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Indus FOREVER

Youth Training Manual on Environmental Education and Advocacy

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Indus for All Programme
WWF - Pakistan

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Youth Training Manual on Environmental Education and Advocacy

Rahat Najam

Syed Ghulam Qadir Shah

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Indus for All Programme is the first five-year implementation phase of the 50-year vision of the *Indus Ecoregion Programme*. The Programme aims to conserve the rich biological diversity of the Indus ecoregion through livelihoods improvement of the local communities. The Indus ecoregion lies in the lower Indus basin covering approximately 65% area of the Sindh Province of Pakistan.

The first implementation phase (April 2007- March 2012) follows the completion of a 9-month inception phase (July 2006-March 2007). Out of the 15 priority sites identified under the Indus Ecoregion Programme, four critical ecosystems in three districts (Thatta, Nawabshah and Sanghar) have been initially selected for the implementation of the *Indus for All Programme*. Those include coastal ecosystem/ mangrove forests (Keti Bunder in Thatta), freshwater wetlands ecosystem (Keenjhar Lake in Thatta), riverine forest ecosystem (Pai Forest in Nawabshah) and desert-wetlands ecosystem (Chotiari Wetlands Complex in Sanghar).

The Programme is being implemented through site-specific implementation units supported by a Programme Management Unit, based at Karachi.

At apex level, the Programme is supported by the Indus Ecorgion Steering Committee (IESC), established under the Chairmanship of the Additional Chief Secretary (Development), Planning and Development Department, Government of Sindh. This committee is mandated to provide institutional and strategic support in the implementation of the Indus Ecoregion Conservation Plan.

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FOREWORD

Environmental degradation is one of the important challenges facing the global community. The rapid pace of loss of natural resources is undermining sustainability of economic, social and biological processes and posing serious threats to the sustenance of needs of the present and the future generations. The impacts of environmental degradation are much more severe in developing countries which are facing many social issues such as high population growth, poverty and food security.

Globally, efforts are being made to reverse the current trends of environmental degradation. The lack of awareness on the values of environmental resources and their linkages to the sustenance economic and social and biological systems is considered an impediment in generating a collective response to the environmental challenges. Therefore, environmental education and awareness are considered as important steps in understanding the phenomenon of environment and promoting participatory responses to environmental challenges individually and collectively. WWF Pakistan under the umbrella of Indus for All Programme has undertaken an approach to raise environmental awareness among different segments of society, including youth in rural and urban areas.

Youth are an important target group in nature conservation, as they have special responsibilities in relation to the environment. Young people have to live for an extended period of their lives with the worsening environment inherited to them by their parent generations. Also youth have tendencies of volunteerism and activism towards nature conservation.

This manual has been prepared for the purpose of educating youth and youth groups through the eloquent and well prepared awareness process to seek their engagements in nature conservation. The manual includes different modules and activities based on various environmental concepts and issues. The focus of the manual has been specific to the natural resources and environmental degradation in the Indus Ecoregion and its impacts on local economy and livelihoods. As far as possible a sincere attempt has been made to customize the modules to the local context.

I hope that the trainers will find this manual simple and helpful in delivering the environmental knowledge to sensitize youth towards their active participation in nature conservation.

Dr. Ghulam Akbar
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Rahat Najam

Syed Ghulam Qadir Shah

Introduction

About the Manual

Environment and natural resources degradation is considered as one of the major challenges of recent time. Increasing human pressure and unsustainable natural resource use and poor management practices are considered as key elements in the rapid pace of this degradation. The lack of knowledge and awareness of linkages between these natural resources and sustainable livelihoods and non-participatory natural resource management approaches have contributed to these ends.

Realizing the situation, there has been growing realization worldwide to encourage participatory and sustainable natural resources management approaches by engaging all the stakeholders in natural resource conservation, in particular the local communities whose livelihoods are directly linked to sustainability of these resources. Participatory management emphasizes on involvement of all segments of society in natural resources planning and management decisions.

Youth form an important segment of the society and are considered as the custodians of future hence, their awareness and involvement in natural resources protection and conservation is considered as vital.

> The United Nations General Assembly defined 'youth', as those persons falling between the ages of 15 and 24 years inclusive. This definition was made for International Youth Year, held around the world in 1985. All United Nations statistics on youth are based on this definition, as illustrated by the annual yearbooks of statistics published by the United Nations system on demography, education, employment and health.

This training manual has been developed to sensitize youth on environment and natural resource conservation issues. The interactive modules contained in this manual provide systematic guidance for the youth trainers to mobilize youths and youth groups towards conservation of their local natural resources as the agents of change. The modules provide a simple approach for the resource persons to adopt to mobilize role of youth in nature conservation by creating an understanding of the linkages between local natural resources and community livelihoods and the opportunities for initiating conservation awareness actions at community level through youth organization and youth greening activities.

Although, the manual has been specifically formulated in the context of natural resources of the Indus Ecoregion, for use by the staff of the Indus for All Programme, the ideas contained in, it could be used by any nature conservation organization targeting environmental awareness among youth.

Purpose of Training Manual

The overall purpose of the training manual is to enhance the knowledge and awareness of youth in identifying environmental issues/problems and seeking their active participation in conservation activities. The manual would provide useful guideline to the Indus for All Programme field staff in mobilizing support of youth in conservation efforts in the Indus Ecoregion.

This manual is suggested to be used as the basic resource material for youth training workshops. It is hoped that additional training will strengthen youths / trainers environmental knowledge and enhance their confidence in undertaking activities which demonstrate the value for environmental protection and the need for increased knowledge on their environment.

Environmental Awareness and Nature Conservation

Human activities have intensified the pace of degradation of natural resources in Sindh province as elsewhere in the world. The environmental issues like deforestation, illegal hunting and poaching of wildlife, non-environment friendly agricultural practices, diversion of water for agriculture uses, invasive species, pollution, desertification, loss of traditional environmental knowledge and rapidly increasing population are considered as some of the key elements in natural resources degradation in the country and in the Sindh province. The degradation of natural resources has a direct and mutually reinforcing impact on the livelihoods of dependent communities and their poverty.

The lack of awareness about the real values of natural resources at various levels is regarded as one of the important factors leading to low priority to environment, poor policy decisions and unsustainable use of natural resources for short-term gains without caring for the needs of future.

The main objective of environmental awareness is to sensitize different sections of the society towards nature conservation to promote their sustainable use and to advocate for participatory conservation actions for sustaining the needs of present as well as the future generations.

Why Youth Participation in Nature Conservation is Important?

Youth are one of the important sections of any society which can play an important role in mobilizing support for natural resources conservation at different levels. Formal and informal youth groups existing in cities, towns, and villages provide an untapped source that could potentially be sensitized to generate support for environmental movement and engage them in nature conservation. Youth are enthusiastic and have inclination towards volunteerism and playing a positive role in social and environmental development, besides being custodians of future. Youth have also been recognized as an important target group and the agents of change by United Nations. Therefore, youth participation in natural resources conservation will ensure their effective conservation and sustainable management.

It is essential that youth need to be engaged actively in all relevant levels of decision-making processes because it affects their lives today and has implications for their futures.

Youth can perform responsible roles in the society by acting as trainers, as activists and as pressure groups. They can help make their influence felt as a constituency for the long term, calling the political leaders to emphasize for long-range environmental sustainability.

They can steer social response through informal networks of activists, information sharing, protests, demonstrations, boycotts and events geared to attract media publicity. Young religious scholars are the best institutions for addressing the community participation in nature conservation through religious teachings. Youth can volunteer for various movements of nature conservation and can organize summer camps and nature walks.

The educated youth can organize awareness programmes like seminars, workshops, lectures, speech contests and discussion forums in urban as well as rural areas about sustainable use of natural resources.

Module 1:

Understanding Natural Resources and Environment

Introduction:

In this module some basic concepts of natural resources and environment will be discussed within the context of Sindh province. During this module the participant will also learn about the services and products of natural resources. They will be able to identify their local natural resources and understand the services and products provided by those resources. The concept of sustainable development will be introduced and understanding of the concept through hands-on activities would be enhanced.

Duration: 3-1/2 hours

No. of sessions: 4

Objectives: The participants will be able to;

- Understand the concepts of natural resources and environment such as wetlands, forests, biodiversity, wildlife, rangelands, ecosystem, food web and pollution
- Understand the concept of the sustainable development
- Identify local natural resources and their products and services

Understanding Natural Resources and Environment

Framework of Module 1			
Duration	**Venue**	**Methodology**	**Output**
Session: I The Concepts of Natural Resources			
1 hour 15 minutes	Training hall Outdoor Field visit	Role play Field observations Group work Sharing ideas Discussion Presentation Activity sheet	The participants will understand the concepts of various types of natural resources and associated issues. They will be able to identify the products and services of their local natural resources and environment and realise importance of their local ecosystems.
Session : II Understanding Sustainable Development			
45 minutes	Training Hall	Game Discussion Sharing thoughts Group work	The participants will understand the sustainable development and its importance
Session : III Natural Resources Products and Services			
45 minutes	Training hall	Group discussion Individual work Activity sheet Discussion Game Art / poster competition	The participants will be able to identify their own local natural resources and their products and services.
Session : IV Identification of Local Natural Resources			
45 minutes		Discussion Sharing thoughts Presentation Activity sheet Inventory development	The participants will be able to recognize / identify their local natural resources.

Note: in case of outdoor activities add travel time to the relevant sections.

Session I: The Concepts of Natural Resources

Duration
1hour 15 minutes

Resources Required
- Hand out
- Flip chart
- Markers

Methodology
- Group work
- Discussion
- Sharing thoughts
- Presentation

Output
The participants understand the concepts of wetlands, forest, rangelands, biodiversity, wildlife, wetlands, water and pollution.

Procedure:

1. Discuss the various concepts of environment and natural resources among the participants for 10 minutes.
2. Divide the participants in groups of 4-5 members.
3. Distribute related concepts from reading material -1-9 such as; Wetlands, Forests, Rangelands, Biodiversity, Wildlife, Ecosystem, Food web, water and Pollution.
4. Keep the concepts relevant to the local context and give one topic per group to discuss the basic concept in groups for 30 minutes.
5. After 30 minutes, invite group representatives to give a 5 minutes presentation on their assigned topic with question - answer session at the end.
6. Review and reinforce each topic through discussion within the local context.
7. Distribute the reference material of given topics for further reading.

Questions:

1. What will happen if the natural resources continue to degrade?
2. How natural resources degradation will impact us?
3. How could we halt the process of degradation?
4. Who should contribute their roles to stop degradation?

Session II: Understanding Sustainable Development

Duration
45 minutes

Resources Required
- Handout
- Markers
- Activity sheet

Methodology
- Game
- Discussion
- Sharing thoughts
- Group work

Output
The participants will understand the sustainable development and its importance

Procedure:

1. Give a presentation on the Sustainable Development.
2. Discuss the importance of sustainability.
3. During discussion provide the examples within the local context.
4. Distribute reference material on sustainable development for reading.
5. Involve participants in interactive activities to reinforce the concept. Example: Activity "Thinking for Tomorrow".

Questions:
1. What is sustainable development? How could it be achieved?
2. What is unsustainable use? How could it be prevented?
3. What will happen if a plant/animal goes extinct?

Session III: Natural Resources Services and Products

Duration
45 minute

Resources Required
- Hand out
- Flip chart
- Markers

Methodology
- Field observation
- Analytical Group work
- Discussion
- Sharing thoughts
- Presentation
- Activity sheets

Output
The participants will learn the direct and indirect services and products of the natural resources and environment.

Procedure:

1. First enable the participants to understand services and products through a presentation.
2. Divide the participants in groups according to the total number of participants and distribute flip charts and markers in each group.
3. Assign each group one natural resource theme (Wetlands, Forests, Rangelands and Livestock, Biodiversity, Water), and ask them to list down five services and products of the given local natural resources. Give 15 minutes to finish the assignment.
4. After 15 minutes take feedback from them.
5. Reinforce the topic through discussion with the participants for 20 minutes using the list of products and services in HO_1.

Or

Take the participants into nearby wetlands, forest/ grazing land and ask them to identify various products and services of that natural resources. Reinforce their understanding with onsite discussion.

Note: The facilitator may arrange a presentation on Indus Ecoregion's natural resources and their uses.

Session IV: Identification of Local Natural Resources

Duration
45 minutes

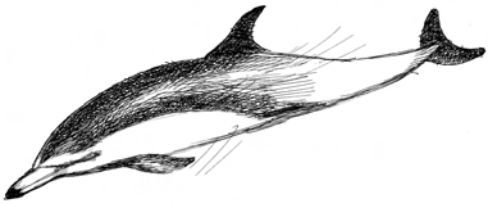
Resources Required
- Hand out
- Flip chart
- Markers
- Activity sheet

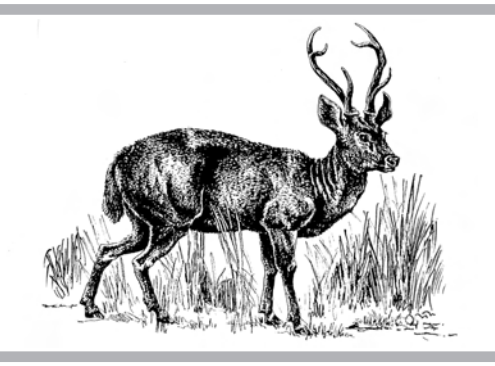
Methodology
- Discussion
- Sharing thoughts
- Presentation
- Activity sheet
- Inventory development

Output
The participants will be able to recognize/ identify their local natural resources.

