

Q No: 03

Write a short note on any of four

(also)

FOOD SECURITY

(10)

ANSWER

I. INTRODUCTION

Food is the first condition of life; Its security defines civilization

Food security is the essence of human survival and societal stability. It ensures that every individual has access to safe, sufficient, and nutritious food for a healthy and productive life. In truth, ~~food~~ food is not merely a need - it is dignity, justice, and the foundation of sustainable development

II: DEFINITION

When all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life

FAO, WB, World Food Summit 1996

III: BACKGROUND

The term "Food Security" gained prominence after the 1974 World Food Conference, which addressed the

global food crises following widespread famines and economic disruptions.

IV: PILLARS OF FOOD SECURITY

4 Pillars of Food Security.

- 1: Availability: Adequate supply of food through production or imports.
- 2: Accessibility: Economic and physical ability to acquire food
- 3: Utilization: Proper nutrition, health, and food safety.
- 4: Stability: Continuous access to food despite shocks or crises.



V: DIMENSIONS OF FOOD SECURITY

Food Security encompasses agricultural, economic, environmental, and social aspects. It is influenced by climate, income distribution, infrastructure, and government policies.

Food Security is not merely about feeding mouths; It is about sustaining lives, economies, and national stability

VI: GLOBAL PERSPECTIVE

According to the FAO (2023) around 735 million people worldwide face chronic hunger, largely due to conflicts, climate change, and inequality.

VII FOOD SECURITY IN PAKISTAN

About 36% of Pakistanis remain food insecure, with rural areas being the most vulnerable.
~ State Bank of Pakistan

VIII CAUSES OF FOOD INSECURITY

- Population Explosion
- Poverty and Unemployment
- Climate change and natural disasters.
- Poor infrastructure and storage losses
- Gender inequality.
- Weak agricultural Policy Implementation
- Inflation
- Conflicts

IX CONSEQUENCES OF FOOD INSECURITY

- Malnutrition
- Stunted growth
- Poverty cycles
- Political unrest
- Economic decline

It undermines human development and threatens national stability.

NO Country can achieve sustainable development while its people remain hungry and malnourished

X GLOBAL AND NATIONAL INITIATIVES

Global Efforts:

- FAO, WFP, IFAD Programs
- UN SDG Framework (Agenda 2030)
- SDG 2: Zero Hunger, SDG 1: NO Poverty, SDG 3: Good Health
- WFP global hunger initiatives

Pakistan

Ehsaas Program / Ehsaas Nashonuma Program
Kissan Card and agricultural subsidies.

WAY FORWARD

Promote climate-smart sustainable agriculture
Strengthen food storage and supply chains
Enhance social safety nets and nutrition education.

Empower women farmers

Invest in agricultural research, innovations,
Ensure policy coordination and effective governance

II CONCLUSION

Food security goes beyond production - it ensures equitable access, gender inclusiveness and sustainable development. For Pakistan and the world, it is both a moral duty and a strategic necessity for peace, prosperity, and human dignity.

Hunger anywhere is a threat to peace everywhere.

FOOD IN SECURITY IN PAKISTAN

Projected food Shortage 2025 : 70 Million tonnes.

Wheat Shortfall: 3.2 Mtonnes ; Prevalence of FS: 40.2% Moderate-severe

Population lacking safe Drinking water: 61.3%.

FAO, SBP, World Bank,
WHO

Q No: 03

Short note on Environmental Toxicology

ANSWER

I: INTRODUCTION

When the environment falls ill, humanity becomes the Patient

Environmental toxicology is an emerging inter-disciplinary field that studies how pollutants in the environment affect human health, ecosystems, and global sustainability. In era of rapid industrialization and chemical intensification, it helps identify risks and guides pollution control strategies.

II: DEFINITION

Environmental toxicology is the scientific study of the sources, pathways, fate, and harmful impacts of toxic substances (toxicants) on living organisms, including humans, animals, plants, and microbial communities.

III - SCOPE OF ENVIRONMENTAL TOXICOLOGY

It integrates chemistry, biology, ecology, epidemiology, and environmental science to assess contaminants in air, water, soil, food chains, and consumer products.

Environmental toxicology reveals the silent poisons shaping the destiny of life on Earth

IV MAJOR ENVIRONMENTAL TOXICANTS

- Heavy Metals : Lead (Pb), Mercury (Hg), Arsenic (As)
- Pesticides :- DDT, Organophosphates

- Industrial Chemicals: Polychlorinated biphenyl (PCB), Dioxins, Furans
- Air pollutants: PM_{2.5}, NO_x, O₃
- Emerging pollutants: microplastics, Pharmaceuticals
- To date, 1300 marine species have been found to ingest plastics.

