Renewable Resources

Solar Energy

Wind Energy
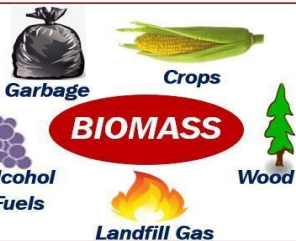
Biomass Energy

Thermal Energy

Non-Renewable Resources

Oil

Coal

Natural Gas

Nuclear

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ENVIRONMENT IMPACT ANALYSIS (ARC-555)

ENVIRONMENTAL IMPACT ANALYSIS_EIA

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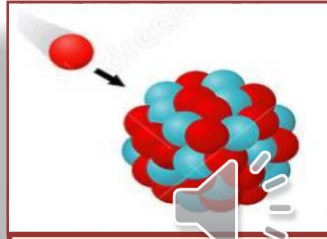
The environment is the totality of all the external conditions affecting the life, development and survival of an organism.

- **The naturally produced physical surroundings** on which humanity is entirely dependent in all its activities. The various uses to which these surroundings are put for economic ends are called environmental functions.

- **The circumstances, objects, or conditions by which one is surrounded**: the complex of physical, chemical, and biotic factors (such as climate, soil, and living things) that act upon an organism or an ecological community and ultimately determine its form and survival.

- **Ecology** is the study of the relationships between living organisms, including humans, and their physical environment. Ecology considers organisms at the individual, population, community, ecosystems, and biosphere level.

- **"Ecosystem"** includes the interaction between the organism and its surroundings.

Different branches of science are interested in studying the environment, its components, and the interaction between living organisms and their environment. For example, **Environmental science** is interested in studying and investigating the interaction of organisms with their environment and its outcomes. A branch of environmental science is **ecology,** which deals with the ecological interactions within ecosystems.

Internal and external

An **internal environment** would be the internal milieu of a multicellular organism. Maintaining the internal environment of an organism through homeostasis is crucial to the organism's survival. An external environment refers to the environment outside of the organism.

Natural and Built

Environments may be *natural* or *built*. A **natural environment** is a type of environment found in nature. It includes all naturally occurring things, both living and nonliving. It, therefore, involves the complex relationships of weather, climate, living species, and natural resources.

Built environments, unlike natural environments, are made by humans, such as agricultural conversions or urban settings. With the current breadth of human interventions and conversions, many natural environments have acquired some degree or level of being *"built"*.

What is the purpose of the Initial Environment Examination (IEE)?

The IEE is an initial environmental examination, and it is a preliminary small study to see if a project harms the environment while the EIA is a full assessment of the effects of the project on the environment.

What is the purpose of the Environmental Impact Assessment (EIA)?

EIA provides not only evaluation of environmental impact caused by implementation of the project but also information on changes and modification of the project including design of structure, construction methods and others before implementation in order to minimize environmental negative impact.

EIA
-"An environmental study comprising collection of data, prediction of qualitative and quantitative impacts, comparison of alternatives, evaluation of preventive, mitigatory and compensatory measures, formulation of environmental management and training plans and monitoring arrangements, and framing of recommendations and such other components as may be prescribed" (Pakistan Environmental Protection Act, 1997)

-"The process of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of development proposals prior to major decisions being taken and commitments made.

Environmental Impact Analysis

Environmental impact analysis aims to determine system pollution as a prerequisite of environmental impact assessment. The analyzed system generates hydrogen from solar energy. As solar energy is not harmful on earth, there will be no negative environmental impact of the system during its operation period; however, the system construction involves certain amounts of construction materials and energy spent for manufacturing. The construction phase and even the scrapping phase of the system lifetime are definitely affecting the environment.

