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M.Phil Zoology (2nd Semester)

Memo No 01
Date 16/01/2017

WILDLIFE Complete Lectures

"CONSERVATION BIOLOGY OF WILDLIFE"

⇒ WILDLIFE:-

→ Wildlife is the entire native uncultivable flora and undomesticated fauna.

⇒ BIODIVERSITY:-

→ Biodiversity is the variety / variatility of life.

⇒ CONSERVATION BIOLOGY:-

→ Conservation Biology is the science of protection and management of biodiversity.

⇒ Why conservation is necessary?

1- To know the status of biodiversity.

2- To protect the declining biodiversity.

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* Status of Species

→ Status of species means that either a specie is decreasing, increasing or stable.

E.g.,

* Kangroos → restricted to Australia → 2000 no need to conserve them
* Deer → cosmopolitan → 20,000 → need to conserve

→ To conserve the biodiversity, first we have to know the status of species.

* we have to conserve declining or rare species.
* If species are naturally rare and stable, then there is no need of conservation.
* If species are declining due to environmental factors, hazards and human activities, then it is necessary to conserve them.

⇒ Why we conserve the species?

1- The resources are limited.

* If resources are unlimited, then there is no need of conservation. (Because natural

resources are limited, so we always conserve the limited species that are rare or declining.)

2- The natural resources / species have values.

→ Some economic value / valuable species or natural resources.

⇒How Conservation is done?

→ Various methods to conserve the species

1- Direct Method 2- Indirect Method

Direct Method: Sampling, Total count, Capture-Mark-Recapture

Indirect Method: Voice, Fecal Analysis, Predators, shed off

* Antelops are different from deers because they have ability to shed off.

⇒How we come to know → either a species is increasing / decreasing or stable → by:

→ Previous records → Population Census

→ If previous records are not available, then status of specie is known by pop. census

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Memo No 02
Date 23/01/2

⇒ Challanges towards Conservati

1- To know the status of biodiversity.

2- Rarity of Species / Commenness of Species

* Some species are naturally rare e.g. Kangroos. * Some species are naturally common. e.g., Crow.

* Vulture → naturally common but declining due to certain anthropogenic activiti So, need to conserve.

3- To conserve only declining species.

⇒ **How we measure** → that species are declining?

→ When we say:

→ Species decline is 50% in last 20 years It means, species disappear from 50% area.

→ 1.5 Million Species known → 5-100 M species (total 70-98.5% Error

→ Population census is based on "netting effort".

→ If species is represented by only one individual in Pakistan and netting effort is done 1 time in every province,

and we catch 1 individual from each province, then taxa is abundant.

→ Netting Effort – 1 time

→ Individual catched – 1 from each area.

→ Taxa is abundant.

* Conservation → never means to increase the number of individual but to maintain the genetic variability.

⇒ APPROACHES OF Conservation:-

→ Two approaches of conservation

* Area
  ↳ In-situ
  ↓
  natural environment

* Species → controlled environment
  ↳ Ex-situ (215 in work in IUCN).

4- Identification of species is also a challange.

→ we have to identify species first.

→ **Erwin** → done fumigation on tropical tree and collected the insects, counted them and identified them. → Multiplied with world's insect species and estimated that there 8 Million Species of insects.

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→ Erwin's estimation is one way to estimate the diversity.
→ Identification of species is one of the biggest challanges of conservation.

*** Morpho-Species** → Some species are identified on the basis of their morphology.
→ The resembling taxa should be consides as one specie.

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Memo No 03
Date 24/01/2017

⇒Challanges in Conservation Biology

* Identification of species
* To know the species status
* Rarity / commenness of species
* Conserve only declining species

⇒Statement:-

→ Diversity increases from poles to tropics.
* Biodiversity ∝ Temperature
* This statement is not a rule or theory because most of the species are unexplored or unknown.

*Hypothesis On this Statement

"Diversity increases from poles to tropics."

1- Catastrophe Hypothesis:-

→ According to this hypothesis, the tropics are more balanced.
* If temperature is increased on poles, then catastrophic conditions will caused while in case of tropics, there is no catastrophic effect of temperature. So, tropics are balanced.

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2- Evolutionary Speed Hypothesis:-

→ According to this hypothesis, all the diversity remains active throughout the year on tropics.

* Diversity remains active → reproduction occurs → this phenomenon speeds up the evolution. So, tropics are more diverse.

3- Energy Input Hypothesis:-

→ According to this hypothesis, tropics recieve more energy.

* Source of energy is sun because tropics are winterless zone.

* Desserts have less biodiversity because of evapo-transpiration phenomenon.

4- Productivity Hypothesis:-

→ According to this hypothesis, the tropics are more productive. So, they rich in diversity.

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Memo No 04
Date 30/01/2017

⇒ Approaches to measure & Protect the Biodiversity:-

→ There are certain approaches to measure and protect the biodiversity.

* Resembling taxa → considered as one specie.
* Certain shortcuts to know about the biodiversity → Identification → Status → Population census → Species decline

→ It is difficult to conserve/measure the diversity. So, there are certain shortcuts in conservation biology to:

- Conserve
- Measure &
- Estimate the biodiversity.

