

Landscape Change and Disease Disaster

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What is Landscape, Landscape Change and Disease Disaster

- ▶ **Landscape** is nothing but all visible features on an area when viewed from one place at one time.
- ▶ **Two major types:**

Natural landscape



This is the Original Landscape which exists before Humans acts on it

Cultural landscape



This is the Landscape which have been modified by Humans

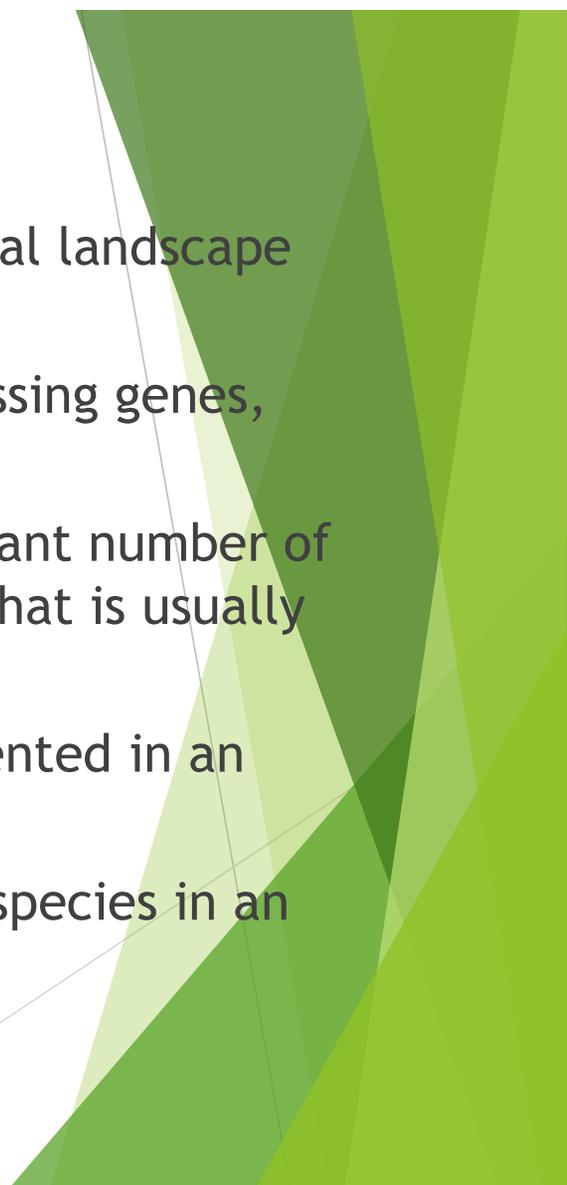
Components of Landscape

Natural Components

like Mountains, Rivers, Natural Forests, Deserts, Wetlands, Coasts, Volcanoes, Grasslands etc.

Man-Made Elements

Buildings, Roads, Fences, Planting, Mining, Farming, Farms, Orchards, Public Parks Golf Courses etc.

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- ▶ **Landscape Change:** are modifications brought in a natural landscape for any purpose.
 - ▶ **Biodiversity:** is the variety of all forms of life, encompassing genes, species, ecosystem and their interactions.
 - ▶ **Disease Disaster:** It refer to the appearance of a significant number of cases of an infectious **disease** in a region or population that is usually free from that **disease**.
 - ▶ **Species Richness:** is number of different species represented in an ecological community, landscape or region.
 - ▶ **Species Evenness:** refers to how close in numbers each species in an environment is.

Mechanism of Interactions in the Landscape

- ▶ Has to be understood in two words: **Pattern and Process**
- ▶ **Pattern:** is the spatial distribution of the elements of the Landscape especially used for spatial distribution of the species and habitats.
- ▶ **Process:** refers to the interactions of the elements of landscape especially biological factors.



What is the need to Study Landscape and Changes in the Landscape

- ▶ To study various interactions in the landscape among biotic factors and change in the biodiversity
- ▶ To study Habitat requirements and changing Habitats and their impacts
- ▶ To study Equilibrium and balance maintained in the landscape
- ▶ To study Host Pathogens chains existing in the Landscape

Outcome of Changes in the Landscape

A) In case of Landscape with minimum and regulated changes

Intact and Unchanged and Unfragmented Landscape



Lesser are the chances of the disturbances in the existing equilibrium between Biotic Factors and Biotic and Abiotic Factors / Lesser is the interaction between wild, domesticated Animals and Humans



More are the chance of conservation of Biodiversity of Landscape



More is the Species Richness, Species Evenness and Species Distribution



More Balance is the Host Pathogen Chain
(Pathogen has more diverse Host Range)



Lesser are the Chances of the Spread of Disease or Disease Disaster

B) In case of Disturbed Landscape:

Opposite of the Above Process

Case study

- ▶ Nipah Virus- Destruction of the habitat/Forest of Frugivorous Bats which are reservoirs host of the virus for Pig Farming (Indonesia to Malaysia)
- ▶ Malaria because of Deforestation of Amazon Forests resulting in more breeding ground for Anopheles Mosquito as more lit open Grass lands and Water grounds
- ▶ Lassa Virus because of clearing of forests for Palm tree plantations resulted in attracting rodents (reservoir of Lassa virus) to move out of forests and settling in human habitations along the palm plantations (in Liberia)
- ▶ Lyme Disease in North eastern US tick Borne Disease with white footed mouse and some Deer Species as their reservoir. Ticks had option with more of species diversity on which they could feed. Because of species richness and evenness the disease was contained and after the disturbance in the forests both species richness and evenness was disturbed.
- ▶ Ebola Virus, Dengue, HIV

To Summarize the Process..

- ▶ The Process of Landscape Change especially Forest clearing results in more of movements of wild animals and residents of Forests, which are living with each other since ages, out of Forest Areas.
- ▶ Humans being new to the interaction and less adapted is on high risk to get infections
- ▶ Landscape changes mainly clearing of forests and changing climate forces the forest dwelling species (which have co-evolved and co-existed and are in a mode of adaptability with each other) like bats, rodents, snails, mosquitoes etc. move out of to original habitats to human dwelling places and resulting in increase in interactions with humans and thus spread of deadly Diseases.
- ▶ Forest acts as buffers zones and as containment zones of these Diseases.

Mitigating Measures for Disease Disaster

- ▶ Attempts should be made for least disturbances of the habitats in the landscape and to conserve the pattern and process of biodiversity.
- ▶ Continuous study on the changing habitats and their interactions with human and wild animal health.
- ▶ Continuous and Proactive approach to epidemiological studies on the landscape
- ▶ Including Continuous Disease surveillance, continuous monitoring of disease prevalence both in wild as well as domesticated animal and their health assessment.
- ▶ Study of rate and incidence of spread of any pathogen due to breakdown of the existing interactions.
- ▶ Interdisciplinary coordination between different departments working in the landscape

Time to Think.....

- ▶ The cost of treating of one patient affected with Malaria or Lymes Disease or Nipha infection and Cost of Protecting the Forests, Ecosystem and Biodiversity.



If not then will have to be ready for
many more to come.....





Thanks