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MASTER TRAINERS' MANUAL ON ENVIRONMENTAL EDUCATION (FOR SCHOOL TEACHERS)



Indus for All Programme, WWF - Pakistan

Master Trainers' Manual on Environmental Education

(For School Teachers)

Master Trainers Manual on Environmental Education

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Foreword

It has been diligently observed by conservation organizations and individuals across the world that environmental protection is highly unlikely without developing a caring attitude among public for their environment. Learning and understanding is the key to bring about attitudinal changes. Environmental education is, therefore, considered to be an essential first step towards a healthy environment and caring society.

WWF – Pakistan’s conservation initiatives are always anchored by a comprehensive education and awareness drive as is done under the Indus for All Programme. The Programme is the first six-year implementation phase of a long-term conservation agenda in the region known as the Indus Ecoregion Programme. The Programme aims to conserve biological diversity in the Indus Ecoregion through livelihood improvement of the local communities.

The Indus Ecoregion is one of the 238 ecoregions in world, which are the outstanding land and seascapes identified globally by World Wide Fund for Nature (WWF) with support of other conservation organisations such as the United Nation’s Environment Programme and National Geographic Society. The analysis called Global 200 and carried out in 1997 was followed by developing conservation programmes for these ecoregions.

Environmental education is a vital component of the Indus Ecoregion Programme intending to address a diverse array of target audiences. School children are one of the major target groups. Acknowledging the fact that educating youth and school children is a long-term investment in conservation initiatives, the Programme has launched a comprehensive environmental education campaign in schools. The campaign focuses on building competencies of school teachers, developing nature clubs and integrating environmental education in school’s curricula.

The manual in hand titled “Master Trainers Manual on Environmental Education” is meant to be utilised by school teachers in general and trained teachers in the priority sites of the Indus Ecoregion in particular to enhance their skills and promote environmental education in their schools. Though, similar manuals and guidebooks have also been developed by many other organizations, but in this manual special efforts have been made to enable teachers to teach the environmental concepts by integrating with their schools’ curricula.

We hope that you will find this manual useful for teaching and learning environmental education in schools. As ever, we are interested in hearing from you about how you, as individuals and as organisations have successfully used this manual. For more information about the Indus for All Programme and how to contact us, please visit our website at: www.indusforever.org

*Dr. Ghulam Akbar
Regional Director
WWF – Pakistan*

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I really appreciate and thank to WWF – Pakistan for providing me a great opportunity for developing this environmental education manual for the master trainers.

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*Qamar Shahid Siddiqui
Consultant,
WWF – Pakistan
22 July 2008*

Acronyms

BMPs	Best Management Practices
CFCs	Chlorofluorocarbons
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
EE	Environmental Education
ESRA	Education Sector Reform Assistance
GDP	Gross Domestic Product
ha	Hectare
HEP	Hydroelectric Power
IUCN	The World Conservation Union
OHP	Overhead Projector
PC	Personal Computer
USAID	U.S Agency for International Development
WWF – Pakistan	World Wide Fund for Nature – Pakistan

Introduction

Learning about environment (climate, soil, biodiversity, ecosystems, natural resources, sustainability, etc.) is the most essential part of education. Humans are required to understand what is necessary to keep life and the factors that are supporting life fit in accordance with the natural principles so that life could have maximum chance for smooth survival on this planet Earth.

The world has realised that excessive industrialisation, technological innovations and nuclearisation, which humans identified as their accomplishment, are now proving to be the major threats to life on earth. As a result thereof, many countries of the world have realised to educate people about environment. Education Ministries have made Environmental Education (EE) as the obligatory part of the school curriculum.

Environmental education mainly focuses on all aspects of environment and the ecosystems like soil, water, forests, the natural resources and their conservation, creating balance between the population increase and the use of resources, the global warming and pollution; which are the major threats to human survival on earth.

In recent years, the Ministry of Education, Government of Pakistan has earnestly felt the need of teaching EE and has incorporated EE as the part of curriculum. Along with the concerned ministry, other stakeholders like non-governmental organisations, international organisations including WWF – Pakistan are struggling to make EE as the integral part of the curriculum.

WWF – Pakistan has long history of research and academic work in the environmental education. 'Indus for All Program' of WWF – Pakistan is one of the recent initiatives which lays emphasis on teachers' education with respect to environment. This manual is one of the efforts to prepare teachers in EE with special focus on promoting environmental education of the Indus Ecoregion in schools and the programme sites of the Indus for All Programme: Keti Bunder (Coastal ecosystem) in Thatta, Keenjhar Lake (Freshwater ecosystem) in Thatta, Chotiari Reservoir (Wetland ecosystem) in Sanghar and Pai Forest (Forest ecosystem) in Nawabshah by enhancing the knowledge and skills of school teachers in environmental education.

This manual focuses on the development of content knowledge that is already available in the textbooks being used in the public and private sector schools in the target areas. In other words, the EE concepts are available in the textbooks and through this manual, teaching of those concepts would be further enriched/ highlighted. The second major aspect of this manual is learning a variety of innovative teaching learning strategies/techniques that could be used/ practiced in the schools.

There are five modules of this training manual namely:

- Module 1: Entry into Learning and Developing Rapport
- Module 2: Developing Conceptual Framework for Environmental Education
- Module 3: Teaching and Learning about Environment
- Module 4: Developing and Implementing Environmental Education Programme in School
- Module 5: Implementing Training in the Field

This manual is developed in a way that would enable the school teachers not only to enhance their present knowledge of environmental education concepts and relate it with the Indus Ecoregion, but also to learn about the major issues of the Indus Ecoregion and later devise the practicable strategies of resolving the issues at all possible levels: school, home, and society. While developing of this manual, it has been cared that creative teaching, learning and assessment methodology would be adopted so that teachers are able to engage their learners in creativity and critical thinking.

This manual also includes a list of readings regarding environmental education and the pedagogy so that school teachers could have maximum opportunity of enhancing their knowledge of environmental education and teaching learning methods and techniques.

Rationale of Environmental Education

In our context of Sindh province, the Environmental Education (EE) is being taught for many years. There are several concepts related to environmental education present in our primary and secondary school textbooks of English, Urdu, Sindhi, Science and Social Studies. Apart from these, there are several environmental themes present in the subjects of language, science and social studies that focus environmental education.

Though the concepts are available in the textbooks and are being taught for a very long time, no proper understanding of environmental education is observable in our children. The close observations of teaching learning methodologies depict several reasons for not witnessing a substantial change. The first reason is that the concepts are integrated within the subjects of language, science and social studies. Teachers mostly pay attention to learning the concepts related to these subjects and they do not pay heed to environmental education concepts. The reason behind this practice is teachers' inability to highlight the environmental education concepts when teaching the other concepts. For example, if a teacher is teaching the lesson on Dolphins (English class 4), he/she will usually concentrate on loud reading of the lesson, dictation of new words and conducting conventional type exercises. A teacher never pays attention to the development of understanding of what a Dolphin is, where it lives, how it lives, why it is popular, why its survival is necessary, what humans can do for its survival etc.

The dilemma is that the teacher in our context does not facilitate children in developing understanding of the environmental education themes in relation to the concepts being focused as the primary concepts. Second, the teacher does not teach concepts in relation to the real life but simply focuses on textbook as the sole source of knowledge. The third reason is that the teacher does not facilitate children in development of a sense of ownership about environment within them. For example, a teacher while preparing a lesson on dolphins should plan the lesson in a way that children feel ownership of dolphins and later think about dolphins' care. The fourth reason is that the teaching-learning of these concepts is very much dull and dreary in the sense that it is based only on memorisation of the concepts. Children usually memorise and do not focus on understanding the concept. As a result of memorisation, children never get involved in creativity, discovery, critical thinking and reflection.

The concepts of EE strongly suggest active involvement of children into various activities, for instance reading stories, singing poems, question answers, debate and discussion, interview, fieldwork, drawing, creating stories, development of environmental clubs, etc. Involvement in these activities can only ensure better understanding along with the development of awareness, realisation, ownership and commitment to resolve the main concerns of their environment both individually and collectively. As a result of this change, it would be possible to hope for active and civilised members of the society in the future course of time.

About this Manual - *Sharing Main Features*

Keeping the academic and professional needs and the cognitive level of the teachers in our context, this manual has been made quite simple for understanding and practice. The understanding and practices of environmental themes are well supported by prior knowledge and experiences, textbook knowledge, activities, simple description of the teaching-learning techniques, procedures, etc.

This manual is based on the current textbooks relating to Sindhi, Urdu and English, Science and Social Studies, which are being used in public and private schools. The EE concepts have been selected from these textbooks and are put in the framework of variety of teaching-learning techniques. The second source of content knowledge is the provision of material and activities related to the conservation of natural resources of the Indus Ecoregion Programme.

The manual is developed on the basis of real life situations. Teachers will be enabled to teach the children what they see, what they feel, and what they evaluate through the in-depth reflection of their actions.

Promoting the constructivist paradigm of learning is the important feature of this manual. All the input in this manual is based on what trainees already know and the experiences they possess. The previous knowledge and experiences will serve as the strong basis for building new knowledge, which will continue throughout their professional career development.

The participatory/ cooperative learning approach will be used across the training programme. This strategy will help in creating social equity, where learning will take place through sharing, exchange, empathy, etc.

The learning will proceed from easy to complex learning and from known to unknown. Hence, learning will gradually evolve from easier to the more difficult concepts.

The provision of a variety of teaching-learning strategies in this manual will provide the learners with great exposure to learn different concepts through the various strategies/techniques. It may be kept in mind that the current and most prevailing method of teaching-learning is based on direct teaching method, where teacher is dominant over the learner.

Field trip has been made the prime feature of this training manual as the trainees' involvement in actions outside of classroom greatly helps them in understanding the complex ideas.

The analytical and reflective approaches are the part and parcel of this manual in order to enable trainees to evaluate their learning in depth, explore alternate ways of working, etc.

Objectives of the Manual

This manual will enable the master trainers to:

1. Develop understanding about the environmental education concepts;
2. Enrich the existing environmental education concepts available within the textbooks and integrate them into various subjects;
3. Learn a variety of pedagogical and assessment skills involved in teaching environmental education concepts;
4. Develop and implement school's environmental education action plan; and
5. Learn how to organise a training programme in environmental education.

1 - Module

Entry into Learning and Developing Rapport

Objectives of the Module:

This module will enable course participants to:

- *Know each other;*
- *Make entry in the learning environment;*
- *Learn about the objectives; and*
- *Develop social skills chart as a tool for creating discipline throughout the workshop.*

1 - Activity *Knowing Each Other*

Objective:

To enable participants to know each other.

Strategies:

- Searching partner.
- Making inquiry.

Time: 45 minutes

Resources:

- Flash cards
- Pictures, etc.

Tips for Resource Persons:

Criteria of searching partner could be having similarity in the living or nonliving things like animals, birds, fish, plants, trees, food, habitats, etc.

Procedure:

- Ask participants on individual basis to write the name of any bird, animal, tree, plant, food, ecosystem or habitat, etc.
- The participants having similarity in the names, family of specific species, taste in case of food, habitat in case of similar features may form the pair.
- Each individual will have to draw or write on the flash card or select a picture and pin up in front of dress so that everyone could have easiness in searching the partner.
- After searching, sit in the corner and make conversation to know each other. Below are some guiding questions that may help to get information but participants will have freedom to devise other questions as well.
- For presentation, each individual in pair will read out the answers collected through conversation/enquiry.



Guiding Questions:

These are a few questions given below. The participants may feel free to add any question to make conversation. The questions could be:

1. What is your name?
2. Where do you serve and in which capacity?
3. Where do you live?
4. How do you see the environment where you live?
5. Which animal do you like the most and which animal makes you scared and what are the reasons?
6. Have you ever planted a tree; what were your feelings?
7. Have you ever cared for an animal, bird, tree, environment, etc?

2 - Activity *Entry into Learning*

Objective:

To enable participants think about a situation through reading a poetry.

Strategies:

- Reading a poem, understand and link it with real life.

Time: 30 minutes

Resources:

- A poem.
- Pictures.

Tips for Resource Persons:

Reading a poem is an artistic activity which may provide an opportunity to listeners to visualize or perceive what they are listening to.

Procedure:

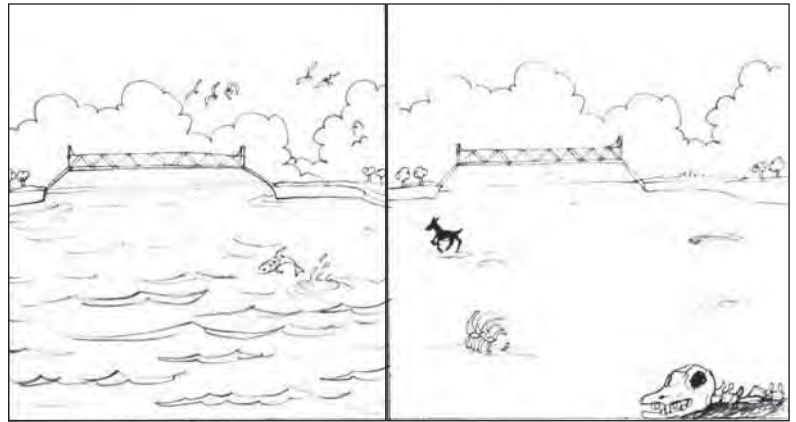
- Welcome all the participants by reading a poem of Shah Abdul Latif Bhitai, thus giving a message to save the environment and bring prosperity.
- Read another poem giving message related to the environment (see a poem on the next page as an example).
- Ask participants to visualise poetry and develop a link with real life.
- Hold a debriefing asking:
 1. What participants have learnt from the poem?
 2. What do they feel as a result of this poem?
- Conclude the session in a way that creates a logical link with the next session.



Welcome Welcome Dear All

Welcome Welcome dear All
I really feel nice to make this call
Let's come to learn about the place we live in
Where there remained our kith and kin
A place once was beautiful
Now looks terrible
There was a river called Indus
Alexander called it mighty Indus
Because of its powerful flow
Where birds, trees, fish, humans grow
Now, where is its forceful flow?
Disappeared! Yes disappeared.
Now dry look like a desert
Fish, birds, humans are crying
They are dying
Save them please save them
From the fearful flame
Lets unite and do strong action
For that we need strong commitment and a
realistic plan of action
That should back Indus the same flow
Where all birds, trees, humans could grow
And move towards a direction
A direction of peace, care, love and satisfaction
Welcome Welcome dear All
I really feel nice to make this call
Let's come to learn about the place we live in
Where there remained our kith and kin
A place once was beautiful
Now looks terrible

Qamar Shahid Siddiqui



Poem Presenting Tips

- ✓ Make voice audible to all the participants.
- ✓ Develop rhythm in the voice.
- ✓ Use body language/gestures.
- ✓ Try creating scene in the poetry.

3 - Activity *Sharing Objectives*

Objective:

Facilitate participants to understand what they have to do to achieve something.

Strategies:

- Discussion.

Time: 15 minutes

Resources:

- Objectives written on a transparency.
- Overhead projector or multimedia.
- Computer.

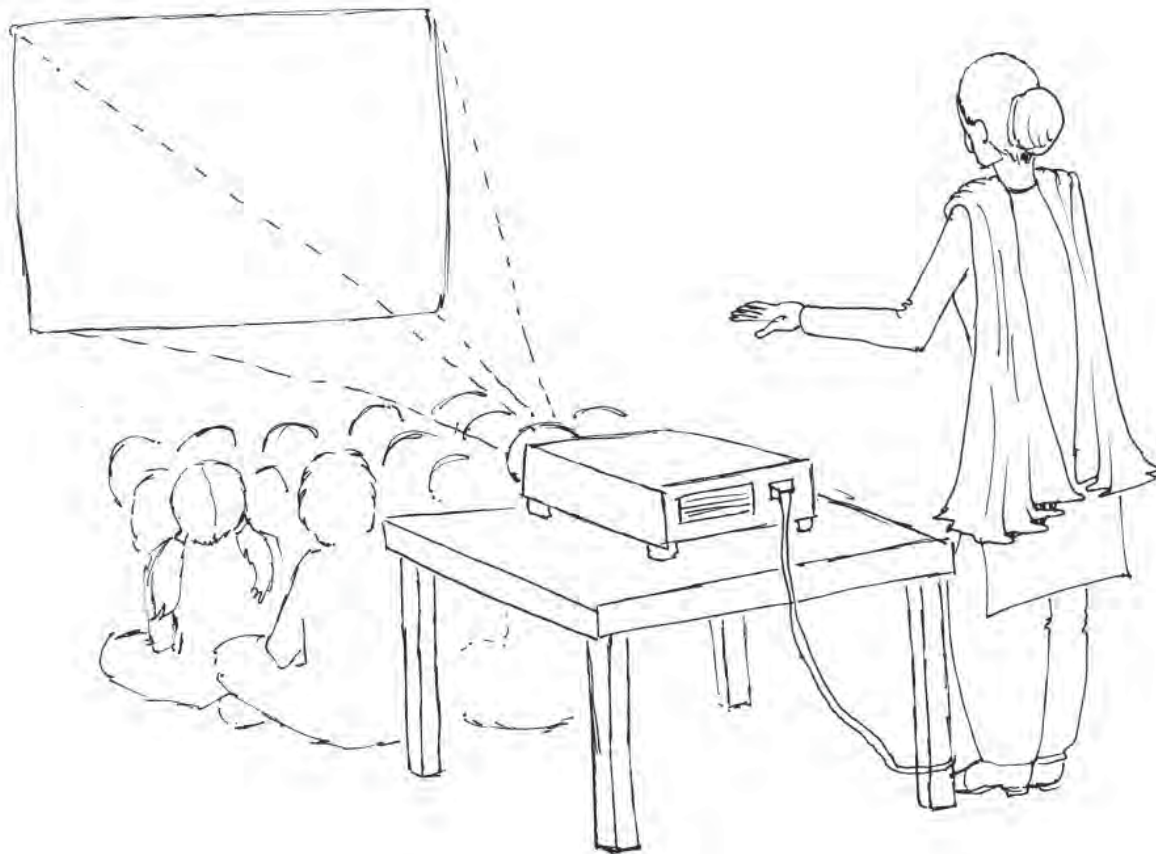
Tips for Resource Persons:

- Resource Persons carefully read and should understand the objectives.
- Prepare for a simple discussion.
- Follow the discussion tips in Appendices.

Procedure:

Resource Persons:

- Display the objectives (please see objectives of the manual on page 5).
- Read objectives one by one along with clarifications, examples, responses to any questions, etc.



4 - Activity *Setting Social Skills*

Objective:

Enabling the participants to design social skills that are to be practiced throughout the training workshop.

Strategies:

- Group Activity.

Time: 30 minutes

Resources:

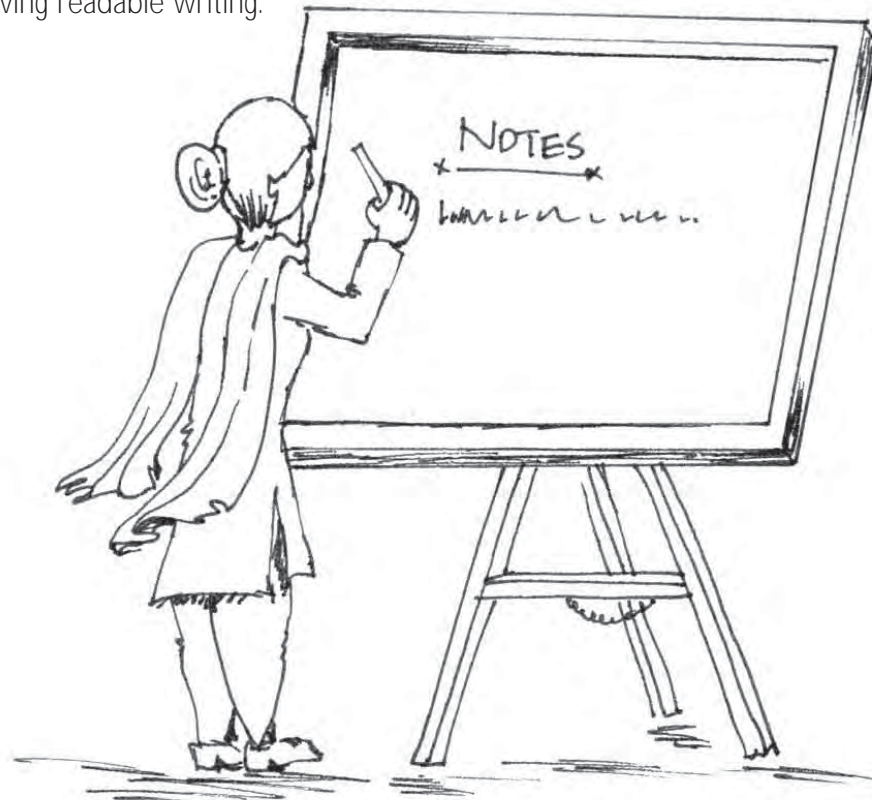
- White/black board.
- White sheets.

Tips for Resource Persons:

- Resource persons would facilitate in discussing, recording and displaying the social skills.
- Be careful for having readable writing.

Procedure:

- Share course participants about the importance of social skills and elicit their opinion.
- Ask course participants to share social skills. Give hint to course participants about the social skills that lie in the categories of work such as: time management, sharing and questioning, regularity, punctuality, etc.
- Write responses on the black/whiteboard.
- Ask one of the course participants to write social skills on a sheet of paper and display it in the corner of the training hall/room. It may be noted that displayed sheet may be easily visible to all the participants.



2 - Module

Developing Conceptual Framework for Environmental Education

Objectives of the Module:

This module will enable Master Trainers to:

- *Understand what environmental education is and how to teach it in a school; and*
- *Search the environmental education themes in the textbooks being taught in the public and private schools.*

Purpose of the Module:

Through this module, the participants of the training program would be able to learn what environmental education is and how to teach it in a school. Later on, the support would be extended to exploring the themes of environmental education in the textbooks being used in the public and private schools. Through this activity, the participants would be able to identify the units/lessons that are matching with the environmental education themes being introduced in the Module 3.

1 - Session *Learning Environmental Education*

Objective:

At the end of the session, the participants would be able to understand the concept, significance and implications of environmental education in real life.

Strategies:

- Watching a documentary and talking about it.
- Reading.
- Discussion.

Time: 60 minutes

Resources:

- A documentary.
- Reading Material # 1 (see the annexed reading pack).
- Multimedia.

Tips for Resource Persons:

Distribute participants into groups in a way that each group should contain a mixed setting of slow or passive and active participants who would collaborate with each other.

Procedure:

- Watch a documentary
- Talk about documentary: look at the environmental concepts, issues, etc.
- Make four groups and distribute Reading # 1 (provided in the reading package given at the end of the manual) giving one paragraph to each group.
- Provide a set of questions to each group to respond and prepare presentation.
- Invite groups for making presentations.



2 - Session *Searching for Environmental Education Themes in the Textbooks*

Objective:

To enable the participants locate the themes of environmental education in the existing textbooks being taught in the public and private schools.

Strategies:

- Analysis and presentation.

Time: 60 minutes

Resources:

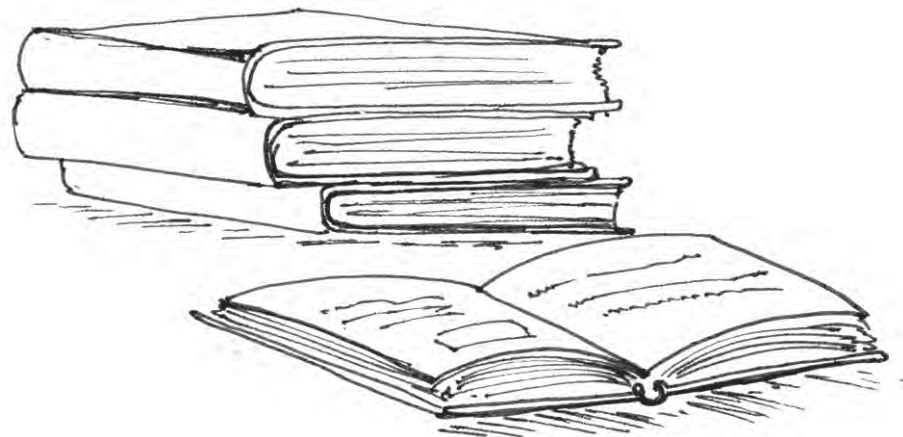
- Textbooks from Class I-X used in the Public/Private Schools in Sindh.