→ Different approaches/shortcuts to avoid challanges.

1- Surrogate Approach:-

→ We select an indicator taxa on the basis of certain characteristics.

i. Indicator taxa should have well-known

and stable taxonomy.
E.g., Scientific name, literature surveys
ii- Indicator taxa should have known ecology.
E.g., role of specie in the ecosystem must be known.
iii- Indicator taxa should be cosmopolitan in distribution.
E.g., Cosmopolitan → Easily available → More literature → Easily conserved.
iv- Some species of indicator taxa should be habitat specific.
E.g., Mountain, caves, Grasslands → habitat of different species.
v- The strategies applicable to indicator taxa should be equally applicable to all other taxa.
vi- Indicator taxa should have some economic value.
→ Economically significant species are more conserved.
*Problems with this approach are

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* The strategies applicable to indicator taxa should be equally applicable to all other taxa.

→ By the strategies of conserving one taxa, we can not conserve all other taxa.
E.g. we can't conserve the birds with the conserving strategies of mammals.

* Indicator taxa should have some economic value.

→ Instead of having some economic value, species should have some biological value.

* Various types of Extinctions on the basis of Specie's values:-

a- Ecological Extinction:-

→ The individual of a specie are there but unable to play their ecological role

b- Local Extinction:-

→ The specie is still present in its geographical range but extinct locally.

C- Biological Extinction:-

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→ When the species are no more know to exist. This is called "real /true extinction."

2- Multiple Taxa Approach / Slopping Basket Approach:-

→ In this approach, we select multiple taxa to conserve the multiple taxa.

→ It is quite rational by conserving one specie of mammals, we can conserve all other species.

→ Insects = Insects, → Aves = Aves

→ Mammals = Mammals etc.

* Problem with this approach:

→ The only problem with this approad is "taxonomic distinctiveness"

3- Taxonomic Distinctiveness Approach:-

→ In this approach, we have to apply our own conservation strategies for some species that are endemic or

unique. E.g. Indus River Dolphin conservation

4- Representation Approach:-

→ In this approach, we apply all other approaches where they needed.

* Surrogate Approach
* Multi-taxa Approach
* Taxonomic Distinctiveness Approach

5- Complementary Approach:-

→ In this approach, we mark the grids of biodiversity.

* National Park → have an intact ecosystem
  ↳ larger area → all biotic+abiotic factors
    ↳ In-situ

→ It is difficult to conserve all the biotic and abiotic factors to make an intact ecosystem.

→ Mark the areas where diversity is dense → by conserving 5% area, we can conserve 95% biodiversity.

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Memo No 05
Date 31/01/2

⇒ Advocacy of Wildlife:-

→ Some people focus on:
* One type of wildlife value
* Multiple type of wildlife values
* Apathetic about wildlife values

→ On the basis of economics, there are four types of values:

1- Direct-Use Values

→ Current market values

2- Indirect-Use Values

→ Ecosystem services provided by biodiversity.

3- Option Values

→ Values that are still hidden.

4- Existence Values

→ Values that exist.

→ How much you will pay to have the tiger.

→ The species have right of existence as humans (ethical statement).

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Memo No 05
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→ On the basis of values, there are certain types of advocates of wildlife:

1- Laissez- Faire Group:-

→ People living mostly in cities and apathetic about wildlife and their values.

2- Protectionists:-

→ They want to conserve the wildlife on ethical grounds.

3- Sentimentalists:-

→ Group of people that want to conserve the wildlife for aesthetic values.

4- Single Use Adherents:-

→ They focus only one value for the conservation of wildlife.

5- Multiple Use Adherents:-

→ They use multiple values for the conservation of wildlife and they are true wildlife lovers.

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Date 06/02/2

⇒ Conservation → Species Based (Ex-situ) 215 IUCN sp. records
→ Area Based (In-situ)
↳ biggest catagory is "National Park". → Maintainenance & Conservat
→ We consider ecosystems are closed. All biotic and abiotic factors of one ecosys-em will never interfare with the factors of another ecosystem.
→ we consider ecosystems are closed whi in reality ecosystems are open. and they can interfare in another ecosyst
E.g., Stream → narrow portion → less productivity
Wider Portion → More productivity.
"→ When the individual relatively greater in number and chances of survival are greater than extinction." → (Insitu)
"→ When the chances of extinction are greater than survival and individuals are relatively lesser in number." → (Exsitu)
→ Major Challange in Conservation is
Inbreeding
→ To maintain genetic variability of individua

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Date 06/02/2017

⇒ Landscape Scale Conservation:-

→ Landscapes are heterogenous
→ There are patchiness in the habitat.
→ Patches of different habitats.
*National Park → homogenous ecosystem
* Landscapes → heterogenous ecosystem
→ Ecosystems are open and they are heterogenous.

Desert → Grassland → Water Body → Dessert
↳ Patchiness in habitat

→ There are certain factors that effect conservation efforts in landscapes;

1- Patch Quality:-

→ The quality of the patch for species of concern. It can effect conservation efforts.