Ocean Conservancy

V CAUSES OF ENVIRONMENTAL TOXICITY

- Rapid industrialization and unregulated emissions
- Agro chemicals overuse = Improper waste disposal
- Urbanization and traffic congestion
- Mining and smelting activities
- Household chemicals and plastics
- Contaminated water supply & sewage mixing

Air pollution is responsible for an estimated 5.13 million global deaths each year.
~ WHO

Toxins do not just contaminate the environment they contaminate our future.

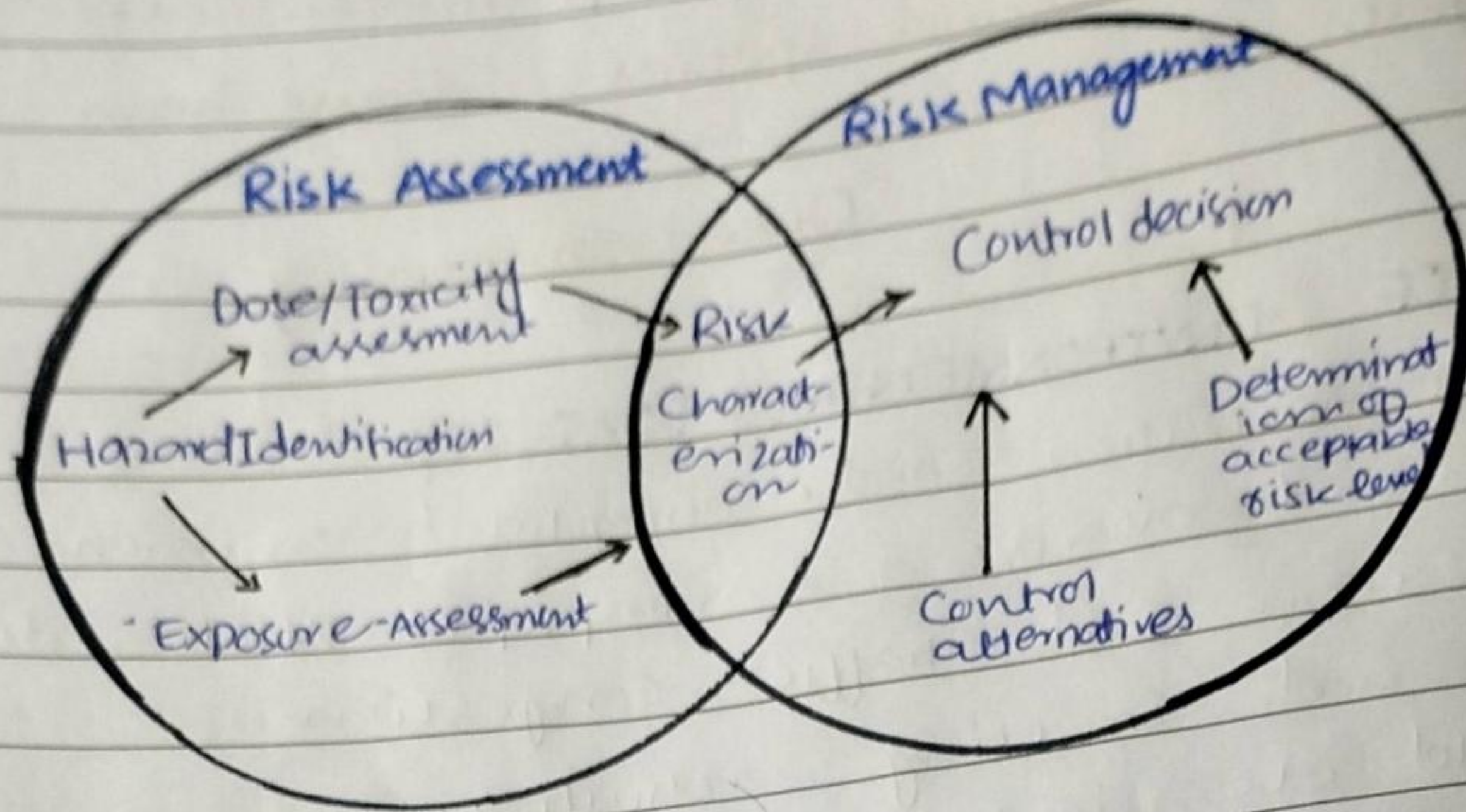
VI: EFFECTS ON HUMAN HEALTH

- Respiratory diseases (fibrosis, emphysema, irritation, etc.)
- Neurological damage (lead, Hg $\Rightarrow$ Brain damage, neuroinflammation)
- Cancers (PAHs, dioxins)
- Kidney and liver toxicity
- Immune system suppression