Energy is necessary for the mankind, whatever is the source of this energy. There are many different sources of energy, e.g. crude oil, natural gas, wind power, solar energy, etc. But the two most important environmental hazards faced by humankind today are air pollution and global warming. Both have a direct link with our current overdependence on fossil fuels. Pollutants produced from combustion of hydrocarbons now cause even more health problems [1]. Hence, today's world is facing an urgency in developing alternative fuels.
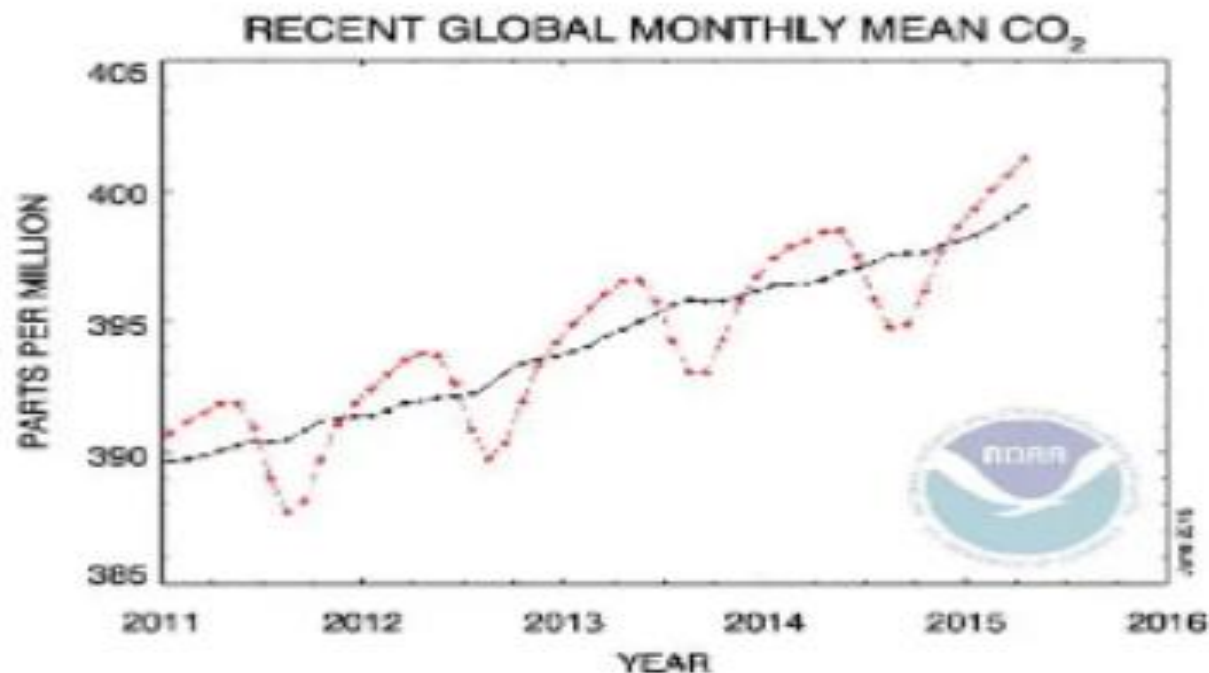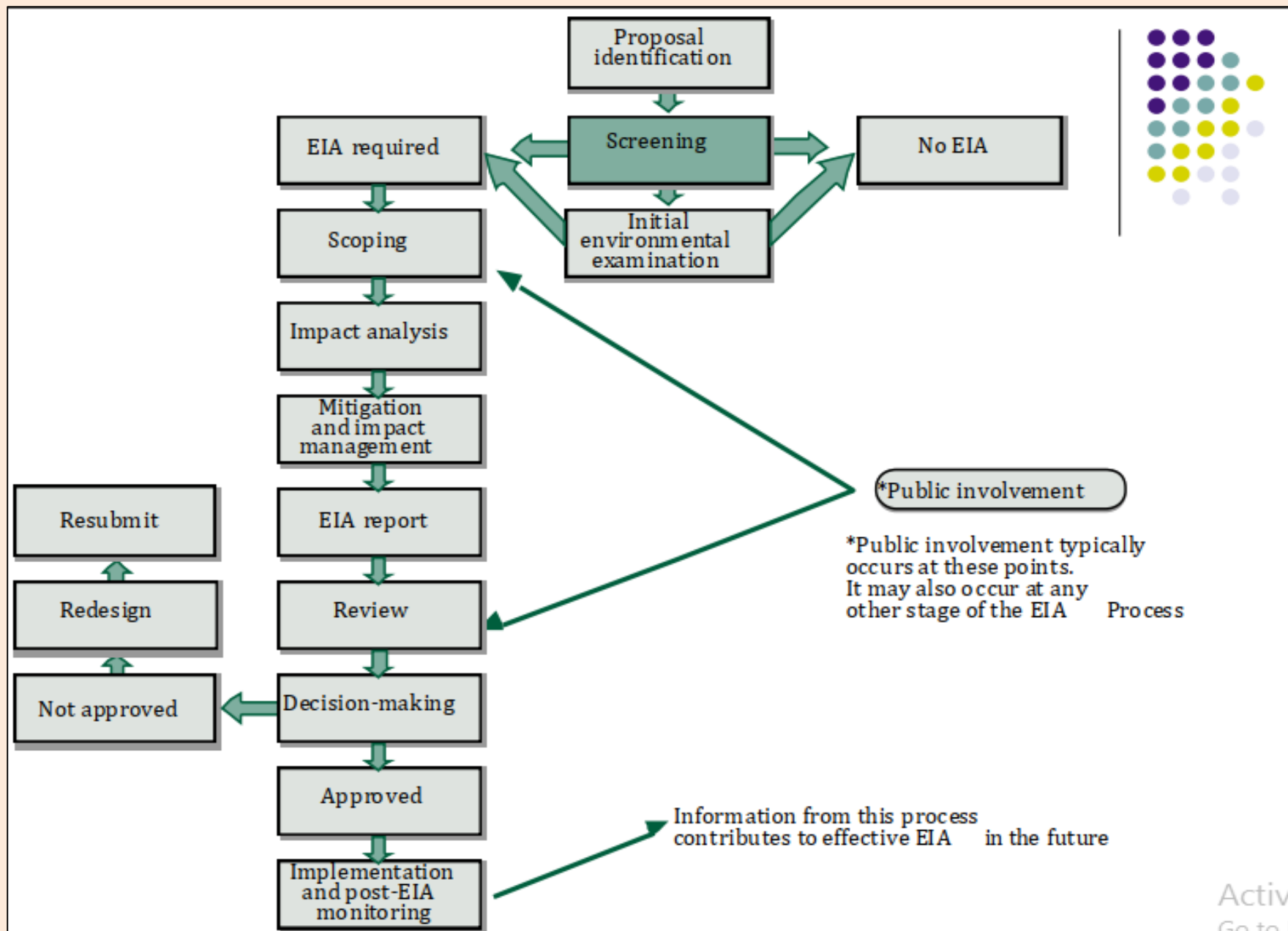