Procedure:

1. Provide flip charts and markers to the participants and encourage them to list down the natural resources of their area.
2. Ask the participants to map their local natural resources.
3. Provide them 30 minutes to finish the activity and take feedback from the participants and display sketches on the wall.
4. Discuss the identified natural resources and their status and the issues facing them.





Module: 2

Natural Resources Degradation and Their Impact on Livelihood

Introduction:

In this module the livelihood dependency on natural resources will be discussed. Threats associated with the natural resources and their causes will be highlighted. The participants will also learn about the impacts of degradation of natural resources on their local livelihoods.

Duration: 3 hours

No. of sessions: 3

Objectives: The participants will be able to;

- Understand the natural resources in relation to their livelihoods
- Identify the threats to their natural resources and environment
- Identify various impacts of natural resource degradation on local livelihoods.

Natural Resources Degradation and Their Impacts on Livelihood

Framework of Module 2			
Duration	**Venue**	**Methodology**	**Output**
Session 1: Natural Resources and Livelihoods			
1 hour	Training hall	Art / poster competition Group work Sharing ideas Discussion Presentation Activity sheet	The participants will learn the importance of natural resources and their values to local livelihoods
Session 2: Threats to local Natural Resources and Biodiversity			
1 hour	Training hall	Field observation Group work Activity sheet Discussion	The participants will be able to identify threats to their local natural resources, their source and mitigation options
Session 3: Impacts of Natural Resources Degradation			
1 hour	Training Hall Field	Group Discussion Sharing thoughts Survey interviews	The participants will recognise the impacts of natural resource degradation

Note: In case of field activity the travel time may be added to the relevant sessions.

Session I: Natural Resources and Livelihoods

Duration
1 hour

Resources Required
- Hand out
- Flip chart
- Markers
- Various pictures of natural resources
- Old magazines, Scissors
- Gum sticks
- Colour markers and poster colours with brushes etc.
- Newspapers/ magazines

Methodology:
- Poster competition
- Group work
- Discussion

Output
The participants will be able to know direct and indirect linkages of natural resources with livelihoods of the people.

Procedure:

1. Divide the participants in groups and provide them the poster materials.
2. Give each group one of the themes such as, wetlands, forest, rangelands, biodiversity, wildlife, water etc. specific to the local context.
3. Provide 30 minutes to develop the sketches / posters about the direct and indirect association of natural resources with livelihoods of their local area and people. Give the participants freedom to use any visual aids like photographs, newspapers, magazine, individual artwork etc.
4. After 30 minutes each group will present their work. Discuss each poster to identify any gaps.
5. Rank the posters to encourage the group's performance and display them in the workshop hall.
6. Reinforce the concept through slides / presentation using examples of local natural resources.

Session II: Threats to Local Natural Resources

Duration
1 hour

Resources Required
- Hand out
- Flip Chart
- Markers

Methodology:
- Group work
- Discussion
- Sharing thoughts
- Presentation

Output
The participants will be able to identify threats to their local natural resources and mitigation options

Procedure:

1. Divide the participants in groups.
2. Assign different themes to each group specific to local context such as, forest, wetlands, rangelands, wildlife, biodiversity, water etc.
3. Ask participants to discuss in the groups for 30 minutes and identify threats to the specific natural resources and their causes.
4. Ask the participants to identify some of the measures to address the threats at local level.
5. Each group representatives to share their group ideas with other participants.
6. Reinforce participants learning through participatory discussion.

Session III: Impacts of Natural Resource Degradation

Duration
1hour

Resources Required
- Hand out
- Flip chart
- Markers

Methodology
- Field observation
- Interview
- Group work
- Discussion
- Sharing thoughts
- Presentation

Output
The participant will build capacity of researching and analytical thinking to identify the impacts of natural resources degradation on their livelihoods and environment. They will also be able to understand poverty-environment nexus, how poverty and natural resources degradation mutually impact each other.

Procedure:

1. Divide the participants in two groups and write down following topics on flip chart board;
   - *The Impact of natural resource degradation on people*.
   - *The impact of natural resource degradation on environment.*
2. Provide one topic to each group and ask them to write down their ideas on the given topic for 20 minutes.
3. Take the participants in to a nearby field area (Lake, Forest, Agriculture land, Mangrove forest etc.)
4. Ask them to observe or interview the local people (fisherman, farmer, etc.) to record their views on impacts of natural resources degradation on their livelihoods.
5. Provide 30 minutes to finish this activity and allow them to assemble back. Discuss on their field observations and field notes.
6. Discuss the impacts of natural resources degradation on environment, people and possible mitigation measures through presentation to reinforce the participant's understanding.

Module 3:

Natural Resources Conservation

Introduction:

In this module the importance of natural resources conservation will be discussed. Different conservation actions like declaration of National Park, Wildlife Sanctuary and Game Reserve will be discussed. Participants will also learn about other conservation actions like Ramsar site declaration and Ecoregion actions by NGOs and Govt bodies. The participants will also be able to acknowledge the role of local communities in natural resources conservation and their sustainable use.

Duration: 3 hours,

No. of sessions: 3

Objectives: The participants will be able to;

- Understand the importance of natural resources conservation
- Learn about various conservation actions
- Learn about community involvement in conservation programmes

Natural Resources Conservation

Framework of Module 3			
Duration	**Venue**	**Methodology**	**Output**
Session I: Natural Resources Conservation: What? Why and How?			
1 hour	Training hall	Group work Sharing ideas Discussion Presentation	The participants will learn the need for natural resources conservation and how to get involved in nature conservation at various level.
Session II: Some Conservation Actions in Sindh			
1hour	Training hall	Presentation Sharing thoughts	The participants will learn about legal actions for conservation in Sindh, how a natural or artificial habitat could be protected by law. Besides, they will come to know about various International actions for conservation such as, the Ramsar sites
Session III: Community-based Conservation Programmes (What, Why and How)			
1 hour	Training hall Field visit	Presentation Group discussion Sharing thoughts	The participants will learn about community participation in the conservation and how they can adopt participatory approaches to address environmental issues in their areas

Note: In case of field visit add travel time to the relevant sessions.

Session I: Natural Resources Conservation: What? Why? and How?

Duration
1hour

Resources Required
- Hand out
- Flip chart
- Markers

Methodology
- Group work
- Discussion
- Sharing thoughts
- Presentation

Output
The participants will understand the need for natural resources conservation and measures to address the conservation issues at various levels.

Procedure:

1. Through a presentation discuss the need for natural resource conservation, covering the importance of natural resources to human beings, and how one can play his/her role in the conservation of the natural resources both individually and collectively.

2. Encourage the participants to discuss the state of the local natural resources and conservation measures that could reverse the process of degradation.

Or

1. Ask the participants to discuss the conservation issues of natural resources in the Indus Ecoregion and prioritize three important issues.
2. Divide them into 3 groups and allow them to choose one of prioritized issue.
3. Ask them to develop the action plan, to combat that particular issue.
4. After 40 minutes take feedback from each group.
5. Reinforce the concepts of natural resources conservation in the light of community livelihoods and sustainable use.

Session II: Some Conservation Actions in Sindh

Duration
1hour

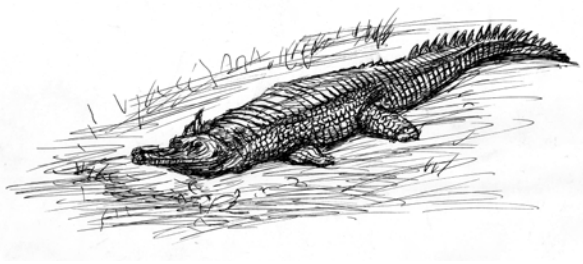
Resources Required
- Hand out
- Flip chart
- Markers
- Pictures of various natural resources

Methodology
- Presentation
- Sharing thoughts
- Field visit

Output:
The participants will learn the legal actions and frameworks for conservations in Sindh. They will also come to know about various limitations in natural resources conservation

Procedure:

1. The resource person will give a presentation on conservation actions in Sindh by explaining the terms like Protected Areas, National Parks, Wildlife Sanctuaries, and Game Reserves (Reference material module 3).
2. Also explain some other actions; like Ramsar sites and Indus Ecoregion Programme.
3. Encourage participants to brainstorm on the status of their local natural resources and protected areas and their related issues.
4. Organize a field trip to the nearby protected area for discussion with the relevant natural resources management authorities.



Session III: Community Based Conservation Programmes

Duration
1hour

Resources Required
- Hand out
- Flip chart
- Markers

Methodology
- Presentation
- Discussion
- Sharing thoughts

Output:
The participants will be able to learn about community participation in natural resources conservation and they can use participatory approaches in their own areas.

Procedure:

1. Introduce the concept of community-based natural resources management, its necessity and the process of community organization with specific focus on youth organization using reference material for module 3.
2. Discuss among participants about merits and demerits of community-based conservation.
3. The resource person may select and use a case study on the community based programmes by WWF-Pakistan or any other NGO or Govt. projects.
4. If possible organize a field visit to nearby community-based conservation, area if possible
5. Review and reinforce the topic through open discussion using reference material for module 3.

Module 4:

Role of Youth Groups in Natural Resources Conservation

Introduction:

In this module the role of youth groups in natural resources conservation will be discussed. The participant will understand the process community organization, how they can participate and organise the campaigns or awareness raising activities at local level to increase environmental awareness. Further the roles and responsibilities of local youth in nature conservation will be highlighted and the importance of various youth greening activities will be discussed. The participants will practically demonstrate their role in one of the greening activities at the end of session.

Duration: 3 hours 45 minutes

No. of sessions: 3

Objectives: The participants will be able to:

- Understand the role of local youth in nature conservation
- Identify their roles and responsibilities
- Familiarize with various youth greening activities
- Would be able to organize and launch an awareness raising campaign

Role of Youth in Natural Resources Conservation

Framework of Module 4			
Duration	**Venue**	**Methodology**	**Output**
Session: I	**Role of Youth in Advocacy and Awareness Raising for Natural Resource Conservation**		
1hour 15 minutes	Training hall	Group work Sharing experience Discussion Presentation	The participants will identify various youth greening activities through which they could play their roles in conservation awareness and advocacy.
Session : II	**How to Organize a Campaign**		
1 hour	Training hall	Presentation Group work	The participants will learn the process of organizing a campaign.
Session : III	**Youth Greening Activities**		
1 hour 30 minutes	Training hall Outdoor	Creative ideas Brainstorming Presentation Group discussion Organizing the event	The participants will be able to identify the practical steps in organizing a youth greening activity.

Session I: Role of Youth in Advocacy and Awareness Raising for Natural Resources Conservation

Duration
1hour 15 minutes

Resources Required
- Hand out
- Flip chart
- Markers
- Cards

Methodology:
- Group work
- Discussion
- Sharing experience
- Presentation

Output
The participants will be able to identify their roles in nature conservation. They will come to know, how they could materialise these roles for creating conservation awareness and advocacy in their area.

Procedure:

1. Discuss for about 10 minutes the importance of youth awareness and advocacy in nature conservation, clarifying the meaning of terms 'awareness' and 'advocacy' using reference material 1.
2. Share briefly with participants various steps involved in the process of organizing youth groups at local levels.
3. Distribute five cards among each of the participants and ask them to identify youth greening activities in which they have previously participated or would like to participate (one on each card). Give 15 minutes for this.
4. Display the identified activities on the board and discuss each of the identified activities.
5. Share and discuss the HO_3 on the list of typical youth greening activities to reinforce participants learning on the role of youth in environmental conservation, awareness and advocacy. (15 minutes)
6. List down the local youth forums in the area on a flip chart with input from participants which could be utilized to create conservation awareness and advocacy. (15 minutes)

Session II: How to Organize a Campaign?

Duration
- 1 hour

Resources Required
- Hand out
- Flip chart
- Markers

Methodology
- Brainstorming
- Group work
- Discussion
- Sharing experience
- Presentation

Output
The participants will learn the steps for developing the environmental campaigns

Procedure:

1. Resource person to prepare a presentation on how to organise a campaign using Reference material 2
2. After presentation ask the participants to work in groups to formulate a campaign plan on any nature conservation issue of their area.
3. The participants should be encouraged to identify practical actions, methods of their implementation, timelines, roles of responsibilities and indicators of achievements.
4. After 30 minutes take feedback from each group.
5. Discuss the various thoughts given by groups to reinforce the topic.

Session III: Youth Greening Activities

Duration
1 hour 30 minutes

Resources Required
- Hand out
- Flip chart
- Markers

Methodology
- Brainstorming
- Group work
- Discussions
- Sharing experience
- Presentation
- Activity Participation

Output
The participants will learn how they could organize various environmental awareness activities at local level.

