

Friday

Mock Exam: 4

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Environmental Science

Past - I

Q No 4: What is the importance of public participation in an Environmental Impact Assessment (EIA) process? What is the difference between EIA and Strategic Environmental Assessment (SEA)? (20)

Introduction:

Public participation is a fundamental component of the Environmental Impact Assessment (EIA) process, as it ensures that the voices of those affected by proposed projects are heard and considered.

It enhances the legitimacy and transparency of the decision-making process leading to more influenced and sustainable outcomes.

Additionally, understanding the differences between EIA and SEA is crucial, as these tools while similar in purpose, differ significantly in their scope, timing and application with the environmental governance.

I. Importance of Public Participation in Environmental Impact Assessment (EIA):

Public Participation in the Environmental Impact Assessment (EIA) process is important for several reasons:

1. Enhancing Transparency and Accountability:

Involving the public in the EIA process to ensure transparency, allowing stakeholders to understand the potential environmental impacts of proposed projects. It holds decision-making accountable as public interest can be deterred based on uninformed decisions.

"Public Participation in decision-making process is essential to enhancing transparency and holding authorities accountable for their action"
(Aaron Macneight)

2. Incorporating Local Knowledge:

Local communities often have vulnerable environmental and social aspects of their region. Public Participation enables the integration of indigenous knowledge, leading to more accurate assessment and better-informed decisions.

3. Promoting Social Acceptance:

Engaging the Public helps to build trust and acceptance of the proposed projects. When communities feel that their concerns are heard and addressed, they are more likely to support the project, reducing the likelihood of conflict and opposition.

"Public engagement increases project approval rates by up to 25%"
(World Bank)

4. Ensuring Sustainable Development:

Public Participation ensures that environmental and social considerations are balanced with economic development.

It helps to identify the potential negative impacts and suggests mitigation measures to contribute to more sustainable policies.

"The greatest threat to our planet is the belief that someone else will save it"
(Robert Swan)

5. Strengthening Democratic Processes :

The involvement of the public in the EIA process reflects democratic principles by allowing citizens to participate in decisions that affects their environment and well-being. It empowers communities to influence policy and decisions development.

II. Differentiate Between EIA and Strategic Environmental Assessment (SEA) :

Environmental Impact Assessment (EIA)

Strategic Environmental Assessment (SEA)

1. EIA focuses on assessing the environmental impacts of specific projects such as infrastructure development, industrial facilities and urban expansions.

SEA focuses on assessing the environmental impacts such as policies, plans and programs at a broader, strategic level. It is not tied to a single project but rather to overarching strategies that guide future development.

2. EIA conducted after a specific project is proposed but before any significant decisions are made or construction begins.

EIA

SEA

3 The EIA process is usually mandatory and project-specific.

It is proactive and aims to integrate environmental considerations into higher level planning and policy development.

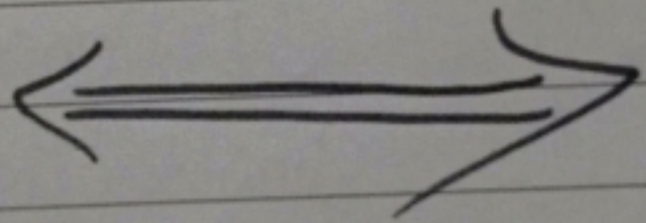
4 EIA provides detailed information on the environmental impacts of a specific project, which informs decision making regarding the approval, modification and rejection of the project.

SEA is used in the development of policies, plans and programs. Particularly, like transportation, energy and land use.

It ensures that environmental considerations are embedded in the early stages of planning and policy development.

Conclusion :

Public Participation in the EIA process is essential for ensuring transparency, incorporating local knowledge, promoting social acceptance and fostering sustainable development. EIA is project-specific and reactive while SEA is broader, strategic and proactive focusing on consideration into policy and planning processes in negotiating environmental processes. Together EIA and SEA plays complementary roles in promoting environmentally responsible decision-making.