Fig. (1-1) CO_2 Concentration during the last 4 years [1].

Stages of EIA

EIA stage	Questions requiring decisions
Screening	Is the project one for which an EIA is necessary?
Scoping	What environmental impacts need to be examined?
Prediction	What is the size, magnitude or extent of the impacts?
Assessment	Is the impact significant?
Mitigation	What can be done to reduce the impact?
Review	Are the assessment and the environmental statement adequate?
Decision	Should the project be authorized to proceed?
Monitoring and auditing	Was the prediction of impacts accurate and do the mitigation measures work?

Proposal identification

Screening

EIA required

No EIA

Initial environmental examination

Scoping

Impact analysis

Mitigation and impact management

EIA report

Resubmit

Review

Redesign

Decision-making

Not approved

Approved

Implementation and post-EIA monitoring

*Public involvement

*Public involvement typically occurs at these points. It may also occur at any other stage of the EIA Process

Information from this process contributes to effective EIA in the future

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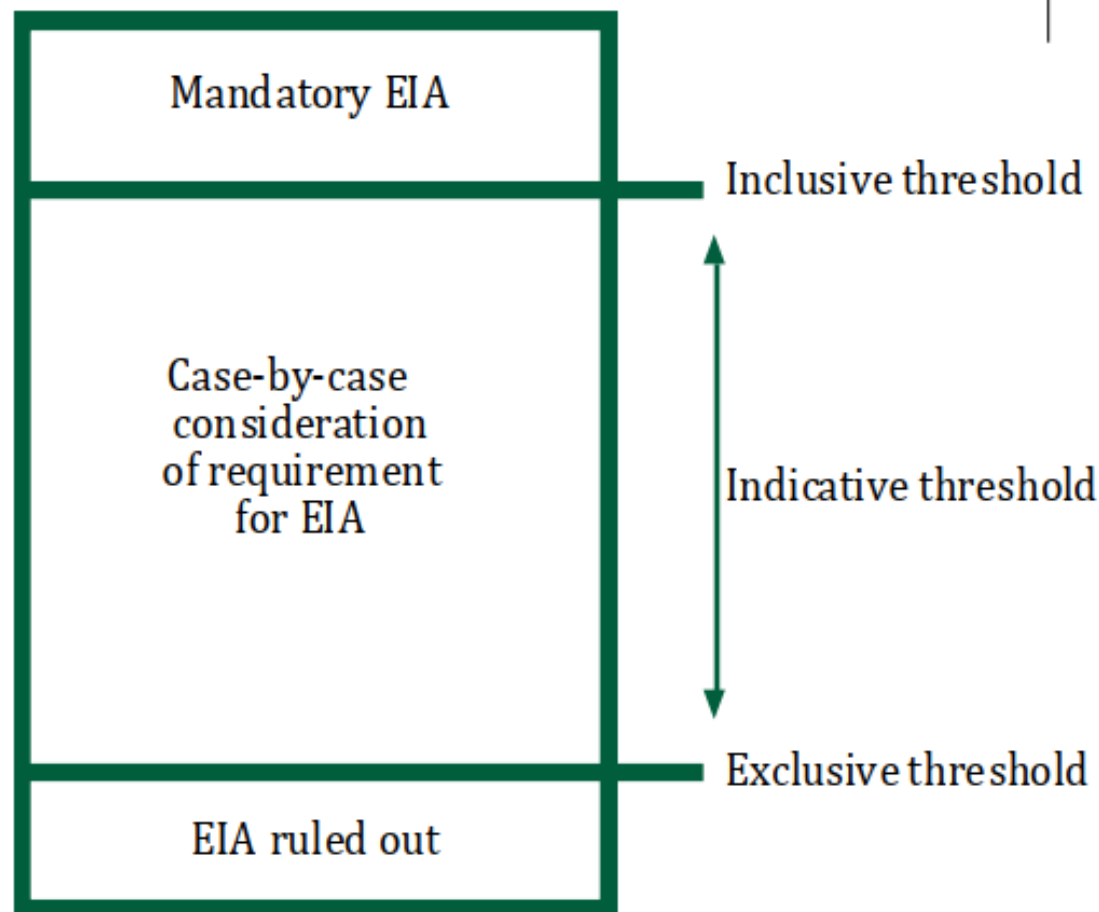
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Step 1: Screening

- This step determines:

  - whether or not EIA is required for a particular project

  - what level of EIA is required

- Screening Outcomes:

  - Full or comprehensive EIA required

  - Limited EIA required

  - No EIA required

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Tools for Screening

- Project lists:
  - Inclusive — listed projects must undergo EIA
  - Exclusive — listed projects exempted from EIA

- Case-by-case examinations:
  - determine whether projects may have significant environmental effects
  - if so, project should undergo EIA

- Combination of above

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Screening Process

Mandatory EIA

Inclusive threshold

Case-by-case
consideration
of requirement
for EIA

Indicative threshold

Exclusive threshold

EIA ruled out

Step 2: Scoping

- begins once screening is completed

- the most important step in EIA

- establishes the content and scope of an EIA report

Outcome:

- identifies key issues and impacts to be considered

- lays the foundation of an effective process, saves time and money, and reduces conflict

Types of Scoping

Closed scoping:

> wherein the content and scope of an EIA Report is pre-determined by law and modified through closed consultations between a developer and the competent authority

Open or Public scoping:

> a transparent process based on public consultations

Actors

> proponent, EIA consultant, supervisory authority for EIA, other responsible agencies, affected public and interested public

The scoping process

- prepare a scope outline

- develop the outline through informal consultation with environmental and health authorities

- make the outline available

- compile an extensive list of concerns

- evaluate relevant concerns to establish key issues

- organise key issues into impact categories (study list)