Tips for Resource Persons:

Ensure the arrangement of all textbooks at the training venue.

Procedure:

- Distribute participants into four groups.
- Divide the Textbooks of Science, Social Studies, English and Sindhi/Urdu into four groups (Giving a set of textbooks related to each subject to a group).
- A list as Appendix – B is already provided showing certain topics identified.
- Ask groups to identify environmental education themes.
- Provide a framework to each group to prepare and deliver the presentations.
- Other groups will give feedback.



3 - Module

Teaching and Learning About Environment

Objectives of the Module:

To facilitate the participants to:

- *Learn about the environmental education themes through different activities.*

Purpose of the Module:

This module will enable the training participants to learn about environmental education themes. These themes include:

1. Ecosystems and their Conservation
2. Soil
3. Biodiversity
4. Wetlands
5. Forests
6. Population
7. Natural Resources and their Depletion
8. Pollution
9. Climate
10. Energy

First of all, the theme is defined and explained along with suitable examples through the provided readings. Second step is to link that learning with participants' prior knowledge. Third step is involving participants into the activities so that they may develop better understanding about the concept. In the fourth step, participants are required to identify the units/lesson in the school textbooks of science, social studies, language and mathematics so that later on, they could integrate with the environmental education themes.



I - Theme

Ecosystems and Their Conservation

Objective:

Enabling the participants to:

- ✓ Understand the concept of ecosystem; and
- ✓ Identify the lessons/units in the textbooks that relate the concept of climate.

Strategies:

- Looking for pictures of different ecosystems on multimedia/ or photographs.
- Sharing prior knowledge.
- Briefly reading about the concept.
- Doing activities like enlisting and identifying.

Time: 60 minutes

Resources:

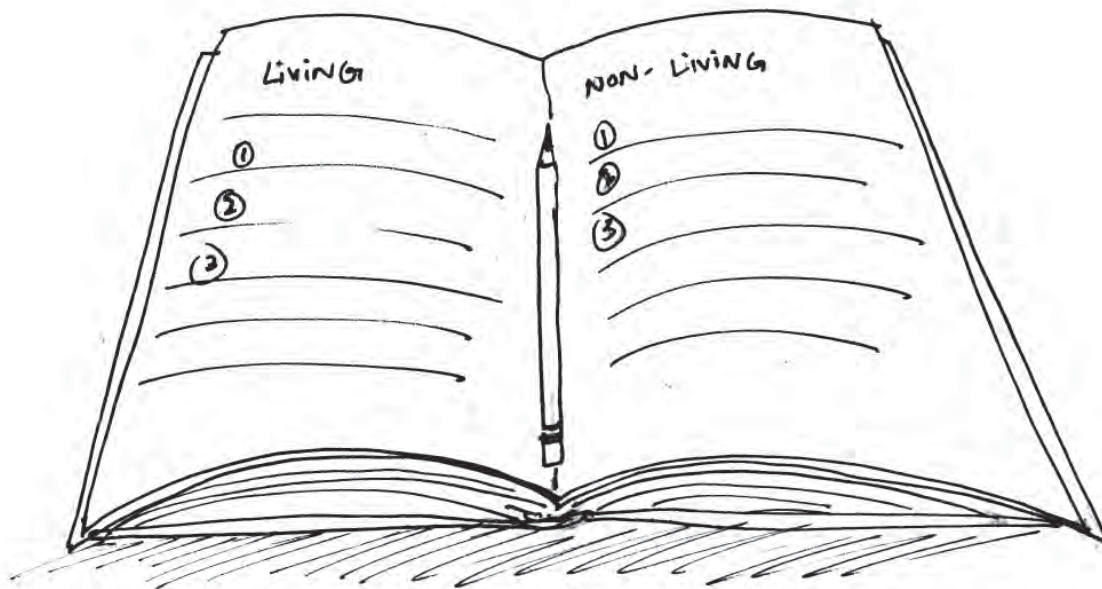
- Pictures related to different ecosystems, Multimedia, etc.

Tips for Resource Persons:

Use of examples and critical incidents along with prior knowledge would be an asset for the session.

Procedure:

- Look at the pictures of different ecosystems on multimedia/ photographs and talk about them.
- Ask participants to list down the living and non-living components of an ecosystem, and ask them to identify interrelationship of different components of an ecosystem with each other and with ecosystem.
- Share with participants the concept of ecosystem, different ecosystems, examples, etc. In this regard, it would be quite useful going through the Reading Material # 2.
- In relation to this, please open the provided textbooks and identify the lesson/units focusing the concept of ecosystem.



1 - Activity *Developing a Model of an Ecosystem – Forest*

Objective:

At the end of the session, the participants would be able to develop a model of a forest to show the concept of ecosystem.

Strategies:

- Working in group setting to produce concrete things through discussion and sharing ideas.

Time: 45 minutes

Resources:

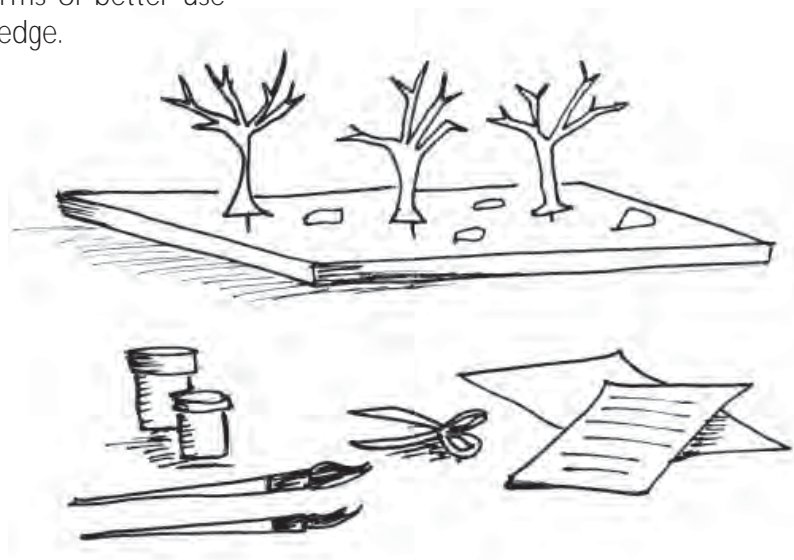
- Branches of trees, plants and grass.
- Clay or plaster of Paris.
- A big hard sheet of empty carton or a piece of chip board.
- Colours.
- Brushes.
- Glue.

Tips for Resource Persons:

Facilitating in shape of providing instant feedback serves the purpose of check and balance. Keeping this in mind, facilitate participants along the way to produce sound outcomes in terms of better use of skills and deriving new knowledge.

Procedure:

- You are setting a model of a forest; therefore, first see what you need to include in the model. For example, a forest has trees, plants, birds, animals, grass, etc.
- First decide how you are making this model. The possible ways of setting things could be through bringing real objects or pictures of things you would like to have displayed in the model.
- Keep in mind the forest that exists in your area/or vicinity to make the model.
- You may bring clay to make animals and birds, branches of trees to show as trees and plants, pieces of grass to show grass, etc.
- First, keep a big hard sheet of empty carton or a piece of chip board.
- Use clay or plaster of Paris to make animals and birds and let them dry. Later colour them to have a real look.
- Paste the branches of trees and plants with glue.
- Display names of things by using small cards.



2 - Activity *Investigating Your Local Environment*

Objective:

At the end of the session, the participants would be able to identify the living and non-living components of their local environment.

Strategies:

- Field work.
- Investigation.

Time: 60 minutes

Resources:

- Thermometer.
- Hand lens.
- Light meter.
- Humidity meter.

Tips for Resource Persons:

Facilitating in shape of providing instant feedback serves the purpose of check and balance. Keeping this in mind, facilitate participants along the way to produce sound outcomes in terms of better use of skills and deriving new knowledge.

Procedure:

1. Select a garden/forest or field for your research.

2. For the area that you have selected, look for all the living things you can find as proof of existence of other organisms. Use a hand lens if necessary. Do not remove any living thing from its habitat.
3. Record all the organisms in the form of a table.
 - a. In the air,
 - b. On plants,
 - c. On the ground surface
 - d. In the soil
4. List out non-living things of your study area such as ambient air temperature, soil temperature, relative humidity and amount of light or shade.
5. Identify the relationship between living things and non-living things of studied habitat with your fellows, who studied other areas.

Questions:

1. Do you find the same type of organisms living in areas with different physical features?
2. Explain why living things should not be removed from their habitat?
3. Explain how living and non-living parts of the environment are related to each other?



3 - Activity *Building a Food Chain or Food Web*

Objective:

At the end of the session, the participants would be able to learn about the concept of food chain or food web in an ecosystem.

Strategies:

- Observation.
- Recording.
- Discussion.

Time: 30 minutes

Resources:

- Charts.
- Markers.
- Some Reading Material (optional).

Tips for Resource Persons:

You may start by giving the example of humans to share a food web.

Procedure:

1. Look at these food chains.

Grass → Caterpillar → Sparrow → Sparrow hawk

Leaves → Worm → Sparrow → Eagle

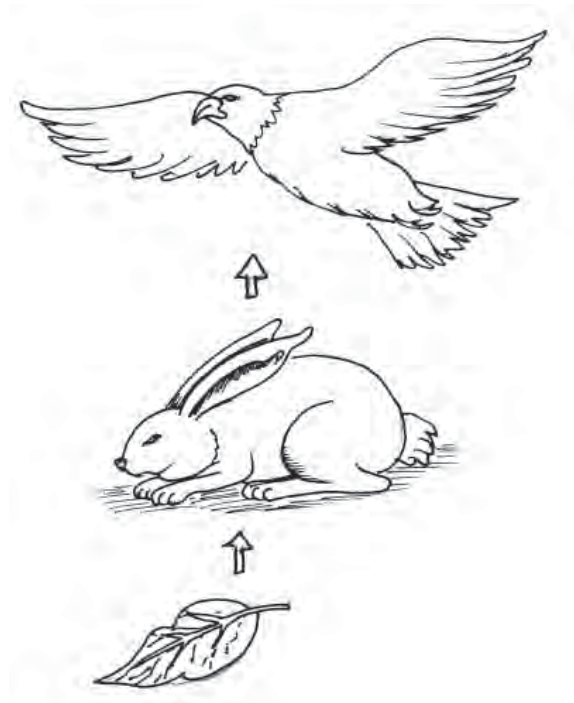
Leaves → Rabbit → Eagle

Grass → Rabbit → Eagle

Leaves → Caterpillar → Sparrow → Sparrow hawk

2. Write the names of different living organisms found in your area on a separate pieces of paper and arrange them into a food web on a clean piece of paper/chart. Use the following steps to help:

- Put all the plants at the bottom of the page.
- Put anything which eats the plants one layer above them. These are the primary consumers.



- Put anything which eats the primary consumers one layer above them. These are the secondary consumers.
- Put anything which eats the secondary consumers one layer above them.
- Do not worry if some animals in the same level eat each other.
- Stick the boxes on the paper. Draw arrows to connect the boxes into a food web.

Questions:

1. What is a food web?
2. Define
 - a) Primary consumers
 - b) Secondary consumers
 - c) Tertiary consumers
3. What will happen if a component of a food web is removed?
4. Define:
 - a) Food chain
 - b) Food web

II - Theme *Soil*

Objective:

At the end of the session, the participants would be able to:

- ✓ Understand and share the concept of soil; and
- ✓ Identify the lessons/units in the textbooks that relate to the concept of Soil.

Strategies:

- Reading material.
- Searching textbooks.

Time: 45 minutes

Resources:

- Reading Material # 3.

Procedure:

- Participants should go through the Reading Material # 3 about Soil.
- Respond to the provided questions at the end of the reading.
- In the light of the above reading, share one or two examples and elicit similar examples from the participants.
- In the light of the reading, search for textbooks to identify the lessons/units in the textbooks that relate to the concept of Soil.



1 - Activity *Experimenting Soil*

Objective:

At the end of the session, the participants could be able to distinguish/recognise the various types of soil.

Strategies:

- Activity through experimentation.

Time: 60 minutes

Resources:

- Samples of soils.
- Newspaper.
- Dustpan.
- Brush.

Tips for Resource Persons:

- Ensuring availability of all materials before the activity will make this activity interesting.
- Following the procedure as required by the activity.

Procedure:

You have some soil samples. Use the key below to identify the type of soil in each sample.

Key:

1. Pick up a handful of soil. Let it run through your fingers.
 - a. Is the soil gritty but not sticky?
Yes: go to question 2.
No: go to question 1b.
 - b. Is the soil sticky but not gritty?
Yes: go to question 3.
No: go to question 1c.
 - c. If the soil is neither gritty nor sticky, your soil is a loam.
2. Hold the soil in your palm and press the soil between your hands.



Then open your hands.

- a. Does the soil form a ball?
Yes: your soil is a sandy loam.
No: go to question 2b.
 - b. If the soil does not form a ball, does it make a muddy mark on your hand?
Yes: your soil is loamy sand.
No: our soil is sand.
3. Rub some soil between your fingers and look carefully at the soil which has passed through your fingers. Does the surface of the rubbed soil have a shine?
Yes: your soil is a clay loam.
No: your soil is a silt loam.

Assess the soil by asking how soils differ from each other and describe in words or write a short note.

2 - Activity *Walk in a School Garden*

Objective:

Providing participants the exposure of garden and enabling them to assess the soil of their school garden.

Strategies:

- Walk and observe.

Time: 40 minutes

Resources:

- A pen and a simple notebook to collect notes.

Tips for Resource Persons:

Watching a documentary of a garden can also be opted if there is no garden in the school or near to school.

Visit to a garden is a fantastic way of learning about a whole range of issues to do with soils,

plants, trees, product and the environment, as well as bringing many other benefits. The garden can be used to find out the importance of soil and its magical properties. The garden can help you develop an understanding of the needs of our damaged plants.

Procedure:

- Move to a garden
- Observe the
 1. Kind of soil in the garden.
 2. Relationship between soil, plants and humans.
 3. Continuing care and maintenance in the garden.
 4. Unhealthy plants and find out the reason of that.
- Synthesize your observations.
- Prepare the presentation and deliver.



III - Theme *Biodiversity*

Objective:

To enable the participants to:

- ✓ Share/learn the concept of biodiversity, its kinds and importance with particular reference to Indus Ecoregion; and
- ✓ Identify the lessons/units in the textbooks that relate to the concept of biodiversity.

Strategies:

- Eliciting prior knowledge through brainstorming.
- Reading literature
- Presentation.

Time: 30 minutes

Resources:

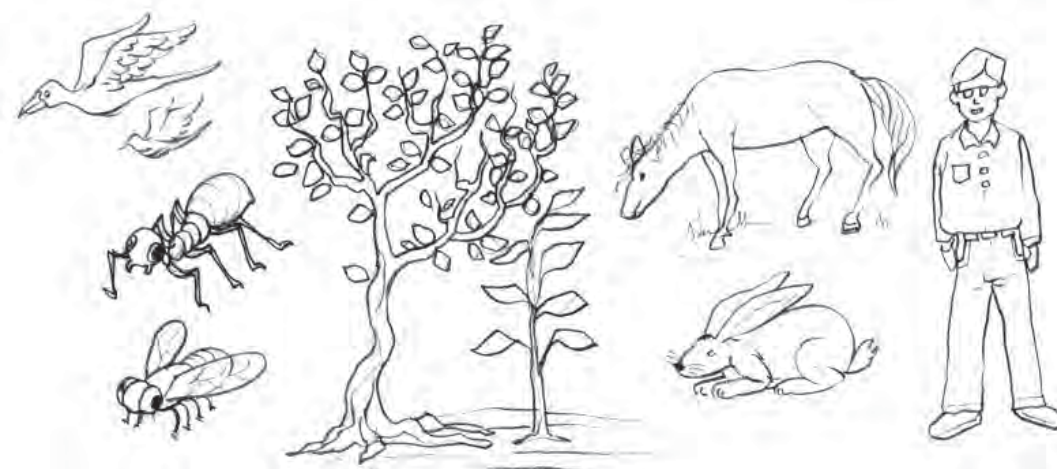
- A Reading on biodiversity (given as Reading Material # 4) and textbooks.

Tips for Resource Persons:

Ensure that participants would have understood the concept of biodiversity through their own understanding emerged as a result of personal experiences from interaction with home, society and school. Use of textbooks in this process would be advantageous.

Procedure:

- Arrange presentation on biodiversity with specific attention to biodiversity of Indus Ecoregion.
- Participants go through the Reading Material # 4 on biodiversity.
- Respond to the provided questions at the end of the reading.
- Sharing examples from daily life eliciting the concept of biodiversity.
- Participants will identify the textbook lessons/units that focus on the concept of biodiversity.
- Discuss why biodiversity is important.



1 - Activity *Observing Biodiversity*

Objective:

To enable the participants to observe biodiversity in the surroundings and record notes.

Strategies:

- Working as a group.
- Observing and taking notes.
- Discuss outcomes.

Time: 60 minutes

Resources:

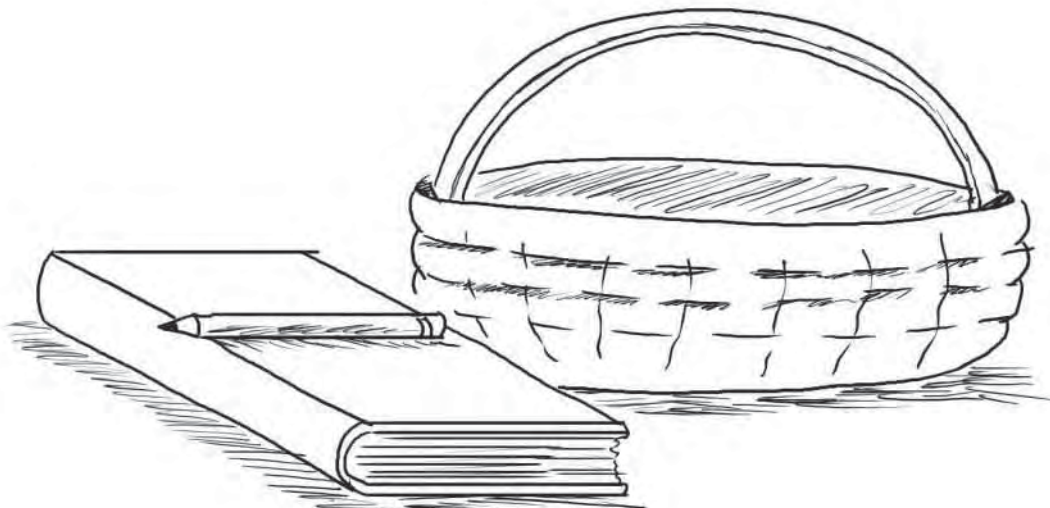
- A notebook to record observations.
- A bag or basket to keep searched things.

Tips for Resource Persons:

Facilitate participants to bring out as much examples of biodiversity as possible. This will help to build strong idea about biodiversity.

Procedure:

- Move out of classroom to a garden /nearby forest or agricultural field with the intention to observe biodiversity in your surroundings.
- While observing you may record: the living things like birds, animals, insects, plants, trees, etc.
- Record their actions like feeding, flying, sleeping, making home, protecting themselves, their impact on humans and humans' impact on them etc.
- Collect concrete things that may support your observations and outcomes.



2 - Activity *ABC Book of Nature*

Objective:

To enable the participants prepare the ABC Book of Nature through field trip/observation.

Strategies:

- Field Observation.
- Recording.
- Preparing.
- Displaying.

Time: 90 minutes

Resources:

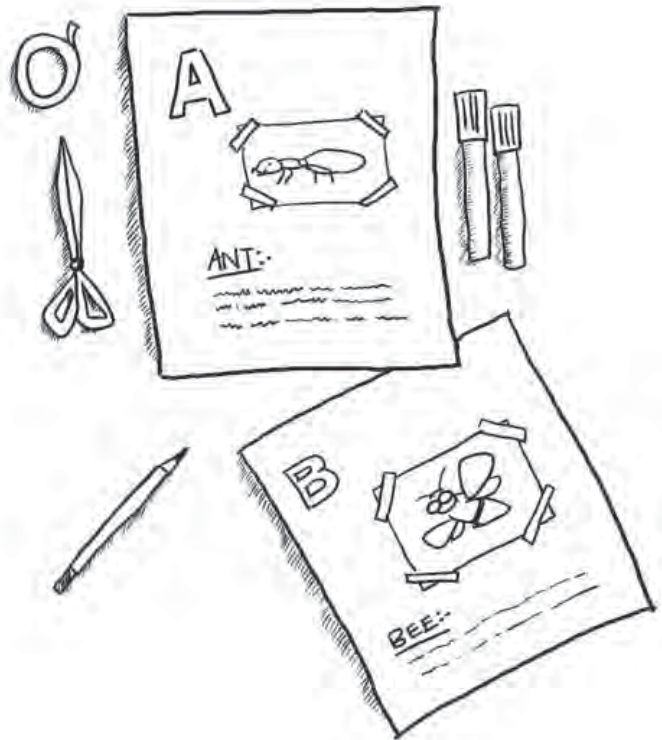
- A notebook to record observations.
- Hard sheets.
- Colours.
- Scissors.
- Markers.
- Pencils.
- Rubber.

Tips for Resource Persons:

Give clear instructions to participants that they have to observe things/animals according to English alphabet.

Procedure:

- Clearly brief the participants about the task: To find one object in nature for every letter of the alphabet. (For example, A for Ant, B for Bug, C for Caterpillar, L for Lion, etc.)
- Take all the participants for a nature walk, where the participants could observe the nature things/living beings.
- Participants to record observations such as what they see, their actions, life etc.
- After returning, ask participants to create an ABC Book of Nature using one page for each letter of the alphabet.
- Collect pictures or draw pictures, colour them and paste with scotch tape or glue.
- Write a few words about each of the things you observed.
- Arrange the pages in alphabetical order.
- Give a suitable title to your ABC Nature Book.



IV - Theme *Wetlands*

Objective:

At the end of the session, the participants would be able to:

- ✓ Learn about the concept of Wetlands; and
- ✓ Identify the lessons/units in the textbooks that relate to the concept of Wetlands.

Strategies:

- Watching a video.
- Reading.
- Discussion.