VII ~~RIS~~ ECOLOGICAL AND ENVIRONMENTAL EFFECTS

- Decline in biodiversity = Disruption of food webs
- Reduce crop productivity = Soil infertility
- Contamination of rivers and lakes
- Fish kills due to eutrophication and toxins

VIII. RISK ASSESSMENT AND MANAGEMENT IN ENVIRONMENTAL TOXICOLOGY



IX. MONITORING AND ANALYTICAL TECHNIQUES

- water and soil testing
- Biomonitoring using fish, plants, and birds.
- chemical assays, chromatography, bioassays

X. PREVENTION AND CONTROL MEASURES

- Green Tech and Clean energy
- Regulations of chemical use (REACH, EPA guidelines)
- Waste water Treatment
- Safe pesticide practices
- Phyto and bioremediation
- Air quality monitoring & control

XI. POLICY AND GLOBAL FRAMEWORK

- WHO guidelines on air and water quality
- Basel Convention on hazardous waste
- Sustainable Development Goals.
- National Environmental Quality Standards NEQS.

Date:

XII CONCLUSION

Environmental toxicology plays a vital role in safeguarding human health and ecological balance. By understanding pollutants and their impacts, societies can design better regulations, promote sustainable development, and protect future generations from environmental hazards.

The science of toxins is, ultimately, the science of survival



Short note on: ENVIRONMENTAL ECONOMICS

ANSWER

I: INTRODUCTION

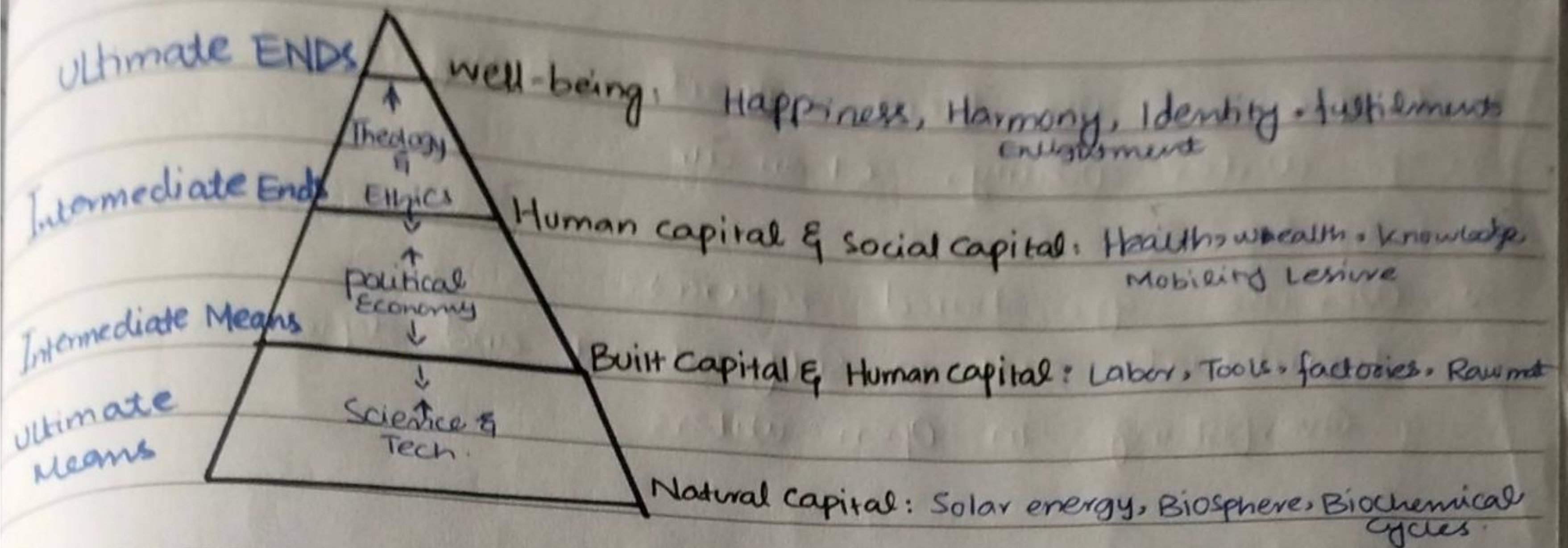
Growth that doesn't cost the Earth. In an age of climate stress and resource scarcity, environmental economics provides an essential lens to understand how economic activities shape environmental outcomes. It emphasizes sustainable use of resources, pollution control, and policy tools that can align economic growth with ecological stability.