Procedure:

1. Introduce the concepts of greening activities among the participants using reference material 3.
2. Divide participants in groups of 4-5
3. From the list of typical youth greening activities (HO_3) ask each group to identify one activity they would like to organise.
4. Ask each group to suggest the procedure / steps to organise the identified activity using the (HO_4)
5. Share with the participants the procedure of establishing green clubs (reference material 1).
6. Reinforce participants learning through organisation of a simple outdoor greening activity such as; tree planting, bird watching, nature walk etc.

FORESTS OF PAKISTAN

A forest is defined as an ecosystem or assemblage of ecosystems dominated by trees and other woody vegetation. The living parts of a forest include trees, shrubs, vines, grasses and other herbaceous (non-woody) plants, mosses, algae, fungi, insects, mammals, birds, reptiles, amphibians, and microorganisms living on the plants and animals and in the soil. These interact with one another and with the non-living part of the environment - including the soil, water, and minerals, to make up a forest ecosystem.

The forests of Pakistan reflect great physiographic, climatic and edaphic contrasts in the country. The total area of forests in Pakistan is 4.224 million ha which is 4.8% of the total land area. The per capita forest area is only 0.037 ha as compared to the world average of ONE ha. Main reason for this is that more than 70% land area of Pakistan is arid and semi-arid with annual rainfall of 250-500 mm; which is low and erratic to sustain natural vegetation and to plan large scale afforestation/regeneration programmes.

As recognition of the multiple values of forests has grown, so have concerns for their disappearance. In Pakistan, subtropical, temperate, riverine and mangrove forests are being lost because of irrational land use practices and deforestation. This trend needs to be reversed through more responsible management approaches to meet the complex economic and ecological needs. Designation of selected forestlands as national parks, promotion of agro-forestry practices and wood alternates are the needs of the hour.

The following nine forest types are found in Pakistan:

1. Littoral and Swamp forests
2. Tropical dry deciduous forests
3. Tropical thorn forests
4. Sub-tropical broad-leaved evergreen forests
5. Sub-tropical pine forests
6. Himalayan moist temperate forests
7. Himalayan dry temperate forests
8. Sub-alpine forests
9. Alpine scrub

1. Littoral and Swamp forests

These are more or less gregarious forests of low height which occur along the coast of Sindh and Balochistan. The main species is Avicennia marina (99%). Other species like Rhizophora have disappeared over a period of time due to heavy cutting. They are commonly called as mangrove forests.

2. Tropical dry deciduous forests

These are forests of low or moderate height consisting almost entirely of deciduous species. This type occurs in the Rawalpindi foothills. The chief tree species are Lannea (Kamlai, Kembal) Bombax ceiba (Semal), Sterculia, Flacourtia (Kakoh, Kangu), Mallotus (Kamila, Raiuni) and Acacia catechu (Kath). Common shrubs are Adhatoda (Bankar, Basuti, Bansha), Gymnosporia (Putaki) and Indigofera (Kathi, Kainthi).

3. Tropical thorn forests

These are low, open and pronouncedly xerophytic forests in which thorny leguminous species predominate. This type occupies the whole of the Indus plain except the driest parts. The major tree species are Prosopis cineraria (Jhand), Capparis decidua (Karir, Karil), Zizyphus mauritiana (Ber), Tamarix aphylla (Farash) and Salvadora oleoides (Pilu, wan). Among them are a large number of shrubs of all sizes.

On the basis of climax vegetation, almost the whole Indus basin plain consists of tropical thorn forests. The climate varies from semi-arid (250 to 750 mm rainfall) to arid (less than 250 mm rainfall). The summer temperature in this tract is as high as 50°C. Earlier, these forests merged with riverine forests along the river banks and with scrub forests in the low hills in the north and north-western regions of Pakistan and provided an ideal habitat to the wildlife of the area which seasonally migrated according to their needs. Riverine forests now grow in disjunct patches.

4. Sub-tropical broad-leaved evergreen forests

These are xerophytic forests of thorny and small-leafed evergreen species found on the foothills and lower slopes of the Himalayas, the Salt Range, Kalachitta and the Sulaiman Range. The typical species are; Olea cuspidata (Kau) and Acacia modesta (Phulai) occurring mixed or pure, and the shrub Dodonaea (Sanatta).

5. Sub-tropical pine forests

These are open inflammable pine forests consisting of Chir pine (Pinus roxburghii) found between 900 m and 1700 m elevation. They overlap with Pinus wallichiana (Kail, Biar) at the upper limit.

6. Himalayan moist temperate forests

These are evergreen coniferous forests locally mixed with oak and deciduous broad-leaved trees. These forests occur between 1500 m and 3000 m elevation in the Western Himalayas except where the rainfall falls below about 1000 mm.

These forests are divided into a lower and an upper zone, in each of which definite species of conifers and/or oaks dominate. The main species include Cedrus deodara (Deodar, diar), Pinus wallichiana, Picea smithiana and Abies

pindrow (Partal). In the upper zone Abies pindrow and Q. semecarpifolia are the dominant tree species.

7. Himalayan dry temperate forests

These are open evergreen forest with open scrub undergrowth. Both coniferous and broad-leaved species are present. Dry zone deodar, Pinus gerardiana (Chalghoza) and/or Quercus ilex are the main species.

8. Sub-alpine forests

Evergreen conifers and mainly evergreen broad-leaved trees occur in relatively low open canopy, usually with a deciduous shrubby undergrowth of Viburnum (Guch), Salix (Willow, Bed), etc. The type occurs throughout the Himalayas from about 3,350 m to the timber limit. Abies spectabilis and Betula utilis (Birch, Bhuj) are the typical tree species. Dwarf junipers are often abundant.

9. Alpine scrub

Under this type are included shrub formations 1 m to 2 m high extending 150 m or more above the sub-alpine forests. The characteristic genera are Salix, Lonicera (Phut), Berberis (Sumbul, Sumblue), Cotoneaster with Juniperus and occasionally Rhododendron or Ephedra (Asmania)

FORESTS OF SINDH PROVINCE

An area of 1.126 million ha (or eight percent) in Sindh comes under the control of the Sindh Forest Department. Out of this, about 2.29 % area consists of riverine forests and irrigated plantation. This clearly indicates the deficiency of forest resources in the Province. The remaining area under the control of the Sindh Forest Department consists of mangrove forest and rangelands.

1. Riverine Forest:

Riverine forests owe their existence to the flooding of the River Indus and are the mainstay of forest in Sindh. They are located along the Indus within protective embankments constructed to confine flood water.

The main tree species grown are Babul (Acacia-nilotica), Kandi (Prosopis cinraria) and Lai (Tamarix dioica). These forests are diminishing at a rapid pace due to deforestation, encroachments and inadequate river flooding. Riverine forests are source of timber, fuel wood, 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, mangroves are found in the Indus Delta which occupies 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 in addition to extensive mudflats and constitutes 97% of total 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. An area of 344,845 ha of the Indus delta has been declared as protected forests and is under the control of Sindh Forest Department (Qureshi 1985). The Indus Delta is believed to have had as many as eight manrgove species in the past. However, at present only four species have been left. Nearly 95% of the mangroves located in the Indus Delta comprise the species Avicennia marina. Very small patches of Ceriops tagal and Aegiceras corniculatum are found near the mouth of the Indus at Keti Bunder. Rizophora mucronata and Ceriops tagal have been introduced in the Indus delta.

Amazing Mangrove Values

One hectare of mangrove forest, if properly managed, will produce an annual yield of 100 Kg of fish, 25 Kg of shrimps, 15 Kg of crab meat, 200 Kg of molluscs and 40 Kg of sea cucumbers (UNEP 1990)

Significance of Mangrove Forests

- Provide nursery for fish, shrimp and crabs.
- Constitute a complex supporting diversity of plants and animals.
- Protect coastline and sea ports from erosion and siltation.
- Act as natural barrier to cyclones and tsunamis.
- Provide habitat and breeding ground for marine life and migratory birds.
- Meet fuel wood 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 with 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.

ECOSYSTEM AND FOOD CHAIN / FOOD WEB

An **ecosystem** is a community of plants, animals, and micro-organisms that interact with each other and with their physical environment. Forests, streams, lakes, coral reefs, grasslands, deserts, and rotting logs are all examples of ecosystems. Animals and plants in an ecosystem are interconnected 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 or added to an ecosystem, it is likely to cause a major disruption to that ecosystem.

Ecosystem changes can be caused by humans or natural processes, such as floods, fires, or drought. Humans can also have a negative effect on ecosystems, for example through clearing of forests, over-hunting or over-harvesting plants, or polluting the air, soil, and water. Sometimes disruptions can be made more severe or more frequent because of the way humans use the environment.

Food Web/ Food Chain:

Food chains, food webs and/or food networks describe the feeding relationships between species to another within an ecosystem. A food chain is the flow of energy from one organism to the next. Organisms in a food chain are grouped into trophic levels. Trophic levels may consist of either a single species or a group of species that are presumed to share both predators and prey. Trophic levels usually start with a primary producer and end with a consumer. Most food chains have no more than four or five links. Most animals are part of more than one food chain and eat more than one kind of food in order to meet their food and energy requirements. These interconnected food chains form a **food web**. A food web extends the food chain concept from a simple linear pathway to a complex network of interactions.

Components of a Food Chain:

a) Plants are called **producers** because they are able to use light energy from the Sun to produce food (sugar) from carbon dioxide and water through the process of photosynthesis.

b) Animals cannot make their own food so they eat plants and/or other animals. They are called **consumers**. There are three groups of consumers.

- Animals that eat ONLY PLANTS are called **herbivores** (or primary consumers).
- Animals that eat OTHER ANIMALS are called **carnivores**.
- carnivores that eat herbivores are called secondary consumers

- carnivores that eat other carnivores are called tertiary consumers e.g., killer whales in an ocean food web ... phytoplankton → small fishes → seals → killer whales

c) Organisms eating BOTH animals and plants are called **omnivores**.

d) **Decomposers** (bacteria and fungi) which feed on decaying matter. These decomposers speed up the decaying process that releases mineral salts back into the food chain for absorption by plants as nutrients.

A change in the size of one population in a food chain will affect other populations. This interdependence of the populations within a food chain helps to maintain the balance of plant and animal populations within a community. For example, when there are too many giraffes; there will be insufficient trees and shrubs for all of them to eat. Many giraffes will starve and die. Fewer giraffes means more time for the trees and shrubs to grow to maturity and multiply. Fewer giraffes also mean less food is available for the lions to eat and some lions will starve to death. When there are fewer lions, the giraffe population will increase.

BIODIVERSITY

1. 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 thing in the world as a whole or in any location within it. This variety provides the building blocks that allow adoption to changing environmental conditions. Since all life depends on the uninterrupted function of natural ecosystems that ensure flow of energy and nutrient in a given ecosystem, therefore, preserving 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's everything 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 interconnections 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.

Biological diversity is usually considered at three different levels: genetic diversity, species diversity and ecosystem diversity.

- **Genetic diversity** refers to the variety of genetic information contained in all of the individual plants, animals and microorganisms. Genetic diversity occurs within and between populations of species as well as between species.
- **Species diversity** refers to the variety of living species.
- **Ecosystem diversity** relates to the variety of habitats, biotic communities, and ecological processes, as well as the tremendous diversity present within ecosystems in terms of habitat differences and the variety of ecological processes.

2. Why is biological diversity important?

Today, as ever, human beings are dependent for their sustenance, health, well-being and enjoyment of life 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.

Generally, benefits arising from the conservation of components of biological diversity can be considered in three groups: ecosystem services, biological resources and social benefits. Some examples of these benefits are as follows:

- Protection of water resources
- Soil formation and protection
- Nutrient storage and recycling
- Pollution breakdown and absorption
- Contribution to climatic stability
- Recovery from unpredictable events
- Maintenance of ecosystems
- Food, fiber and drink
- Milk, butter, leather and hides
- Soil fertility
- Pollination of crops
- Biological control of insect pests
- Medicines
- Industrial raw materials
- Better crop varieties
- Leisure, cultural and aesthetic values

3. Threats to biodiversity

During the last century, erosion of biodiversity has been increasingly observed. Some studies show that about one of eight known plant species is threatened with extinction. Almost all scientists acknowledge that the rate of species loss is greater now than at any time in human history, with extinctions occurring at rates hundreds of times higher than previous extinction rates. This rate of extinction has been expedited by human actions such as, population pressure accompanied with unsustainable uses, expansion of cities, communication infrastructure, expansion of agriculture, overgrazing of pastures, pollution, and hunting and poaching of wildlife.

The rich diversity of unique species across many parts of the world exist only because they are separated by barriers, particularly large rivers, seas, oceans, mountains and deserts from other species. These are barriers that could never be crossed by natural processes. However, humans have invented ships and aeroplanes, and now have the power to bring into contact species that never have met in their evolutionary history.