Time: 60 minutes

Resources:

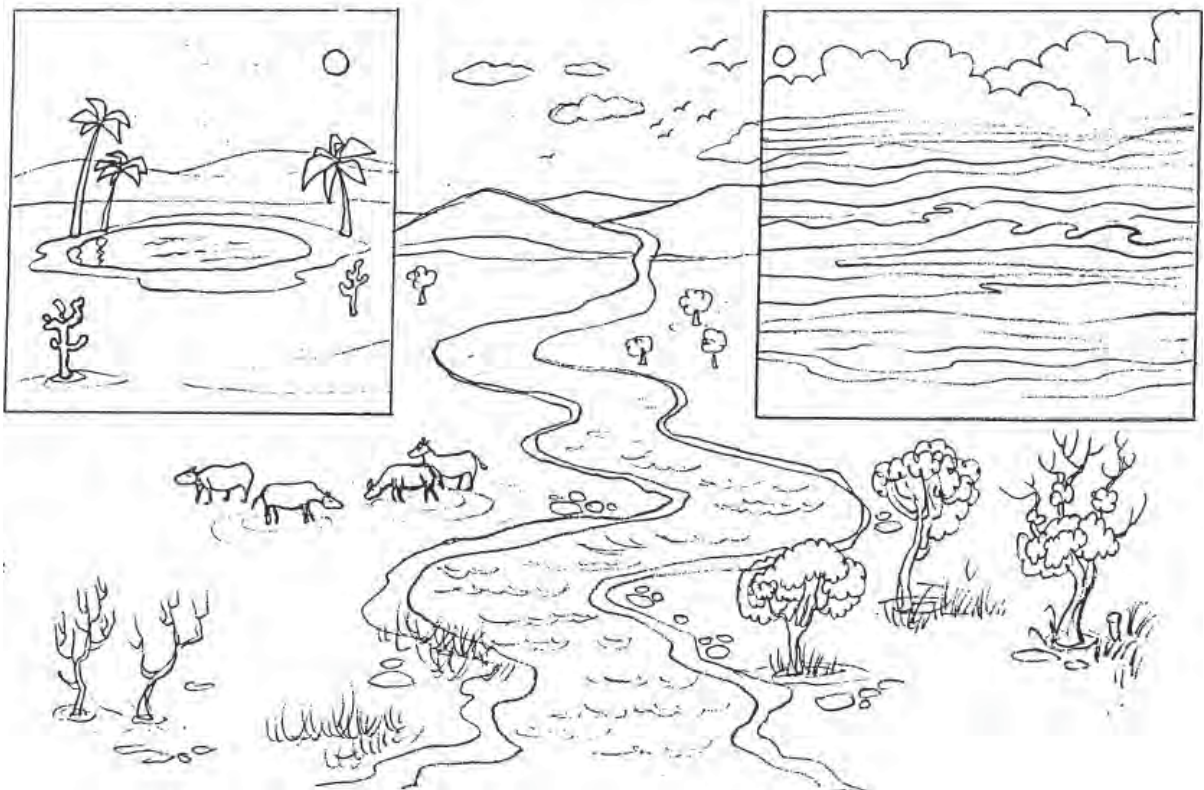
- A Video.
- Reading Material # 6.

Tips for Resource Persons:

Facilitate participants to use personal experiences of life. Use of textbooks in this process would be advantageous.

Procedure:

- Participants to watch a documentary on wetlands to understand the concept
- Go through the Reading Material # 6.
- Respond to the given questions.
- Do a small discussion about the threats pertaining to wetlands in our context and determine the possible strategies to conserve this natural resource.



1 - Activity *Tour of a Wetland*

Objective:

At the end of the session, the participants would be able to learn about wetlands through direct observations.

Strategies:

- Field trip.
- Observation.
- Recording.

Time: 180 minutes

Resources:

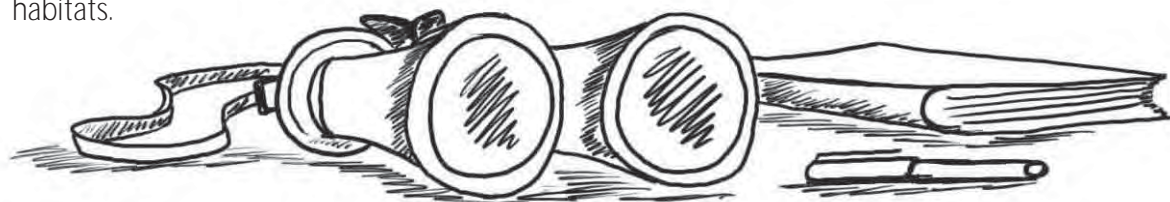
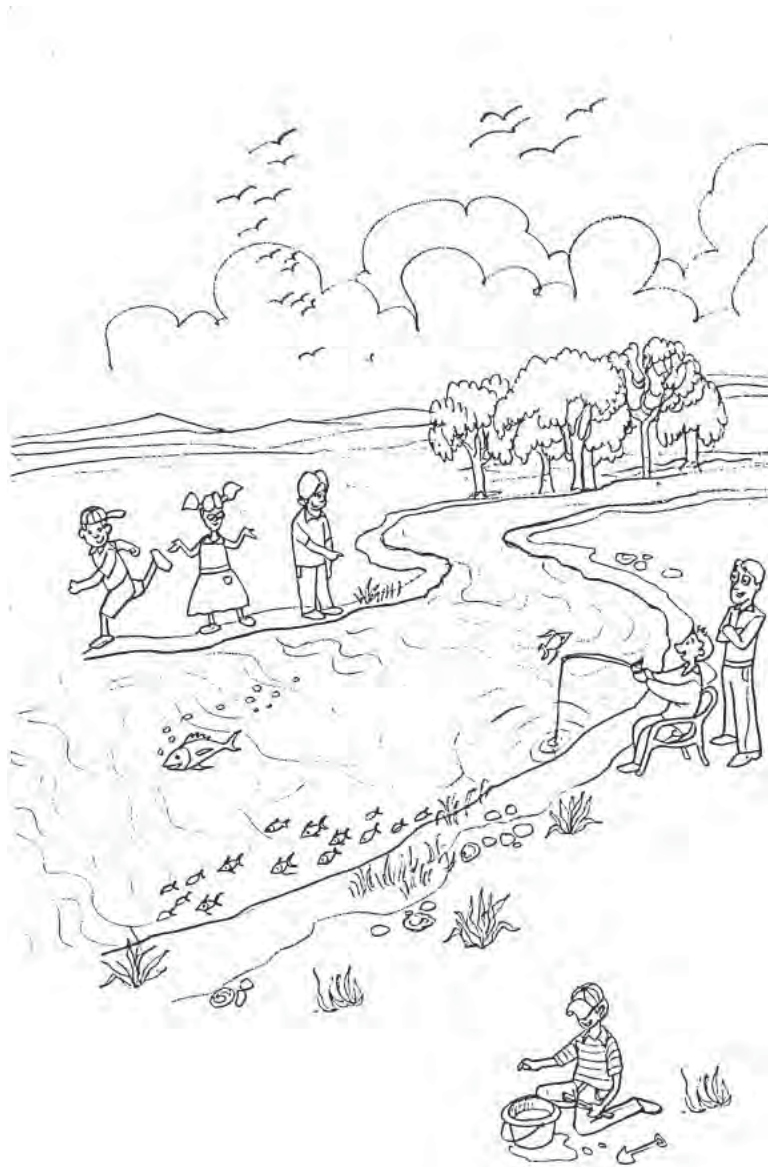
- A notebook, a pen.
- Binoculars if possible.

Tips for Resource Persons:

In case, if there is no wetland nearby then photographs or a documentary may also be arranged as an alternate.

Procedure:

- If you have wetlands near your school, take participants for a field trip there.
- Participants make a list of animals, birds, and other creatures they see in the wetlands. Bringing binoculars if possible to make observations more enriched.
- Also record the impact of humans on wetlands and importance of wetlands for livelihood.
- Participants, after observation, may draw or develop their own model of a wetland ecosystem and label all the creatures in their habitats.



2 - Activity *Developing the Model of a Wetland Ecosystem*

Objective:

At the end of the session, the participants would be able to develop a model of a wetland ecosystem.

Strategies:

- Working as a group.

Time: 60 minutes

Resources:

- Marker.
- Thermopile sheet.
- Chart paper.
- Sand.
- Water Colours.
- Scissors.

Tips for Resource Persons:

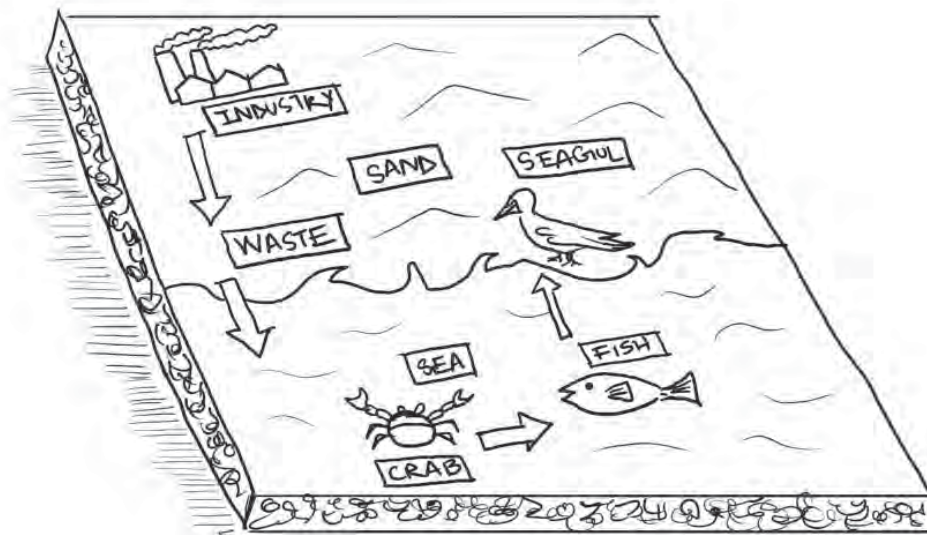
In order to facilitate participants, the picture of a wetland can be brought to have a stronger idea.

Procedure:

- Participants after observation of wetland and its ecosystem may draw a model of the wetland on a thermopile sheet, using the chart

paper to label the components of a wetland ecosystem.

- Look at what has been collected from the visit of a wetland.
- Draw a sketch on the paper so as to devise the model of a wetland accordingly.
- Place the things and label them.
- The group may look up for interesting findings and facts that could be emphasised on the model using water colours, sand or small models of wildlife of the area.
- Arrows can be used to reveal important information, like the food chain or linkages among different components of a wetland ecosystem.
- The model may also contain linkages and dependency of human on wetlands, showing their livelihood resources such as fishing.
- Show the impact of humans on wetland ecosystem by showing the dumping of industrial effluents from a nearby industry or various anthropogenic activities such as hunting and over exploitation.
- Deliver your presentation and get feedback.



V - Theme *Forests*

Objective:

At the end of the session, the participants will be able to:

- ✓ Learn about the concept of Forest; and
- ✓ Identify the lessons/units in the textbooks that relate to the concept of forest.

Strategies:

- Watching documentary.
- Reading material.
- Searching textbooks.
- Make a discussion.

Time: 60 minutes

Resources:

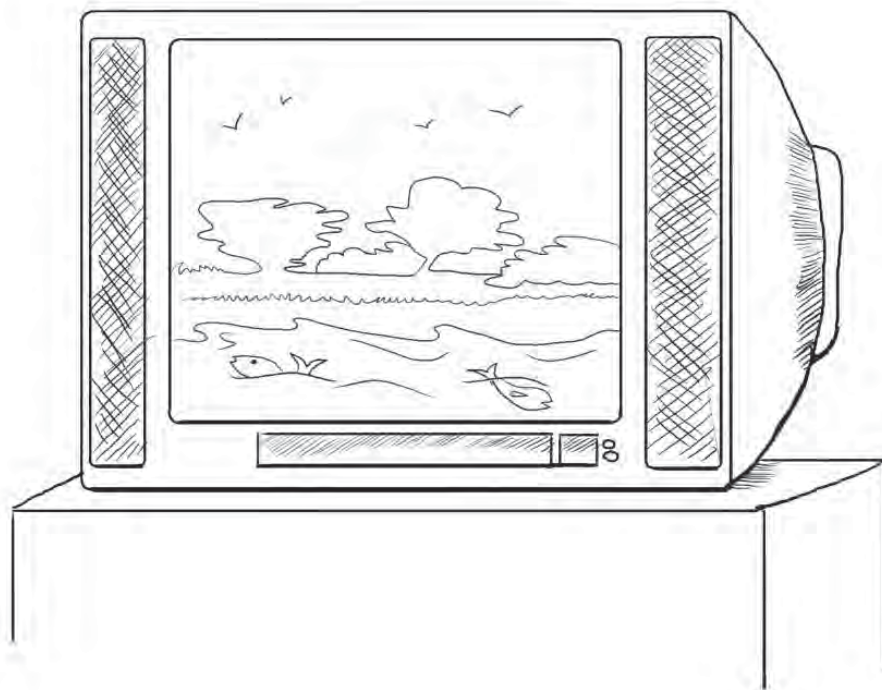
- Documentary on "Life Around the Mangrove Forests."
- Reading Materials # 7 and 8.

Tips for Resource Persons:

Facilitate in understanding the difference between the kinds of forests and the impact of deforestation on human survival.

Procedure:

- Participants watch a documentary on "Life Around the Mangrove Forests."
- While watching, they may take notes.
- Resource person should initiate the discussion on the documentary.
- In relation to the documentary, the participants should read about the concept of forest (Reading Materials # 7 and 8).
- Involve participants into a discussion pertaining to forests in the Indus Ecoregion.
- Discuss why forests are important.
- Search for the units/lessons in the textbooks that relate to the concept of forests.



1 - Activity *Planting a Tree*

Objective:

At the end of the session, the participants would be able to plant trees to make their area green and contribute to nature conservation.

Strategies:

- Planting a tree.
- Discussion/debriefing.
- Writing reflection.

Time: 60 minutes

Resources:

- A pen and a notebook.
- Plants.
- Shovel.
- Water.

Tips for Resource Persons:

Facilitate the participants to devise questions that need to be kept in mind while observing a tree.

Procedure:

- Take your participants to an open area may be within your school, where you find some space to plant trees.
- Purchase/voluntarily get some saplings of plants from a nursery.
- Distribute the participants into groups and assign a sapling to each member of the group.
- When one group would be planting a tree, other groups would observe the planting activity.
- After completion of task, ask participants for vocal reflections as to:
 1. How they felt while planting a tree?
 2. How they can motivate the society for tree plantation?
- Take a pledge from the participants to plant more tree and take care of them.



2 - Activity *Debate on Forest*

Objective:

At the end of the session, the participants would be able to find out the issues and possible solution through the debate.

Strategies:

- Debate.

Time: 60 minutes

Resources:

- It may be the pictures or newspaper cuttings to provide as proof of statements/arguments.
- Reading Material # 18.

Tips for Resource Persons:

Good debate starts with strong concerns that really exist in the context of forest and its impact on humans and vice versa.

Procedure:

- Divide your students in two groups:
Red group: this group will be taking the role of farmers bordering the forest (nearby). You need to cut and burn forest in order to grow agricultural crops.
Green group: this group will be taking the role of scientists who are monitoring the effects of deforestation on environment.
- The groups will discuss and make a list of as many ideas as possible to support their case.
- They will need a note taker and two speakers to speak on behalf of their group. As a group, they need to choose these three people.
- Each group will get a sealed envelope with some extra information that they can use in making their case.
- Give 15–20 minutes for the preparation of their case. Remind them that each group



should have two speakers so they will need to share out some of the ideas.

The debate:

- Ask for the first speaker from each group to come out and present their case. The note taker should take notes about what the other group is saying. The second speaker will then be able to speak about these points and answer them at his/her turn.
- After each group has had its turn, it will be given a five-minute break to consider the other group's arguments.
- The second speaker from each group will then speak from each group to sum up all the main points.

The jury:

When the debate concedes, tell the students that they are free to change their mind based on what they have heard from each of the groups. Now find out, if they still agree that the riverine forests should be destroyed to support the local farmers grow agricultural crops.

Questions:

1. Why are forests important for us?
2. What are the benefits of forests?

VI - Theme *Population*

Objective:

At the end of the session, the participants would be able to:

- ✓ Learn about the concept of population increase and its impact on families with limited resources; and
- ✓ Identify the lessons/units in the textbooks that relate to the concept of population.

Strategies:

- Listen to a story.
- Share personal reflections.
- Perform reading.
- Searching textbooks.

Time: 60 minutes

Resources:

- A story.
- Reading Material # 21.
- Textbooks.

Tips for Resource Persons:

Story telling or reading are the best ways of creating learning through enjoyment. It also helps learners to be imaginative about characters that are there in the story.

Procedure:

- Participants would listen to a story about a family which has limited resources but the number of children in the family is increasing every year. This family suffers due to lack of resources/income.
- After the end of the story, ask participants what they have understood/learnt from the story.
- Write down important points on the chalk board. Point out the underlying issues and ask about the possible strategies.
- Finally sum up the discussion.



1 - Activity

A household survey to determine the impact of population increase over scarce resources.

Objective:

Involve participants in conducting a household survey to analyse the burden on an ordinary family due to increase in the population.

Strategies:

- Survey.
- Analysis.
- Evaluation.
- Debriefing.

Time: 60 minutes

Resources:

- A one-page survey tool.

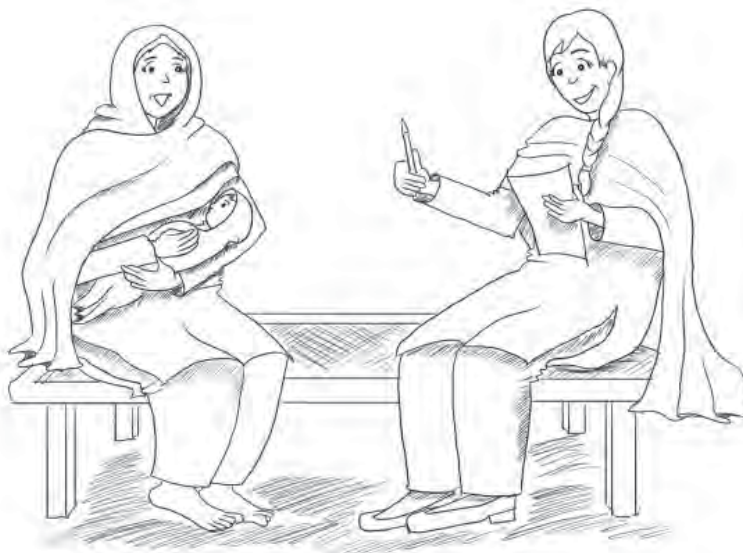
Tips for Resource Persons:

This activity needs time, therefore, see its applicability during a training programme.

Procedure:

- Participants should plan a survey and conduct it in free time at home.

- The next day, participants should present the outcomes of their survey.
- The survey questions could be:
 1. How many members are there in your family?
 2. How many adults and how many children are there in your family?
 3. How many are working and how many are dependent?
 4. Do they have their own house?
 5. How many kids are school going?
 6. How do they celebrate the common events?
 7. Do they have any loan to pay? Why did they take loan?
 8. How do they maintain their health, clothing, food, etc?
 9. What happens, when household size increases?
- In your survey, compare small and large family households in terms of access to various resources and the quality of life.
- As a group, present the findings and get feedback.



2 - Activity

Presenting a drama showing impact of population increase on limited resources/income within a family.

Objective:

At the end of the session, the participants would be able to know the impact of increase in number of members in a family with limited income.

Strategies:

- Drama/role play.
- Discussion.

Time: 60 minutes

Resources:

- Plot for a drama.
- Reading Material # 22.

Tips for setting a plot of a drama:

Plot of a drama: Two families; one small and one large.

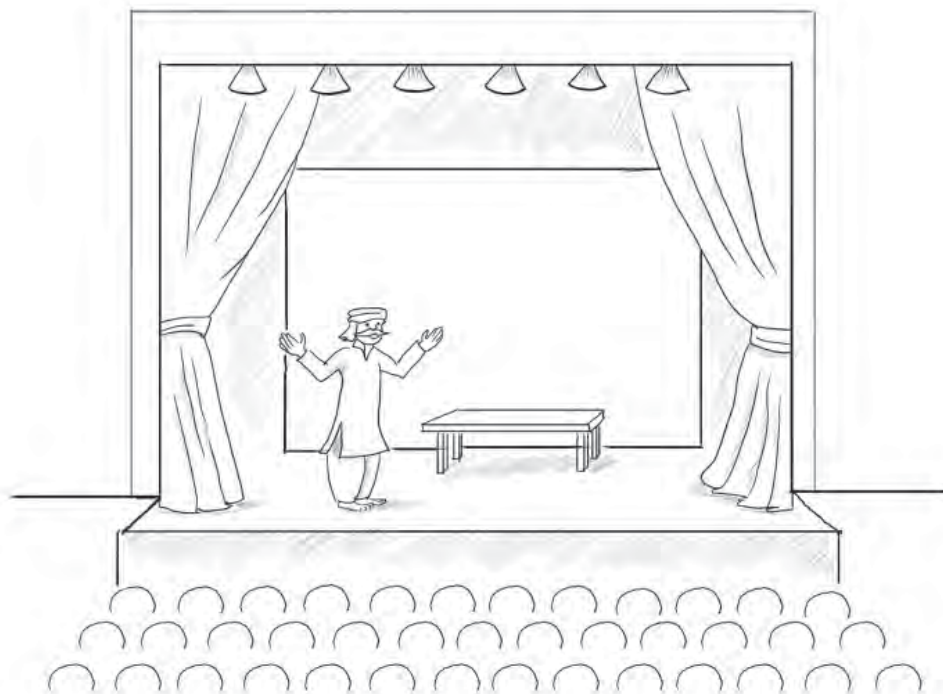
Family characters: father, mother, children, grand parents, etc.

Drama Scene: changing scene with small family and big family.

Dialogues: Write your own dialogues that show the impact of scarce resources on a large family. Also show how a small family enjoys life.

Procedure:

- Plan and set a plot for a drama (according to above tips) on the issue of increase in population and its impact on a large family with limited resources/income and simultaneously on a small family keeping in view the local context.
- Write the dialogues, do the rehearsal and perform it before the audience.
- Debriefing/discussions over the content and presentation of the drama.



VII - Theme *Natural Resources and Their Depletion*

Objective:

At the end of session, the participants would be able to:

- ✓ Learn about the concept, kinds, issues related to natural resources, and
- ✓ Identify the lessons/units in the textbooks that relate to the concept of natural resources and their depletion.

Strategies:

- Watching a documentary.
- Discussion.
- Searching textbooks.

Time: 60 minutes

Resources:

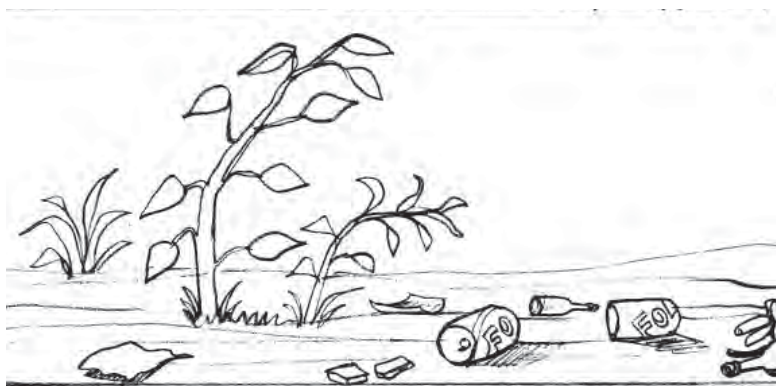
- A documentary.
- Reading Material # 9.
- Textbooks.

Tips for Resource Persons:

Ask the participants to note down the causes of depletion of natural resources and their impact on human lives.

Procedure:

- Watch a documentary relating to natural resources and their depletion.
- If there is time available, please go through the reading provided in the reading package about depletion of natural resources and its impact on earth and human lives.
- Relate the documentary with real life.
- Search for textbooks and identify the units/ lessons related to the above concept.
- Have a discussion and get feedback from the resource person.



1 - Activity *Discouraging Misuse of Water*

Objective:

At the end of the session, the participants would be able to learn about the significance of water as a resource and its effective utilisation.

Strategies:

- Role play.
- Debriefing.

