societies (IFRC),2007)

Concept of disaster management

- A sudden disastrous event which seriously disrupts the normal function of the society to the extent that it cannot subsist without outside help.
- Not just the occurrence of an event such as earthquake, flood, conflict, health epidemic or an industrial accident, it occurs negatively to the human populations.
- It combine two elements: hazard and the vulnerability of affected people. “ A disaster occurs when a hazard exposes the vulnerability of individuals and communities in such a way that their lives are directly threatened or sufficient harm has been done to their community’s economic and social structure to undermine their ability to survive.

Continue.....

- It is a calamitous, distressing, or ruinous effect of a disastrous event which seriously affects or disrupts (or threaten to disrupt) the critical functions of the community, society or system, for a period long enough to significantly harm it or cause its failure.
- It is beyond the capability of the local community to overcome.
- It is a situation resulting from an environmental phenomenon or armed conflict that produce stress, personal injury, physical damage and economic disruption of great magnitude.

Principles of disaster management

1. Solidarity.
2. Joint responsibility.
3. Non-discrimination.
4. Humanity.
5. Impartiality.
6. Neutrality.
7. Co-operation.
8. Territorial sovereignty.
9. Prevention and
10. Role of the media.

Types of disasters

Disaster

Disasters are Two types:-1. Natural disasters. 2.Man- made disasters

Natural disasters

*Earthquake

*Volcanoes.

*Tsunami.

Cyclone. Flood. *Drought.*Landslide.* Avalanche.

*

Man-made Disasters

* Fire *Building collapse.

*Industrial hazards.

*Transport accident. *Stampede.

*Riot *Terrorist attack

Causes of disasters

Natural disasters:-

- 1.Movement of the earth.*These occur with the minimum amount of warning and include earthquakes,volcanic eruptions and tsunamis.....
- 2.Weather related disasters:-These will include hurricanes,tornadoes,extreme heat and extreme cold weather.....
- 3.Floods,mudslides,landslides and famine.....

Causes of disasters

Man-made disasters:-

It include hazardous material spills, fires, groundwater contamination, transportation accidents, structure failures, mining accidents, explosions and acts of terrorism.

Examples:-The Bhopal Gas Leak, The Jilin Chemical Explosion, The Tennessee Coal Ash Spill, The Sidoarjo mud volcano, The North Pacific Garbage Patch, The Gulf War Spill, The Deepwater Horizon Oil Spill, The Exxon Valdez Oil Spill.....

Impact of disasters

Natural disasters:- Natural disasters are a naturally occurring event that causes damage to human life, but human activity can increase their frequency and intensity. Deforestation is wiping out trees, causing increased risk for flooding, soil erosion, and drought.

Man-made disasters:-Examples:-Gas Leaks, Oil Spills, Nuclear Meltdown, Industrial fires, etc.....

Disaster Management Training

Definition: Disaster Management Training may be defined as an essential means through which agencies and individuals can develop and maintain their disaster management capabilities and capacity. Training can provide the knowledge, skills and proficiency required across the disaster management phases of prevention, preparedness, response and recovery. Furthermore, training is important in ensuring that all agencies can seamlessly integrate their arrangements and contribute to effective and coordinated disaster operations.

Need of Disaster Management Training

1. It helps to learn how to handle through hands-on activities.
2. You can be confident that we will know exactly what to do, no matter what disaster occurs.
3. identify how disasters affect you
4. identify what you can do about disasters
5. recognize the phases of disasters
6. identify the aims and elements of disaster management
7. describe how disasters influence development
8. describe how to implement disaster mitigation measures through development projects
9. recognize inter-relationships between natural and human-made disasters

Importance of Disaster Management Training

1. Disasters are a growing problem/concern
2. Disasters are non-routine events that require non-routine responses for which we need training
3. DMT helps to consider emergency response activities in light of existing and new disaster risks.
4. DMT helps safeguarding efforts to create and expand enabling conditions for sustainable poverty alleviation and development.

cont.

5.DMT approaches and tools will prevent relief work from rebuilding the vulnerabilities that made people prone to similar disasters.

6.It helps us identify and map local capacities to cope with these hazards.

7.DMT provides valuable insights into the underlying factors of vulnerability to hazards and the features of those hazards

8.helps us conduct effective disaster response while reducing risks that similar disasters will reoccur

Indian scenario with respect to kerala disaster management training

India's geo-climate conditions, along with its high degree of socio-economic instability, make it one of the world's most disaster-prone nations. A disaster is an severe disruption of a society's functioning which causes widespread human, material, or environmental losses that exceed the capacity of the affected society to cope with its own resources.

Indian Scenario: India due to its geo-climatic and socio-economic condition is prone to various disasters. During the last thirty years time span the country has been hit by 431 major disasters resulting into enormous loss to life and property. According to Prevention Web statistics, 143039 people were killed and about 150 crore were affected by various disasters in the country during these 3 decades. The disasters caused huge loss to property and other infrastructures costing more than US \$ 4800 crore.

Role of teachers and educational institutions in disaster management

ROLE OF TEACHER

1. Awareness should be created by teachers on the various types of hazards and the preparedness measures to be taken in order to counter them.
2. In case of a fire, cyclone earthquakes and floods, prepare a contingency plan for the school.
3. Students should be told about the primary escape route in the school Train the First Aid and Rescue operations for children.

4. In the school hold mock drill at least twice a year.

5. Initiate the planting process in the school and offer knowledge on the type of trees to grow.

6. Generate information among the children on water and sanitation.

7. The student should be shown the actions he would take while caught in a fire.

Educational institution role

1. Act as a safe shelter.
2. Health centre for the locality.
3. Disaster management Information centre where data base could be maintained on population, health, institutions etc.
4. A centre for learning and counselling.
5. The school can be feeding centre.
6. Training for DRM volunteers, Village Council members, Teachers, Government officials at the Sub-Division level.

2 Marks Questions

1. What do you mean by disaster management.?
2. Define disaster management.?
3. What do you mean by natural disaster.?
4. What do you mean by man-made disaster.?
5. What do you mean by Disaster Management Training?
6. Write any two roles played by teachers in disaster management?

5 Marks Questions

1. Explain the concept of disaster management.?
- 2.Explain the principles of disaster management.?
- 3.Explain the causes of disaster management.?
- 4 Briefly explain the impact of disasters.?
- 5.What is the need of DMT?
- 6.What are the importance of DMT?

15 Marks Questions

- 1.Explain the concept of disaster management.?What are the types of disaster management .?
- 2.What is Disaster Management Training?Explain the need and importance of DMT.
- 3.Describe the role of teachers and educational institution in Disaster management?
4. Explain the disaster management in india with respect to kerala disaster management training?