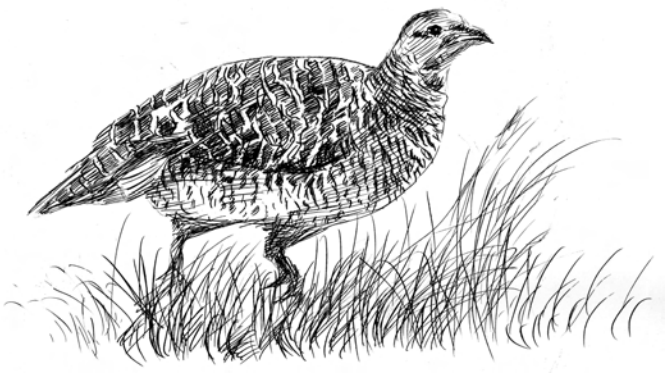
The widespread introduction of exotic species by humans is a potent threat to biodiversity. They may establish self-sustaining populations and threat to the existence of endemic species in that ecosystem. The exotic organisms may include aggressive species that deprive indigenous species of nutrients, water and light, and make endemic species uncompetitive against them, for example, the Mesquite in Sindh.

4. BIODIVERSTY OF SINDH

Sindh is blessed with diversity of ecosystem and species living within these ecosystems. The land along the main river course is very fertile and a variety of crops are cultivated there. The River Indus is habitat of the Blind Dolphin. Owing to arid conditions, the flora of Sindh chiefly consists of thorny tree and plants with either small or no leaves. The riverine forest on the bank of the Indus harbors 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, fish and other aquatic species. Some of these wetlands have been declared as Ramsar sites as they exist on Indus Flyway and are important habitat for several species of resident and migratory birds. These wetlands include, Keenjhar, Haleji, Nurri Jubbo and Keti Bundar. All these wetland serve as wintering grounds for waterfowl such as flamingoes, duck and shorebirds. The Indus Delta is habitat of four mangrove species including, *Avicenina 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 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 only the backwaters of the Indus and its eastern Nara channel. Besides a variety of marine species like the Plumbeous dolphin, the Beaked dolphin, Rorqual or Blue whale and a variety of skates visit the coastal areas of Sindh. The Green Turtle and Olive ridley Turtle frequently visit the shores of the Karachi coast for nesting.



Activity sheet: World's a Web Module 1

Objective:

- Define biodiversity and create a word web that illustrates some of the complex connections in the web of life. Discuss at least one way how biodiversity affects people's lives.

Methodology:

- Group work
- Analyzing (identifying components and relationships among components)
- Interpreting

Duration

1hour

Resources required:

- Container for key words
- List of web words

Procedure:

1. Divide the participants into five groups.
2. Assign one key word to each group (see box no.1)
3. Provide a list of web words to each group.
4. Ask each group to create a web of connections with key word at the centre of webs. Encourage them to write in words that describe the connections they are creating. Examples, include the verbs and phrases such as "influences", "affects", "benefits", "is helped by", "can lead to", and "can cause". For example: people benefit from medicine, medicine comes from plants, human population growth can cause loss of natural habitats and pollution can affect threatened species and so on.
5. Each group should be able to explain the connections that they drew between the key word and the web words, as well as between the different web words.
6. Ask the participant if they notice any similarities among different groups, webs and to identify and write down two or more of these similarities. They may also be encouraged to identify and write down any differences. Use their ideas to start discussion.

Box 1:

Key Words:	Web Words:	
Earth, animals, plants people energy	Earth animals plants people energy technology natural habitats crops trash shopping soil solutions pollution twenty-first century pesticides food	oceans money water human population growth school cars threatened species organic farming atmosphere future generations air medicine trees

Note:
This activity is a great way to understand interconnections among different species, which are the heart of biodiversity. By making word webs with the words provided, participants can learn the complex connections that characterize life on Earth.

NATURAL RESOURCES

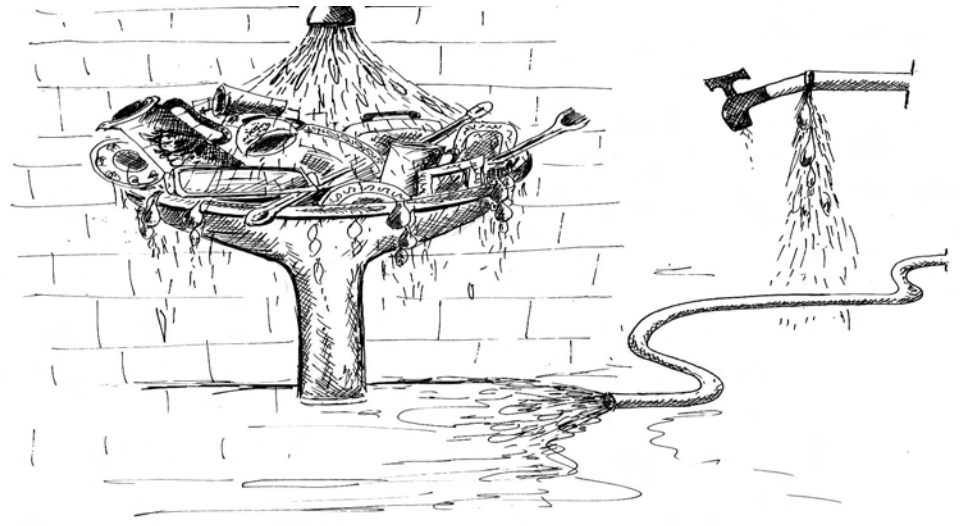
Natural resources are the naturally occurring substances that are considered valuable in their relatively unmodified (natural) form. A natural resource's value rests in the amount of the material available and the demand for the certain material. A commodity is generally considered a natural resource when the primary activities associated with it are extraction and purification, as opposed to creation. Thus, mining, petroleum extraction, fishing, hunting, and forestry are generally considered natural-resource industries, while agriculture is not. The term was introduced to a broad audience by E.F. Schumacher in his 1970s book Small is Beautiful.

Natural resources are often classified into renewable, flow, and non-renewable resources. Renewable resources are generally living resources (fish, hogdeer, coffee and forests, for example), which can restock (renew) themselves if they are not over-harvested. Renewable resources can restock themselves and be used indefinitely if they are used sustainably. Once renewable resources are consumed at a rate that exceeds their natural rate of replacement, the standing stock will diminish and eventually run out.

Non-living renewable natural resources include soil and water. Flow renewable resources are very much like renewable resources, only they do not need regeneration, unlike renewable resources. Flow renewable resources include wind, tides and solar radiation

Resources can also be classified on the basis of their origin as biotic and abiotic.

- Biotic resources are derived from animals and plants (i.e., the living world).
- Abiotic resources are derived from the non-living world (e.g., land, water, and air). Mineral and power resources are also abiotic resources some of which are derived from nature.



RANGELANDS AND LIVESTOCK

Rangelands represent a variety of ecosystems and landforms not suited for intensive agriculture or forestry, because of limitations imposed by climate, soils or topography (Stoddardt et al. 1975, Holecheck et al. 1989). Grazing by free-ranging livestock is the traditional primary use of the world's rangelands. However, there is growing recognition of the importance of these vast areas for wildlife habitat, hydrology and ground water recharge, recreation and aesthetics.

Rangelands of Sindh:

The arid zone of Sindh represents 17 percent of the arid land of Pakistan and can be classified as subtropical deserts. The arid lands cover an area of over 68,000 square km of the province and can be roughly divided into three even - sized distinct regions, Thar, Nara and Kohistan. Out of total geographical area of 14.09 million hectares of Sindh, 9.28 MHA forms rangelands. The rangelands are mostly state property. They were declared as protected forests in 1958.

1. Tharparkar:
Thar region covers 23,000 square km. Thar and Tharparkar (including Nara) is the Sindh part of the great Indian Desert. The region encounters poor rains about every three to four years and a complete drought occurs once in every eight to ten years. The average range carrying capacity increases immediately after the rains but reduces to 7 to 10 ha per five sheep during periods of low rainfall.

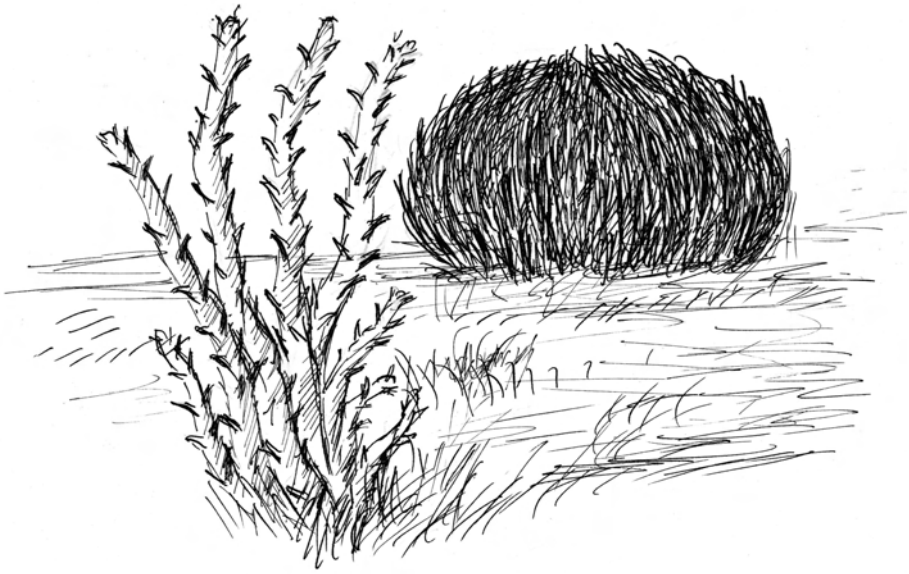
2. Nara:
The Nara region stretches over 22,000 square km. Its upper portion lies in Sukkur, Khairpur, Nawabshah and Sanghar districts. Thar and Nara are located on the left side of the river and form the eastern boundary of the province.

3. Kohistan:
The Kohistan region covers 23,000 square km, consisting of parts of Dadu, Larkana and Thatta. Ecologically, it is categorized as a tropical sub-mountainous zone and is classified as tropical maritime rangeland.

Livestock and Rangeland Conditions:-

The arid region has a total population of 4.87 million heads of livestock valued at Rs. 7.5 billion and 7.5 million heads of poultry valued at Rs. 375 million. Livestock production is the main economic activity of the 76 per cent people of the arid regions. The areas plagued by water shortages witnesses migratory patterns as people migrate with their livestock to the flood plains of the Indus or to the barrage areas in the dry season or during drought. Rangelands provide most of the forage (up to two thirds) for livestock that feeds in the arid regions. During the rainy season crops are sown by local communities to supplement their household income.

Pasture lands in the arid region are being desertified for a number of reasons. The most important cause of desertification is increasing livestock pressure. Due to this, over grazing is taking place. The approximate stocking ratio for excellent rangeland condition is quoted as 30 cattle equivalent unit per hectare. In Thar, stocking ratio is 68 head per 100 hectare in degraded rangeland.



WATER

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 purpose.

The principal sources of water for human use are lakes, rivers, soil moisture and relatively shallow groundwater basins. About 2 billion people, approximately one-third of the world's population, depend on groundwater supplies. About one-third of the world's population lives in countries suffering from moderate-to-high water stress — where water consumption is more than 10 per cent of renewable freshwater resources.

For many of the world's poorer populations, one of the greatest environmental threats to health remains the continued use of untreated water. More than half of the world's major rivers are seriously depleted and polluted, degrading and poisoning the surrounding ecosystems, threatening the health and livelihood of people who depend on them (World Commission on Water 1999).

Water development projects during the 20th century have had significant impacts on freshwater ecosystems by eliminating marshes and wetlands, removing water for other uses, altering flows, and contaminating water with industrial and human wastes. In many rivers and lakes, ecosystem functions have been lost or impaired. In some areas, growing water demand has led to reductions in the volume of large rivers, affecting riverine and adjacent coastal areas such as, degradation of riverine forests and mangrove ecosystems in Sindh province.

Water Resources of Pakistan:

Rainfall: Rainfall in Pakistan is markedly variable in magnitude, time of occurrence and its aerial distribution. The mean annual precipitation ranges from less than 100 mm in parts of the Lower Indus Plain to over 750 mm near the foothills in the Upper Indus Plain. The relative contribution of rainfall in most of the canal commands is low when compared with canal water and groundwater.

Glacier: The catchment areas of the Indus Basin contain some of the largest glaciers in the world, outside the Polar Regions. The glacial area of the upper Indus catchment is about 2,250 km^2 and accounts for most of the river runoff in summer. The snow and ice melt from the glacial area of the Upper Indus catchment supply approximately 80% of the total flow of the Indus River in the summer season.

Rivers and Dams: The Indus river system is the main source of surface water in Pakistan. The Indus Basin Irrigation System comprises of three major reservoirs, 16 barrages, 2 head-works, 2 siphons across major rivers, 12 inter river link

canals, 44 canal systems (23 in Punjab, 14 in Sindh, 5 in NWFP and 2 in Balochistan) and more than 107,000 water courses. The average annual river diversions for irrigation in the Indus Basin are 104.7 MAF, to irrigate over 14.6 million hectares of irrigated land. Of this, 67.11 MAF on average are diverted during the kharif period, while 37.63 MAF are diverted during the rabbi periods. The system utilizes over 41.6 MAF of groundwater, pumped through more than 500,000 tube wells, in addition to the canal supplies. In Pakistan, 97% of water is used in agriculture and rest of 3% is available for other users.

Salinity and Waterlogging:

Pakistan has an agriculture-based economy, which is mainly dependent on irrigation through canal supplies. Before the introduction of irrigation system, the water table was sufficiently deep. However, due to a lack of drainage facilities and improper water management, the water table has risen, resulting in waterlogging and salinity. About 25% of the irrigated area of Pakistan is affected by waterlogging and salinity / sodicity problems.