2- Patch Context:-

→ Patch context is spatial location of patch with reference to space. → Either it is tropical, subtropical or dessert.
* temporal with reference to time.
→ Connectivity → ease of movement of the species. how much is ease to bridge the gap.

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* Separate national parks for separate ecosystems.

⇒ SLOSS → Single large or several small
* Larger is the best.
→ Conserve abiotic & all biotic factors.
→ In landscape conservation, there is patchiness. → Issue is Inbreeding

⇒ MVPS → Minimum viable population size
↳ below the size of population are unlikely to recover.

⇒ Franklin Rule :-
→ Ideal condition,

Time Period	Survival
1000 years	→ 99%

→ For Convenience,

100 years	→ 95%

E.g. Bighorn sheep → 120 in population in 70 years.

⇒ Ne → The numbers of individuals can contribute to the next generation.

→ "Ne" also called Effective Population Size.
→ Short Term Conservation → 50 animals
→ Long Term Conservation → 500 animals
⇒ If there is patchiness in landscapes, then we can make fragments to maintain the genetic variability.
→ We create bridges for ease of the movement of animals → But predators can also move through these bridges. This is the major problem.

⇒ Speciation :-

→ Formation of new species.
→ Uniqueness of individuals also might be disturbed. The gene pool is unique.
→ Speciation → Allopatric Speciation
→ Speciation that Isolate the population geographically
→ First Step → Geographical Isolation
→ Reproductive Isolation
* If the individuals are very few in number. Then, we Re-inforce the individuals.
⇒ Re-inforcement = Adding up of Individuals in Existing Population

⇒Re-Introduce → we can introduce new species where the extinction have occured.

→Many adapted genes can be transferred from one population to another population.

Lec# 08
14/02/2017

⇒Principles of Conservation Biology:-

1-Evolution is the basic axis that unites all of biology.
(The Evolutionary Play)

2-The ecosystems are dynamic and largely non-equilibrial.
(The Ecological Theatre)

3-Humans are the part of every ecosystem.
(Humans are part of the play).

* Species → Conservation → Ex-situ
* Ecosystem → Conservation → In-situ

→ we should not be rigid about patchiness → we should declare the

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Date 07 02 / 2017

area as "Biosphere reserve".
→ We should not be strict about bound-aries.

⇒ Biosphere Reserve :-
→ There are four parts of biosphere reserve:

1- Core Area: → is the undisturbed natural area of natural habitat.
2- Buffer Zone → is the area where disturbance is allowed but it should be sustainable.
3- Environmentally Sensitive Area → reserve for intensive agriculture.
4- Human Use Area → reserved for human habitation.

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* [Management of Semi-Natural Ecosys

⇒ Management by Woodlands:-

→ There might be six situations.

1- Wild Wood;

→ These are natural communities but are managed for timber production.

2- Wood Pasture;

→ These are the trees in the pestor landscapes for grazing (managed for grazing).

3- Non-Woodlands;

→ These are the trees in hedgerows.

4- Plantations;

→ These are the aforested landscapes

5- Orchard;

→ Trees managed for fruit production

6- Ornamentals;

→ Eye catching trees in Parks, Streets & houses.

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Date 20/02/017

⇒ Coppcing:-

→ One way is to manage the trees is "coppcing".
→ Coppcing is also carried out for the management of biodiversity.
"To use the regrow power of plants" is known as coppcing.
E.g., Butterflies → prefer sunny weather
→ To manage the butterflies, grow the trees in rows → We can cut one & alternate row within the period of 5-30 years. → to manage the butterfly diversity.

cut after 5-30 years by using regrow power

⇒ Fire:-

- Ground Fire
- Surface Fire → **Best**
- Canopy Fire / Crow Fire → **Destructive**

→ Another way to manage the trees is "fire".
→ Surface fire is best.
→ We can manage the grasses by fire.

⇒ Grazing → manage the trees

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Another way to manage the ecosystem is "Ecological Restoration."

⇒ Ecological Restoration:-

→ Restoration means to return the object to its Pristine (historic) condition.

*Why ecological restoration is necessary

→ 3 basic reasons to restore the ecosys

→ 1- We have to spend money for the provision of clean air/water etc.

[Material: E.g. → Concept of species. E.g. humans take more care of their own species.

2- [Existential:-

→ For the existance of humans, the societies should restore the ecosystem and there will be ownership.

→ Ecosystems should be maintained. Human participate in restoration and if they succeed, then there will be ownership.

3- [Heuristic → Experiments for restoration

⇒ Components of [Ecological [Restoration

→ For the restoration of ecosystem, there are certain components:

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1)- Soil → There might be two conditions
   (a) Only ploughing can resolve the issue (Compactness)
   (b) Introduction of soil from the nearby areas (Mining)
2)- Vegetation → Native vegetation of the areas through introduction of seed/vegetation.
   * we have to introduce native vegetation.
3)- Pollinators → we have to introduce native pollinators communities.
4)- Native Seed Dispersers → we have to introduce native seed dispersers.
5)- Herbivores → Vegetation of any area depends on native herbivores. → Introduce native herbivores.

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