Question no: 07

Biodiversity — Causes, Effects, Solutions

Introduction:

Biodiversity is defined by the world Health organization as;

It underpins all life on Earth and refers to biological variety in all its forms, from the genetic makeup of plants and animals to cultural diversity.

Biodiversity is measured by two components;

a) Species richness
b) Species evenness

a) Species richness:

It is the measure of the **number of species** found in a community.

Tropical rainforest in the terrestrial ecosystem and **coral reefs** in the marine ecosystem have the highest degree of species richness.

b) Species evenness:

It is a measure of the relative abundance of the different species making up the richness of the area.

Example;

Sample A forest has 2 tigers, 5 deers, and 6 rabbits and the sample B forest has 1 tiger, 6 deer, and 8 rabbits. Both samples have the same richness (3 species, species richness) and the same total number of individuals. However, forest A has more evenness than the forest B.

Low evenness indicates that a few species dominate the site.

ii) Nature of Biodiversity:

Alpha diversity

=> refers to diversity within a particular area or

Beta diversity

- comparison of diversity between ecosystems,

ecosystem, usually expressed by the number of species in that ecosystem.

usually measured as the change in the number of species between the ecosystems.

Gamma diversity:

It is a measure of the **overall diversity** of the different ecosystems within a region.

Genetic diversity

- It is the total number of genetic characteristics in the genetic makeup of a species.
- allows species to adapt to changing environment.
- ensures that some species survive drastic changes, and thus carry on desirable gene.

Species diversity

- It is ratio of are species population over total numb of organisms across all species in the given biome.
- a measure of the diversity within an ecological community that incorporates both species richness and species evenness.

02) Causes For the loss of Biodiversity

Natural ecological disturbances such as weather, wildfire, floods, and volcanic eruption change ecosystems drastically by eliminating local population of some species. Such disturbances are temporary because natural disturbances are common, and ecosystems have adapted to their challenges (ecological succession).

Permanent biodiversity loss is typically associated with mass extinction events and anthropogenic ecological changes.

There are four major anthropogenic causes for the loss of biodiversity _ The Evil Quartet _

- Habitat loss
- Overexploitation
- Alien species
- Secondary extinction

a) Habitat loss :

This is the most important cause of driving animals and plants to extinction. wetlands are being made dry through landfills as the demand of land increases.

The most dramatic examples of habitat loss came from tropical rainforests.

- Once covering more than 14% of the earth's land surface, these rainforests now cover **no more than 6%.**

- **Amazon rainforests** (called as the lung of the planet), is being cleared for cultivating soyabean or for conversion to grasslands for raising beef cattles.

b) Over-exploitation :

When human 'needs' turn 'to greed', it leads to overexploitation of natural resources. In the last 500 years, many species extinction was due to overexploitation by humans. Excessive cutting of trees, overgrazing, collection of firewoods, hunting of wild animals for skin (e.g tigers) - all result in gradual loss of species.

c) Alien Species Invasion :

Invasive alien species are **non-native species** that spread and interfere in a new

ecosystem by posing a serious threat to the native biodiversity, leading to economic loss.

They are the second biggest cause for biodiversity loss, next to the habitat destruction.

For example,

the **Nile Perch** fish introduced into Lake victoria in East Africa, led eventually to the extinction of an ecologically unique assemblage of more than **200 species of cichlid fish in the lake.**

Secondary

d) Species extinction:

Various processes led to the extinction of species;

- **deterministic processes** - that have cause and effect, eg glaciation, human interference
- **stochastic processes** - affect the survival and reproduction of individuals - e.g unexpected changes in the weather pattern, diseases, increase of competition, predators, or parasites etc

03) Consequences of loss of biodiversity:

(i) Affects livelihoods:

Human health depends on ecosystem products and services. Changes in ecosystem services affect livelihoods, income, local migration, or may even cause or exacerbate political conflict.

(ii) Human-animal Conflict.

It refers to the interaction between wild animals and people and the resultant negative impact on people and/or their resources, or wild animals or their habitat.

It occurs when the wildlife needs overlap with those of human population.