Pakistan is extremely low in water irrigation efficiencies which leads it to face problems like water-logging and salinity and issues related to water conservation. The crop yield in Pakistan is on the lower side. The current estimated irrigation efficiency in Pakistan is 35.5%. This means that only 35.5% of the water that reaches the fields is actually used by the crops. Irrigation efficiency is a compound of three efficiencies i.e. canal-head efficiency, watercourse efficiency and farm efficiency.

Improved agricultural and irrigation practices could reduce water use by 20% to 30%. Options include:

- pricing agricultural water to encourage conservation.
- using lined or covered canals that reduce seepage and evaporation.
- irrigating at times when evaporation is minimal, such as, at night or in the early morning.
- using improved irrigation systems, such as sprinklers or drip irrigation.
- improved land preparation for water application.
- encouraging the development of crops that require less water or are more salt tolerant.

WETLANDS

What is Wetland?

Definition

Under the International Convention on Wetlands (Ramsar, Iran, 1971) "wetlands" are defined by Articles 1.1 and 2.1 as below:

"wetlands are areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters."

Article 2.1 provides that wetlands: *"may incorporate riparian and coastal zones adjacent to the wetlands, and islands or bodies of marine water deeper than six meters at low tide lying within the wetlands".*

Functions of the wetland ecosystem

Wetlands are among the world's most productive ecosystems. Wetland ecosystems are cradles of biological diversity, providing the water and primary productivity upon which countless species of plants and animals depend for their 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.

- Supply water
- Sustain agriculture, industry, tourism and commerce
- Sources of fish and other foods
- Act as vast sponges for holding water, thus reducing floods
- Recharge groundwater systems
- Maintain water quality by trapping sediments, retaining nutrients, and removing toxins
- Prevent saline intrusion in coastal areas
- Recycle nutrients
- Oxygenate water and release clean water into the environment
- Stabilize microclimate
- Provide transportation networks, especially in rural areas
- Provide a wide range of housing materials
- Serve as valuable educational tools
- Provide exceptional sources of recreation
- Act as valuable wildlife refuges

- ♦ Provide wintering, feeding and resting grounds for palearctic migratory birds
- ♦ Often have 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
- Over-harvesting of fisheries resources
- Introduction of exotic species
- Illegal grazing (all the year around)
- Poorly regulated recreational use/ tourism

Overview of Pakistan's Wetlands:

Wetlands cover approximately 9.7% or 7,800,000 hectares (7,800 Km^2) of the total area of Pakistan. The country has a great variety of wetlands both man – made and natural.

In Pakistan, wetlands are scattered from the high Himalayan region in the north to the mangrove swamps in the south. The River Indus is the major wetland artery of the country. Natural wetlands in Pakistan include the wide range of ecosystems, like freshwater lakes and salt marshes. In addition, there are man-made wetlands such as reservoirs, dams, barrages, rice paddies and flooded arable land.

Under Ramsar Convention 1971, some wetlands have been identified for their high biodiversity significance. Nineteen such sites have been identified and declared as wetlands of special significance in Pakistan out of which ten sites exist in the Sindh province.

Important wetlands of Sindh:

1. Haleji Lake:
It is an artificial freshwater lake comprising an area of 1,704 ha. The lake is a Wildlife Sanctuary and 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:
The largest freshwater lake in Pakistan covering an area of 13,468 ha. It is a Wildlife Sanctuary and Ramsar site and 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 an important fishery. Breeding birds include Night heron, Cotton teal; Pheasant tailed Jacana, Purple moorhen, besides some passerines.

3. The Nurri Lagoon:
Nurri lagoon is situated in the Golarchi subdivision of Badin district. The site is a good representative example of a natural wetland, featuring a combination of brackish coastal and inland lagoons and mudflats. The site is Ramsar designated and its area approximately is 2,540 ha. Some important waterfowl present in the Narri lagoon are; Pelicans, Cormorants, Egrets, Herons, Storks, Flamingos, Glossy Ibis and White Spoonbill.

4. Jubho Lagoon:
Jubho Lagoon is a large shallow brackish water lagoon located in Jati subdivision of Thatta district. The site is Ramsar designated and its area approximately is 706 ha. The site regularly supports an average of 60,000 to 100,000 migratory waterbirds per annum. It is an important site for wintering waterbirds (particularly Greater and Lesser Flamingos and Dalmatian Pelicans) and for commercial fisheries.

5. Drigh Lake:
Drigh is a small, slightly brackish semi-natural lake with extensive marshes. It was formerly an arm of the Indus River, but is now situated 30 km away from the river. The site regularly hosts over 20,000 waterbirds in winter. It is a breeding and wintering area for a wide variety of waterfowl, and an important roosting site for Night-heron *Nycticorax nycticorax*.

6. Indus Dolphin Reserve
The 170 km stretch of the River Indus has been declared as Indus Dolphin Reserve from the Sukkur Barrage upstream to the Guddu Barrage near Kashmore. This particular stretch of the river is very important for the survival of more than 500 remaining individuals of the formerly common Indus dolphin *Platanista minor* (*P. indi*). This unique species is endemic to Pakistan and listed

on Appendix I of CITES and the IUCN Red List 2000. Riverine forests predominated by *Acacia nilotica* and *Prosopis cineraria* exist in adjacent flood plains.

7. 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 source of food for fish.

8. Indus Delta

Indus delta is located in Thatta administrative District. 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 of seventeen major creeks. Indus Delta is the fifth largest delta of 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 predominant by mangrove vegetation. Major animals found in the Indus delta include Humpback whale, Bottlenose Dolphin, Finless porpoise, Green Turtle, Olive ridley turtle, Indian python, Sea snakes, Saw-scaled viper, and various species of aquatic and common birds. The delta is also rich in fish and shrimp diversity which are source of livelihood for local fisherfollks.

9. Rann of Kutchh

Rann of Kutchh and its adjoining tidal mudflats area is part of the great Thar Desert covering an area of 566,375 ha. Rann of Kutchh was declared wildlife sanctuary in 1980. The area is an ideal habitat for a number of wild animals and birds of global significance. The important wildlife of the area includes; Indian Wild Ass, Wolf, Cranes, Great Indian Bustard, Hyena, Desert Cat, Caracal Cat, Small Indian Civet, Honey Badger, Blue Bull, Houbara Common peafowl/Peacock, Chinkara Gazelle, Foxes Indian Cobra, Sawscaled Viper, Indian Krait, Indian Fringe – toed sand lizard Partridges, Sandgrouse, Tawny Eagle and Sakar Falcon.

10. Deh Akro II

Deh Akro-II is a typical stable sandy desert covered with sand dunes and flat-bottomed valleys between the dunes, which contain perennial lakes. These lakes are recharged either by seepage from Nara and Jamrau canals or rainwater. The important wildlife of the area include Desert cat, Fishing cat, Darter or Snake bird, Garganey, Glossy Ibis, Spoon Bill, Black Ibis, Hog deer, Marsh Crocodile, Houbara Bustard, Marbled teal and White-Eyed Pochard.

11. Hadero Lake:

A natural brackish lake in a shallow depression on the edge of a stony desert, between Keenjhar Lake and Haleji Lake.The lake supports the commercial fishery. Some important waterbirds of the Hadero lake are; *Tachybaptus ruficollis, Pelecanus onocrotalus, P.crispus, Phalacrocorax carbo, Egretta garzetta, Anas crecca, A acuta, A strepera, A clypeata, A. fuligula and Tringa erythropus.*

12. Hamal Lake:

Hamal Lake is a shallow natural depression and has been formed by the construction of the flood protection bund during 1930's. The sources of water to Hammal Lake are from hill torrents and surface drains in the area. Hamal Lake is about 26,000 acre during flood season and in very dry years it is virtually known to dry up. Various waterfowl species found, include Marbled teal, Red crested pochard, *Tachybaptus ruficollis, Anser anser, Anaus Penelope, Anas creca, Anas acuta, Aythya ferina, Fulica atra, Anser strepera, Anas platyrhynchos, Anas clypeate, Anas fuligula.*

13. 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 provided a livelihood for 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.

14. Keti Bunder:

Keti Bunder is situated in Thatta district at a distance of about 200 km SE of Karachi. Keti Bunder is dominated by mangrove vegetation covering an area of 40874 ha. Eight species of mangroves have been reported to occur in the area but four species have been lost from Indus Delta including Keti Bunder during the past 70 years. The locals use mangrove trees for fodder and fuel wood, camel browsing and hut making. Mangroves provide breeding ground for variety of fish, shrimps, crabs and other invertebrates. They are also of great significance as a source of nutrients for fisheries. Keti Bunder North and South is a Wildlife Sanctuary, mainly for the water birds. About 50,000 birds in a migratory season have been recorded from this area in the past including pelicans, egrets, herons, waders and raptors. Fishing is the main livelihood resource of the community. Fish, shrimps and crabs are harvested on regular basis. Besides, providing valuable export earnings to the country, it is the primary source of livelihood or the population.

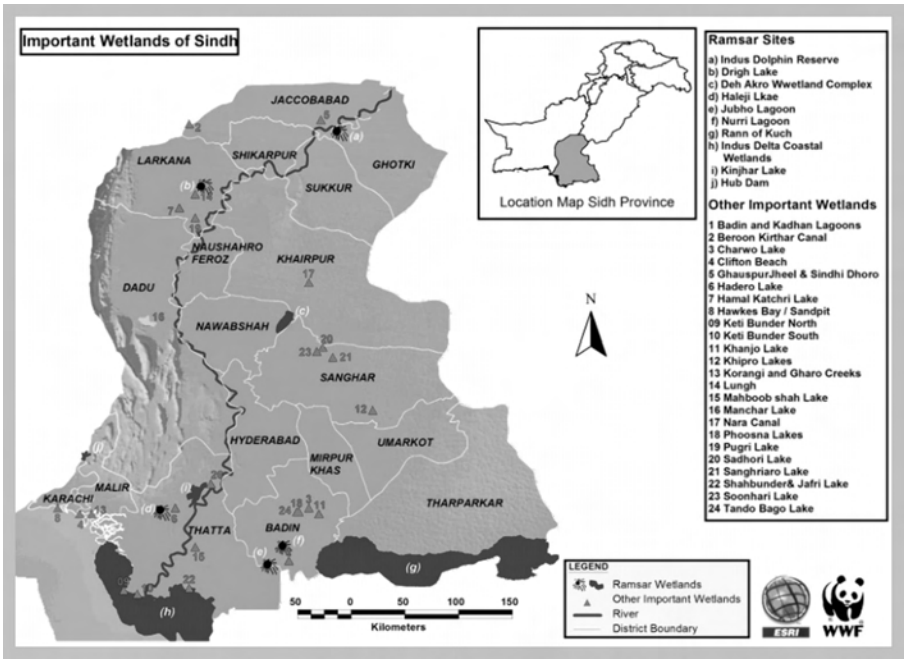
15. Chotiari Wetlands Complex

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 km^2. Chotiari reservoir is created in a natural depression that exists along the left bank of the Nara canal.

The aquatic features of the reservoir area comprise diversity of 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 variety of fish, mammals, birds and reptiles. Important wildlife of the area include Hog deer, Chinkara, Jungle cat, Fishing Cat, Caracal, Smooth coated otter, Marsh

crocodiles, Python and a variety of birds including globally threatened Marbled Teal are reported in winter and breed here, and rare species of Sindh Warbler. In a survey in 1993, 40,000 birds were observed in this area.

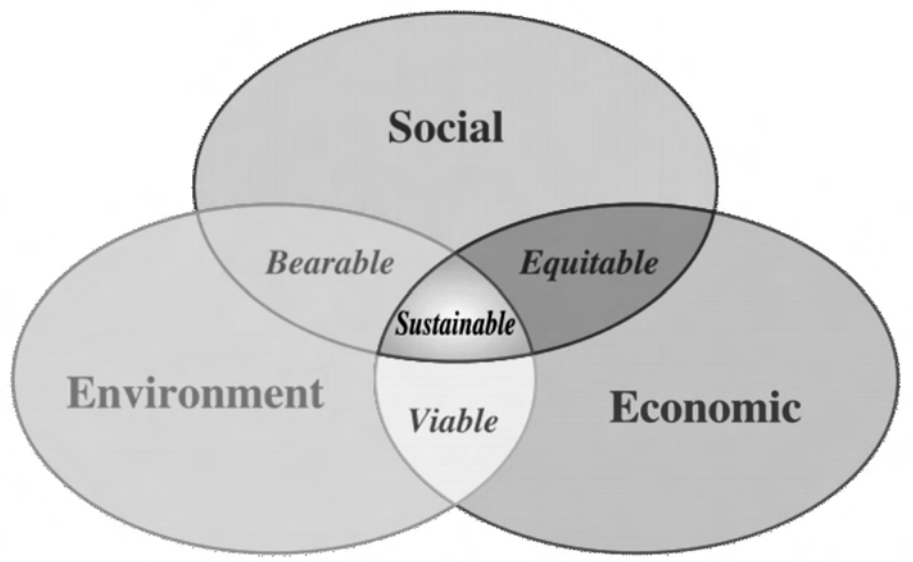
Map of Important Wetlands of Sindh



SUSTAINABLE DEVELOPMENT

Sustainable development is defined as *balancing the fulfillment of human needs with the protection of the natural environment so that these needs can be met not only in the present, but in the indefinite future.* The linkage between environment and development was first recognized in 1980 when IUCN published World Conservation Strategy. Sustainable development focuses on three areas i.e. economic, environment and social. These are inter-dependent and mutually reinforcing pillars of sustainable development.