- amend the outline accordingly

- develop 'Terms of reference' (ToR) for impact analysis

- monitor progress against the ToR, revising as necessary

SCOPING
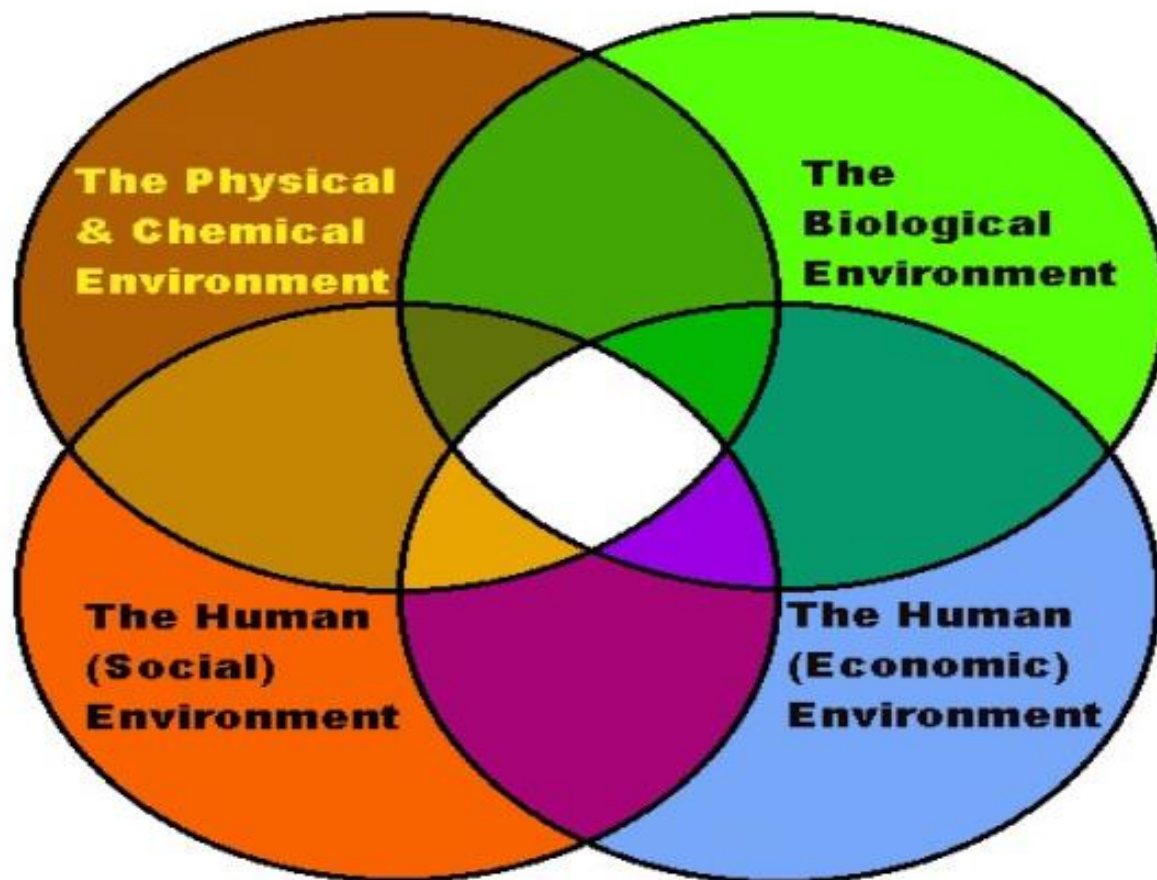
THE 4 FACETS OF THE ENVIRONMENT

EXAMPLE : SCOPING
IMPACT OF A PROPOSED PAPER INDUSTRY

A PAPER INDUSTRY IS PROPOSED TO BE ESTABLISHED IN A LOCALITY AND THE EFFLUENT IS PROPOPED TO DISCHARGE IN ADJACENT RIVER

❑ETP WILL BE INSTALLED TO BRIING THE DISCHARGE DOWN TO PERMISSIBLE LIMIT

❑THERE ARE FEW OTHER INDUSTRIES ALREADY ESTABLISHED DISCHARGING EFFLUENT TO THE RIVER AT ALLOWABLE LIMIT

❑PEOPLE BATH IN RIVER WATER AND DRINK AFTER TREATMENT

❑SIGNIFICANT NUMBER OF PEOPLE DEPEND ON FISHING FOR OCCUPATION

MAJOR ISSUES (SCOPING)