Q No 5 (a): Define Environmental Economics and explain briefly interrelationship between Environment and Economics. (10 Marks)

Definition of Environmental Economics:

Environmental Economics is a branch of economics that focuses on the relationship between the economy and the environment. This economic system seeks to develop strategies for managing natural resources efficiently, minimizing environmental degradation and promoting sustainable development.

"Economics without ethics is blind;
Ethics without economics is empty."
(Amartya Sen)

I. Interrelationship Between Environment and Economics:

The interrelationship between environment and economics is complex and multifaceted.

1. Resource Dependency:

Economic activities rely heavily on natural resources such as water, minerals and energy. This environment provides the raw materials needed for production, making it a foundational component of an economic system.

2. Environmental Degradation and Costs:

Un sustainable economic practices can lead to environmental degradation such as pollution, deforestation and climate change. These environmental issues imposes significant economic costs, including healthcare expenses, loss of biodiversity and reduced agricultural productivity.

Air Pollution Costs the global economy \$8.1 trillion annually (World Bank)

The Cost of climate change impact could reach \$23 trillion by 2050 (Swiss Re Institute)

3. Economic Incentives for Environmental Protection:

Environmental economics explores how economic incentives such as taxes, subsidies and market-based approaches like cap and trade system can be used to encourage business and individuals to adopt environmentally friendly practices.

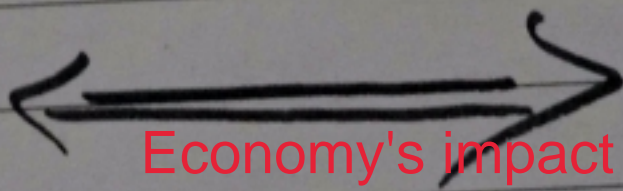
4. Sustainable Development:

The concept of sustainable development promotes the need to balance economic growth with environmental protection. Environmental economics provides the tools to assess the long-term economic benefits of preserving the environment for future generations.

"The future depends on what we do in the present"
 (Mahatma Gandhi)

5. Valuation of Ecosystem Services:

Environmental economics also deals with the valuing ecosystem services such as clean air, water purification and carbon sequestration, which are often overlooked in traditional economic analyses.



Economy's impact on Environment
 Environment impacts on economy

Q No 5: (b) Explain the phenomenon of eutrophication. (10 marks)

Eutrophication:

Eutrophication is a process where water bodies such as lakes, rivers and oceans become excessively enriched with nutrients, particularly nitrogen and phosphorus. This nutrient enrichment leads to the rapid growth of algae and other aquatic plants.

Explain properly

Eutrophication is a reminder of how interconnected our actions are with the health of the environment.
(William L. Boggs)

1- Key Steps in the Eutrophication Process:

1. Nutrient Overload:

The process begins when excess nutrients, primarily from agricultural runoff, wastewater and industrial discharge enter a water body.

2. Algae Bloom:

The influx of nutrients stimulates the rapid growth of algae, leading to a surface bloom of water, blocking sunlight from reaching underwater plants.

3. Oxygen Depletion:

As the algae die and decompose, bacteria consume a large amount of oxygen in the water, leading to hypoxic conditions of low oxygen level.

This oxygen depletion can create "dead zones" where most aquatic life cannot survive.

There are over 400 known dead zones worldwide, areas where the oxygen levels are too low to support most marine life.

National Oceanic and Atmospheric Administration (NOAA)