The Universal Declaration on Cultural Diversity (UNESCO, 2001) elaborates further the concept by stating that "...cultural diversity is as necessary for humankind as biodiversity is for nature"; it becomes "one of the roots of development understood not simply in terms of economic growth, but also as a means to achieve a more satisfactory intellectual, emotional, moral and spiritual existence". In this vision, cultural diversity is the fourth policy area of sustainable development.



Scheme of Sustainable Development

Environmental sustainability is defined as the ability of the environment to continue to function properly, indefinitely. This involves meeting the present needs of humans without endangering the welfare of future generations. The goal of environmental sustainability is to minimize environmental degradation, to halt and reverse the processes of degradation.

An "unsustainable situation" occurs when natural capital (the sum total of nature's resources) is used up faster than it can be replenished. Sustainability requires that human activity only uses nature's resources at a rate at which they can be replenished naturally. Theoretically, the long term result of environmental degradation would be local environments that are no longer able to sustain human populations to any degree. Such degradation on a global scale could imply extinction for humanity.

Consumption of renewable resources	State of environment	Sustainability
More than nature's ability to replenish	Environmental degradation	Not-Sustainable
Equal to nature's ability to replenish	Environmental equilibrium	Steady-state Sustainability
Less than nature's ability to replenish	Environmental renewal	Sustainable Development

WILDLIFE

Wildlife are those animals that live in wild. Animals include amphibians, reptiles, fish, mammals, birds, and invertebrates. Invertebrates are generally not included as wildlife, with the exception of crustaceans that are used by humans for food or bait. Only animal's native to the country are usually considered wildlife and domesticated animals that have become wild, or feral, are usually not included.

OR

Wildlife is all non-domesticated plants, animals, and other living things. Domesticated wildlife is plants, animals, and other living things that have been removed from nature and raised in an environment that is more or less controlled. Domestication, act of taming, or controlling, wild plant and animal species and producing them for human benefit often has an impact on the environment, both positive and negative.

Current Status

The wildlife population of Sindh has declined during the past few decades as a result of loss of habitat and increased human population. There are still some areas such as arid desert of Thar, mountains and sub-mountain areas of Kirthar and Kohistan range (Karachi-Dadu and Larkana Districts), Karunjhar hills (Tharparkar district) and Takkar area (Khairpur district), riverine forests, swampy areas and a large number of wetlands that support a variety of wildlife.

The ecological zones of Sindh also support different plant species, which provide essential habitat for wildlife. In the western hills, a few patches of trees are found along the seasonal rills or small valleys called woodlands. The main plant species of this woodland are *Acacia Senegal, Acacia jacquemontii, Prosopis cineraria, Prosopis glandulosa, and Capris deciduas, Ziziphus numularia, Tecoma undulata, etc.* In the sandy desert, vegetation is confined to slightly more moist areas. Predominant trees are, *Prosopis cineraria, Salvadora oleoides, Acacia sengal, Acacia jacquemontii, Capris deciduas, Ziziphus numularia, Calligonium polygonoides, Calotropis procera, Tamarix aphylla, Aever javanica etc.* Forest in the Indus valley can be classified as irrigated and riverine forests. The coastal wetlands from Karachi to Kutch possess mangrove vegetation.

Among the wildlife, the mammalian fauna is few, whereas, the bird fauna is comparatively rich and as many as 400 species of birds have been recorded. Of these about 35% are migratory, mostly consisting of waterfowl. Fresh and marine water fisheries play a vital role in economic activities of Sindh Province. The peculiar ecological conditions of the Sindh province support a variety of wildlife including some very rare and endangered species. Rare species include Wild ass *(Equus hemionus)*, Fishing Cat (*Felis viverrine*), Wolf (*Canis lupus*), Sarus crane (*Grus antigone*), Grate Indian Bustard (*Choriotis nigriceps*), Indus Dolphin

(*Platanista minor*), Hyena (*Hyaena hyaena*), Desert Cat (*Felis libyca*). Endangered species are Blue Bull (*Boselaphus tragocamelus*), Small Indian Civet (*Viverricula indica*), Common Crane (*Grus grus)*, Chinkara gazelle (*Gazelle gazelle*), Hog deer(*Axis porcinus*), Caracal Cat (*Felis mydas*), Olive Ridley Turtle (*Lepidochelys olivacea*), Indian Python (*Python molurus)*, Sindh ibex (*Capra hircus*), Urial (*Ovis orientalis*) Finless porpoise (*Neophocaena phocaenoides)*, Common peafowl/Peacock (*Pavo cristatus*) etc.

Distribution of Wildlife within Sindh

Chinkara Gazelle, Sindh Ibex, Urial, Hyaena, Wolf, Anteater, Houbara Bustard, See see partridge, Sand grouses, and local common birds, reptiles and migratory birds are found in western hill range of Khirthar mountain, while Chinkara, Blue Bull, Wild ass, Crane, pewfowl, Grey Partridge, Black Partridge, Sand Grouses, Mountain Lizard, Sand Boa are commonly found in the eastern desert habitat. Hog deer, Wild boar, Jungle Cat, Jackal, Marsh crocodile, Black Partridge, Grey Partridge, migratory waterfowls and common forest and crop birds are found in the riverine forests, agricultural fields, grassland and wetlands of the plains. The coastal zone also supports a variety of waterfowl, sea animal, mangrove habitat, marine fishries and marine turtle.

Major Threats to Wildlife

Like other parts of the country, Sindh is also facing many problems regarding the conservation, management and protection of wildlife in its geo-political system. Major issue and threats are:

1. Population pressure resulting in deforestation, agricultural expansion, urban and industrial development and over exploitation of natural resources.
2. Diversion of water for irrigation and power generation.
3. Environmental pollution through industrial and agricultural sectors resulting in habitat destruction (eutrophication, etc.)
4. Hunting and poaching pressure.
5. Over grazing.
6. Poor legislation and enforcement
7. National and regional mega drainage projects
8. Lack of awareness
9. Low priority to wildlife conservation in government policies
10. Un-scientific management and lack of research of facilities
11. Lack of coordination among the line departments, NGOs and CBOs
12. Lack of trained human resources in natural resource conservation
13. Financial constraints
14. Lack of management plans of wildlife areas
15. Oil and Gas exploration
16. Sea Intrusion

POLLUTION

What is Pollution?

Pollution has its origin in the Latin word polluere, meaning *"contamination of any feature of the environment".* Pollution has the following characteristics:

1. It is the addition of substances at a faster rate than the environment can accommodate e.g., certain pollution like arsenic or mercury has natural level in nature. If these levels exceed certain critical value they are consider to be pollutions.
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 changes in the physical, chemical or biological characteristic of land, air and water that will harmfully affect humans and other living organisms.

Humanbeings depends on environment both directly and indirectly. They need food to eat , water to drink and meet other requirement, air to breath and fuel to fulfill energy requirements. Human activities in this industrial era generate basic wastes e.g. coal, gas, oil and other fuels and a variety of other solid and liquid wastes. All these wastes somehow adversely affect the quality of our environment in which we live.

Types of Pollution:

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

1. Air Pollution.

The layer of air that supports life extends about 8 km above the earth's surface and is known as troposphere. 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 the home, by industry or in internal combustion engine. 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 to eyes, nose, throat and lungs. Many other dangerous gases and chemical like Mercury, Zinc, Lead and spray industries may cause chronic kidney and liver diseases and damage to blood.

2. Water Pollution:

Water is one of the most important sources of life. 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 industries use and only 5 % is used for domestic purpose.

Industrial wastes largely bring water pollution. Municipal and agricultural wastes are two other major sources. Domestic sewage of cities and towns ultimately enters into streams, rivers, lakes and finally into seas and oceans. Due to these pollutions, concentration of heavy metals, Ammonia, Nitrates and Phosphates increases and that of oxygen decreases in water, thereby the aquatic life comes under serious threat.

3. Soil pollution:

Soil plays a very important role in any ecosystem. Plants need soil to grow. The top layer of the 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 from domestic and industrial sources such as chemicals, detergents, solid waste and plastic bags not only give an ugly look to our environment but, also damage the habitat. More than 90 % of pesticides applied never reach their target, i.e. pests. Instead these chemicals find their way into and contaminate air, water and soil.

4. Noise pollution:

Noise is an unwanted sound. As the world population is growing, the automobiles and industries 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 hospital and schools. The purpose of such signs is to minimise noise level.

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

PESTICIDES

What are pesticides?

Rodents, bugs, and mold are natural organisms found in our environment and can benefit people in many ways. However, when we find rodents in the garden, bugs in the kitchen, or mold in the bathroom, we may consider these organisms pests. Often we use pesticides to get rid of them. The chemicals in pesticides are used to control insects, weeds, and rodents thereby protecting crops and food supplies and making our lives pest free. Pesticides are generally divided into four chemical groups: insecticides to control insects, herbicides to control weeds, fungicides to control molds and fungus, and rodenticides to control rodents.

Pesticides use has become common nowadays, particularly in agriculture. In addition, following pesticides are commonly used in households:

- Cockroach sprays and baits
- Insect and wasp sprays
- Termite control products
- Rat and mice poisons
- Flea, tick, and lice sprays, powders, and pet collars
- Kitchen, laundry and bath cleansers
- Bleach products to kill mold and mildew
- Lawn and garden products such as weed killers
- Swimming pool chemicals, including those that kill algae
- Pesticides applied in agricultural fields

Why is reduction pesticides' use important?

Pesticides are not only harmful to pests. If used improperly, pesticides can also create health risks to humans, pets, and the environment. If pesticides are not applied properly on crops, pesticide residues on unwashed fruit and vegetables can cause human health problems such as, immune system problems and birth defects. Improper use of pesticides also kills beneficial insects and other predators which act as natural control and assist in pollination of crops. When pesticides are applied to land, residues may run off into streams and rivers, thereby contaminating fish, plants, and animals living in or near the water, and drinking water sources.

Pesticides applied to land can also migrate through soil into groundwater, and also pollute groundwater sources. Air is another pathway for pesticides to migrate in the environment. During pesticide application, air currents may carry pesticide vapours to nearby living areas. In addition, pesticides are improperly applied and handled in agricultural areas, posing serious health risks to the farmers.

PROTECTED AREAS

Land areas set aside specifically for protecting wildlife and the natural ecosystem characteristics are called Protected Areas. Establishment of Protected Areas concept is not new in Pakistan. The early rulers or Mirs often declared certain areas as preserves especially for this purpose so that they would have a sufficient supply of game animals for hunting. The British rulers set aside forest reserves in mid 1800's to protect forest ecosystem and wildlife habitat along the riverside

Outside the Indus basin, wildlife has maintained itself due to the remoteness and inaccessibility of the terrain, especially in the northern mountainous tribal areas. Local chieftains with a passion for hunting often recognized the value of putting certain areas off limits to hunting to allow animal populations to build up. Thus, a number of areas scattered around the country have been marked to protect wildlife.

During earlier days except for the reserved or protected forests, few Protected Areas received more than a minimum degree of management and many were unknown. However, the enforcement of Wildlife Protection Ordinance in 1959 and issuance of the Wildlife Protection Rules in 1960 legally authorized the establishment of sanctuaries and reserves for game. The wildlife regulations allow establishment of the following three categories of Protected Areas:

1. **National Park** is an area of outstanding scenic merit, where the landscape, flora and fauna are protected and preserved in their natural state and public access for recreation, education and research is provided for. Access roads and other facilities should be planned so they do not conflict with the main objectives of national parks. Hunting wild animals is prohibited, as is firing a gun or otherwise interfering with animals or plants. Clearing land for cultivation, mining or allowing polluted water to flow in National Parks is also prohibited. Under the regulations, these acts may be allowed for scientific purposes or to improve the park.

2. Wildlife Sanctuaries: Wildlife Sanctuaries are areas set aside for the protection of wildlife. Public access is prohibited or regulated and no hunting of wildlife is allowed.

3. Game Reserves: Hunting and shooting of wild animals is regulated under permit. The numbers of shoots allowed in reserves varies and is determined by provincial governments.