Time: 60 minutes

Resources:

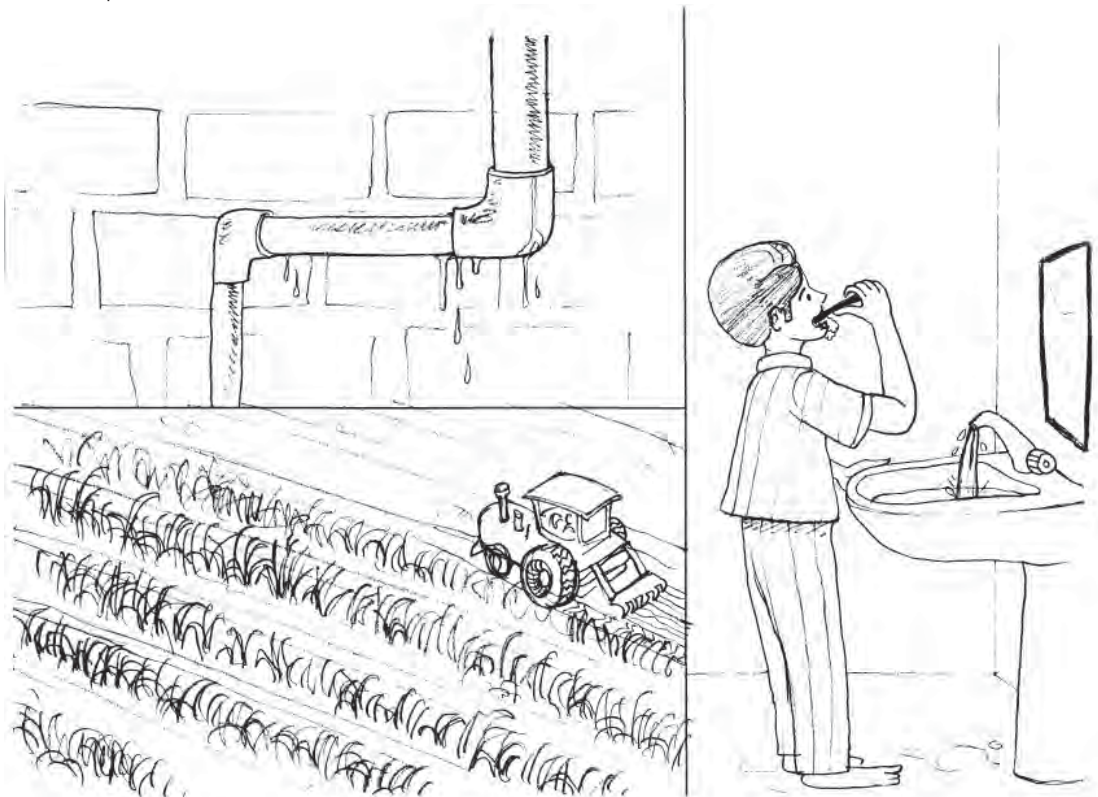
- Costumes (if available).

Tips for Resource Persons:

Support participants in setting the plot of the drama and the dialogues would be highly productive during the whole process

Procedure:

- Setting groups of 4-5 participants in each group.
- Ask all groups to set a situation underlying the main theme "water is scarce; there is misuse of water; and setting strategy to use water optimally."
- One situation could be: the farmer who over uses water to irrigate his agricultural land. Over the time, this resulted in problem of his land turning waterlogged and saline with decreased productivity.
- The other examples may be wastage of water in our homes through pipe leakages, etc.
- After all presentations, there should be a debriefing session.



2 - Activity *Depletion of Wildlife*

Objective:

At the end of the session, the participants would be able to learn about the depletion of wildlife due to illegal hunting.

Strategies:

- Reading a story.
- Discussion.
- Debriefing.

Time: 60 minutes

Resources:

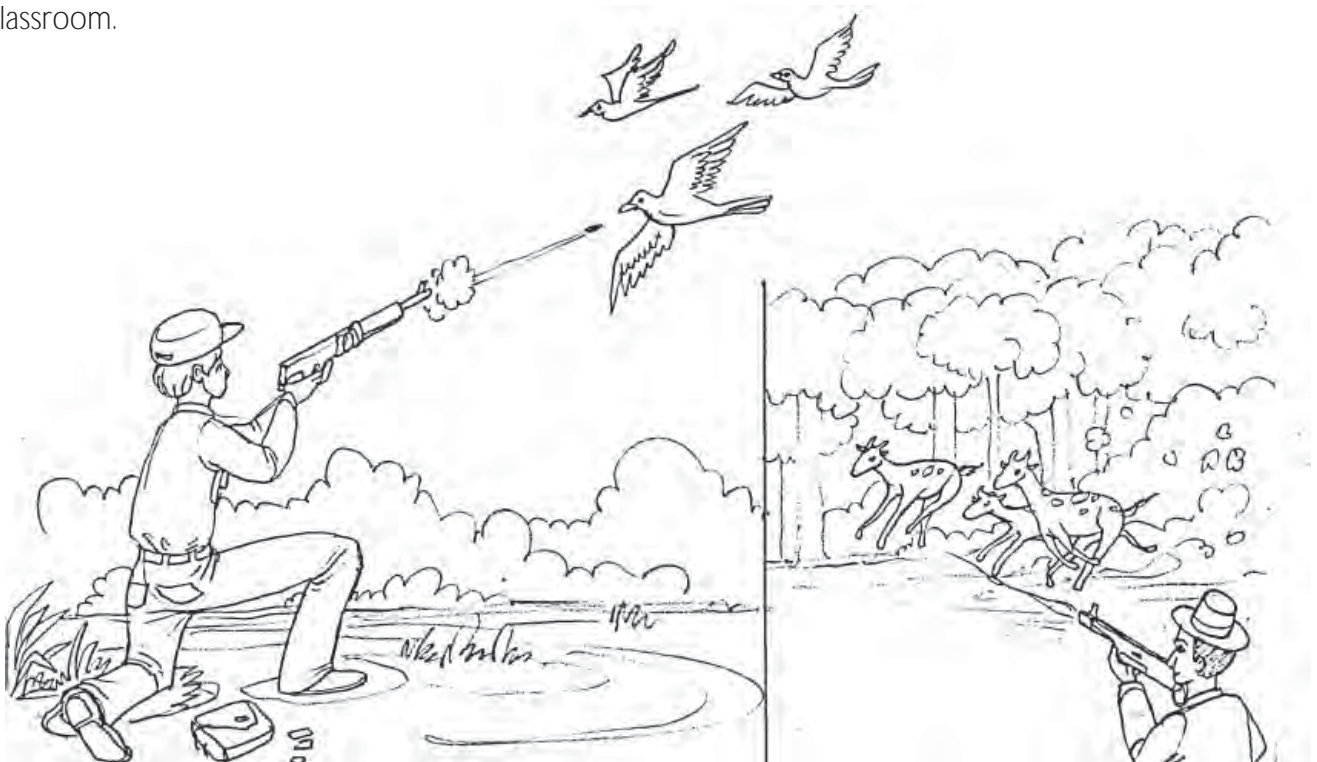
- A story.

Tips for Resource Persons:

Conceiving own story would be a constructive activity. Facilitating all participants to do so would make them creative while teaching students in the classroom.

Procedure:

- Setting groups of 4-5 participants in each group.
- Ask all groups to develop a story based on the theme "Depletion of wildlife due to illegal hunting."
- One story could be on illegal hunting of Hog Deer.
- Discuss the importance of wildlife for human beings.
- Participants to share their views on depletion of local wildlife. Who is responsible for this depletion? What could be done?
- After all presentations, there should be a debriefing session.



VIII - Theme *Pollution*

Objective:

At the end of the session, the participants would be able to:

- ✓ Learn about the concept and kinds of pollution, and
- ✓ Identify the lessons/units in the textbooks that relate to the concept of Pollution.

Strategies:

- Reading and responding to the questions.
- Searching/identifying concepts.

Time: 60 minutes

Resources:

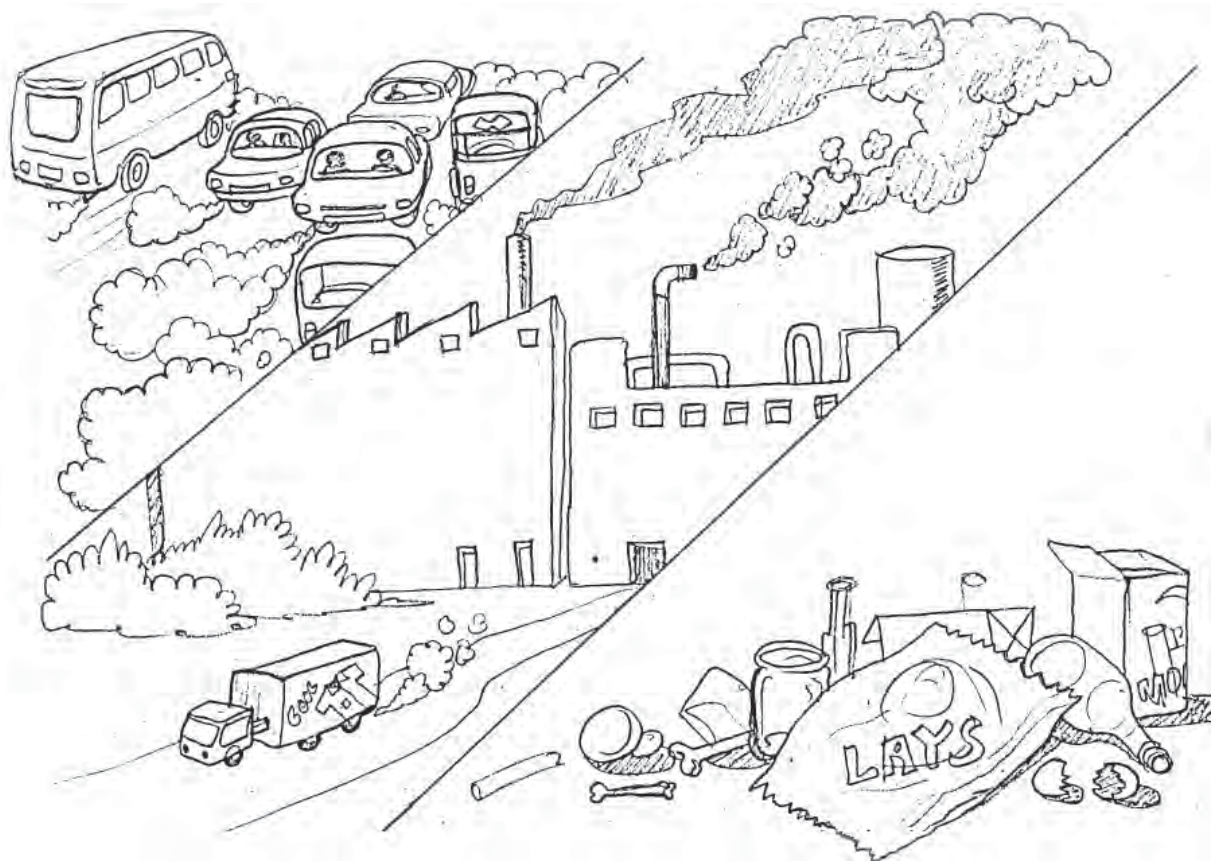
- Reading Material.
- Textbooks.

Tips for Resource Persons:

Make the participants understand pollution with the real life examples. The concept of critical incidents from real life can be portrayed through drawings or vocal or written expressions.

Procedure:

- Read the poem provided as Reading Material # 11.
- Within the poem, identify concepts/issues, relate them with real life, and suggest any possible strategies.
- Make groups of 4-5 participants and ask them to go through Reading Material # 10 and in relation to that search/identify the lessons/units in the textbooks that relate to the concept of pollution.



1 - Activity *Observing the Different Kinds of Pollution*

Objective:

At the end of the session, the participants would be able to understand further about the kinds of pollution through their participation in the investigation.

Strategies:

- Field observation.
- Recording of data.
- Discussion.
- Presentation and Feedback.

Time: 90 minutes

Resources:

- A notebook and a pen.

Tips for Resource Persons:

Prior to conducting the activity, search for the spots, where you would take the participants to make them involved in the process of identifying the different kinds of pollution.

Procedure:

- Keep in mind that you have to observe all kinds of pollution: air, water, noise and earth pollution in your outdoor study/activity. Please choose nearby spots where you could find out/observe all these kinds of pollution.
- First of all, select a traffic intersection for your study. Look at all the vehicles on the road, and observe:
 - ✓ Smoke that is coming out from each vehicle type, count such vehicles, feel smoke and its impact.
 - ✓ Record the number of vehicles that are creating noise, feel the impact of the noise, etc.
 - ✓ Observe condition of environment and any difficulty in breathing due to polluted air.
- ✓ List the types of vehicles on the road.
- ✓ Observe the number of environment friendly and non-environment friendly vehicles.
- Next spot of observation is a solid waste/garbage point that may be lying in the corner of a street or any street, where there is no arrangement of the garbage collection. Move close to the point of observation and record:
 - ✓ What do you see around?
 - ✓ How do you feel?
 - ✓ In your opinion, what would be the impact of this mismanagement on the residents?
 - ✓ In your opinion, what items in the garbage may be recycled or reused?
- Also move to a street where you find the garbage management system. Please do compare both the streets.
- Final observation is regarding water pollution. In this regard, visit any industrial area or nearby drainage system.
- Ask the participants to notice pollutants and poisonous chemicals in the drain coming from the factory and domestic sewage city.
- Discuss where these pollutants are ending up and their possible impacts on human health and ecosystem.
- Share the facts about water borne diseases in community areas due to water pollution.
- Make the list of various sources of pollutants, which are the main cause of water pollution in participants' areas.
- After doing field observations, please analyse and synthesise the findings.
- Participants share their field observations with the entire group and give their feedback.
- Sum up the session with major findings, which all participants may note down and display in the corner of the training hall.

2 - Activity

Determine the Types of Waste, Causes of Waste Generation and Waste Management

Objective:

To enable participants identify the types of waste, causes of waste generation, and the ways of waste management.

Strategies:

- Discussion.
- Preparation of sheets/charts.
- Presentation.

Time: 60 minutes

Resources:

work sheet, plain big sheets, markers, etc.

Procedure:

- Make four groups.
- Distribute worksheet (given below) to the groups.
- Give clear instructions: what to do, how to do, how to conclude, etc.
- Facilitate all participants during the process.
- Ask groups for presentation.
- Give feedback to the groups.



Worksheet

	Type of Waste	Causes of waste generation	Strategy for waste management
1.			
2.			
3.			
4.			
5.			
6.			
7.			

3 - Activity *Making Recycled Items From Solid Waste*

Objective:

Enabling participants to collect waste material and develop teaching resources.

Strategies:

- Collection of waste material.
- Making no cost/low cost resources.

Time: 60 minutes

Resources:

- Waste or disposed off items.
- Glue.
- Scissors.

Tips for Resource Persons:

Guide participants in collecting waste items like empty cans, bottles, cartons, straws, old newspapers, magazines, etc.

Procedure:

- Ask participants to bring waste material like empty cans, bottles, cartons, straws, old newspapers, magazines, etc. from home.
- Distribute participants into groups and ask them to make teaching resources.
- Present the resources to get feedback.



IX - Theme *Climate*

Objective:

At the end of the session, the participants would be able to:

- ✓ Learn about the concept and issues of climate with particular reference to the Indus Ecoregion, and
- ✓ Identify the lessons/units in the textbooks that relate to the concept of climate.

Strategies:

Reading and responding to questions.

Time: 60 minutes

Resources:

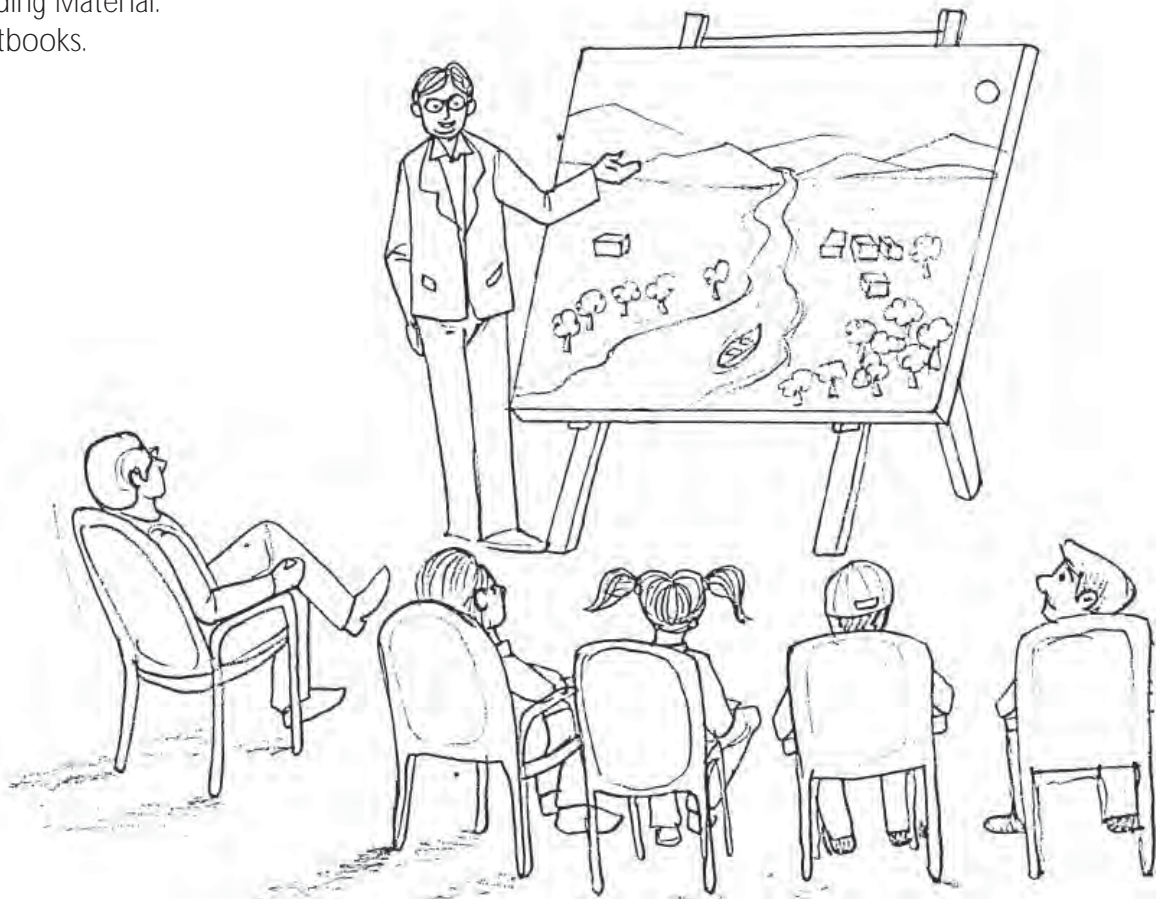
- Reading Material.
- Textbooks.

Tips for Resource Persons:

Using examples from local context will be helpful for the participants to understand the concept of climate change.

Procedure:

- Go through the Reading Material # 12.
- In the light of the reading, have a discussion on "human factors affecting climate and possible strategies to reduce global warming."
- Conclude the discussion with the production of chart including possible strategies that help in reducing the global warming.



1 - Activity *Watching a Documentary on Climate Change Effects*

Objective:

At the end of the session, the participants would be able to visualise the depletion of ozone layer and its impact on life on earth.

Strategies:

- Watching a documentary.
- Discussion.

Time: 60 minutes

Resources:

- Watch a documentary on "Saving the Ozone Layer: Every Action Counts."

Tips for Resource Persons:

In a free time, see the documentary and note down the discussion questions.

Procedure:

- Participants watch the documentary on "Saving the Ozone Layer: Every Action Counts."
- After watching the documentary, discuss the documentary focusing issues such as: increasing pollution and its impacts on climate, and the impact of global warming with special reference to the Indus Ecoregion.



2 - Activity *Depletion of Ozone Layer*

Objective:

At the end of the session, the participants would be able to understand the concept of depletion of ozone layer.

Strategies:

- Demonstration.
- Discussion.

Time: 60 minutes

Resources:

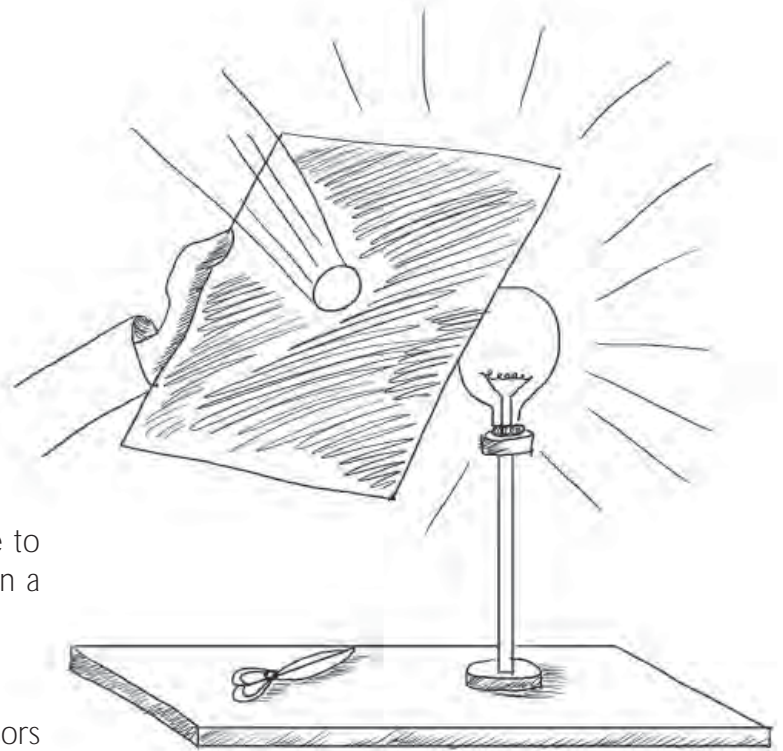
- Table lamp.
- Card paper.
- Scissor.

Tips for Resource Persons:

Do at least one practice before you introduce to the participants. This will ensure experiment in a better manner.

Procedure:

- Take one table lamp, a card paper, and scissors for this activity. In this activity, the table lamp is shown as the Sun and the card paper as Ozone layer. Lit the table lamp and put paper over the open top of it and explain the participants that this ozone layer blocks the ultraviolet radiation from the sun from reaching directly to earth.
- After that, make a hole in the same paper to demonstrate depletion of ozone layer (hole in space) by putting it back over the open top of the table lamp. The ultraviolet sunrays can now directly pass through the hole, reaching the earth and causing skin cancer and other damages to living tissues. Ozone depletion is caused by certain chemicals know as Chloro-fluorocarbons (CFCs) which are used in refrigeration and air conditioning units.



Questions:

- What is the ozone layer important for?
- What are the causes of ozone layer depletion?

3 - Activity *Global Warming*

Objective:

At the end of the session, the participants would be able to understand how a reduction in carbon dioxide emissions prevents global warming and ozone layer depletion.

Strategies:

- Debate.

Time: 60 minutes

Global Warming is defined as “an increase of the earth’s temperature by a few degrees resulting in an increase in the volume of water which contributes to sea-level rise. The warming predicted to occur as a result of increased emissions of greenhouse gases such as carbon dioxide and methane.”

Procedure:

Divide your students into four groups:

Red group: it will represent the United States. This is the richest country in the world, and also the largest in the production of carbon dioxide. It wants to continue its production of carbon dioxide to maintain the high standard of living and the industry competitive.

Blue group: it represents China, a very large country with a huge population. The country has vast deposits of coal and wants to develop its industry.

Green group: it represents The Gambia, a very small country in Africa with rich rainforests but no coal or oil. The country wants to improve the standard of living for its people.

Yellow group: it represents Pakistan, a developing country. It currently produces a good amount of coal and oil but wants to develop its industry further.

- Each group is supposed to discuss country’s views on the motion and make a list of as many ideas as possible to support their case. They are required to discuss what they know about global warming, and what the views of people from their country would be towards it. If necessary, they can consult books or do some research on the internet.
- They will need a secretary to take notes and two speakers to speak on behalf of their group. As a group, they need to choose three people.
- Provide each of your groups with a sealed envelope with some extra information.
- Give them 15–20 minutes to prepare their case. Remind them that each group should have two speakers so they will need to share some of the ideas.

The debate

Ask for the first speaker from each group to come out and present their case. The secretary should take notes about what the other group is saying. The second speaker will then be able to speak about these points and answer them when it is his/her turn to speak. They can ask questions when each speaker has finished. After each group has had its turn, it will be given a five-minute break to consider the other groups’ arguments. The second speaker will then speak from each group to sum up all the main points.