II: DEFINITION

Environmental economics deals with the efficient allocation of environmental resources, focusing on externalities, market failures, resource valuation, and policy measures to correct environmental degradation.

III: BACKGROUND

- Environmental economics arose as economics confronted pollution, resource depletion, and ecological limits.
- A.C. Pigou laid its foundation with the externality theory and the idea of taxing pollution.
- Herman Daly strengthened and modernized the field by emphasizing sustainability, ecological limits, and steady-state economics.



THE DALY'S TRIANGLE

IV: SCOPE OF ENVIRONMENTAL ECONOMICS

- Management of natural resources
- Pollution Control • Climate change economics
- Sustainable development • Cost-Benefit Analysis
- Environmental regulation • Renewable + nonrenewable resource economics

V: FUNDAMENTALS OF ENVIRONMENTAL ECONOMICS

(i) Externalities:

- unpriced side-effects of economic activities.
- They cause costs or benefits to those not involved in the action.

Example: Factory pollution harming nearby residents.

Externalities

positive

- when consuming or producing a good causes BENEFIT to third party
- e.g:- waving to work reduce congestion

Negative

- when consuming or producing a good causes a COST to third party
- e.g Air travel causes Air pollution

(ii) Public goods

- ~~Resources~~ ^{Resources} that are non-excludable or non-rival

= People can use them without reducing others' access.
e.g.: water quality, clean air

(iii) Tragedy of Commons

= Over use of shared resources.
= Individuals act in self-interest and deplete common assets.
e.g.: Overfishing in open waters

(iv) Market Failure

= when markets fail to allocate resources efficiently.
= Environmental goods are undervalued or unpriced.

e.g.: Free access to forests leading to deforestation

Tree loss in KP and GB (2025): over 14,300 Acres of forest degraded due to timber mafia

(v) Natural Capital

= Stock of natural resources and ecosystems

= It provides essential services for human survival and the economy.

e.g.: Forests supplying oxygen and timber.

VI: POLICY INSTRUMENTS IN ENVIRONMENTAL ECONOMICS

(i) Command and Control Regulation

= Government sets limits, bans, or standards for pollution.
Emission Standards for vehicles

(ii) Market-Based Instruments

(a) Pigovian Taxes:

Tax equal to external cost: e.g. Carbon tax.

(b) Subsidies:

For clean energy, afforestation, recycling

(c) Tradeable permits

Permits allow a fixed amount of pollution; firms can buy/sell based on their needs.

- (d) Deposit - Refund system
 • Encourage Recycling (Plastic bottles).

VII COST-BENEFIT ANALYSIS

Cost-Benefit Analysis of Diamer Basha Dam

COST

- Displacement of communities
- Loss of cultural heritage
- Env. degradation: Habitat loss, biodiversity
- High financial cost: one of the most expensive
- Seismic risks: sensitive zone

BENEFIT

- Hydropower generation: Clean energy
- water storage: Improved Irrigation, Flood control
- Reduced flood damage
- Economic growth: Jobs, local development
- Energy security: long term, reliable

REF: Pakistan Economic Survey, Project CBA Report EPA, WWF Pakistan

VIII: ENVIRONMENTAL VALUATION METHODS

Used to estimate the economic value of non-market environmental goods.

- Contingent valuation (willingness to pay)
- Hedonic Pricing (Property affected by pollution)
- Travel cost method (recreational value of parks)
- Replacement cost methods.

IX SUSTAINABLE DEVELOPMENT PERSPECTIVE

Environmental Economics supports SDG goals, especially:

- **SDG 7** (Clean Energy) • **SDG 12**: Responsible Consumption & production
- **SDG 13**: Climate Action • **SDG 15**: Life on land

It encourages Policies that meet Present needs without compromising future generations.

X CHALLENGES IN ENVIRONMENTAL MANAGEMENT

- Weak institutional capacity • Poor enforcement of laws
- Lack of environmental awareness • Inadequate data for valuation
- Political & economic instability • High reliance on fossil fuels.

XI: EXAMPLES IN PAKISTAN

- 1. Water Scarcity economics in Balochistan & Sindh
- 2. Smog and air pollution in Lahore (externalizing + regulation failure).
- 3. Deforestation in KP & Northern Areas
- 4. ~~Mean~~ Economic cost of floods: climate
- 5. Induced Economic losses (2000-2025) $\Rightarrow$ USD 29 Billion

XII CONCLUSION

Environmental Economics offers a balanced framework to manage resources, curb pollution, and guide sustainable development by valuing environmental goods and correcting market failures. It supports climate action, biodiversity protection, and long-term economic stability.

Sustainability succeeds when economics and ecology speak the same language

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