Summary of Protected Areas in Pakistan (based on NCCW data)

Region/ Province	Nat Parks	Wildlife Sanct.	Game Resv.	Un Classified	Total PAs	Total Area Conserved (ha)	% of Total Land Area Protected
A J K	1	0	8	0	9	51,998	3.91
Balochistan	2	15	7	7	31	1,837,704	5.29
Punjab	2	37	19	0	58	3,315,803	16.14
NWFP	3	6	38	5	52	470,675	6.30
Sindh	1	35	14	4	54	1,307,575	9.27
Federal Territory	1	1	1	0	3	94,186	100
Northern Areas	4	5*	9	0	18	2,092,180	2.97
Totals	**14**	**99**	**96**	**16**	**225**	**9,170,121**	**10.40**

The first national park declared in 1972 in Pakistan is Lal Sohanra. Followed by Kirthar National Park in Sindh, declared in 1973. Following is the table of National Parks in Pakistan:

S.No	Name of Park	Area	Year-Declaration
1	Ayubia	1,684	1984
2	Chinji	6,095	1987
3	Chitral Gol	7,750	1974
4	Hazarganji-Chiltan	15,555	1980
5	Hingol	165,004	1997
6	Khunjrab	226,913	1975
7	Kirthar	308,733	1974
8	Lal Sohanra	37,426	1972
9	Margalla Hills	17,426	1980
10	Central Karakorum	13,90,100	1995
11	Kandrap Shandur	51,200	1993
12	Deosai Plains	3,58,400	1993
13	Sheikh Buddin	15,554	1993
14	Machiara	13,532	1980
	Total	**37,67,518 Ha**	

(Source: WWF-Pakistan and MELGRD)

In addition to the above National Parks, the provincial governments have listed 99 wildlife Sanctuaries (Punjab-19, Sindh-35, NWFP-6, Balochistan-15, Northern Area-5) and; 96 other areas as Game Reserve (Punjab-19, Sindh-14, NWFP-38, Balochistan-7, and AJK-8). (Source: WWF-Pakistan and MELGRD).

The IUCN has developed a category of Protected Areas as follows:

I. Strict Nature Reserve/Wilderness Area: Areas of land and/or sea possessing outstanding or representative ecosystems, geological physiological features and/or species, available primarily for scientific research and/or environmental monitoring; or large areas of unmodified or slightly modified land, and/or sea, retaining their natural character and influence, without permanent or significant habitation, which are protected and managed so as to preserve their natural condition.

II. National Park: Protected areas managed mainly for ecosystem conservation and recreation. Natural areas of land and/or sea, designated to (a) protect the ecological integrity of one or more ecosystems for this and future generations, (b) exclude exploitation or occupation inimical to the purposes of designation of the area and (c) provide a foundation for spiritual, scientific, educational, recreational and visitor opportunities, all of which must be environmentally and culturally compatible.

III. Natural Monument: Protected areas managed mainly for conservation of special features. Areas containing one or more specific natural or natural/ cultural features which is of outstanding or unique value because of its inherent rarity, representative or aesthetic qualities or cultural significance.

IV. Habitat/Species Management Area: Protected areas managed mainly for conservation through management intervention. Areas of land and/ or sea subject to active intervention for management purposes to ensure the maintenance of habitats and/ or to meet the requirements of specific species.

V. Protected Landscape / Seascape: Protected areas managed mainly for landscape/ seascape conservation and recreation. Areas of land, with coast and sea as appropriate, where the impaction of people and nature over time has produced an area of distinct character with significant aesthetic, cultural and/ or ecological value, and often with high biological diversity. Safeguarding the integrity of this traditional interaction is vital to the protection, maintenance and evolution of such an area.

VI. Managed Resource Protected Area Protected areas managed mainly for the sustainable use of natural ecosystems. Areas containing predominantly unmodified natural systems managed to ensure long-term protection and maintenance of biological diversity, while providing at the same time a sustainable flow of natural products and services to meet community needs.

Source: IUCN, 1994. Guidelines for Protected Area Management Categories

COMMUNITY PARTICIPATION IN NATURE CONSERVATION

A group of people who belong to the same or different ethnic groups inhabiting a certain environment or area and interacting with each other is called a 'community. (Wetland Action Plan 2000) WWF – P & NCCW

The community participation is broadly used to reflect community involvement or taking part in the management of resources. It is a process in which community participates in conservation of resources, because the local people have been the users of these resources over the countless years. However, it has been observed that the utilization of these resources is mostly unsustainable, as the number of users is increasing rapidly while the resources base remains the same and everyone is trying to get a maximum share of it. Mostly community does not realize that if these resources are not utilized in a sustainable manner, they will be depleted soon. Sometimes a lack of alternatives pushes unsustainable use of resources. Through community awareness and participation in natural resources management, we can encourage them to use these natural resources wisely and help them to identify possible alternatives. This could only be possible, if communities are made aware of the values of natural resources and volunteer themselves in conservation efforts.

In order to ensure community participation it is important to involve them in the entire process from the planning to the implementation. This will help towards better planning and develop a sense of ownership among them.

Each natural resource may have different class or group of communities living in the vicinity with different resource use patterns. This may require assessment of distinct socio-economic situation in each natural resource. Therefore, it is necessary to understand the socio-economic and cultural factors operating in the area to design community involvement approaches.

As a first step in the process it is essential to understand the socio-economic background of the communities and categorize them into different classes based on the resource use pattern and poverty levels through PRA (Participatory Rural Appraisal) or PLA (Participatory Learning and Action) exercises of local appraisal.

The objective of the PRA /PLA should be;

i) To identify different classes or groups living within the community, as well as the key issues perceived by them.
ii) To establish the human resource use pattern.
iii) To define the problems and identify ways by which the issues could be resolved as suggested by communities.

The community mobilization is another systematic approach aimed towards the conservation of natural resources. The expected outcome of this process will be:

i) Priority needs will be identified with communities participation.
ii) Establishment of self sustained system to solve issues at local level.
iii) Participation of communities in conservation of natural resources on self help basis.

INTEGRATING CONSERVATION AND DEVELOPMENT (ICD)

The wise use principle implies that conservation actions should be undertaken so as to protect the values of the natural ecosystem. These actions can range from the strict protection of an area - not using resources is also a form of wise use - through to the inclusion of conservation activities in development projects. Furthermore, conservation measures may require regeneration or restriction of some of the activities carried out by local communities - including communities which depend on natural resources for part of the year only (e.g. nomadic stock - farming communities). Such measures may also generate costs that must be borne by local communities - e.g. crop destruction by protected wildlife species (Braatz, 1992).

Finally Natural Resources conservation is a long term endeavour that has rarely allowed local communities to increase their revenue or meet their needs in the short term. Therefore, conservation projects must integrate actions for local development to improve the quality of life of local people to scale their active participation in the conservation measures. ICD approval generates win-win opportunities for community development and natural resources conservation.

YOUTH AND ENVIRONMENT

Environmental concerns present some of the most profound and complex challenges requiring attention today and in the coming decades. One foundation-building step in enhancing local, regional, national and global capacities to respond to those challenges is increasing environmental awareness among all segments of the society. Young people constitute a large part of the world's population. They have both special concerns and responsibilities in relation to the environment as they have to live for an extended period with the deteriorating environment bequeathed to them by earlier generations. Young people will be compelled to engage in new forms of action and activism that will generate effective responses to ecological challenges. Youth involvement with nature and environmental processes is an important part of maturing with capable skills for modern living.

Environmental awareness is one way of equipping young people with the necessary knowledge to recognize and withstand the pressure of environmental realities. Young people are especially well placed to promote environmental awareness simply because they often have better access to information, can introduce fresh ideas and outlook to environment than do their elders. The energy and the endurance of the youth is an asset to meet the challenges of the day and proposed solutions on the harsh realities of environment and development. Here the role of youth is central, for it is in the rising generations that heightened awareness can most easily be achieved.

The active participation of the youth is of great significance in the following activities:

- Youth are the main stakeholders, policy makers and a major resource group playing an important role in taking up responsibilities, revolutionizing the other stakeholders, acting as a catalyst for bringing about the change.
- Pollution control and management through initiatives that sensitize the youth towards garbage control, littering, recycling and similar activities.
- Opening of community-based vocational training facilities, with emphasis on sustainable use of natural resources, to enable the youth to acquire new skills for alternative income-generating activities.
- Youth can perform a responsible role in the society by acting as trainers, as activists and pressure groups, thereby bridging the gap between the two generations.
- Youth can help by making their influence felt as a constituency for the long term, calling political leaders to account for the long-range environmental consequences of their decisions.
- The role of youth can be institutionalized in policy-making through advisory bodies such as youth councils, affairs divisions and conventions.
- One particularly important role is in the social movement to talk about environment. Within the public sphere, social movements rely on the media as well as informal networks of activists, information sharing,

protests, demonstrations, boycotts, and events geared to attract media publicity.

- Young religious scholars are the best institutions for addressing the environmental realities particularly in rural areas where the functional literacy is very low.
- Establish youth forums for sustainable development at manufacturing level.
- The involvement of youth community can improve efficiency of municipal solid waste management through awareness campaign for proper segregation; this would lead to better disposal of the waste.
- Inter-provincial youth networking, providing a platform for sharing traditional knowledge.
- Youth can be as volunteer for various practical environmental movements conducted by all circles ranging from government sector to NGOs.
- Organizing summer camps and nature walks.
- The promotion of youth in the area of ecopreneurship (career connected with sustainable development), education and development.
- The educated youth have very important role, they can arrange awareness programmes like seminars, workshops, lectures, speech contests, discussion forums in urban as well as rural areas. They can publish their articles about current and future environmental problems in daily newspapers of local and national languages.
- Cycling race can be organized at local scale across country. By doing this they can wear shirts and caps displaying different environmental messages to raise awareness among masses.
- Eco-tourism is a wonderful idea to sensitize the youngsters about sustainable development. Through organization of trips to nearby eco-tourist attractions.
- Building local network of young people and encourage them for sustainable consumption of natural resources.
- Young celebrities can use media for communication and interaction to create global message platform on sustainable development, consumption and behavior pattern to create alternative environment vision.

FRAMEWORK OF LAUNCHING ENVIRONMENTAL CAMPAIGN

The following steps are required to organize and conduct the campaign;

1. Introduction of Campaign Launch:

A campaign launch will probably comprise at least two of the following three inter-related and mutually reinforcing elements.

i. Media event to raise awareness of past achievements and future plans in the area of selected topic like tree plantation, save earth etc.

ii. Substantive event such as a policy review, a capacity-building workshop or a learning event such as an exchange of best practices.

iii. Action-plan Develop an action plan which outline the different activities with time frame and place.

A launch should have a clear message to rally around.

Objectives of a Campaign Launch:

The specific objectives of the campaign should be drawn before launching.

2. Considerations for any campaign launch;

i. Clear Focus and Objectives
The campaign should have a clear substantive focus on one of the objective. Measurable objectives should be developed through a participatory process leading to the approval of a campaign action plan.

ii. Transport and Accountable Institutional Framework
There should be a local/national/regional steering group including representatives of all key stakeholders, including all levels of government, civil society, the private sector, multi-lateral and bi-lateral organizations, academia, the media and on-going urban governance initiatives. The roles and responsibilities of each actor should be clearly defined within this framework. One institution, however, must take the lead responsibility in managing the events leading to the launch as well as the discussions on the action plan.

iii. Linkages to Regional Campaign Strategies and Partner Activites
Wherever possible, launches should be part of the overall regional campaign strategy and should involve campaign partners in the design and implementation.

iv. Secured Funding

The campaign should not raise expectations it cannot fulfill. Secured funding for at least activities of the campaign action plan is essential, with strong possibilities for future funding probable.

3. Outputs Required Prior to a Campaign Launch

Based on the above considerations, several key outputs should be produced, at least in draft form, prior to the launch.

i. Campaign Launch Proposal

This should be prepared in consultation with key local stakeholders, campaign partners; regional steering groups should include the following information:

(a) Context, including a justification for launching the campaign in the area based on the above criteria. Special consideration should be given to describing the current state of issue in the area , including the legal and policy context.
(b) Launch Objectives.
(c) Outputs and Activities related to the launch objectives.
(d) Institutional Arrangements, including the identification of a lead institution and clarification of the roles and responsibilities.
(e) Timeline, including key benchmarks;
(f) Budget, including in-kind and in-cash requirements and the sources.
(g) Supporting Documentation, including letters of support from key stakeholders from government, civil society, the private sector, multi-lateral and bi-lateral organizations, academia, the media and on-going urban governance initiatives.

ii. Campaign Action Plan

This should include a clear focus on one or several well-defined objectives, outputs and activities, institutional arrangements, a communication strategy, a time-line and a budget. The level or scale of the campaign will affect the specific structure of the action plan. It is essential that the action-plan be prepared through a transparent and participatory process to ensure the commitment of all stakeholders to its implementation. The action-plan should not be seen as the final blueprint for implementing the campaign after the launch, but rather as a work-in-progress that will evolve over time.

iii. Memorandum of Understanding (MoU)

The MoU is to be signed by key stakeholders involved in the implementation of the campaign action plan. It should include a general statement in support of the principles the identification of their priority principle(s) and establish specific mechanisms to improve collaboration.

iv. Campaign Steering Group

The Steering Group should include representatives of key stakeholders including all levels of government, civil society organizations the private sector, multi-lateral and bi-lateral organizations, academia and media.

V. Media Strategy

A strategy to achieve the awareness raising and communication objectives of the campaign launch that is linked to the regional campaign strategies.

YOUTH GREENING ACTIVITIES

What are greening activities?

Greening activities are those activities which are in some way beneficial to the general standard of the environment or are in support of some movement to carry an environmental cause.