For instance, Himalyan snow leopard preys on goats in the Himalyan region, farmers trap and kills snow leopards to save their livestock.

(iii) Increased Zoonoses due to habitat loss:

Zoonoses are diseases transmitted from animals to humans.

e.g Rabies (dogs), Ebola (fruit bats) and novel Coronaviruses (Pangolin) etc.

Zoonotic diseases are interlinked with the health of an ecosystem.

According to the UN - Environment Programme, 60% of human infectious diseases are zoonotic.

04) Solutions fa biodiversity loss:

Biodiversity Conservation:

Conservation of biodiversity leads to the conservation of essential ecological diversity, to preserve the continuity of food chains. It assures sustainable utilization of potential resources and constant flow of ecosystem services and goods.

a) In-situ conservation:

It is the on-site conservation of genetic resources, in the natural population of plants or animal species.

i) Reserved and protected forests:

In reserved forests, rights to all activities are banned unless specific orders

are issued.

In protected forests, rights to activities like hunting, grazing are given to communities living at the fringes of the forests.

Other in-situ conservation methods are;

- national parks
- Wildlife Sanctuaries
- Community Reserves
- Sacred groves

b) **Ex-situ conservation:**

In this approach, threatened animals and plants are taken out from their natural habitat and placed in a unique setting where they can be protected and given special care.

Zoological parks, botanical gardens, wildlife safari parks and seed banks serve this purpose.

a very well composed and satisfactory
good examples and good use of syllabus
always ans like this using the terms and points from syllabus
good work
1420

Question no: 04

Era of global boiling

Introduction:

Atmosphere gases like carbon dioxide, methan, nitrous oxide, water vapours and chlorofluorocarbons can trap the out-going infrared radiations from the Earth's surface thereby causing greenhouse effect. These gases if are not checked, by the turn of the Century, will cause the temperature to rise by 5°C.

Special reports have been prepared on the topic such as regional impacts of climate change and the global climate system. IPCC decided in 2016 to prepare three special repots;

a) Special repost on global warming of 1.5°C (SR1.5 - 2018)

b) Special repost on climate change and Land (SRCCL - 2019)

use marker for facts and figures

c) Special report on the ocean and cryosphere in a changing climate change (SROCC - September 2019)

Special report on Global warming of 1.5°c (SR1.5 - oct 2018):

- SR1.5 said it was possible to keep the rise in temperature within 1.5°c if the world could keep would bring down its GHG emissions to half of its 2010 levels by 2030 and to net zero by 2050.
- at the current rate of emissions, of the world is set to break the limit of 1.5°c between 2030 and 2050.
- **Net-zero** is achieved when the total emissions is balanced by the amount of absorption of CO_2 through natural risks or removal of CO_2 through technological interventions.

Impacts of Global Warming: that led to global boiling:

i) Increased frequency of heatwaves:

The unprecedented heatwaves which

has claimed hundreds of lives in British columbia and neighboring Washington and Orega states, is the latest in the growing list of extreme weather events.

Australia (2019-20) and California, Serbia - have all recently experienced deadly wildfires caused by extreme heatwaves.

(ii) Increased incidence of wildfires:

Increased incidence of wildfires creates a positive feedback loop exacerbating global warming.

Although wildfires on permafrost in Serbia South of the Arctic are not uncommon. But in 2020, burning occurred well above the Arctic Circle (tundra), a region not normally known to support large wildfires.

(iii) Sea-level changes:

World meteorological organization (WMO) has hinted at global warming as a cause of current increase in

Sea surface temperatures.

IPCC report warns sea level could reach **60 to 110cm** if emissions continue to increase strongly.

In 2019, Indonesia's President Joko Widodo announced that a country's capital would be relocated from Jakarta to the province of East Kalimantan on the lesser populated islands of Borneo.

(iv) Tropical cyclones - becoming more severe:

The frequent high intensity storms have been tied to the very warm sea surface temperatures.