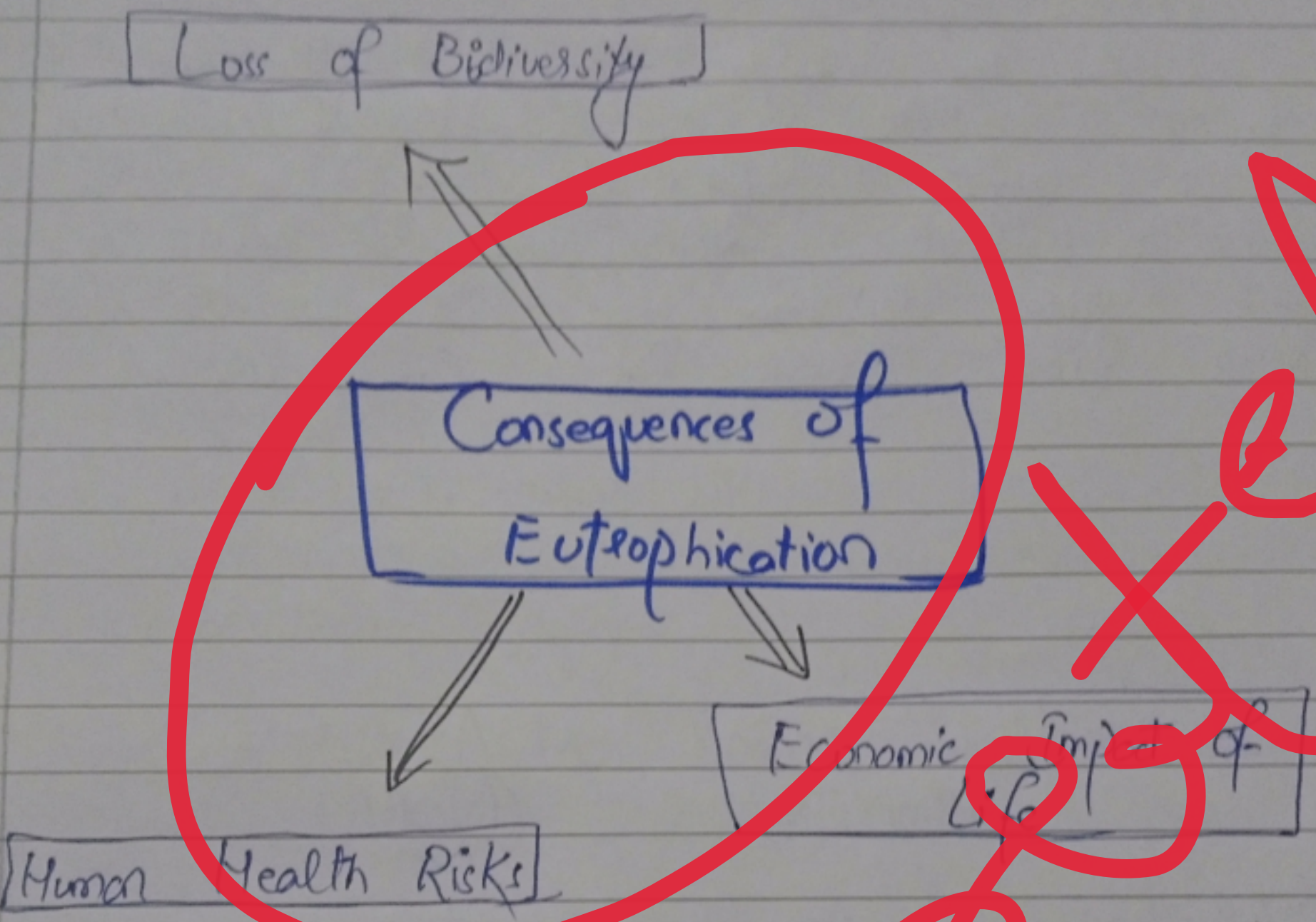
4. Disruption of Aquatic Ecosystems:

The lack of oxygen affects the entire aquatic ecosystem. Fish and other marine life may die, reducing biodiversity.

The decay of dead plants and animals further contributes to the problem, creating a cycle of degradation.

5. Water Quality Deterioration:

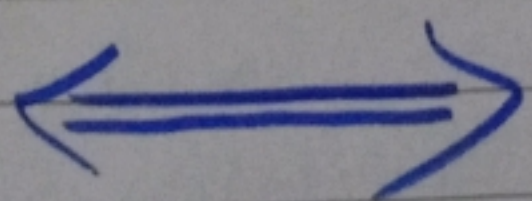
Eutrophication can lead to the deterioration of water quality, making it unsafe for drinking, recreation and other uses. It also results in the production of toxins by creating types of algae, which can harm both aquatic life and human health.



Conclusion :

Eutrophication is a significant environmental problem that disrupts aquatic life of ecosystems, degrades water quality and poses threats to biodiversity and human health.