PHYSICAL AND CHEMICAL ENVIRONMENT

❑THE LEVEL OF INCREASE GASEOUS AIR POLLUTANTS

❑POSSIBLE CHANGE IN NOISE LEVEL

❑CHANGE IN DOWNSTREAM DO DUE TO DISCHARGE OF AQUEOUS EFFLUENT (ORGANIC MATTER)

BIOLOGICAL ENVIRONMENT

❑EUTROPHICATION (EFFLUENT CONTAINING N ,P)

❑PUBLIC HEALTH IMPACT

❑FISH KILLS

MAJOR ISSUES
(SCOPING)

THE HUMAN (SOCIAL) ENVIRONMENT

☐ AFFECT ON FISHERIES AND AQUACULTURE AS A LIVLIHOOD FOR THE COMMUNITY

☐ URBANIZATION TREND AND RELATED PROBLEM

☐ SCOPE OF JOB CREATION

THE HUMAN (ECONOMIC) ENVIRONMENT

☐ POSSIBILTY OF INCREASING DRINKING WATER TREATMENT COST

☐ PRODUCTIVE HOUR LOSS DUE ENVIRONMENTAL DEGRADATION

☐ HEATH TREATMENT COST

Step 3: Impact Analysis

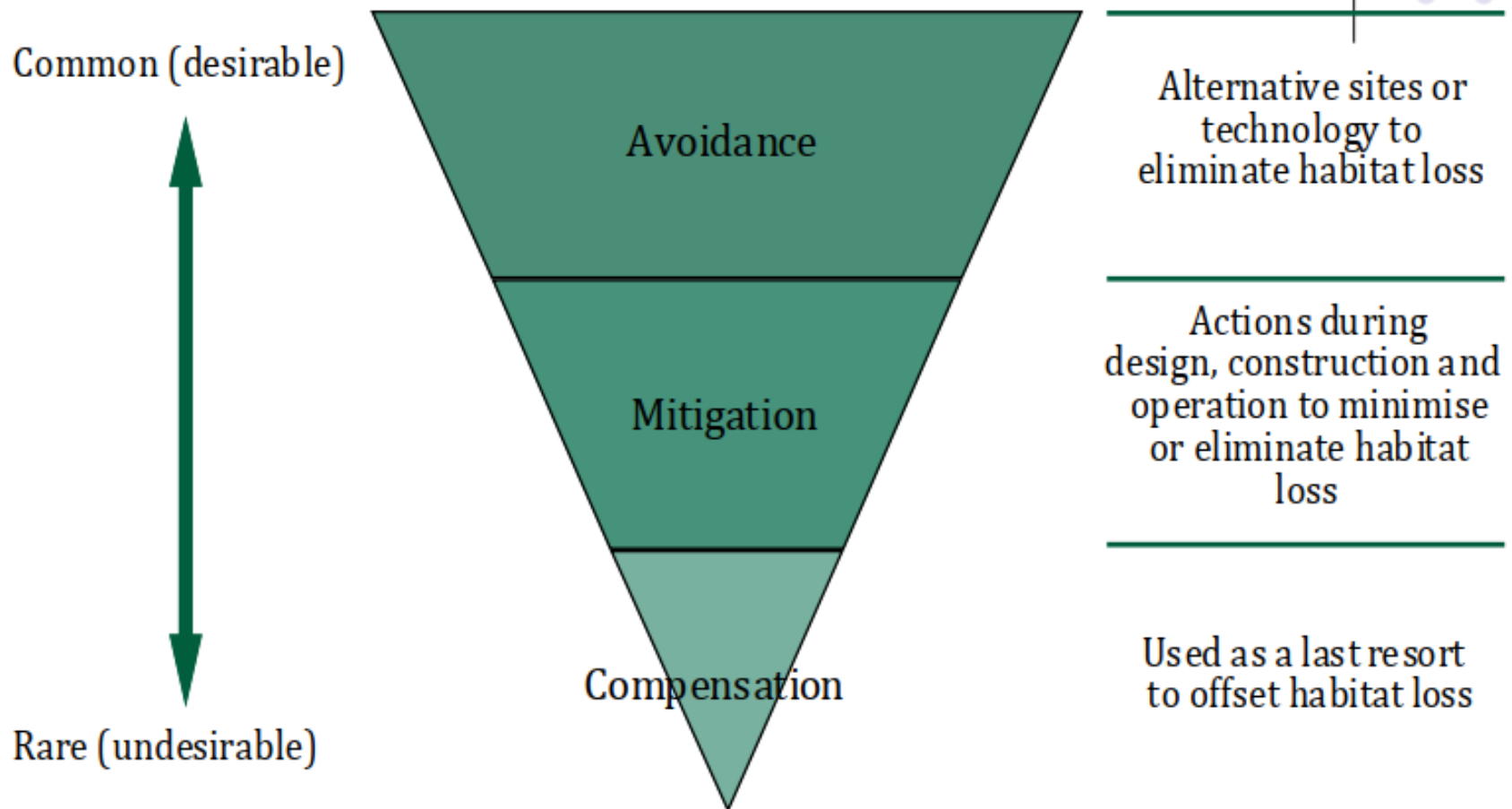|	
→ **Type**	biophysical, social, health or economic
→ **Nature**	direct or indirect, cumulative, etc.
→ **Magnitude or severity**	high, moderate, low
→ **Extent**	local, regional, trans-boundary or global
→ **Timing**	immediate/long term
→ **Duration**	temporary/permanent
→ **Uncertainty**	low likelihood/high probability
→ **Reversibility**	reversible/irreversible
→ **Significance***	unimportant/important