The jury

When the debate concedes, tell the students that they are free to change their mind based on what they have heard from each of the groups. Then ask them, whether they agree that all countries in the world should immediately plan to reduce carbon dioxide emissions by 50% within five years.

Questions:

1. What will happen if global warming persists?
2. What are the causes of global warming?
3. How can we stop global warming?
4. Are there any local impacts of global warming in your area?
5. Identify the types and impacts in the different geographical areas of Pakistan.
6. How green house gas effect can be minimized?
7. What actions could be taken at the community level in terms of saving energy, paper, etc?

4 - Activity *Green House Effect*

Objective:

At the end of the session, the participants would be able to learn about the green house effect.

Strategies:

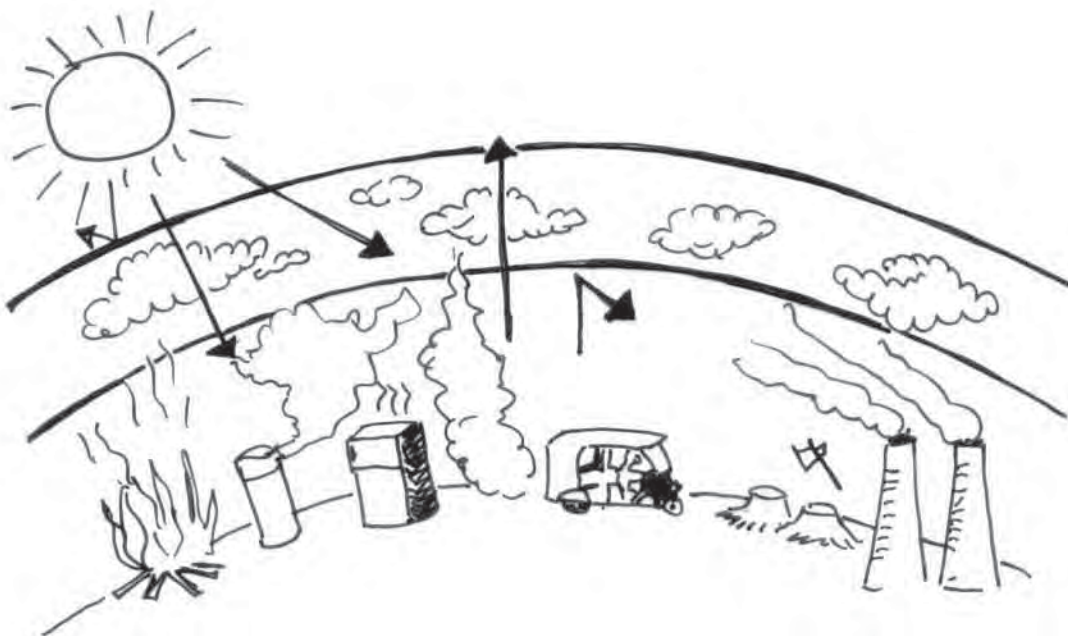
- Experimentation.
- Explanation.
- Discussion.

Time A: 60 minutes

A **green house** is a room which has glass walls. It is used for growing plants because glass walls retain the sun's heat as a result of which the temperature inside the green house rises. Nowadays, CO₂ concentration in our atmosphere has increased as a result of fossil fuels consumption, population explosion and deforestation. Umbrella of CO₂ in atmosphere traps the sun's heat and prevents it to escape and causes global warming. Thus, a green house effect is produced.

Procedure:

- Discuss the topic to motivate the participants.
- Take the participants to a green house in a nearby area. With the help of a thermometer ask the participants to measure the degree of hotness inside the green house and outside the green house and note down the readings on a piece of paper. Compare the temperature of inside with outside to demonstrate the difference due to trapping of heat inside the Green House.
- Now, participants should be able to understand that the temperature inside the green house is higher than outside the room because inside the green house heat is trapped due to green house effect. Relate this phenomenon to green house effect produced by the higher concentration of CO₂ and other gases in the atmosphere. The CO₂ has great capability to trap the heat energy from the sun.



X - Theme *Energy*

Objective:

At the end of the session, the participants would be able to understand the concept and kinds of energy.

Strategies:

- Elicitation through brainstorming.
- Reading brief about energy.
- Sharing examples or issues.

Time: 60 minutes

Resources:

- Reading Material.

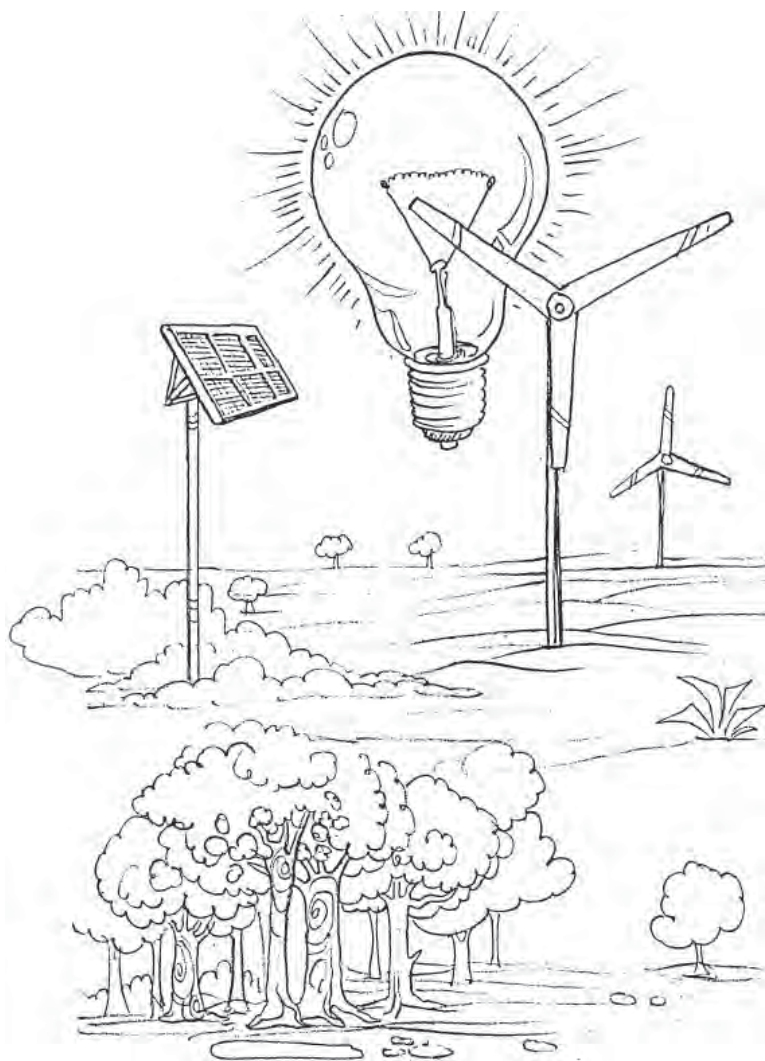
In physics and other sciences, energy (from the Greek - *energeia*, "activity, operation", from *energos*, "active, working") is a scalar physical quantity that is a property of objects and systems which is conserved by nature. Energy is often defined as the ability to do work.

Several different forms of energy, including, but not limited to, kinetic, potential, thermal, gravitational, sound energy, light energy, elastic, electromagnetic, chemical, nuclear, and mass have been defined to explain all known natural phenomena.

While one form of energy may be transformed to another, the total energy remains the same. This principle, the conservation of energy, was first postulated in the early 19th century, and applies to any isolated system. According to Noether's theorem, the conservation of energy is a consequence of the fact that the laws of physics do not change over time.

Procedure:

1. Involve participants in sharing their prior knowledge about the concept of energy.
2. Ask them to read the provided text.
3. Share learning along with examples from the context.



1 - Activity *Understanding the Role of Energy in Biosphere*

Objective:

At the end of the session, the participants would be able to understand the role of energy in biosphere.

Strategies:

- Showing pictures.
- Discussion.
- Presentation.

Time: 40 minutes

Resources:

- Four pictures of the sun, plant, animal and man labeled with a, b, c and d.

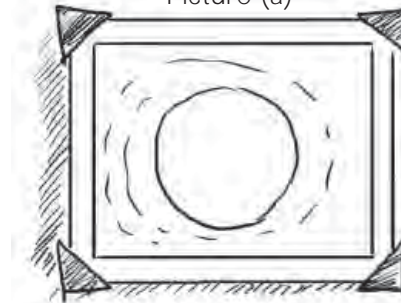
Procedure:

- Display four pictures i.e. a, b, c, d and initiate brainstorming process. Tell the participants how energy flows from sun to other sources of energy.
- Divide students into four groups.
- By discussion and sharing ideas allow them twenty minutes to answer the following questions:
 1. What is the difference between the use of energy by plants, animal and men?
 2. Enlist activities, which are responsible for energy loss.
 3. Make a list of five steps, in which energy can be saved in special circumstances.
- Allot five minutes to each group for presentation of their information.

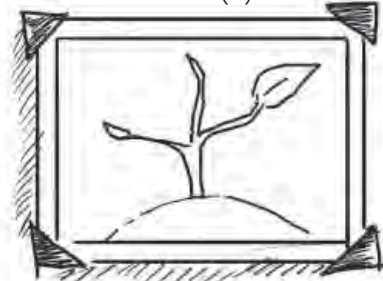
Questions:

1. How does energy give force to biosphere?
2. What do you mean by energy flow from one source to another?
3. What are natural compounds which store energy?
4. What steps do we take for saving energy?
5. How can we spread the message of saving energy?

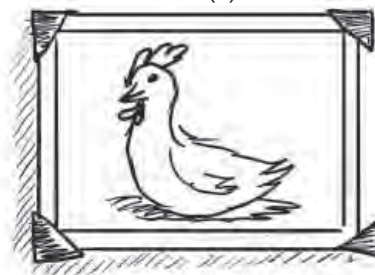
Picture (a)



Picture (b)



Picture (c)



Picture (d)



2 - Activity *Generating Environment – Friendly Electricity*

Objective:

At the end of the session, the participants would be able to decide about the most suitable power station to be constructed at particular geographical locations to generate electricity with minimum negative impacts on environment.

Strategies:

- Group work.
- Presentations.
- Sharing ideas.

Time: 90 minutes

Resources:

- Books or leaflets on various types of power generation.
- Access to PC connected to the internet.
- OHP, acetates and pens, or card paper and pens.
- Posters, or PC with Power Point.

Tips for Resource Persons:

Clarification of all the four options to the participants would facilitate them in making better decision.

Procedure:

You are going to do some research about the environmental impacts of various ways of generating electricity. Having become a specialist about that type of power station, you will present your findings to a panel (the class), which will compare the environmental impacts of each option. Finally, you will look at some sites to decide on the best power station for each site. Your group will be making a presentation to the class about the type of power station you have investigated.

A. Researching power stations:

Choose from the list below on which method of generating electricity you will conduct your research:

- Coal
- Oil
- Gas
- Hydroelectric Power (HEP)
- Wave
- Tidal
- Wind
- Solar
- Geo thermal
- Bio mass
- Nuclear.

Use the questions below to help you do your research:

1. What is needed to run the power station?
2. How pollution is produced?
3. How far does the pollution spread and how does it affect the surroundings?
4. What are the other effects the power station has on the environment?
5. Are there any long-term effects on the environment?
6. What accidents might occur and how serious these might be?
7. How will the power station affect the local population?
8. Will the power station generate a lot of power?

B. Choosing which type of power station:

Listen carefully to the presentations about types of power stations from all the groups in your class. Make notes of important points.

Decide, which type of power station to construct in each of the following locations:

- a. There are beautiful mountains here, with high snowfall and rainfall. Many tourists come here for skiing and climbing. The weather can be lovely in the summer but the winters are harsh. A power station is needed for the big cities to the south (where there is no spare building land) and the local villages. There is coal under the western half of the mountains.
- b. There are lovely beaches in this area and it is home to thousands of seabirds, some of them are rare. Many people spend their summer holidays here. Hence, more power is needed for the small towns and holiday villages where they stay. There are no big cities in the region, and no coal, oil or gas reserves. A strong wind comes from the sea and many places are named after it. The area can be stormy with high waves.
- c. This is a wonderful place for a holiday, the sun shines almost every day, the wind is gentle and the seas are calm. There are no fossil fuel reserves, which is a problem as more power is needed for the dozen or so small towns on the island. There is an oilfired station using imported oil, and more could be built nearby. The biggest problem is the amount of electricity used for the air-conditioned hotels.
- d. This city in northern Britain needs a lot of power. Some of the old power stations need replacing. There are supplies of coal under the fields, and oil and gas out to sea, about 20 miles away. There are large slow-flowing rivers. Between here and the coast, there are no more large towns, just a few isolated villages.

4 - Module

Developing and Implementing an Environmental Education Programme in Schools

Objectives of the Module:

This module will enable the participant to develop and implement an Environmental Education Programme in schools

1 - Session *Teaching Environmental Education*

Objective:

At the end of the session, the participants would be able to:

- ✓ Develop an integrated lesson plan; and
- ✓ Teach and evaluate the lesson.

Strategies:

- Planning.
- Teaching.
- Evaluation.

Time: 60 minutes

Resources:

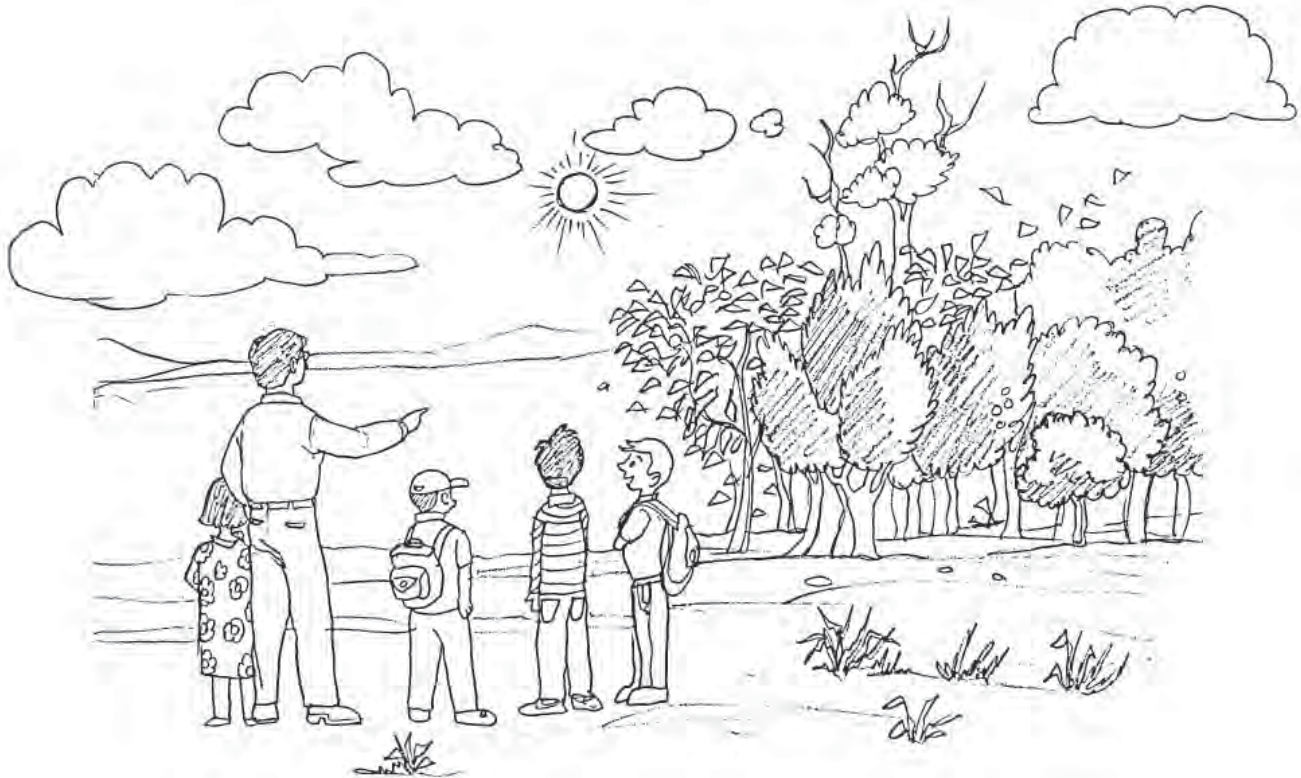
- Lesson plan template provided as Appendix-C.
- Textbooks.

Tips for Resource Persons:

Putting an example in lesson plan template will give first hand idea to the participants, which they will follow later on while developing their own lesson plans.

Procedure:

- Ask participants to make groups of equal number and mixed population.
- Participants open the lesson plan template provided in the Appendix pages.
- Select content from the textbooks (class 1 to X).
- Develop a lesson plan by using the steps.
- Teach and assess the lesson.
- Evaluate the lesson.
- Debriefing and providing feedback.



2 - Session *Understanding and Practicing Nature Club*

Objective:

Enabling participants understand the concept and significance of a nature club in school and facilitate in identifying activities.

Strategies:

- Reading.
- Sharing.
- Discussion.
- Preparing chart.

Time: 60 minutes

Resources:

- Reading Material # 13.
- Activity template given as Appendix-D.

Tips for Resource Persons:

Explain the significance of nature club in the context of school environment and with concrete examples.

A **Nature Club** is the friendly association of school head teacher, teachers and students and possibly the outside community having common goal, objectives and activities to save nature and make this as the part and parcel of school curricula and culture. Through the Nature Club, students learn about the significance of natural resources and environment.

A Nature Club may include activities like:

- Everyday school cleanliness
- Collecting waste for development of resources
- Conducting environmental exhibitions
- Tree plantation and beautification of school
- Nature tour/walk
- Quiz competitions
- Writing competition
- Watching documentaries
- Taking part in indoor and outdoor sports
- Conducting environmental enquiries/research

- Lecturing on environmental education/issues by a seasoned expert/teacher
- Mentoring junior teachers
- Conducting mass awareness campaigns

Procedure:

- Distribute participants into groups.
- Ask groups to identify existing co-curricular or extra-curricular activities of school.
- Display tasks/activities of nature club given below on a white/blackboard or on the wall:
 1. Nature tour
 2. Nature study camp
 3. Quiz, speech, poster competition
 4. Nature exhibition/ nature at display
 5. Preparing ABC book of nature
 6. Preparing teaching/learning aids (mobiles, models etc)
 7. Solid Waste Management (sorting of various waste material, safe disposal of solid waste)
 8. Inviting local resource persons in schools to talk about various aspects of environment.
- Ask participants to find out which environmental education activity can be done during which co/ extra curricular activity in school. The template is provided as **Appendix - D**.

1 - Activity *Nature Tour*

Objective:

At the end of the session, the participants would be able to:

1. Understand the concept of nature tour; and
2. Get the idea of how to plan and evaluate a nature tour.

Strategies:

- Reading.
- Planning.
- Performing.

Time: 240 minutes

Resources:

- Reading Material.
- Activity sheet.

Tips for Resource Persons:

Managing the available time carefully during a walk or tour help making tour purposeful and result-oriented.

A. Preparatory Phase

1. Choose a place.
2. Gather information about the proposed place of visit.
3. Rationalise the visit.
4. Discuss the risk factors and prepare for that.
5. Formation of groups.
6. Assigning tasks.
7. Prepare tools for data collection.

B. Action Phase

1. Making arrangements of visit including: Conveyance, food, stay, negotiation with place administration.
2. Travel to place.
3. Data collection.



4. Food/refreshment.
 5. Travel back.
- ### C. Analytical and Evaluative Phase
1. Discussion.
 2. Suggestions and Recommendations.
 3. Conclusion.

Procedure:

- Make groups of the participants.
- Brief them the steps of conducting a nature tour.
- Assign tasks.
- For instance: Group A: Collect leaves from various plants, paste them on a white sheet and identify the floral species; Group B: Collect various waste material, paste or draw them on a white sheet and write few sentences about them; Group C: Observe various animals, draw them on a white sheet and write few sentences on each of them.
- Deliver the presentation and get feedback at the end of the activity.

3 - Session *Preparing Environmental Education Action Plan for School*

Objective:

At the end of the session, the participants would be able to develop an action plan for promoting environmental education in school.

Strategies:

- Working on an action plan template through discussion and sharing ideas and present it.

Time: 60 minutes

Resources:

- Action plan template, provided as Appendix-E.

Tips for Resource Persons:

Action plan needs to be a realistic document that will be implemented in the school.

Procedure:

- Ask participants to make groups of equal number and mixed population.
- The resource person will exemplify all steps first to facilitate participants in understanding the idea of action plan.
- Develop action plan by using the format provided as **Appendix - E**.
- Later on, all groups will present their action plan and get feedback to improve it.

5 - Module

Implementing Training in the Field

Objectives of the Module:

This module will enable master trainers to enhance their expertise in developing, organising and implementing a training programme for teachers on the subject of environmental education.

1 - Session

Training Program on Environmental Education

Objectives:

Understand the concept and significance of teachers' training as a model of professional development.

Strategies:

- Reading.
- Discussion.
- Brainstorming.

Time: 30 minutes

Resources:

- Reading Material # 14.

Tips for Resource Persons:

Ensure that the distribution of course participants is done in a way that the slow and active learners would collaborate.

Procedure:

- Participants will go through the Reading Material # 14.
- Participants respond to questions provided at the end of the reading in order to share learning.

2 - Session

Steps of a Training Programme

Objective:

Enable participants to understand the steps of a training programme.

Strategies:

- Brainstorming.
- Reading.

Time: 30 minutes

Resources:

- Reading Material # 15.

Tips for Resource Persons:

Ensure that the distribution of course participants is done in a way that the slow and active learners would collaborate.

Procedure:

- Distribute participants into four groups.
- Distribute the reading into four parts assigning two parts to each group.
- Ask them to respond to the given questions and prepare presentation.
- Deliver the presentation and get feedback.

1 - Activity *Designing a Training Programme*

Objective:

Enable participants to design a training programme.

Strategies:

- Brainstorming.
- Planning through discussion.

Time: 60 minutes

Resources:

- Training Plan Format provided as Appendix - F.

Tips for Resource Persons:

Ensure that the distribution of course participants is done in a way that the slow and active learners would collaborate.

Procedure:

- Distribute participants into four groups.
- Ask groups to design a training programme by following training plan format provided as **Appendix – F**.
- After designing, each group will present and get feedback.

Appendices

A - Appendix *Textbook Analysis*

	Topic	Textbook and class	Environmental Education Theme (How does it link)	Link with the Indus Ecoregion
1.				
2.				
3.				
4.				
5.				
6.				
7.				