By addressing the causes of nutrient pollution is essential to prevent and mitigate the impact of eutrophication.



Q No 6: (a) Give highlights of National Climate Change Policy of Pakistan.

Pakistan's National Climate Change Policy:

Pakistan's National Climate Change Policy

Focuses on adapting to climate impacts, reducing greenhouse gas emissions and promoting sustainable development. It includes measures for better water management, afforestation and disaster preparedness.

Key Features of Pakistan's National Climate Change Policy:

i- Climate Resilience:

The policy emphasizes enhancing the country's resilience to climate change impacts, including extreme weather events, through adaptation strategies and infrastructure improvement.

"In the face of climate change, Resilience is our ability to not only endure but to thrive and transform"

(Helmann H. Storm)

(14)

ii- Sustainable Development :

The policy integrates climate consideration into national development plans, aiming for sustainable economic growth while addressing economic concerns.

iii- Disaster Management :

It includes measures for improving disaster preparedness and response, addressing the increased frequency and severity of climate-related disasters.

Disaster Preparedness is not an option; it is a necessity for safeguarding lives and building resilient communities"

(Ban Ki-Moon)

iv- Water Resource Management :

The policy addresses the need for better management of water resources, given the anticipated changes in the precipitation patterns and water availability due to climate change.

v) Research and Capacity Building :

The policy supports research on climate change impacts and development of local capacity to implement and manage climate adaptation and mitigation measures.

vi) Public Awareness and Education :

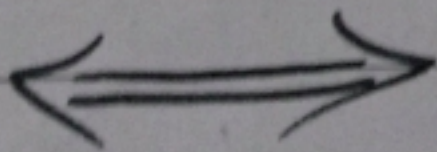
The policy includes initiatives to raise public awareness about climate change and encourage community involvement in climate action.

Divide into key areas and implementation strategies

Public awareness campaigns can increase participation in recycling programs by 20%
(Environmental Protection Agency (EPA))

vii) Monitoring and Evaluation :

It calls for the establishment of a monitoring and evaluation framework to track the progress of climate change initiatives and adjust policies as needed.