The promotion of a greener environment is one priority area where the society has to be very actively involved. A number of tree-planting activities are fostered throughout the urban centers as well as rural areas in Pakistan. There is dire need of continuous support to governmental organizations, local government, educational institutions, as well as the voluntary sector is provided with the aim of increasing the green area.

Since the development of the necessary infrastructure for irrigation, water reuse is considered essential for ensuring the sustainability of any greening activities, continuous support is needed for the operation and maintenance of the municipal wastewater treatment plant of the urban areas, and the extension of its services to support different greening initiatives in an area such as the establishment of a tree nursery, a children's garden and the extension of the green belt.

Greening activities-A Responsibility for all

Greening activities are a way of giving back to our beautiful planet earth. It is not only the responsibility of NGO's or the government to work to protect the environment it is the duty of everyone. Everyone can make a difference and work for a greener tomorrow and the steps that can be taken to do so on a personal level are so small yet the effect of those steps are enormous once everyone does them.

The general misconception is that all greening activities involve planting trees, hiking, taking nature walks and rescuing animals etc. But this is not the case any activity which will benefit the environment is a greening activity and many of these can be done while sitting at school or even at your home all you need is some time, some dedication and a whole lot of spirit and interest.

There are many other ways you can involve your community in learning about nature conservation and biodiversity. The following are meant to spark ideas for expanding environmental awareness in your area.

Green Clubs:
It is the group of volunteer / people who are working towards the betterment of environment. Mostly the group comprises of local youth who are actively involved in environmental awareness activities in their area. These groups could be organized and mobilized to create conservation awareness and promote advocacy on environmental issues at the local levels. Youth are the important

target group for establishing green clubs, as they belong to formal or informal forums that exist at the local level such as, cultural clubs, sports clubs, education societies etc. These youth forums could be mobilized to incorporate nature conservation in their activities such as celebrating different environmental events or participating directly or indirectly in nature conservation activities.

How to establish the Green Club?

Any individual / group can initiate the idea of establishment of Green Club it can be formally and informally formed.

The following is the general structure of the Green Club:

- General Secretary
- Secretary
- Treasurer
- Coordinators for various activity
- Administration person

The members of the green club will select the above persons to run the activities of the Green club.

Following are the main things before initiating the green Club activities;

- Goal or Aim of the Green Club.
- Letter Head.
- Account for the Green Club. (optional)
- Office for the Club organizers or members meeting.
- Develop Activity Calendar for the Green Club.

Following are the some common activities recommended for Green Club. The members can also modify or create new activities for their particular club.

YOUTH AND NATURE CONSERVATION

The community participation in environmental conservation was recognized at the Rio Summit in 1992 which adopted Agenda 21 initiatives. Local Agenda 21 encourages local authorities to work with community groups to draw up plans for environmental improvement.

Agenda 21 is the global plan for sustainable development and calls for young people to become involved. As well as providing service to young people, it suggests that it is in society's interest to encourage young people to express their views about the environment in which they live. This approach is sometimes called Youth Agenda 21.

While seeking to cooperate with local communities, special attention should be given to ensuring the participation of youth. Youth are an important segment of the society. They constitute a major part of global population

Young people have important environmental concerns and responsibilities. Because of their longer life expectancy, they will have to live for quite some time with the consequences of a deteriorating environment left to them by their parents. Fortunately, youth have a special talent for invention and the development of new forms of action and activism and can generate more effective responses to nature conservation.

Young people are especially well-placed to promote nature conservation simply because they often have better access to information about the environment than do their elders. Aside from exposure in formal education, youth have lived all their lives in an era in which environmental issues have loomed large. Established anti-ecological ways of thinking and behaving are not ingrained in young people, and they can introduce fresh ideas and outlooks to the environmental issues

HOW TO ORGANIZE YOUTH

First of all, there is a strong need to organize youth on one platform. For that purpose, formal and informal meetings are organized to raise the awareness of youth-environment relationship. These meetings are organized on the regular basis which lay down the confidence and mutual trust among youth. After several meetings, a youth group comes into existence and several other youngsters would develop interest to be a part of that group. This group may take form of informal youth group or a youth CBO with well defined objectives and responsibilities.

Once a formal youth organization is established, it may start communication and networking with organizations for the achievements of their objectives seeks financial support from donor organizations.

In order to ensure their organization management knowledge and skills the Institutes like SPO, TVO, SDPI, LEAD-Pakistan, and WWF-Pakistan etc. could provide training. Due networking with other organization, a strong relationship is emerged and helps in solving different problems.

For youth organization, following steps may be required:

1. Strong youth group
2. Name of organization
3. Logo of organization
4. Executive body member
    - Chief Executive
    - President
    - Vice President
    - General Secretary
    - Joint Secretary
    - Secretary Finance
    - Secretary Information
    - Election of General body members
    - Aims and Objectives of organization
    - Area of work
    - Registration
    - Letter Head
    - Membership Form

Objectives of youth groups:

- To make a strong youth group that may work for their local problems and protection of natural resources.
- To educate about the importance of environment and its protection
- To take part in local development processes

- To make communication and networking with other organizations for sustainability

LIST OF PRODUCTS AND SERVICES OF VARIOUS NATURAL RESOURCES

1. Biodiversity

Biodiversity is the variety of life on earth. It provides valuable services to mankind:

- Protection of water resources
- Soils formation and protection
- Nutrient storage and cycling
- Pollution breakdown and absorption
- Contribution to climate stability
- Maintenance of ecosystems
- Recovery from unpredictable events
- Food and drink
- Medicines
- Industrial raw materials
- Better crop-varieties
- Insect pollination
- Leisure activities
- Artistic inspiration

2. Wetlands

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

- Supply water
- Sustain agriculture, industry, tourism and commerce
- Sources of fish and other foods
- Act as vast sponges for holding water, thus reducing floods
- Recharge groundwater systems
- Maintain water quality by trapping sediments, retaining nutrients, and removing toxins
- Prevent saline intrusion in coastal areas
- Recycle nutrients
- Oxygenate the water and release clean water into the environment
- Provide transportation networks, especially important in rural areas without roads
- Provide a wide range of housing materials
- Serve as valuable educational tools
- Provide exceptional sources of recreation for both residents and visitors
- Act as valuable wildlife refuges
- Provide wintering, feeding and resting grounds for palearctic migratory birds

- Often have profound cultural and /or spiritual significance to local people

3. Forests

- It is a store of biological diversity.
- Natural habitat for wildlife
- Maintenance of ecological balance and biodiversity
- Act as a catchment for soil and water
- Prevent floods
- Provide food, fuel, fodder, fiber, shelter and timber
- Support industrial and commercial activities
- Provide job opportunity for large number of people
- Maintain life supporting systems essential for food production, health, and all around human development
- Provide sites for recreation, meditation, peace, and aesthetic sense
- Abate pollution
- Prevent land slides in hilly areas and flood havoc in plains
- Act as house of energy
- Keep the balance of atmospheric gases
- Play role in water cycle or hydrological cycle
- Maintain soil fertility, regulates, earth temperature and check soil erosion.
- Provide Herbal medicines
- Help farmers in protecting their crops from strong dust storms
- Help keep the climate of an area pleasant

4. Rangelands

Rangelands produce a wide variety of goods and services desired by society:

- Livestock forage
- Wildlife habitat
- Develop and sustain watersheds
- Mineral resources
- Wood products
- Wildland recreation
- Open space
- Natural beauty

RAMSAR SITES IN PAKISTAN

S.NO	Wetlands	Date of Designation	Province	Area
1	Astola (Haft Talar) Island	10/05/01	Balochistan	5,00 ha
2	Chashma Barrage	22/03/96	Punjab	34,099 ha
3	Deh Akro-II Desert Wetland Complex	05/11/02	Sindh	20,500 ha
4	Drigh Lake	23/07/76	Sindh	164 ha
5	Haleji Lake	23/07/76	Sindh	1,704 ha
6	Hub (Hab) Dam	10/05/02	Sindh, Balochistan	27,000 ha
7	Indus Delta	05/11/01	Sindh	472,800 ha
8	Indus Dolphin Reserve	10/05/01	Sindh	125,000 ha
9	Jiwani Coastal Wetland	10/05/01	Balochistan	4,600 ha
10	Jubho Lagoon	23/07/76	Sindh	706 ha
11	Keenjhar (Kalri) Lake	10/05/01	Sindh	13,468 ha
12	Miani Hor	10/05/01	Balochistan	55,000 ha
13	Nurri Lagoon	10/05/01	Sindh	2,540 ha
14	Ormara Turtle Beaches	10/05/01	Balochistan	2,400 ha
16	Rann of Kutchh	05/11/02	Sindh	566,375 ha
17	Tanda Dam	23/07/76	North West Frontier Province	405 ha
18	Taunsa Barrage	23/03/96	Punjab	6,576 ha
19	Thanedar Wala	23/07/76	North West Frontier Province	4,047 ha
20	Uchhali Complex (including Khabbaki, Uchhali and Jahlar Lakes).	22/03/96	Punjab	1,243 ha

LIST OF TYPICAL YOUTH GREENING ACTIVITIES

a) Contests and forums
Organize art, poetry, essay, songwriting, or knowledge contests about biodiversity. Hold a debate or school-wide forum on biodiversity.

b) Events celebrations
Organize celebrations around special days or weeks, such as World Environment Day (June 5), Earth Week (third week of April), or the anniversaries of protected areas in your region.

c) Awareness campaigns
Choose an important local environmental issue and design and implement a campaign to raise awareness about that issue. Participants can create a logo and key messages and communicate those messages through posters, radio announcements, articles, events and so on.

d) Field trips / Exposure
Organize a visit to a protected or unique natural area. Go on a nature walk in your area to observe and study different environmental parameters. Inter-community exposure visits and study camps could also be used as an effective tool to create awareness among the youth and mobilize them for advocacy on environmental conservation.

e) Youth environmental journalism
Create a community newsletter/paper to report on local or national natural resources/biodiversity issues. Youth could also be mobilized to write articles and features on their local natural resources for publication in local newspapers and newsletters / magazines.

f) Voluntarism
Talk with a conservation organization or government agency about how your young conservationists could get involved in local conservation efforts. Plan your own project to improve the local environment: clean up a river, park, or beach; plant trees; collect plastic bottles or aluminum cans paper for recycling and find a facility that can recycle them; create a local school organic garden or compost pile; improve animal habitats near office or school (plant a butterfly garden, make bird houses); create a nature trail.

g) Conservation / Nature Fair
Organize a conservation fair in your district where young people from community can plan and present research projects in a competition. Organize youth competition such as, poster, easy, cycling race, cricket/foot ball matches etc.

h) Murals
Paint a biodiversity mural in a central place in the youth group office of community. Solicit help from a local artists and private companies for supplies.

i) Guest speakers
Invite scientists to speak to your youth groups about their work. Hold awareness workshop where conservationists talk about the variety of specific topics related to the local conservation. Invite a community leader or elder to talk about his/her views on conservation. Invite and encourage local religious leaders to deliver sermons on nature conservation in the light of religious teachings.

j) Nature camps
Organize a day camp at wetland / forest sites or protected area. Do some of the activities on this list at the camp.

k) Bookmaking
Have youth members create a field guide to the local animals and plants they have seen in their community. Keep albums about nature. Collect the young participants' stories or poetry about biodiversity and create a community book.

l) Sports tournaments
Youth of the area could be involved in organizing sports events famous to the area such as cricket, football, hockey or local cultural sport such as Kabbadi, Malakhra etc. on environmental days or to create environmental awareness among the local community. During these events environmental messages could be delivered through loudspeaker. Such days / events could be dedicated to specific wildlife species of the area such as, Indus Dolphin tournament, Crocodile Cup, Hog Deer Cup etc.

m) Cultural clubs
Local youth could also be mobilized to form drama clubs/cultural clubs/ music clubs through which environmental messages could be conveyed in the form of local theater/drama plays, puppet shows, musical fairs and local folk songs about nature and biodiversity. It is important that the capacity of such groups is developed through proper training and facilitation. Inter-community performance exchange of such groups could be used as an effective tool to raise community awareness and scaling up of such activities across the area.

TYPICAL CONSIDERATION FOR ORGANIZING OF A YOUTH GREENING ACTIVITY

For organizing of youth greening activities at the community level, following things need consideration.

1. **Purpose:** The purpose of the activity to be organized including target group.
2. **Context:** In what context the activity is being organized such as, issues facing the local natural resources to mark the celebration of significant environmental days.
3. **Target group:** The specific community group or age group to be targeted for the event need to be predetermined such as, school children/teachers, specific youth groups, religious leaders, community elders, government officials, political figures and journalists. The number of people involved also needs consideration for proper logistic arrangements.
4. **Action plan:** How the activity will be organized? This will define various actions and assigning individual responsibilities.
5. **Duration, timing and venue** of the activity.
6. **External support:** Networking and coordination with other organizations may be required to identify resource persons or speakers etc.
7. **Resources required** for conducting the activity including, logistic and financial requirements, sources of funding, volunteers, transport, banners, etc.
8. **Assessment and review:** At the end of each activity identify any gaps as for future planning of such activities.
9. **Documentation:** This is required to record and report proceedings and key features of the event. This may use photographs, videos and reports as documentation tools.
10. **Publicity:** It is essential to consider publicizing before and after the event through local media for dissemination of message widely.