B - Appendix *List of Environmental Education Concepts Identified in Textbooks*

S.No.	EE theme	Textbook Topic	Subject	Class	Page
1.	Indus Ecoregion	Physical Parts of Sindh Social Studies		IV	29
2.		Physical parts of Pakistan		V	41
3.		Visit of River		III	11
4.	Biodiversity		Science	III	1-18
5.		Neem Tree (Poem)	English	IX	17-18
6.		Daffodils	English	IX	33
7.		Biodiversity		V	1-10
8.		Dolphins	English	IV	31-33
9.		The sad story of a peacock	English	V	58-62
10.		Living things	Science	VI	1
11.	Fresh Water		Social Studies	III	11
12.		States of water	Science	IV	36-41
13.		Tarbella Dam	Sindhi	V	51-52
14.		Importance of Water	Science	V	36
15.	Natural Resources	Natural and Energy resources	Social Studies	V	59
16.		Conservation of Natural Resources		III	12-16
17.		Pakistan's Resources	Social Studies	IX & X	68
18.		Stone made things	Science	IV	69-71
19.	Forests	Natural Forests (Plants and Trees)	Social Studies	IV	47
20.	Energy		Science	V	50
21.				IX & X	124
22.	Climate		Social Studies	IV	37
23.		Pakistan's climate		V	50
24.		Land and Climate of Pakistan		IX & X	50
25.	Population		Social Studies	III	21-22
26.				IV	61
27.				V	75
28.				VII	59-69
29.		Increasing Population		VIII	42
30.		Pakistan's Population		IX & X	114

S.No.	EE theme	Textbook Topic	Subject	Class	Page
31.	Environmental Problems	Problems of our Province	Social Studies	IV	80
32.		Our environment	Science	III	19-21
33.		A morning walk	English	IV	7-8
34.	Environment	Environment		IV	14-21
35.				V	23-26
36.				VI	45-59
37.			Sindhi	VIII	19
38.		Environment and Natural Resources		IX & X	101
39.		Let's improve our village	Sindhi	V	55-56
40.		House and Domesticity	Sindhi	V	77-79
41.	Pollution	Understanding own problems	Social Studies	V	100 -108
42.			English	IV	80
43.			Science	IV	22-26
44.		Protecting myself against Pollution	English	VII	16-21
45.	Industry		Social Studies	V	66
46.		Sugar Mill	Sindhi	V	68-70
47.		Pakistan's Industrial Development	Social studies	IX & X	95
48.	Health	Making body healthy	Science	V	19
49.		Keeping Good Health	English	VIII	47-61
50.		Human and health	Science	IX & X	54
51.		A healthy life	English	IV	71-74
52.	Food Web		Science	III	22-24
53.			General Science	VIII	8
54.		Food and Nutrition	Biology	IX & X	138
55.	Soil		Science	III	59-61
56.		Changing surface of our soil		IV	72
57.		Rahim's Farm	English	III	19-22

C - Appendix *Lesson Plan Format*

There are several formats of the lesson plan. Below is one of the formats, which can easily be used in environmental education sessions.

1. **Topic** (Write the topic clearly)
2. **Textbook** (Write the name of textbook and class, for which the lesson is being planned.)
3. **Objectives** [(Objectives should be within three domains): Cognitive (knowledge), psychomotor (skills) and affective (behavioural and emotional)]
4. **Teaching Resources** (Audio-Visual aids and teaching kit, disposable resources, etc.)
5. **Procedure:**
 - a. *Prior knowledge* (Eliciting prior knowledge and experiences that should lead to construct new learning)
 - b. *Knowledge development* (On the basis of prior knowledge, develop new knowledge. This knowledge can be the learners' own ideas, inventions, discoveries, feelings, behaviour, etc. This step includes activities – both related to classroom and outside, description, etc.)
 - c. *Assessment* (This is what finally students have learnt. There are several ways of assessing students except the paper pencil text.)
6. **Feedback** (This is the input from the teacher regarding the ambiguity that are found.)
7. **Evaluation** (This is to measure the quality of the process as well as the product.)
8. **Revised planning** (This is done after evaluation to see what ambiguities were in the lesson plan and how they can be made more clear.)

D - Appendix *Activity Template For Co-curricular Activities For Promoting Nature Club*

Schools' co-curricular Activities	EE Activity to be incorporated	Expected Outcomes
Parents day/Result day	Organise a quiz, speech, poster competition/nature painting exhibition among students.	<ul style="list-style-type: none"> ▣ Students and their parents get awareness about various themes of environment. ▣ Students are encouraged by their parents. ▣ Poster prepared by students can be displayed in school as resource material.
School excursion or picnic	Nature Tour or Nature Camping.	<ul style="list-style-type: none"> ▣ Students learn how to interact with nature. ▣ Research skills among students enhanced. ▣ Students collect various specimens from natural environment, which could be displayed in school's nature corner or classrooms.
Schools corridor or library	Place nature collection/exhibits in a corner, place garbage bins by specifying which waste should be thrown in, display ABC book of nature.	<ul style="list-style-type: none"> ▣ Students learn from various teaching exhibits.
Class room	Display environmental messages or poster/charts and painting, place garbage bins.	<ul style="list-style-type: none"> ▣ Environment-friendly classrooms. ▣ Students' learning enhanced.
Lawn or compound wall	Pits for waste disposal, plantation, a pond.	<ul style="list-style-type: none"> ▣ Improvement in physical space of school.
Morning assembly	Invite a local resource person.	<ul style="list-style-type: none"> ▣ Knowledge about local environment enhanced.

E - Appendix *Action Plan Template*

S#	What (Tasks)	Why (Expected Outcomes)	When (Duration)	Who (Organisers)	Where (Location)	How (Required Resources and process)
	What will be the activities keeping in view their priority or urgency or sequence?	What do you want to achieve?	Date or day or month?	Who has the lead role and who is supporting?	Mention where the activity is being carried out?	Mention the process and required resources?
1.	Organise a nature tour to Pai forest.	20 students and 3 teachers will learn about a unique ecosystem.	On 24 October.	Head Teacher and Nature Club Incharge.	Pai forest.	Transport, food, Forest Officer (Resource person).
2.						
3.						
4.						
5.						
6.						
7.						

F - Appendix *Designing & Training Programme*

Title: (How do you name the training?) Teachers Training in environmental education.

Purpose: (Why do you want to organise the training?) To promote environmental education in schools of target areas by enhancing the knowledge and skills of school teachers in environmental education

Specific objectives: (What exactly do you want the participant to know or act after receiving the training...)

To develop a cadre of trained teachers in environmental education, who:

- Can understand the concepts of environment such as biodiversity, pollutions, population growth, natural resource conservation etc.
- Improve their understanding about the importance of environmental education.
- Can understand and practice some teaching-learning activities and tools to promote environmental education and awareness among students.
- Develop and implement a simple action plan to promote environmental education in their schools.

Curricular outline (What is to be delivered in the training...)

Session Plan:

Sessions	Time	Duration	Expected outcomes	Methodology	Material required	Facilitator/Resource person

Session 1: What is environment and its components?

Session 2: What and why is environmental education and why is it necessary?

Session 3: Some teaching learning tools and methodologies about environmental education.

Session 4: How to plan a lesson to teach an environmental theme by incorporating it with the existing curriculum?

Session 5: What is Nature Club, how does it function and what are its activities?

Proposed facilitators and resource persons (who is facilitating the session?)

Action Plan

Intake Phase

- ✓ Get prior approval.
- ✓ Arrange venue.
- ✓ Inform CPs.
- ✓ Prepare yourself (develop your session plan).
- ✓ Arrange material and resources required.
- ✓ Get confirmation of the participants.

Evaluation, Feedback and Follow up

- Evaluate Training.
- Write a report.
- Recommend follow up action.

Reading Package

1 - Reading *Environmental Education*

Background

The word 'Environment', according to the Oxford Dictionary, means surroundings. Abbas, S. T. and Akbar G. (2003) in their book "Mabadiat Mahol" in Urdu version have very nicely described the word 'Environment'. According to them, Environment is the word of Arabic language, which means everything that is available in our surroundings. Further they say that on our right and left, above and below, here and there - the point or extent we can visualise, are: land, air, light, darkness, dust, fire, water, animals, plants and those creations of Allah Almighty, which we cannot see, are the part and parcel of the environment.

Being humans, we interact with our environment and whatever is available in our surroundings. This interaction is very much important in terms of our sustainability. The other side of the coin is that when we interact, we face problems and issues, which not only hinder our sustainability process but also affect the world in which we live. As a result of our everyday practices of violating natural principles, the other creatures like animals, birds, trees, plants, etc. on this earth are affected seriously. In this regard, Abbas, S. T. and Akbar G. (2003) say that human is the vicegerent of Allah Almighty on Earth. All the things have been made subordinated to humans. It is therefore required that humans do justice or in other words create a balance between their actions and natural phenomena; otherwise, everything will come under risk. It is true that violating natural principles will affect the planet and survival of humans and other creatures.

As the human population grew rapidly, the natural resources, which are scarce, came under threat. Secondly, humans' excessive reliance on technology, industry, and weaponisation brought the life of this planet and its creatures

including humans under heavy risk. The international economic policies have given boost to the economies of the world but at the same time have resulted in pollution and huge deforestation causing global warming and climate change; thus creating a devastating impact on humans and other creatures on earth to a great extent.

The academia realised that education could only be the strongest source of motivating humans to change their practices. It was in year 1948 that IUCN used the term 'Environmental Education'. Gradually, the term became common in the academic world.

Significance and Scope of Environmental Education

Understanding the subject of environmental education is as important as the other subjects like science, mathematics and language. Environmental education provides the opportunity to learn about environmental concepts like natural resources, climate, biodiversity, etc. to which, as humans, we are very much concerned. This subject also provides awareness of the environmental problems we usually face in our routine life. These problems include: increase in pollution, burden on resources as a result of rapid increase in the population, global warming as a result of industrialisation. Amin, A. and Hussain, A. (2004) say that the need for environmental education emerged because of the rapid growth of environmental problems. It would not be wrong to say that these environmental problems are created as a result of human unawareness of the consequences of the environmental problems. For example, establishment of the industries within the human settlements may cause respiratory and eyesight problems due to unchecked fumes and emissions.

Learning and practicing of environmental education

at school level provides several benefits, for example, children keep themselves neat and clean, they manage disposables and use natural resources with care, they develop environmental clubs having main objective of working for awareness, collective action, making action as a part of the daily routine, etc. Overall, the environmental education plays a vital role in managing our environment sustainably at school level and beyond.

Environmental Education in our Textbooks

The word 'Environmental Education' (EE) may be new in the context of our schooling in Sindh province but teaching of environmental education concepts is quite an old practice. This subject is taught as an integrated subject. Many concepts are available in our existing textbooks of social studies, languages: Sindhi, Urdu and English, and Science from class III to class X.

The concepts of environmental education are available in the textbooks and are being taught for many years in school but not as a separate subject. The second issue is that teachers are not trained so that they could identify and teach the concepts and issues that lie in the domain of environmental education. The third issue is that in the past no initiative has been taken by the government or non-governmental organisations to educate teachers in developing a know how of teaching environmental education concepts alongside the primary concepts.

As a result of these genuine issues, the learners do not have sufficient knowledge of environmental education concepts and issues and therefore, no solid change in children's attitude towards their environment looks evident. Why children do not show this change though teaching learning is there? It is a leading question that requires to be addressed with pertinent analysis. The close observations of teaching learning of environmental education concepts point out a critical issue of

a lack of understanding of the concepts in relation to the enhancement of understanding of environmental education and developing the ownership. Teaching learning of these concepts is very much dull in the sense that teaching is based only on memorisation of the concepts. Children usually memorise and do not understand. The concepts of EE strongly suggest involvement of children into various types of actions. Involvement in the actions can only ensure better understanding along with the realization, ownership and commitment to resolve the main environmental concerns. As a result of this, children would be active and civilised members of the society.

Environmental Education Beyond Our Textbooks

The content knowledge available in our present textbooks is not sufficient. It should be upgraded and enriched through a variety of ways including introduction of creative ways of teaching and learning. There is a variety of sources of learning Environmental Education apart from the textbooks such as newspaper articles on environment published in local languages and in English, magazine and children's literature, nearby agricultural fields, gardens, small ponds of water and lakes, meeting farmers, gardeners, etc. A teacher should plan the sessions where he/she could read the textbook knowledge and later think about the other sources that could help enrich his knowledge about the particular Environmental Education concepts.

The ecological regions of Sindh are of great significance. Our kids must know about the place where they live. This can only be done when we educate our children through real life learning of environmental concepts by schooling. For this purpose, training of school teachers on environmental education could be considered as an essential step so that school teachers could develop strong expertise in teaching children.

Conclusion

The question of what is being taught is based on

how is it being taught. And how is it being taught is based on what a teacher has. The present professional state of our school teachers is deplorable. Regarding the teaching of environmental education, the school teachers seriously lack not only the basic conceptual understanding of environmental education but also emphasise on direct method of teaching, which promotes only the rote learning

and memorisation. Keeping this entire scenario in mind, the initiative of teacher training in environmental education is highly appreciated in our context. It is hoped that as a result of this initiative, a drastic change would be observable in teachers and the students.

Questions about Reading

Group A: Background

Questions:

1. How can you define the word 'Environment' in your own words?
2. What happens when we violate natural principles of environment? Articulate what you have understood; give examples.
3. What is the impact of population increase on environment? Please support your answer with the examples.
4. What is the main reason of global warming and climate change?

Group B: Significance and Scope of Environmental Education

Questions:

1. Why do we need to learn about environmental education?
2. What happens when we do not learn about environmental education?
3. What Amin, A. and Hussain, A. (2004) say about environmental problems?
4. In your opinion why do they say that?
5. What may be the impact of learning environmental education at school level?

Group C: Environmental Education in our Textbooks

Questions:

1. Which subjects focus on the environmental education?

2. Please describe the issues within existing teaching of environmental education?
3. How can these issues be resolved? How far do you agree with the provided strategies and why?
4. Do you teach environmental education in your school? How do you teach? Do you consider it an appropriate way?

Group D: Environmental Education Beyond our Textbooks

Questions:

1. In your opinion, what could be the sources of EE knowledge apart from the textbooks?
2. In your opinion, do you think the existing textbook on environmental education concepts may be extended?
3. Do you think learning about the Indus Ecoregion is important for us? Please argue.
4. Give at least one example of extending textbook knowledge and linking it with Indus Ecoregion.

Group E: Training School Teachers in Environmental Education

Questions:

1. In your opinion, why do teachers need to be trained in EE?
2. Please describe various methods of teaching EE?
3. What are the possible strategies of teaching EE?

2 - Reading *Ecosystem*

The Nature has created this earth with a great diversity. The major elements of this earth are: land, water, air, light, living beings and their habitats. For their survival, all these elements depend upon each other. All these elements constitute the physical environment of this earth.

The physical environment of this earth is made of several ecosystems called forests, wetlands, river, mountains, deserts, agricultural land, etc.

In simple terms, an ecosystem is a community of plants, animals and microorganisms that interact with each other and with their physical environment. Forests, streams, lakes, coral reefs, grasslands, deserts, and rotting logs are all examples of ecosystem. Animals and plants in an ecosystem connect to and depend on each other for food, shelter, pollination and many other things. What happens to one member of an ecosystem can have an impact on the whole system. Although all species are important, some species, called keystone species, play critical roles in ecosystems. If a keystone species is removed from an ecosystem, it is likely to cause a major disruption to that entire ecosystem.

Human activities or natural disasters such as: floods, fires, or drought, can cause a change in an ecosystem. Humans can also have a negative effect on ecosystems in many ways such as through clearing forests, over-hunting or over-harvesting plants, or polluting the air, soil, and water. Sometimes disruptions can be more severe or more frequent because of the way humans use the environment.

There are several ecoregions in the world; Indus Ecoregion is one of them. The River Indus starts from Himalayas and ends up in the Arabian Sea by making a Delta called Indus Delta. The Indus Ecoregion exits in Sindh province, which represents a great diversity of ecosystems: biodiversity, water, soil, forests and other natural resources.

Questions about Reading

1. What are the major elements of earth?
2. Please describe the ecosystems that form the physical environment of this earth?
3. What is an ecosystem?
4. How ecosystems change?
5. What do you know about the Indus Ecoregion?

3 - Reading *Soil*

Soil is a thin layer of material on Earth's surface in which plants have their roots. It is made up of many things such as: withered rock, decayed plant and animal matter. Soil is formed over a long period of time. It can take the period of 1000 years or more. It is formed when many things interact such as air, water, plants, animals, rocks, and chemicals. Soil is formed from the weathering of rocks and minerals. The surface rocks break down into smaller pieces through a process of weathering and is then mixed with moss and organic matter. Over time, this creates a thin layer of soil. Plants also help in the process of development of soil. Plants attract animals and when animals die, their bodies decay. Decaying matter makes the soil thick and rich. This process continues till the soil is fully formed.

Types of Soil

Sand, silt and clay are the basic types of soil. Most soils are made up of the combination of these three types. The texture of the soil, how it looks like, depends upon the amount of the three components in that particular soil.

Soil erosion, caused by the wind and rain, can change land by wearing down mountains, creating valleys, making rivers appear and disappear, etc. It is a slow and gradual process that takes thousands and even millions of years. But erosion may be speeded up by human activities such as farming and mining. Soil, as we know, develops very slowly over a long period of time but can be lost too quickly. The clearing of land for farming, residential, and commercial use can quickly destroy soil.

Soils of the Indus Ecoregion

The rich soils of Sindh is indeed a gift of River Indus having 580 miles length bisecting the region into two parts: east and west valley forming rich

areas with forests, deserts, and agricultural lands.

Sindh, from north to south, assumes a pattern of three parallel belts: a central stretch of rich alluvial plain bisected by the River Indus; in the west, there exists mountains called Kirthar range; and in the east, there is a sandy desert belt. The mountainous belt has little soil and is mostly dry and barren. The easterly desert region first appears in the north as low dunes and vast flats. Continuing southward, the Achharo Thar (White sand desert) occurs in the middle of the belt and is followed by the Thar Desert in the southeast. The central riverine belt, which is 360 miles long and about 20000 square miles in the area, constitutes the valley of the Indus. The fertile plain, gradually slopping down from north to south in its long gradient forms the three flat regions: Siro (the upper), Vicholo (the middle) and Larr (the lower). The variety of soils includes: pakki or patt, the flat land of old alluvial forming the northern strips of Sukkur, Jacobabad and Larkana districts; Reti-wari, the soft reddish rocky soil of the belt skirting the northwesterly rocky range; Kacho, the fertile silt in the narrow inundated belt of the Indus River; Wariasi, an admixture of soft clay and sand remains on both sides of Indus; Kalar, found mostly in the Larr region.

Questions about Reading

1. What is soil?
2. What are the components of soil?
3. How do plants help in the making of soil?
4. What are the types of soil?
5. What roles do humans play in the erosion of soil?
6. How do you describe the varieties of soil of Indus Ecoregion?

4 - Reading *Biodiversity*

What is biological diversity?

Biodiversity refers to the variety of life forms, ecosystems or habitat, and the range of genetic diversity among the living organisms – it includes diversity within species, between species and of ecosystems. It is, therefore, an umbrella term for the richness and variety of living things in the world as a whole or in any location within it. This variety provides the building blocks that allow adjustment to changing environmental conditions. Since all life forms depend on the uninterrupted function of natural ecosystems that ensure flow of energy and nutrient in a given ecosystem, therefore, conserving biodiversity on earth has become an accepted goal all over the world (Biodiversity Action Plan 2000.)

Biodiversity is the variety of life on Earth. It encompasses everything ranging from the tiniest microorganisms to the tallest trees, from creatures that spend their entire lives deep in the ocean to those that soar high above the Earth's surface. The word biodiversity also describes the wealth of habitats that house all life forms and the inter-connections that tie us together. All of Earth's ecosystems and the living things that have evolved within them—including the fantastic range and expression of human cultures—are part of our planet's biodiversity.

Today, as ever, human beings are dependent of life for their sustenance, health, well-being and enjoyment on fundamental biological systems and processes. Humanity derives all of its food and many medicines and industrial products from the wild and domesticated components of biological diversity. Biotic resources also serve recreation and tourism, and underpin the ecosystems, which provide us with many services.

While the benefits of such resources are considerable, the value of biological diversity is not restricted to these. The enormous diversity of life in itself is of crucial value, probably giving greater resilience to ecosystems and organisms. Biodiversity also has important social and cultural values.

Biodiversity of Indus Ecoregion

The land along the main river course is very fertile and a variety of crops are cultivated there. Fisheries of the area include the Indus Baril, Indus Garua and Golden Mahaseer. Indus is also the habitat of the blind Dolphin. Owing to arid conditions, the flora of Sindh chiefly consists of thorny trees and plants with either small or no leaves. The riverine forest on the bank of the Indus harbor *Acacia*, *Tamarix* and *Prosopis* spp. The mammals found in riverine tract are Wild boar, Jackal, Foxes, and Hog deer.

A variety of freshwater and brackish wetlands provide ideal habitats for a variety of birds and aquatic species. Some of these wetlands such as Keenjhar, Haleji, Nurri Jubbo, Keti Bundar have been declared as Ramsar sites as they exit on Indus flyway and are important habitats for several species of resident and migratory birds. All these wetlands serve as wintering grounds for waterfowl such as flamingoes, duck and shorebirds. The Indus Delta is habitat of four mangrove species including, *Avicennia marina*, *Agiceras corniculatum*, *Ceriops tagal* and *Rhizophoro mucronata*. Mangrove ecosystem is a rich habitat for wildlife of terrestrial and marine origin.

Among the wild animals, the Sindh ibex, Wild sheep, and Black bear are present in the western rocky range. In the eastern region, Striped hyena, Jackal, Fox, Porcupine, common Gray mongoose, and Hedgehog can be found in the lower rocky

5 - Reading

Indus River Dolphin

plains. The Sindhi phekari (Red lynx or Caracal cat) can also be seen in certain areas. Pharrho (Hog deer) and Wild boar, a variety of bats, lizards, and reptiles including cobra, Lundi (Viper), the mysterious Sindh krait reside in the central region. Crocodiles are rare and inhabit the backwaters of the Indus and its eastern Nara region. Besides a variety of marine species like the Plumbeous dolphin, the Bottlenose dolphin, Rorqual or Blue whale, and a variety of skates visit the coastal areas of Sindh. The Green turtle and Olive Ridley turtle frequent the shores of the Karachi coast for nesting.

Questions about Reading

1. What is biodiversity?
2. What are the three kinds of biodiversity?
3. Why is biodiversity important?
4. What are the major threats to biodiversity?
5. What are the specialties of biodiversity of the Indus Ecoregion?
6. How do you consider the case of Indus River Dolphin as an endangered species?



The Indus River Dolphin is an endangered species, found in the Indus River with a population estimate of only 1,100, facing serious threats. A decrease in the water level is perhaps the most critical of all the threats facing this species. Construction of dams and barrages, intensive agricultural practices, poor water management, municipal sewage, unsustainable fishing practices and mortalities in the fishing gear all have adverse effects on the habitat of the Indus River Dolphin.

Sindh Wildlife Department and WWF – Pakistan have taken several initiatives to conserve the viable population of Indus River Dolphin by protecting the innate biodiversity of the lower Indus river basin Eco-system, and reducing the losses of Indus River Dolphins due to canal stranding through rescue operations.

Other major project activities involve improvement of agricultural practices through the development of Better Management Practices (BMPs) and awareness through a conservation centre and ecotourism. These interventions incorporate a strong component of supporting livelihoods of stakeholder communities.

Source of Information: <http://www.wwfpak.org/index.php>

Questions about Reading

1. Where is Indus Dolphin found?
2. What are the major threats to Indus Dolphin?
3. Please enumerate the steps being taken to save Indus Dolphin.
4. In your opinion, what measures should be taken to save Indus Dolphin?

6 - Reading *Wetlands*

What is Wetland?

Wetlands are defined as “areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salty, including areas of marine water the depth of which at low tide does not exceed six metres.” (Ramsar Convention, 1971)

Functions of the wetland ecosystem

Wetlands are among the world's most productive ecosystems. Wetland ecosystems are cradles of biological diversity, providing water and primary productivity upon which countless species of plants and animals depend for survival. They support high concentrations of birds (especially waterfowl), mammals, reptiles, amphibians, fish and invertebrate species.

Wetlands provide tremendous economic benefits to mankind. Following are some of the important functions of the wetland ecosystem.

- Supplies water.
- Sustains agriculture, industry, tourism and commerce.
- Sources of fish and other foods.
- Acts as vast sponges for holding water, thus reducing floods.
- Recharges groundwater systems.
- Maintains water quality by trapping sediments, retaining nutrients, and removing toxins.
- Prevents saline intrusion in coastal areas.
- Recycles nutrients.
- Oxygenates the water and release clean water into the environment.
- Stabilises microclimate.
- Provides transportation networks, especially in rural areas without roads.
- Provides a wide range of housing materials.
- Serves as valuable educational tool.

- Provides exceptional sources of recreation.
- Acts as valuable wildlife refuge.
- Provides wintering, feeding and resting grounds for migratory birds.
- Often has profound cultural and /or spiritual significance to local people.