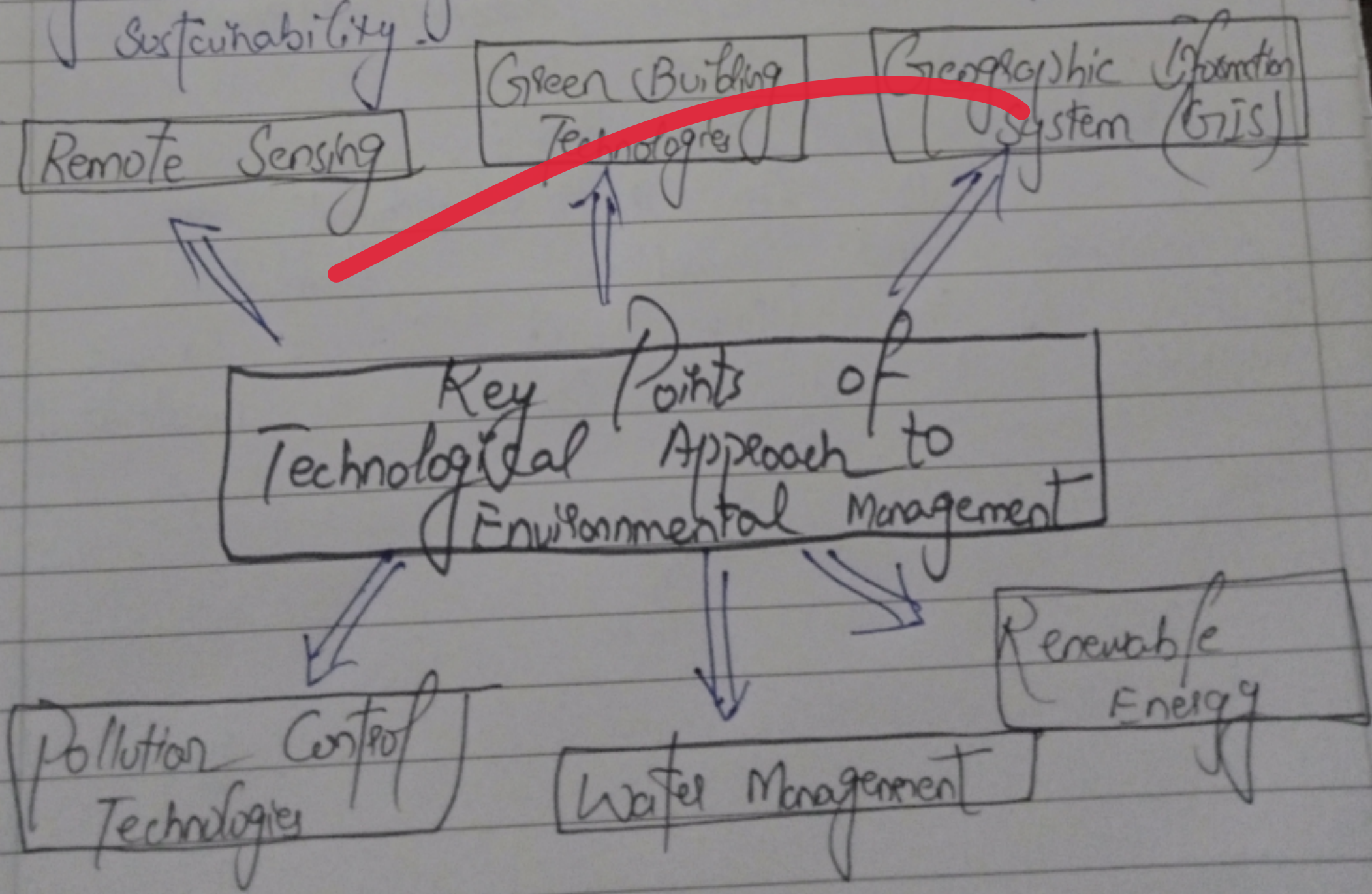


Q No 6: (b)

What are technological approaches to Environmental Management? (10 marks)

Technological Approaches to Environmental Management

Technological approaches to environmental management includes using remote sensing and GIS to monitor and analyze environmental data. Pollution control technologies and waste management systems helps to reduce pollution and manage waste. Renewable energy sources and carbon capture technologies support efforts to reduce greenhouse gas emissions and promote sustainability.



a. Remote Sensing:

Remote Sensing utilizes drone technology to monitor environmental changes, land use, and natural resources management with high precision.

"Over 500 Earth-observing satellites are currently in orbit" (European Space Agency)

b. Geographic Information System: (GIS)

GIS provides tools for mapping and analyzing spatial data to manage natural resources, assess environmental impacts and plan conservation efforts.

"The global GIS market was valued at approximately \$11 billion in 2023"

a. Pollution Control Technologies:

Pollution Control Technologies includes advanced filtration systems, scrubbers and catalytic converters to reduce air and water pollution from industrial processes and vehicles.

d. Water Management Technologies:

Water management technologies incorporate techniques like waste-to-energy system, recycling facilities and composting to manage and reduce waste effectively.

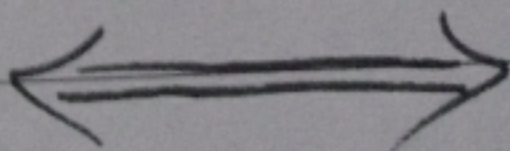
2000 waste-to-energy plants worldwide process about 250 million tons of waste annually, converting it into energy and reducing "land fill use" (International Energy Agency (IEA))

e. Renewable Energy:

Renewable energy utilizes technologies such as solar panels, wind turbines and hydro-electric systems to generate clean energy to reduce reliance on fossil fuels.

f. Green Building Technologies:

Green building technologies includes energy-efficient building materials, smart lighting system and sustainable design practices to reduce the environmental impacts of constructions and operations.