Tools for Impact Analysis

- checklists

- matrices

- networks

- overlays and geographical information systems (GIS)

- expert systems

- professional judgement

Step 4: Impact Mitigation

- to avoid, minimise or remedy adverse impacts

- to ensure that residual impacts are within acceptable levels

- to enhance environmental and social benefits

Framework for Impact Mitigation

Common (desirable)

Avoidance — Alternative sites or technology to eliminate habitat loss

Mitigation — Actions during design, construction and operation to minimise or eliminate habitat loss

Compensation — Used as a last resort to offset habitat loss

Rare (undesirable)

Step 5: Reporting

Different name of EIA reports

- Environmental Impact Assessment Report (EIA Report)

- Environmental Impact Statement (EIS)

- Environmental Statement (ES)

- Environmental Assessment Report (EA Report)

- Environmental Effects Statement (EES)

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Contents of the Report

- a description of the project;

- an outline of the main alternatives studied by the developer, and an indication of the main reasons for this choice,

- a description of the aspects of the environment likely to be significantly affected by the proposed project;

- a description of the likely significant environmental effects of the proposed project;

- measures to prevent, reduce and possibly offset adverse environmental effects;

- a non-technical summary;

- an indication of any difficulties (technical deficiencies or lack of know-how) encountered while compiling the required information.

Step 6: Review

- Review the quality of the EIA report.

- Take public comments into account.

- Determine if the information is sufficient.

- Identify any deficiencies to be corrected.

Who Perform the review?

- environmental agency — Canada (comprehensive studies), standing commission — Netherlands, inter-agency committee — USA, planning authority — UK

- independent panel — Canada (public inquiries)

- Public comment and input

Step 7: Decision Making

- To provide key input to help determine if a proposal is acceptable

- To help establish environmental terms and conditions for project implementation

Step 8: Monitoring

- Ensure the implementation of conditions attached to a decision.

- Verify that impacts are as predicted or permitted.

- Confirm that mitigation measures are working as expected.

- Take action to manage any unforeseen changes.

Key components of Monitoring

- Establish baseline conditions.

- Measure impacts of a project as constructed.

- Verify conformity with established with conditions and acceptable limits.

- Establish links to environmental management plans.

- Carry out periodic checks and third-party audits.

Public Involvement in the EIA Steps

Screening → To consult people likely to be affected by proposal.

Scoping → To ensure that significant issues are identified; project related information is gathered, alternatives are considered.

Impact analysis → To avoid biases/inaccuracies in analysis; identify local values/ preferences; assist in consideration of mitigation measures; select best alternative.

Mitigation and impact management

EIA report

Review → To consider and comment on EIA Report

Decision making

Implementation and monitoring → To monitor the implementation of EIA Report's recommendations and decision's conditions.

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