The increasing ocean temperatures gave rise to devastating Idai cyclone in march 2019 in the South-west Indian Ocean basin. Extremely severe cyclone storm Fani (April 2019) is India's strongest April cyclone in 43years.

Now, the Arabian sea is started receiving tropical cyclones of high intensity in a small time interval. In 2019, storm "Vayu" occurred in the Arabian sea in the month of June.

v) Climate migrants:

Migration due to climate-change impa such as sea level rise floods, draught etc. According to world Risk Index repat-2020; Africa is identified as a hotspot of vulnerability.

vi) Other impacts:

a) Economic damages:

The economic losses suffered due to the emission of one tonn of CO_2 into the atmosphere. US economic damages would be $48 per tonn of CO_2 emission.

b) Biodiversity loss:

Loss of Plankton and bleaching of coral reefs will cause a great loss to marine biodiversity.

Measures to lessen impacts of global boiling:

1. Clean coal technology to reduce CO_2 emission:

Half of the world's electricity is generated by burning coal, and will remain a dominant energy source for years to come.

Clean coal technology seek to reduce the harsh Environmental effects by using multiple technologies. Systems like electrostatic precipitators, coal garification, wet scrubbers, or low NO_x burners can reduce the emission of harmful gases.

(ii) Carbon Sinks and Carbon Sequestration:

Carbon Sink is a natural or artificial reservoir that accumulates and stores some carbon-containing compounds. The process by which carbon sinks remove CO_2 from the atmosphere is carbon sequestration.

Carbon sinks help to tackle the challenge of climate emergency.

(iii) Geoengineering to fight climate change:

The Oxford Geoengineering Programme defines it as' the deliberate large-scale intervention in the Earth's natural systems to counteract climate change.

technologies include managing solar radiation removing CO_2 from atmosphere, afforestation etc.

iii) Climate-Smart Cities:

Climate-smart refers to an integrated approach to managing landscapes and ecosystems to address interlinked challenges of sustainable development and global boiling.

Making cities more resilient, sustainable inclusive and safe is one of the United Nation's sustainable developmental goals.

(v) Transition to green economy:

Three priorities in transition of economy to green economy are:

Decarbonising the economy

Commit the environmental community to justice and equity

Conserve the biosphere.

vi) Transition away from the coal:

IPCC established that a 1.5°C consistent trajectory requires coal-powered electricity to drop to less than 1% of the global electricity mix by 2050.

One proposal is to phase out the oldest coal plants first. This would phase out coal in developed and developing economies at a differentiated rate.

14/20
well done

Current phase-out efforts:

- The UK plans to shut down all "unabated" coal-fired electricity by 2050.
- Germany finalized a plan to shut down all coal power plants by 2038.
- France and Italy have also made similar political commitments.

Question no: 08

Wetlands:

wetlands are areas of **marsh or peatland** with water that is static or flowing, fresh, salne including areas of marine water, the depth of which at low tides does not exceed 6m.

wetlands are transition zones between terrestrial and aquatic ecosystems.

These habitats experience periodic flooding from adjacent deepwater habitats and therefore

& plants and animals specifically adapted to shallow flooding or waterlogging.

Importance of wetlands:

- wetlands are indispensable for the countless benefits that they provide humanity, ranging from freshwater supply, food and building materials.
- wetlands are habitat to aquatic flora and fauna, numerous species of native and migratory birds.
- they carry out water purification, filtration of sediments, and nutrients from surface water.
- Play an important role in flood mitigation by controlling the rate of runoff.
- they act as genetic reservoir for various species of plants (especially rice).
- they help in nutrient recycling.
- Buffer shorelines against erosion and pollutants.

Reasons for the depletion of wetlands:

- Excessive pollutants are dumped into wetlands beyond the recycling capacity
- Habitat destruction and deforestation create ecological imbalance by altering the population of wetland species.
- Overgrazing in marshy soils
- Overfishing and fish farming
- Conversion of wetlands for agriculture and encroachment by public and mafia.
- Removal of sand from beds near seas makes the wetlands vulnerable to wave action and tidal bore.

4/5
ans are very well composed with a relevant good data
ans satisfactory but work on time management