QNO 8: Write short notes on any four of the following. (5 marks each)

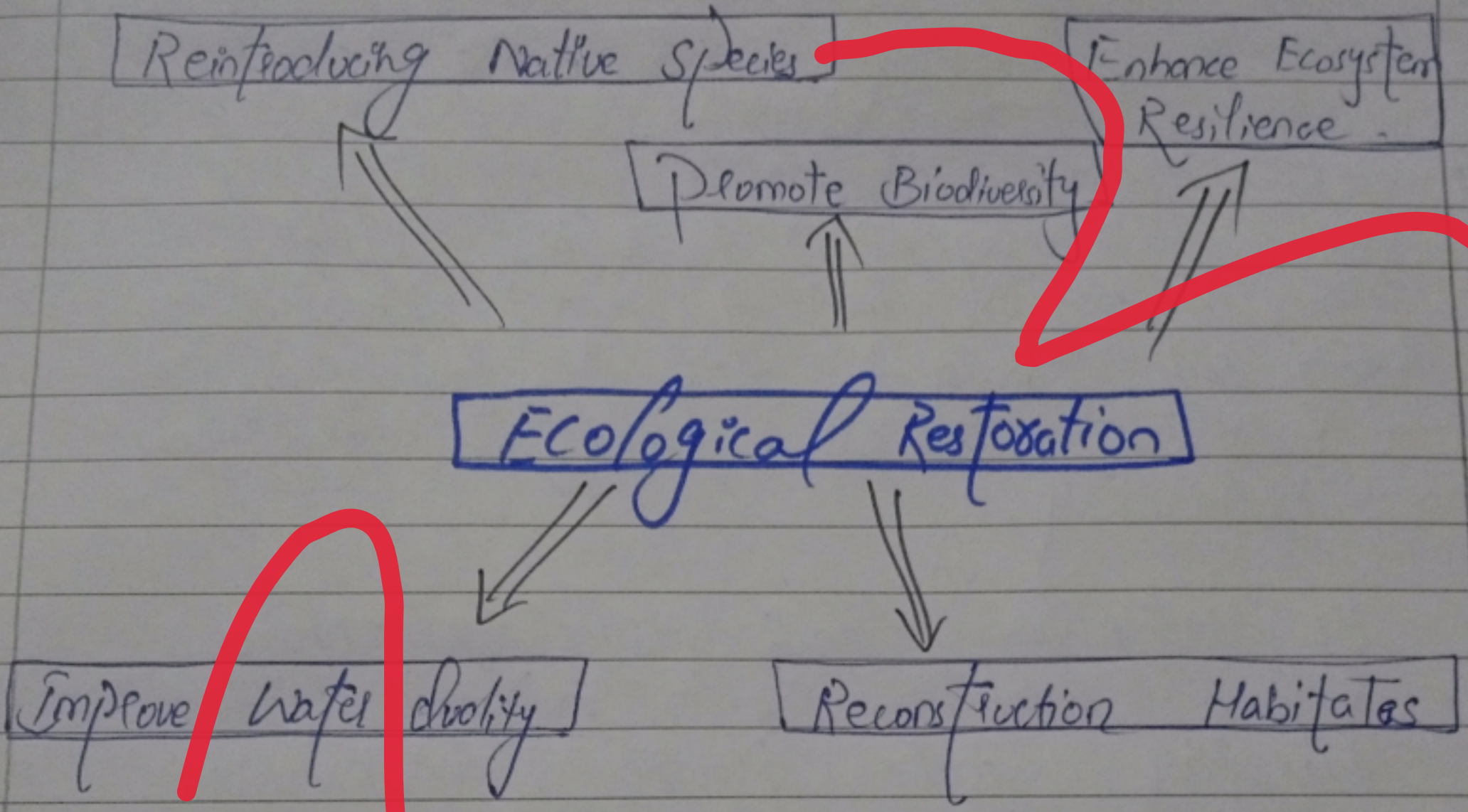
1. Ecological Restoration:

Ecological restoration is the process of reviving and rehabilitating degraded, damaged or destroyed ecosystem to restore their ecological functions and biodiversity.