Threats to Wetland Habitats

- Lack of conservation awareness; ignorance of the ecological and economic importance of wetlands.
- Diversion of water for irrigation.
- Eutrophication.
- Drought.
- Pollution from domestic sewage, industrial wastes.
- Reclamation for urban/ industrial development.
- Poaching/Hunting of wildlife.
- Over-harvesting of fisheries resources.
- Introduction of exotic species.
- Over grazing.
- Poorly regulated recreational use/ tourism.

Important wetlands of Indus Ecoregion

1. *Haleji Lake*

It is an artificial freshwater lake comprising an area of 1,704 ha. The lake is a wildlife sanctuary and a Ramsar site. It is one of the most important breeding, staging and wintering areas for waterbirds, supporting between 50,000 and 100,000 birds annually, including Dalmatian Pelican, European Wigeon and Black Coot. Thousands of Black-crowned Night Heron roost in the area. The lake is also a source of livelihood for local communities through fishing and other wetland products.

2. Keenjhar Lake

It is the largest freshwater lake in Pakistan covering an area of 13,468 ha. It is a wildlife sanctuary and a Ramsar site. It is also an internationally important area for breeding, staging and wintering waterbirds, supporting as many as 140,000 birds, including European Wigeon, Black Coot and Common Pochard. The lake is a major source of drinking water for Karachi and supports a variety of species. Breeding birds include Night Heron, Cotton Teal, Pheasant-tailed Jacana, Purple Moorhen, and also some passerines.

3. Indus Dolphin Reserve

The 170 km stretch of the River Indus from the Sukkur Barrage upstream to the Guddu Barrage near Kashmore has been declared as Indus Dolphin Reserve. This particular stretch of the river is very important for the survival of more than 500 remaining individuals of the Indus dolphin (*Platanista minor*). This unique species is endemic to Pakistan and listed in the Appendix I of CITES and the IUCN Red List 2000. Riverine forests predominated by *Acacia nilotica* and *Prosopis cineraria* exist in adjacent flood plains.

4. Hub Dam

Hub Dam is located in the districts of Karachi and Lasbella, in Sindh and Balochistan provinces. It is a large water storage reservoir constructed in 1981 on the Hub River. The site is an important staging and wintering area for grebes, pelicans, ducks, cranes and coots. It regularly supports over 45,000 water birds. The reservoir is also an important spawning ground and a source of fish.

5. Indus Delta

Indus delta is located in the districts of Thatta

and Badin. It is a typical fan shaped delta spread over an area of 600,000 ha from Pitiani creek in the west to Sir Creek in the east. It comprises seventeen major creeks. Indus Delta is said to be the fifth largest delta in the world, and is considered unique, because of the fact that it experiences the highest wave energy of any river in the World. The delta is predominated by mangrove vegetation. Major animals found in the Indus Delta include Humpback and Bottlenose Dolphins, Finless Porpoise, Whales, Indian Python, Sea Snakes, Saw-scaled viper and aquatic and common birds. The delta is also rich in fish and shrimp diversity which are a source of livelihood for local fisherfolks.

6. Hamal Lake

Hamal Lake is a shallow natural depression and has been formed by the construction of the flood protection barrage during 1930s. The sources of water to Hamal Lake are from hill torrents and surface drains in the area. Hamal Lake covers an area of 26,000 acres during flood season and in very dry years it is virtually known to dry up. Various waterfowl species found here including Marbled Teal, Red Crested Pochard, *Tachybaptus ruficollis*, *Anser anser*, *Ananus penelope*, *Anas creca*, *Anas acuta*, *Aythya ferina*, *Fulica atra*, *Anser strepera*, *Anas platyrhynchos*, *Anas clypeate*, *Anas fuligula*.

7. Manchar Lake

Manchar is the biggest shallow water natural lake of Pakistan; situated in district Dadu. It is a vast natural depression flanked by the Khirthar hills in the west, the Laki hills in the south and the River Indus in the east. Manchar Lake has been substantially supporting various economic activities. It provides livelihood to a large number of fishermen, irrigation water for various crops and aquatic plants including

lotus. The common water birds found in Manchar Lake include Little Grebe, White Egret, Large Egret, Median Egret, Moorhen, Purple Moorhen, Purple Heron, Grey, Heron, Common Teal, Marbled Teal, White Stork, Darter, Goliath Heron, Pheasant-tailed Jacana, Common Rail, Common Stilts, Lapwing and Large cormorant.

8. *Chotiari Wetlands*

Chotiari reservoir lies on the western flanks of Achro Thar desert (white sandy desert) in Sanghar district. The Reservoir occupies an area of about 18,000 hectares and has water storage capacity of 0.75 Million Acre Feet (MAF) flooding an area of approximately 160 km². Chotiari reservoir has been created in a natural depression that exists along the left bank of the Nara canal. The aquatic features of the reservoir area comprise small and large size freshwater and salty lakes which occupy about 30% of the total reservoir area. These lakes are a source of subsistence and commercial fisheries for the local people. The open wetlands and terrestrial areas are habitats for a variety of fish, mammals, birds and reptiles. Important wildlife of the area includes Hog deer, Chinkara, Jungle cat, Fishing cat, Caracal, Smooth coated otter, Marsh crocodiles, Python and a variety of birds including globally threatened Marbled Teal, breed here. In a survey in 1993, 40,000 birds were observed in the area.

Questions about Reading

- What is a wetland?
- What are the functions of a wetland?
- How is a wetland beneficial for humans?
- What have you learnt about the major threats to wetlands?
- Can you please count the wetlands in Indus Ecoregion?
- Which wetlands have been discussed in our textbooks?
- Have you ever made a visit to a wetland? Please share your experiences.



7 - Reading *Forest of Indus Ecoregion*

An area of 1.126 million ha or eight percent of geographical area of Sindh province comes under the control of the Sindh Forest Department. The Riverine forests and irrigated plantations exist over 2.29 percent area, clearly indicating that the province is deficient in forest resources. The remaining area under the control of the Sindh Forests Department consists of mangrove forestry and rangelands.

1. Riverine Forest:

Riverine forests owe their existence to the flooding of the River Indus and are the mainstay of forestry in Sindh. They are located along the River Indus within protective earthen embankments constructed to confine flood water. The main tree species grown are Babul (*Acacia nilotica*), Kandi (*Prosopis cineraria*) and Lai (*Tamarix dioica*). These forests are diminishing at a rapid pace due to deforestation, encroachments and river flooding. These forests provide timber, fuelwood, fodder for livestock grazing, medicinal plants and thatch material for house making.

2. Mangrove Forest:

The coastline of Pakistan is 1050 km long and 40-50 km wide shared by the provinces of Sindh (350 km) and Balochistan (700 km). In the Sindh province, mangrove forests are found in the Indus Delta occupying approximately 600,000 ha extending from Korangi Creek in the north to Sir Creek in the South. Indus Delta comprises 17 major creeks, numerous minor creeks and extensive mudflats and constitutes 97% of all mangrove forests found in Pakistan. Mangroves of Indus Delta are unique in being the largest arid climate mangroves in the world. The survival of these forests is largely associated with perennial freshwater supplies from the River Indus, which flows through the delta

before reaching the Arabian Sea.

Significance of Mangrove Forests

- Provide nursery for fish, shrimp and crabs.
- Protect coastline and sea ports from erosion and siltation.
- Act as a natural barrier to cyclones and tsunamis.
- Provide habitat and breeding ground for marine life and migratory birds.
- Meet fuelwood and fodder requirements of local communities.
- Serve as a source of education, research and recreation.

3. Irrigated Plantations

These are man-made forests raised on sanctioned irrigated water supplies from irrigation department. They were mainly established for the purpose of meeting industrial wood demands. An area of 82,000 ha is presently under control of Sindh Forest Department for the purpose of raising irrigated plantations in the command areas of Guddu and Sukkur Barrages. The main tree species grown in irrigated plantations include: Shisham, Babul and Eucalyptus.



8 - Reading *Pai Forest*

Pai forest is a small yet important forest in the vicinity of Sakrand (District Nawabshah of Sindh Province). It is located adjacent to National Highway and has a total area of 1933 hectares. Pai forest has recently turned into an inland forest, situated outside the river embankments and is facing acute shortage of water. The forest comprises several compartments.

The forest has five major species of plants viz: *Prosopis cineraria* (very common), *Acacia nilotica* (common), *Eucalyptus camaldulensis* (common on north and NE sides), *Tamarix indica* (common) and *Tamarix aphylla* (occasional). Overall the condition of the forest is miserable due to illegal cutting, poor management and over exploitation though at limited scale tree planting and management

of important tree species is being done in some patches of the forest. From ecological point of view, the Pai forest, if given proper heed and consideration, can become a vital shelter for biodiversity.

Forest plantations contribute to reducing deforestation and degradation of natural forest. Therefore, there is a mounting need for biodiversity studies in Pai forest as Pai can support a rich and varied fauna and serve to conserve wildlife as well. For the sustainable management of Pai forest, it is important to understand changes in key ecosystem processes such as decomposition and nutrient cycling that are encountered when natural forests are changed into other land uses or irrigated plantation.



9 - Reading *Natural Resources*

Natural Resources are naturally occurring substances that have economic value, such as: water, land (soil), forests, wildlife, animals, fisheries, metals, etc. Natural resources are often classified as renewable and non-renewable resources. Renewable resources are generally living resources which can restock themselves unless they are not over-harvested such as fish, forests, livestock etc. Non-renewable resources include soil and water.

Natural Resources of Indus Ecoregion

Water

Water is life and a greatest natural resource for the agricultural and economic purposes. The main purpose of water is drinking and cleaning. It is also used for growing plants and crops.

River Indus is a major source of water in Indus Ecoregion but its flow downstream has reduced due to construction of barrages on its way at several places. There generates several canals from River Indus for drinking purposes as well as irrigation of agricultural lands.

At some of the places in Indus Ecoregion, water is scarce – unavailable even for the drinking purposes. Most of our lands are barren due to scarcity of water.

Land or Soil

We live on land and grow crops for food and livelihood. Pakistan is pre-dominantly an agricultural country and produces around 25% of the GDP. Nearly 21.5 million hectares of land is cultivated in Pakistan of which 25% of land of Sindh province is under cultivation. Most of the land in Sindh province is barren – uncultivated because of the non-availability of sufficient water.

Fisheries

Fishing is the main livelihood resource of the community. Besides, providing valuable revenues to the country, fishing is the primary source of livelihood of the population. There has been reduction in fishing in recent years in Pakistan. One of the reasons is the unsustainable practices.

Livestock

Livestock are domesticated animals reared in the agricultural setting and raised for subsistence and profit. Livestock includes: cows, goats, buffaloes, sheep and camels. In rural part of Pakistan, this is the old tradition that these animals are domesticated. Livestock is the source of milk, meat, butter, cheese, etc. Thus, it is the major source in the irrigated, arid, semi-arid and rain fed areas in Pakistan.

Forest

Forest is the natural home of biodiversity. It provides food and shelter to many animals and is a big source of timber. In Pakistan only about 5% of the land is covered with forests, which indeed is a low percentage. The major reason of lack of forests is variations in climate and arid conditions. Riverine forests are mainly found in Sindh province. Irrigated plantations are spread over 82,310 hectares. Besides, the mangrove forests are also found in the Indus Delta which covers 80000 hectares. Mangrove is the nursery ground of shrimps and many species of fishes and birds.

Wildlife

Animals: mammals, birds, and reptiles living in the wild have also been a great source of attraction for humans. These animals are the main source of income, hunting etc. The natural habitat of wildlife in Sindh province includes: coastline, mangrove,

riverine and irrigated forests, the Indus plains and the fresh water wetlands.

The wildlife of Sindh includes species like Sindh Wild goat, Chinkara, Hog deer, Jackal, Wolf, Partridges, etc. The wetlands such as Keenjhar Lake, Haleji Lake, Manchar Lake, etc. provide a wintering ground for migratory and other birds.

The wildlife of Sindh province, particularly of the Indus Ecoregion, has been declined during the last few decades as a result of loss of habitats and increased human interventions.



10 - Reading *Pollution*

What is Pollution?

Human beings depend on environment both directly and indirectly. They need food to eat, water to drink and meet other requirements, air to breathe and fuel to fulfill energy requirements at domestic and industrial level. Human activities in this industrial era generate basic wastes by burning coal, gas, oil and other fuels, besides a variety of solid wastes that generate through human activities. All these wastes adversely affect the quality of environment in which we live.

Pollution is derived from the Latin word *polluere*, mean "contamination of any feature of the environment." Pollution has the following characteristic:

1. It is the addition of substances at a faster rate than the environment can accommodate e.g., certain substances like arsenic or mercury have natural level. If these levels exceed a certain critical value they are considered to be pollutants.
2. Pollutants are not only chemicals but also forms of energy like heat, sound (noise pollution) and radioactive rays.
3. Pollution can also be defined as undesirable change in the physical, chemical or biological characteristics of land, air and water that will harmfully affect humans and other living organisms.

Types of Pollution:

Traditionally, air, water and land pollution are the most recognized categories of pollution.

1. Air Pollution.

Air pollution has existed since humans first used fire. However, the problem has become significant since the industrial revolution in the 19th century.

Almost all air pollutants are the result of burning fossil, fuels, either in home, in industry or in internal combustion engines. Air pollution is much more common in cities than in the countryside.

Air pollutants are source of many health risks such as, respiratory diseases, cancers, irritation of eyes, nose throat and lungs. Many other dangerous gases and chemicals like mercury, zinc and lead may cause chronic diseases and damage to humans and the environment.

2. Water Pollution:

Water is one of the most important sources of life. Where there is water, there is life. Without water life cannot exist. Water occupies about 75% of the land surface. Less than 3% of the earth's total water is fresh. Out of the total freshwater available, 75% is used for agricultural purpose, 20% for industrial use and only 5% is used for domestic purposes.

Industrial waste largely bring water pollution. Municipal and agricultural wastes are two other major sources. Domestic sewage of cities and towns ultimately enters into streams, river, lakes and finally into seas and oceans. Due to these pollutions, concentration of ammonia, nitrates and phosphates increases and that of oxygen decreases in water, thereby adversely affecting living organisms in water. Water pollution is also a source of many waste-borne diseases.

3. Soil pollution:

Soil plays a very important role in the ecosystem. Plants need soil to grow. The top layer of soil is the most important for the growth of plants. Soil also holds water needed for the growth of plants. Pollution of our land and water bodies by different

kinds of wastes in the form of chemicals, detergents, solid waste from home, factories and industries not only give an ugly look to our environment, but also damage the habitats. More than 90 % of pesticides applied never reach their target, i.e. pests. Instead these chemicals contaminate air, water and soil.

4. Noise pollution:

Noise is an unwanted sound. As the world population is growing, the automobiles and industry are also expanding. More and more people are buying cars everyday, thus increasing the volume of traffic, especially in the urban areas. You must have seen signs such as “no horns or” “do not blow horns near hospitals and schools.”

The primary sources of noise are industries, factories, machines, TV, radio, vehicles and aeroplanes. Noise reduces our hearing capacity and causes mental distress, ulcers, heart diseases, high blood pressure and nervousness.

11 - Reading

A Poem on Pollution

Reference: English Book 4, page number 80

Pollution, pollution where do you come from?
Pollution, pollution how do you grow?

I come from the noises, that you make,
And from the litter, you throw in the lake.

Smoke from factories, make me strong,
Trees that you cut down, make me live long.

Every careless human gives me birth.
My friends are enemies of earth.

So if man, continues this way,
He will surely help me to stay.

Mahira Akbani

12 - Reading

Climate

Climate

Climate encompasses the temperatures, humidity, rainfall, atmospheric particle count and numerous other meteorological factors of weather in a given region over long periods of time. Climate can be classified by using parameters such as: temperature and rainfall to define specific climate types.

Atmosphere is a cover over the earth. It is a thin layer of mixed gases which makes up the air we breathe. This thin layer also helps the earth in becoming too hot or too cold.

Oceans cover about 70% of the Earth's surface. Their large size and thermal properties allow them to store a lot of heat.

Land covers 27% of the Earth's surface, where humans and other animals live.

Ice covers 3% of the Earth's surface which includes Antarctica and Greenland and is the largest source of supply of fresh water resource.

Biosphere is the part of Earth's atmosphere, land and oceans that supports any living plant, animal or organism. It is the place where plants and animals including humans live.

Global Warming

Global warming refers to an average increase in Earth's atmosphere, which in turn causes changes in climate. A warmer Earth may lead to changes in rainfall patterns, a rise in sea level, and a wide range of impacts on plants, wildlife and humans. When scientists talk about the issue of climate change, their concern is about global warming caused by human activities. There are both natural and human factors that cause the global warming which are as follows:

A. Natural Factors:

- Changes in solar output (the amount of energy radiating from the sun is not constant).
- Changes in the Earth's orbit (slow variations in the Earth's orbit around the sun change where and when energy is received by earth. This affects the amount of energy that is reflected and absorbed).
- The Greenhouse Effect (when the energy from space enters the Earth's atmosphere, about a third of it is reflected back to space. Of the rest, the atmosphere absorbs some but most of it is absorbed by the surfaces of the earth. The Earth emits energy at longer wavelength. Some of this energy escapes to space but some is absorbed again and remitted by clouds and the greenhouse gases such as water vapours, carbon dioxide, methane and nitrous oxide. This helps to warm the surface and the atmosphere).
- Aerosols (These are fine particles and droplets that are small enough to remain suspended in the atmosphere for considerable periods of time. They both reflect and absorb incoming solar radiation. Changing the quantity and type of aerosols in the atmosphere affects the amount of solar energy reflected or absorbed).

B. Human Factors:

- Enhancing the Greenhouse Effect (Scientific studies suggest that a variety of human activities release greenhouse gases, which include: burning of fossil fuels for producing electricity, heating and transportation.)
- Land use change (As humans replace forests with agricultural lands, or natural vegetation with concrete; they substantially alter the way the Earth's surface reflects sunlight and releases heat. All these changes also affect evaporation, runoff and rainfall patterns. Land use and the

changes in the way it is used affect the global carbon cycle, reduce the world's forests and woodlands, expand the cropped land area, and cause the tropical deforestation).

- Atmospheric Aerosols (Humans are adding large quantities of fine particles (aerosols) both from agricultural and industrial activities.) Although, most of these aerosols are soon removed by gravity and rainfall, they affect the radiation balance in the atmosphere).
- Burning of fossil fuels for energy.

Ozone and Ozone Layer

Ozone is a natural gas found in two different layers of the atmosphere. In the layer around the Earth's surface (troposphere), an oxide of carbon dirties the air and makes smog. The troposphere extends up to the stratosphere layer where good ozone protects life on earth by absorbing some of the sun's ultraviolet rays.

Ozone layer forms a thin layer shield high up in the sky. It protects life on earth from the sun's ultraviolet rays. In 1980, scientists found clues that ozone layer is being depleted. This can cause people to get highly exposed to ultraviolet radiation which can cause skin cancer, eye damage, and other diseases.

13 - Reading *Nature Club*

What is a Nature Club?

A Nature Club is the friendly association of school head teacher, teachers and students and possibly the outside community having common goal, objectives, and activities to save nature and make this as the part and parcel of school curricula and culture. Through the Nature Club, students learn about the significance of natural resources and environment.

A Nature Club may include activities like:

- Everyday school cleanliness
- Collecting waste for development of resources
- Conducting Environmental Exhibitions
- Tree Plantation and beautification in school
- Nature tour/walk
- Quiz competitions
- Writing competition
- Watching documentaries
- Taking part in indoor and outdoor sports
- Conducting simple environmental research
- Lecturing on environmental education/Issues by a seasoned expert /teacher
- Mentoring junior teachers
- Conducting mass awareness campaigns

What are the objectives of a Nature Club?

The establishment of a Nature Club in the school and its further development could ensure the benefits such as:

- Well educated and literate school community.
- Learning of variety of skills including planning, decision making, resources development, monitoring and evaluation, leadership, art and exhibition, poetry and prose, etc.
- Developing positive attitudes such as:

- Creating of a healthy environment.
- Creating friendly, cooperative, collegial and empathetic environment to accomplish tasks which are not possible for an individual person.
- Creating interest, enthusiasm, discipline, commitment in all ranks.

What are the activities of a Nature Club?

There could be several activities that might be performed by a Nature Club. These activities may be categorised as:

- Motivation/awareness activities, for instance lecturing by an expert, watching documentaries, mentoring juniors, etc.
- Health and hygiene activities for example: keeping first aid box, cleaning school, removing dust and garbage, etc.
- Development/improvement activities for example: tree plantation, keeping a recycle bin, placing a notice board for displaying active persons' photos, developing teaching resources, setting a library etc.
- Research/enquiry activities for example: observing environment, interviewing people, reading literature, taking notes etc.
- Art/crafts activities for example: making drawings, posters, charts, sceneries, models, pottery, performing dramas, poetry, developing portfolios etc.
- Outdoor activities for example: nature walks, tours, visits etc.
- Sports activities for example: playing cricket, hockey, volleyball, table tennis, badminton, etc.

Find on the next page, the activities which could be considered as model activities. Teachers

and students together may devise several other activities which could be the part of a Nature Club. This may be kept in mind that fewer resources may be consumed to have the optimal benefits.

How to organize a Nature Club in the school?

Below are the Tips that may support in organising a Nature Club in the school:

- Motivate the school head teacher and other teachers through sharing benefits of a Nature Club for the whole school.
- Under the leadership of school head, select a group of teachers and students who take responsibility of organising this Club.
- This group would sit and devise the methodology of how to do all the things.
- Talking to all the teachers and students through class lecturing, demonstration, field exposures, watching documentaries, etc.
- Making sub groups of the teachers and students and assigning them the tasks according to their interests.
- Devising procedures of doing things.
- Starting the activities.
- Monitoring the activities to create proper check and balance.

How to sustain a Nature Club in the school?

The sustainability of Nature Clubs may only be ensured by strictly:

- Maintaining discipline, cooperation, coordination in all levels.
- Doing activities on continuous basis as part of the curriculum.
- Monitoring and evaluating on regular basis for proper check and balance.
- Collecting a membership fee at regular basis.

14 - Reading

Training School Teachers in Environmental Education

Training is one of the most frequently practiced models of professional development for the teachers in the world. The mode of training provides opportunity to learn and practice several ideas under the mentorship of a senior resource person (s). A reasonable number of participants attend the training program and learn in collaborative and collegial way. They work both as individual and in a collective way to accomplish several types of tasks depending upon what is being learnt in the training.

There are three major grounds of training of school teachers on environmental education. First, knowledge building in a subject to which, as humans, we are very much concerned and contrary to this, we have given less priority to learning of this subject. Second, the environmental themes are available in the textbooks but teachers do not teach them with the intention of learning about environment. Third, though teachers teach these concepts, their way of teaching is simply based on rote memorisation of concepts and do not tend to be creative, innovative and practical. The training of school teachers in environmental education bridges all the three gaps. It provides sound understanding of environmental themes along with exposure to the innovative ways of teaching, assessment and evaluation. The associated feature that makes the environmental education training distinguished from other subject trainings is the fieldwork. In the fieldwork, a teacher is provided an opportunity of field trips, which are highly focused to help them gain direct knowledge of various segments of environment.

Training provides a rich opportunity to learn and practice a variety of teaching learning methods such as lecture, demonstration, project, inquiry,

reflective method etc. These methods also include a variety of teaching learning techniques like: conducting interview, conversation/dialogue, story telling and reading, debate and discussion, written and verbal reflections, field visits etc. Most of these methods and techniques develop four major approaches within the teaching professionals called: constructivist approach, inquiry approach, participatory approach and reflective approach. Teachers get accustomed to these approaches during the training workshops and later on apply the same approaches on students at school level.

Questions for Discussion

1. Why is training the most frequently practiced mode of professional development in the world?
2. Why is training of school teachers in environmental education important?
3. Please write the possible teaching learning techniques that can be used while teaching environmental education.