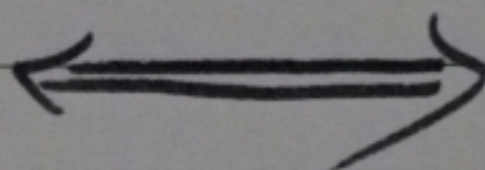
By restoration efforts aims to enhance ecosystem resilience, to improve water quality and promote biodiversity.

"Approximately 5 million hectares of degraded land and restored annually through various ecological projects worldwide."

(Global Restoration Network)



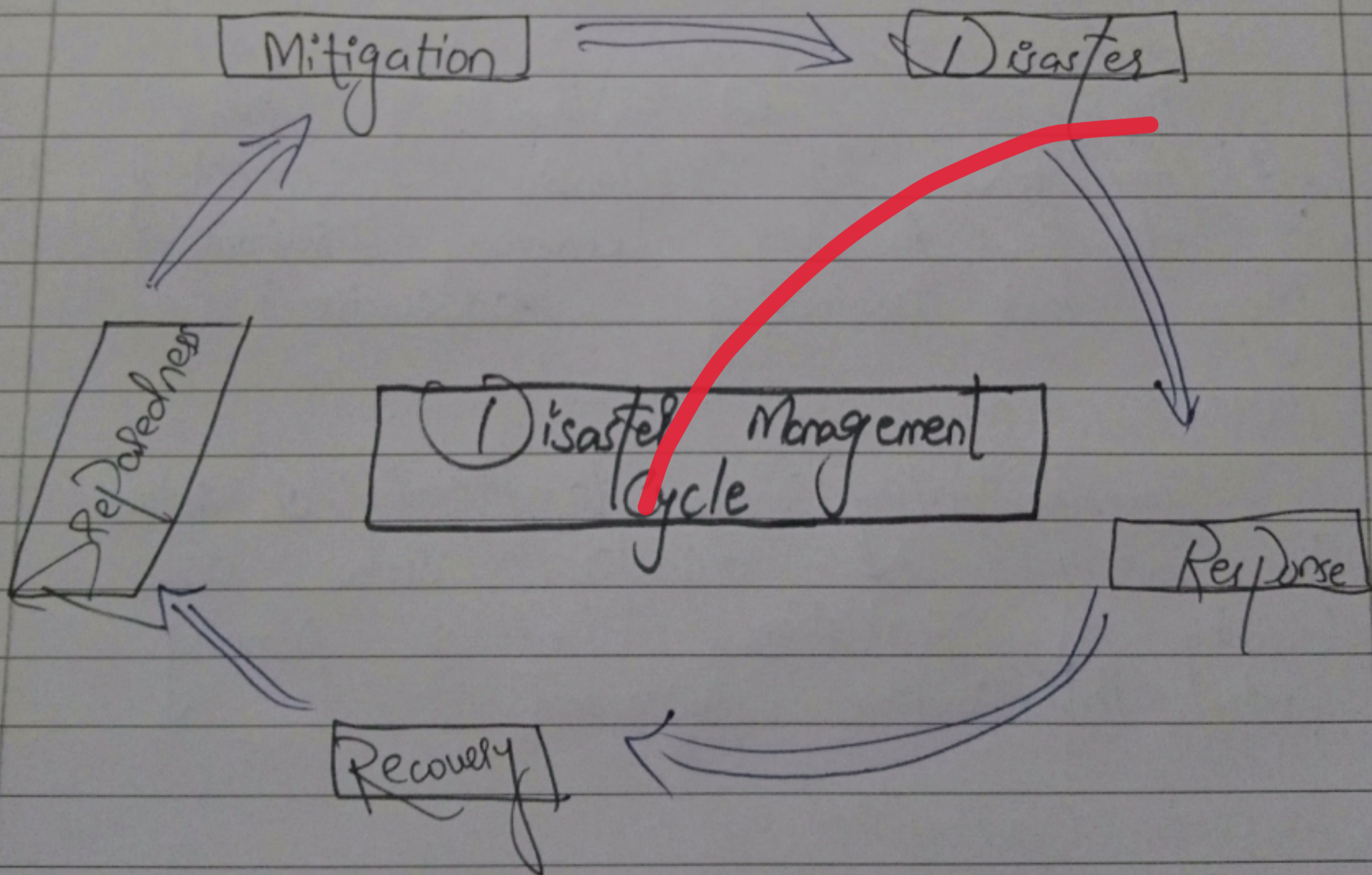
Ecological restoration is a vital process for rehabilitating degraded ecosystems, enhancing biodiversity and ensuring the sustainability of natural resources, ultimately contributing to a healthier environment and improved quality of life for all.



(b) Disaster Risk Management:

Disaster Risk Management involves planning and action to prevent, prepare for, respond to and recover from disasters.

It aims to reduce the impact of disasters on people, property and the environment.



Disaster Risk Management involves Strategy and practices to reduce the impact of natural and man-made disasters it includes;

1. Risk Assessment:

Identifying and Analyzing potential hazards and vulnerabilities to understand their impact and likelihood.

2. Preparedness Planning:

Developing and implementing plans and procedures to respond effectively to disasters, including emergency response plans and training exercises.

3. Mitigation Measures:

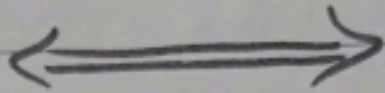
Implementing action to prevent or reduce the severity of disasters, such as building regulations, land-use planning and infrastructure improvements.

4. Response Coordination:

Organizes / organizing resources and coordinating efforts among government agencies, organizations and communities to manage and respond to disaster events.

5- Recovery and Reconstruction:

Managing the recovery process to restore normalcy, rebuild communities and improve resilience to future disasters through long-term planning and support.



(C) Convention on Biological Diversity:

The CBD (CBD) aims to conserve biological diversity to ensure sustainable use of its components and promote fair, equitable sharing of benefits from genetic resources.

The CBD was adopted at the Earth Summit in Rio de Janeiro in 1992 and has been ratified by nearly 200 countries."

Three Main Objectives of CBD:

Conservation of Biological Diversity

Sustainable Use

Fair and equitable Share of Benefits

Three Main Objectives of CBD:

1. Conservation of Biological Diversity:

To protect and preserve the variety of life on Earth, including ecosystems, species and genetic diversity, to ensuring that natural habitats and wildlife are maintained.

2. Sustainable Use and its Components:

To promote the responsible and sustainable use of natural resources so that they can be utilized without depleting them or harming the environment thereby supporting long-term ecological balance.

It includes protocols such as the Nagoya Protocol on Access to Genetic Resources"

3. Fair and Equitable Sharing of Benefits:

To ensure that benefits derived from genetic resources, such as medicines and agricultural crops are shared fairly with the countries or communities providing these resources to promoting justice and equity in biotechnological advancements.

(d) Montreal Protocol:

The Montreal Protocol aims to protect the ozone layer by phasing out the production and use of ozone-depleting substances (ODS), such as chlorofluorocarbons (CFCs) and halons.

The Montreal Protocol was adopted on September 16, 1987 and has been ratified by nearly every country, making it one of the most widely supported environmental agreements.

Success of Montreal Protocol:

1. The Montreal Protocol is credited with significant reductions in atmospheric concentrations of ODS, leading to gradual recovery of the ozone layer.

Amendments of the Montreal Protocol:

The Protocol has been amended several times, including the Kigali Amendment in 2016, which aims to phase out hydrofluorocarbon (HFCs), a group of greenhouse gas (GHG).

Explain properly

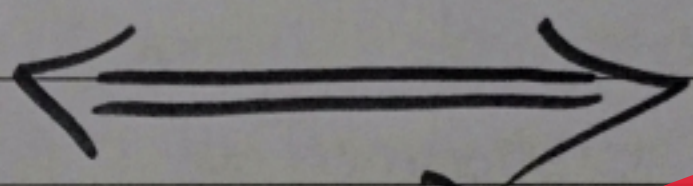
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3.

Impact of Montreal Protocol:

The Montreal Protocol has been instrumental in preventing millions of skin cases of cancer and protecting ecosystems from harmful UV radiation by mitigating ozone layer depletion.



THE END

Add flowcharts and diagrams to secure good marks