15 - Reading *Steps of a Training Programme*

In a training programme, a trainer's role is multidimensional beginning from planning to implementation, evaluation and follow up. Following are the steps of a training programme that a good trainer needs to follow:

i. Planning of sessions

Planning of sessions is the foremost task, on which the entire learning is based. A good planning requires: understanding what to teach and what to produce, deciding how to teach, gauging the level of learners, assessing what resources are available, analysing how much time to be allocated etc. The careful decisions regarding all these ensures good planning which leads to effective implementation. In the planning process, it is necessary that the objectives, timeframe, activities, content knowledge and resources selection should be clearly highlighted.

ii. Preparation according to planning

After planning, the second most important thing to keep into consideration is preparation. The preparation covers: review of literature or content knowledge, selection of content knowledge according to the need and level of learners, adoption of the teaching-learning strategy, which suits the content knowledge. One thing that must be kept in mind is that teachers should be given the knowledge of variety of teaching learning methods and techniques so that they are able to understand the diversity of topics and make the teaching-learning more creative and innovative. The preparation also involves arrangement of teaching resources such as worksheets, charts, drawings, etc. In this respect, the no cost- low cost idea is effective in arranging resources that also leads to conservation of resources and reduces the levels of pollution.

iii. Facilitation

The facilitation is meant for creating congenial (friendly) learning environment where master trainers' role is to support or guide in terms of using simple language, providing clarifications, supporting ideas with the appropriate examples, eliciting response from learners, providing freedom of expression, creating gender equity, making groups of mixed levels of learners, making resources, encouraging creativity etc. Clear instructions must be the part and parcel of facilitation. The vague instructions or no instructions make implementation ineffective.

iv. Assessment

Assessment is an effective way to find out what learners have learnt as a result of teaching. There are a variety of assessment strategies other than paper pencil text, which has turned obsolete. Application of assessment strategies promotes creativity. A good master trainer should be well-aware of the framework of each strategy, what each assessment strategy measures, how learners can be involved in each strategy etc.

v. Feedback

A good master trainer should pay maximum attention to improving the learning process and the outcome. Feedback is the strategy that requires assessing the gaps in the learning. These gaps include: no undefined objectives, ambiguity in concepts, incompatibility between the content knowledge and the teaching learning strategy, poor assessment which does not achieve objectives, etc. A good feedback includes: clarifications, exemplification, reflections etc.

vi. Time management

This is the most important aspect of planning and implementation. A good master trainer should be careful of the availability of the time, its activity-wise distribution, its proper utilisation etc. The monitoring of time management is necessary during the implementation of a programme or a session.

vii. Appreciation

Appreciation encourages learners. As a result of appreciation, learners get freedom to think from various perspectives, reflect on what they have done, develop strategies etc.

viii. Debriefing and concluding learning

This provides opportunity to discuss in detail what has been done, how it was done, what are the alternate ways, what is the overall level of learning, what are the implications of that learning in real life etc.

16 - Reading

Conversation/Dialogue

Conversation is an informal dialogue about anything. People who get involved in conversation are not restricted to remain within one topic. They can focus on several topics in their conversation. For example, it is usual that persons at the same time talk about current affairs, economic issues of our country, children's education, etc. There are several purposes of conversation, which include: personal expression, to find out information, and to compare views with others. It serves to share experiences, informing somebody about something and solving problems etc.

The conversation in classroom has several merits, which include: improving listening and speaking skills, building confidence among students, being critical and reflective in their talk etc. An environmental education teacher may frequently involve students in conversation process to talk about a concept or issue related to the environment with the objective to facilitate the students develop their own understanding rather depending on the ready made information given to them for reading purpose. The teachers should plan their daily schedules to involve students in the conversation on a variety of topics on daily basis so that students develop interpersonal skills as well as broaden the horizon of their knowledge. Teacher should provide students a good degree of freedom to choose the topics of their choice. This will help students to be independent in their decision making which ultimately leads to development of their confidence. A teacher can allow students to make conversation in pairs and groups depending on whatever the setting suits. A teacher should ask students to use their mother tongue or local language as a tool of conversation. This would make students quite comfortable in oral communication.

The framework of conversation is based on taking turns. There is a logical connectivity within conversation. When one person talks about something, the other person carefully listens. The second person responds when the first person concludes his talk. This process continues till the conversation ends. The conclusion reaches when the persons participating in conversation reach at a point of view or solve a problem or leave the talk incomplete with the intention to continue it further. Please refer Unit 3: "Protecting Myself Against Pollution" page number 16 of Everyday English Class 7 as the example of how students and the teacher could involve in conversation about environmental issues/problems.

Conversation between Jehangir and Doctor

Reference: English Textbook for Class VII, page 16

Jehangir: Assalam – o – Alaikum Doctor sahib.

Doctor: Walaikum – us – Salam. Please sit down.

Jehangir: Thank you Doctor sahib.

Doctor: What's the problem?

Jehangir: I have a bad throat and body ache.

Doctor: Let me examine you. You must be feeling a lot of pain in your throat.

Jehangir: I do take care of my throat but my throat problem continues.

Doctor: Actually, the air that we breathe in becomes dirty by things like smoke and dust. It is the dirty air, which affects your throat.

Jehangir: Oh, I see. So my throat problem is linked with dust and smoke.

Doctor: Exactly! Thick smoke from mills and vehicles pollutes the air.

Jehangir: Ok. Then, how can I protect myself against this?

Doctor: Well, to begin with, you should cover your nose and mouth with mask or a piece of cloth when the smoke is very thick.

Jehangir: All right Doctor sahib.

17 - Reading *Discussion*

The discussion is also an important technique that teachers use in a constructivist and analytical classroom. This mode of learning promotes opinion making skills, arguments and counter arguments skills, questioning skills, and explanation and evaluation skills. Discussion assists students in the development of reasoning, critical thinking, and problem-solving skills. It gives them practice in expressing ideas orally in an organised manner and enables them to reach at conclusions, clarify or modify ideas, resolve differences and find alternative solutions. There are varieties of discussion that can be implemented in the teaching–learning of environmental education. These may include: teacher–led discussion, group discussion, etc.

1) Teacher-led discussion

The teacher-led discussion is done, where the teacher’s role is as an initiator (one who initiates discussion) and moderator (one who monitors discussion, switches over to the next person for sharing or creates equity or balance between those who are involved in the discussion). In other words, the teacher’s role in the discussion is of a facilitator. This discussion is done in front of the whole class.

Tips for Teacher-led discussion

A resource person would:

- Select a topic for discussion according to the requirements of the session.
- Assess the scope and significance of the theme to be brought under discussion.
- Initiate the discussion by sharing a small critical incident or personal experience or observation, a case study, etc.
- Place a question, which should help in initiating the discussion.
- Provide maximum chance to learners to speak.

- Make counter questions to further unpack knowledge/theme under discussion.
- Moderate the discussion in a way that no irrelevant topics are discussed and all should get a good chance of sharing. At least keep those into consideration who speak less or are passive in communication.
- Always try to connect ideas with the main theme by sharing participants’ comments.
- Take care of time during the discussion.
- Write the main points of discussion on the white/blackboard in order to facilitate the course participants to record the points.
- Conclude the discussion in a way that it would derive some solution to a problem, or make addition to information or knowledge.

2) Group Discussion

The group discussion is held in a group setting. This discussion is led by one of the group members chosen in a consensus within a group. Prior to initiating the discussion, the roles of the group members are decided. The major roles of the group are:

1. Group leader/moderator
2. Note taker/writer
3. Time keeper
4. Presenter

All these members work collectively in a group. It is the responsibility of the group leader to involve members actively. Teacher/resource person divides the whole class into the groups of 4 to 5 members (depending on size of the class) for group discussion. There is a joint responsibility of the teacher/resource person and the group leader to tackle the discussion. The teacher/resource person moderates the whole class, whereas the same responsibility lies over the group leader

at the group level. Apart from these two, all members have their joint responsibility as well as the individual responsibility.

Tips for Group discussion

- The teacher/resource person would select the topic(s) for each group. Sometimes, a teacher gives one topic to all groups and sometimes, different topics to different groups.
- Each group would distribute the roles and choose the group leader.
- Each group would initiate the discussion.
- Group Leader would initiate the discussion by sharing a small critical incident or personal experience or observation, a case study, etc. He/she may place a question, which should help in initiating the discussion.
- All group members should speak. The passive members must be encouraged to speak.
- Each member should make cross questions to further unpack knowledge/theme under discussion.
- The group leader would moderate the discussion in a way that no irrelevant topics may come under discussion and all should get a good chance of ideas. Always try to connect the sharing with the main theme by sharing participants' comments.
- Take care of the time during the discussion.
- The whole group would conclude the discussion in a way that it would derive some solution to a problem, or make addition to information or knowledge.
- Develop a presentation of the discussion on a sheet, use a transparency, or make a computer/multimedia presentation (depending on the availability of the resources).
- Other groups, while listening to a presentation, would record any questions or comments, which later on are asked in the debriefing session.

- If the presentation is on a big sheet, display the sheet in a corner of the training hall/room as a record.

A resource person would keep in mind that a group should not be formed of the same members repeatedly but each time the trainees would have opportunity to work with different members of the group. Second important thing that needs to be taken care is to create a balanced group. It would also be ensured that groups would be formed of the active as well as passive members together. All slow learning members may be brought under work through the continuous motivation.



18 - Reading *Debate as a Teaching Strategy*

A debate is a discussion in favour or against a topic in which speakers put forward their view point in support of their arguments. Usually, debate occurs between two parties on a topic that is arguable, where there is disagreement on one side and the agreement on the other side. Both parties defend each other's point of view by providing the arguments, asking questions, adding precedents or proofs, etc. The debate provides opportunity to explore, listen to other's point of view, reflect and enjoy the process of learning. Debate has some advantages, which are as follows:

- Debating reflects the learning process. Debate establishes extremes, allowing the viewers and participants to see the areas in between more clearly.
- Debating allows students to explore ideas and arguments in a non-threatening atmosphere, because presentational guidelines are provided.
- Debating is an effective method of acquiring knowledge, as arguments need to be supported by relevant, accurate, and complete information.
- Students, who debate informally, learn to recognise the elements of a good argument and to develop further their abilities to speak confidently.

A debate should not be a time killing activity but a productive one. It should serve as a device for solving problems, to settle a controversy, to enhance knowledge etc.

Tips for involving students in Debate:

- Before involving students into the debate, a teacher/resource person should find out the areas /issues that are debatable.
- A teacher/resource person should show some videos (if possible) regarding the debate. This

will give the students a good idea of how to start a debate. Also provide one or two readings about debate as learning strategy.

- Before involving students into debate, educate students how to argue, how to question, how to produce evidence in debate.
- A teacher/resource person should present the students an issue for debate.
- According to the interest, divide the students into two groups: one that is favoring the topic and the other that is against. It may also be possible that 50% of the whole class is involved in the debate and the rest of the class simply observes.
- Before starting the debate, a teacher/resource person would provide sufficient time to students for preparation.
- A teacher/resource person must ensure preparation of students for debate.
- Develop a set of ground rules that both the groups of students should strictly follow.
- Before starting the debate, ask students to prepare a list of arguments that should support in the process of debate. It is possible that counter arguments or questions may arise during the process of debate.
- The students, while debating, must carefully listen to the point of view of the opposite group and defend themselves.
- A teacher/resource person should work as a mediator – serve as neutral.
- A teacher/resource person must set the time for debate.
- Finally, the teacher/resource person would conclude the debate as to what has been derived as a result of the debate.

19 - Reading *Interview as a Teaching Strategy*

In the era of electronic and print media, interview is a very common practice and almost every person is aware of this way of conversation. In this context, the purpose is to introduce someone with the public or offer a talk about any issue with somebody. The interview tool is also used in research or data collection process. This interview helps in exploring the respondents to have data required for either solving a problem or making addition in the knowledge. This type of interview is both structured and semi-structured.

In the context of education, the use of interview as a technique for teaching and learning has good number of benefits. It helps in:

- ✓ Introducing someone.
- ✓ Developing confidence in making verbal communication.
- ✓ Developing listening and speaking skills.
- ✓ Enhancing knowledge of learners.
- ✓ Exploring or investigating the knowledge about an issue or problem or personality traits.

The use of interview as a strategy in environmental education could be an option of exploring or inquiring about a situation or issue. Environmental education opens the avenues for learners to interact with each other, civil society members, educators, administrators etc. regarding the discovery of new facts or information about environment. A teacher may provide maximum support to the students in planning and conducting an interview first inside the school and later outside the school. This could be making visits to bazaar, shopping markets, offices, villages, settlements nearby agricultural fields etc. This upgraded nature of interview should be implemented when students reach at the higher level, such as: the classes IX and X. It must be kept in mind that students should plan for conducting

interview along with the teacher/resource person. A teacher/resource person should take students of small groups to the interview sites.

In conducting an interview, the interviewer requires an interview guide. This interview guide is made of questions almost set upon as open-ended structure. The open-ended questions based interview guide is designed in a way that it helps the interviewer to mould the talk to a new direction. In other words, the interview guide is quite flexible. The interviewer may include a new question during the process of the interview.

Interview should have a definite purpose. In this regard, a teacher may facilitate students in planning the interview and devising the interview guide. During the planning phase, it is very important to determine the purpose of interview, interviewee, the questions etc. For example, interviewing a wildlife officer regarding the excessive hunting of birds at Keenjhar Lake will serve the purpose. This would include a number of critical questions that will explore the reasons why hunting of birds takes place and what are the steps the management should take to prevent it.

A teacher/resource person would facilitate the students in thinking about several topics/issues on which the interviews could be conducted. A teacher/resource person may enrich the existing knowledge of textbooks by adding the new information acquired through interviews.

Tips for involving Students in Interview:

- While planning the interview, think of a definite purpose of the interview and describe it in easy language.

- Determine the target group, place of interview, time of interview, interview guide etc.
- Develop an interview guide.
- Contact the interviewee for appointment. First introduce yourself and then share the purpose and make a request for the interview, also ask about the time and place for the interview.
- Reach 10-15 minutes earlier than the scheduled time.
- When you meet, greet the interviewee by saying Assalamalaikum, good morning, good evening etc.
- Be soft in tone while interviewing.
- Use the interview guide but be flexible in adding new questions.
- Use a tape recorder to record the interview so that later you could transcribe the interview.
- Ask questions from several dimensions so that you could have rich information.

Sample Interview Guide

Main theme: Interviewing regarding the excessive hunting of birds at Keenjhar Lake.

Interviewee: A wildlife officer.

Place of Interview: Wildlife office, Keenjhar Lake.

Date: _____

Time: _____

Questions:

1. For how long have you been serving as a wildlife officer?
2. What type of issues do you find at Keenjhar Lake regarding the wildlife?
3. A newspaper survey report published in the Daily 'X' says that the number of birds at Keenjhar Lake are being decreased year by year? Is it right?
4. From where do these birds come?
5. What might be the reasons for decrease in number of those birds?
6. Do you think that local people are involved in bird hunting?
7. What strategies the Wildlife Department has adopted to reduce bird hunting?

Note: more questions can be added within this Interview Guide.

20 - Reading

Picture Description as a Teaching-Learning Strategy

Picture description is an interesting strategy in terms of its uniqueness in facilitating the learners use their inner potentials in describing a picture. A picture could be a human portrait, scenery or a landscape, abstract art, geometrical shapes etc. A picture could be a drawing or a real photo. It conveys a certain message to viewer. A viewer makes a quick analysis of a picture and shares what the picture tells.

Picture description is used as a useful strategy in the teaching-learning process. It enables learners to develop thinking skills, drawing skills, language or communication skills, aesthetic sense etc. A teacher may use picture description frequently depending on the kind of session or tutorial. A teacher may give the activity of picture description on pair basis, group basis and individual basis, again depending upon what the session demands. All three ways can make interesting output on the part of students.

In environmental education class, picture description could be an interesting experience for all learners. Environmental education is full of pictures relating to the landscapes, for example photos of lakes, rivers, streams, birds, plants, trees, etc.; critical incident photos, for example the garbage lying in the street and children playing there. In another picture, children are attending

clinic to have a treatment of a viral disease. The students can easily read pictures because it is almost in their observation and experiences. A teacher may only facilitate learners in providing pictures and giving clear instructions.

Tips for Picture Description

- Select a picture that should put learners into in-depth thinking.
- Provide sufficient time to learners to look at the picture, think about it and have discussion, if the work is pair based or group based.
- Provide a set of questions in order to facilitate the learners to think. Please see a set of questions at Appendix –F.
- While working in groups, teacher/resource person would move around in order to facilitate the learners in their work.
- Referring to the questions, learners would respond.
- Each of the group would have a chance to describe the picture before the whole class. This depends on the teacher/resource person to involve the students in verbal communication or written communication.
- Use bullet points for the description.
- Time management should be given priority.
- Example of picture description is on the next page.

Example of Picture Description

Isolated Mangrove Tree

- The things that are visible in this picture are: Creek, mangrove tree, boat, blue sky, land, and clouds. This is a beautiful landscape of Indus River Delta. Once this was a thick natural forest of mangroves. Unfortunately, due to excessive deforestation, Sindh is losing its valuable natural resources.
- This picture helps me recall the days of my past when I used to live in a village called 'Pat Sharif' (located at the right bank of River Indus in District Dadu, Sindh) and study in high school. Along with my cousins, I visited the land of Kucha three times. There were green fields and thick trees along the River Indus. There were riverine forests.
- The message that is being communicated from this picture is that we should conserve our natural resources. We are the custodians to transfer them to the next generations.
- A teacher/resource person can use this picture in understanding about the Indus River Delta and the mangrove forests.

Supportive Questions

1. Picture Title.....
2. What do you see in the picture?
3. Can you relate this picture with any incident that you have experienced or observed? How will you describe?
4. In your opinion, what message is being communicated to the viewer through this picture?
5. What implications of this picture do you see in your learning process?



Note: These are some of the supportive questions. A teacher/resource person or participants may ask other questions according to the nature or requirements of the picture that they use.

21 - Reading *Telling and Reading Stories*

Story telling and story reading is a usual feature of everyone's childhood. Grand mothers, grand fathers, mothers, elder sisters are the sources of telling stories. The culture of telling stories transforms from generations to generations. May it be a cold night of winter and sleeping in a blanket or lovely breeze of spring and walking along the path in a village or sitting under tree and enjoying summer or sitting in a garden and seeing falling leaves in autumn, the experience of listening to stories in these modes provide a typical charm to listeners. All children enjoy listening to stories. The reason is that they get engrossed into the story in-depth and explore the treasure of ideas. They put themselves in the framework of characters. It is observed that male children become heroes and kings with Herculean features and the female children become queens with beauty and charm. The experience of listening to stories is also practiced in schools where the teacher reads the stories. The stories are usually available in the language (Sindhi, Urdu and English) textbooks. The experience of listening to stories through the teacher's reading remains similar as that of childhood experience.

Story telling or reading could be an interesting strategy in the environmental education classroom. These types of stories are usually full of adventure. In these stories, children make a group and take a big task to rescue life from danger or extinction. The thinking of forests, animals, friendship, search for food, cold night, river flow, catching fish, escaping from danger are the most frequent features of these stories. Those children who prefer outdoor activities, enjoy these stories.

Tips for Telling or Reading Stories

- Select a story that helps learners get motivated towards the understanding of their environment and the related issues. For example, the story about pollution, deforestation, hunting, etc.
- Select lesson-oriented stories.
- While telling or reading stories, use body language and gestures so that learners could enjoy the experience.
- Use easy language.
- After finishing the telling or reading stories, ask learners what they have learnt.

22 - Reading *Role-play and Drama*

Children like to perform role-plays and drama in their extra curricular activities. A small ratio of schools involves learners into role-plays and dramas in their routine teaching-learning activities. Children have strong tendency of art and performance. When they are assigned different role-plays or characters in the dramas, they perform wonderfully. The reason is that it is quite interesting to learn about historical events or current affairs through the performing art.

The role-play is different from drama in the sense that the role-play, as it is believed, is a strategy for exploration and does not attend to structure or aesthetic concerns. It can be used to explore one situation or episode and does not need to be structured with a beginning and an ending. In a drama, there are episodes and it is structured with a beginning and an ending. A drama consists of the story plot, characters, scenes, dialogues, typical costumes, etc. Whereas, role-play requires only a simple script to perform.

The role-play and drama both help the students to develop:

- Empathy so that they could examine others' ideas, feelings and points of view.
- Oral expression and interpretation skills so that they could use language to describe perceptions, emotions and reactions.
- Decision-making and problem-solving skills so that they could gain experience in independent thinking and co-operative learning.
- Speaking and listening abilities.

In the developed world, teachers are trained in using the role-play and drama most frequently in their classrooms. Teachers also take interest in using these strategies because they find that in less

possible time, they can easily communicate the message or transform an idea.

Role-plays and dramas can be interesting in environmental education. There are several issues in our region. It would be the most fruitful way to educate our school children about our current environmental issues. Teachers can facilitate learners in creating own stories or convert critical incidents in the shape of stories. Those learners who are able to use internet, can easily find out the stories about environment. It is highly recommended that trainings should be designed in a way that educators get strong orientation of using Internet resources and skills of searching most authentic websites related to environmental education. They would learn searching stories that could be used parallel to the current textbook environmental themes.

Tips for Role Play

- First of all choose a topic or theme. For example, in the context of environmental education, the conversation in English textbook for class VI given at the end of the reading, can easily be role-played. The groups can develop their own script for performing role-play.
- Review the script of dialogues and distribute the dialogues depending on whether its a pair role-play or group role-play.
- Make a rehearsal of the dialogues.
- Try to be natural in performance. For example, if the role is of a teacher, perform as a teacher.
- Be careful of time in performing the role-play.
- Teacher must encourage the performance and give feedback so that the next performance could be improved.

Tips for Drama

- Select the theme on which drama needs to be presented.
- Discuss the theme in detail; devise the plan for presenting the drama.
- Write or arrange the script.
- Distribute the characters. The major criterion for the distribution of characters could be the choices of the group members. They know about their tendencies; some would prefer to perform as hero and the others as villain.
- Teacher/resource person would facilitate each group by providing suggestions, appropriate time for preparation, facilities, costumes arrangement etc.
- Do rehearsals of the dialogues before performance.
- Do not be confused while performing dialogues.
- Teacher/resource person would assess during performance. In this regard, he/she may devise the tool for observation.
- After the performance, conduct a debriefing session about the drama.

Conversation for Role-Play

Reference: English Textbook class VI, page 32

Jamal: Assalam – o – Alaikum.

Ahmed: Walaikum –us- Salam.

Jamal: How are you?

Ahmed: I am fine. Thank you very much.

Jamal: My name is Jamal and I have come from a village near Hyderabad city.

Ahmed: My name is Ahmed and I have come from a village near Quetta city.

Jamal: Ahmed, please tell me about your village.

Ahmed: The name of my village is Khanozai. It lies in a valley, seventy kms to the north east of Quetta.

Jamal: How many houses are there in your village?

Ahmed: There are about six hundred and fifty houses built of stone and mud in the village.

Jamal: I have heard that some of the houses in the village are built on slopes of the hills.

Ahmed: Yes, we are lucky to live in such comfortable houses. I am proud of my village.

Jamal: From where do you get water?

Ahmed: We get drinking water from 'Karaiz', which is an underground canal.

Jamal: Thank you very much for sharing with us some very useful information about your village.

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Our Mission

WWF - Pakistan aims to conserve nature and ecological processes by:

- Preserving genetic, species and ecosystem diversity
- Ensuring that the use of renewable natural resources is sustainable, both now and in the longer term
- Promoting actions to reduce pollution and the wasteful exploitation and consumption of resources and energy

Vision of the Indus Ecoregion Programme

“Mankind coexists with nature in complete harmony and biodiversity flourishes in its respective habitat”

Indus for All Programme, WWF - Pakistan

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