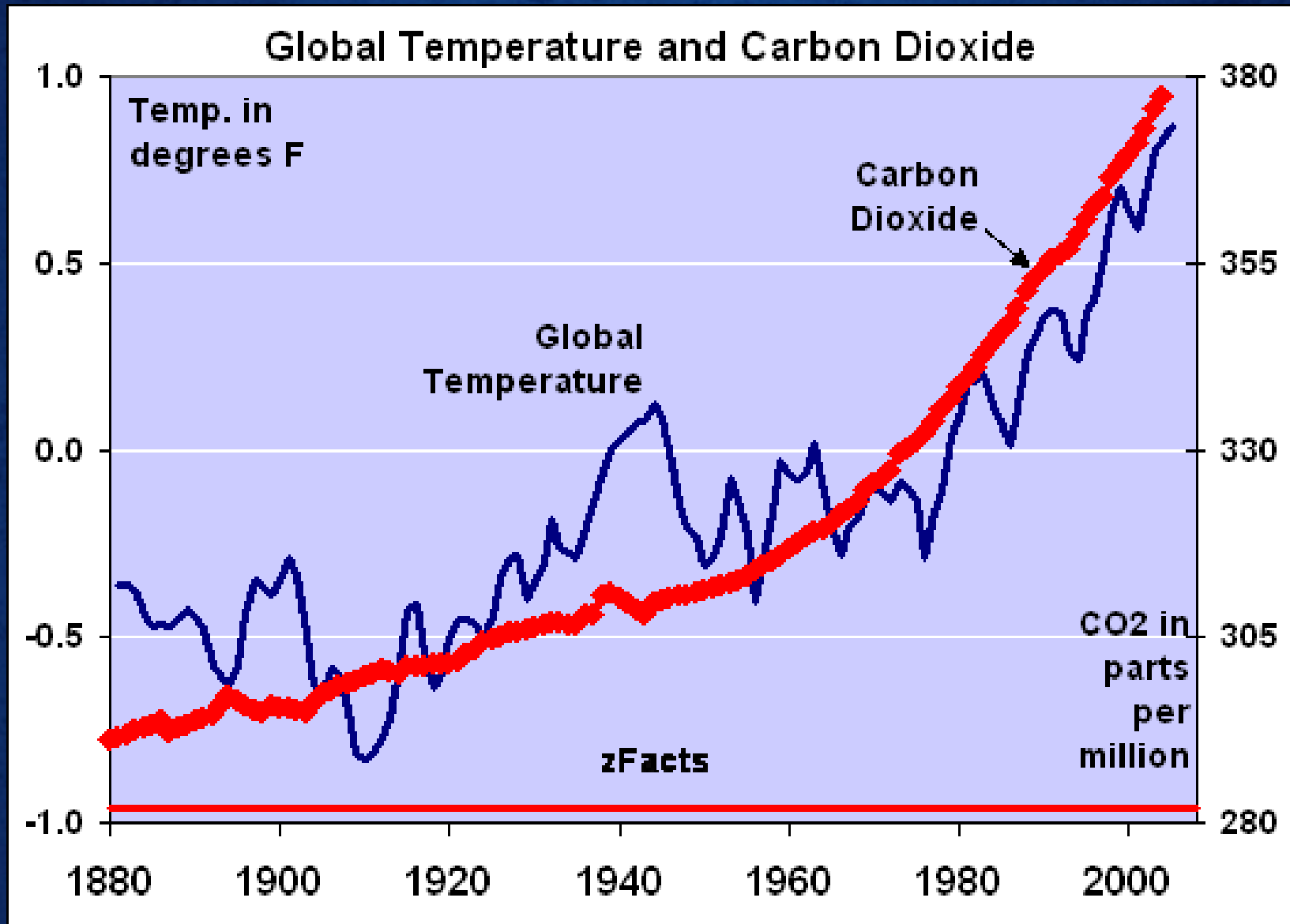


EIA

An Introduction to Environmental Impact Assessment

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Intro

ecosystem

/i:kəʊsɪstəm/ 

noun **ECOLOGY**

a biological community of interacting organisms and their physical environment.

"the marine ecosystem of the northern Gulf had suffered irreparable damage"

- (in general use) a complex network or interconnected system.
"Silicon Valley's entrepreneurial ecosystem"

Eg: Aquarium

Intro

development

NOUN

[mass noun]

1 The process of developing or being developed.
'she traces the development of the novel'

3 The process of converting land to a new purpose by constructing buildings or making use of its resources.
'land suitable for development'

Eg: Buildings, roads, Metro

Intro

sustainable 


ADJECTIVE

- 1 Able to be maintained at a certain rate or level.
'sustainable economic growth'

Human body, population

Intro

feasible

/ˈfiːzɪb(ə)l/ 

adjective

1. possible and practical to do easily or conveniently.
"the Dutch have demonstrated that it is perfectly feasible to live below sea level"
synonyms: practicable, practical, workable, achievable, attainable, realizable, viable, realistic, sensible, reasonable, within reason, within the bounds of possibility; [More](#)
2. likely; probable.
"the most feasible explanation"

Intro

Development project is expected to give economic benefits

Benefits (gains)	Losses
Increase in GDP	Depletion of resources (renewable and non renewable)
New employment (jobs)	Pollution
Additional foreign exchange	Disruption of social structure

Gains are tangible. Losses are intangible and are often missed in the cost-benefit analysis.

Intro

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Is the project sustainable?

Ideally, it should have good net benefit after considering both gains and losses

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Technical feasibility

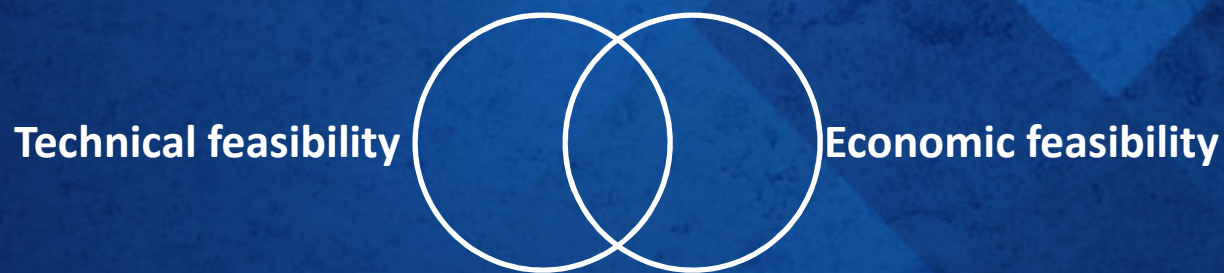


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Intro

Basic objective of EIA

To identify and evaluate potential impacts of dev. projects on the environmental system.

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Basic objective of EIA

both gains and losses

To identify and evaluate potential impacts of dev. projects

Including society at all levels

on the environmental system.

EIA may be defined as,

A process designed to ensure that all potentially significant impacts are satisfactorily assessed and taken into account in planning, designing, authorization and implementation of a development project.

Intro

When should it be done?

Who must do it?

How should it be done?

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While the project is being planned (not implemented).
Should not be decide-act-defend approach.

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By a neutral agency.
Not by supporters or opponents of the project.

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How should it be done?

All those affected should be consulted.
All impacts should be considered carefully.

financial, environmental, social etc.

EIA Process: Stages

1. Project conception
2. Planning and design of project alternatives
3. Baseline survey
4. Impact assessment
5. Documentation of EIA report and safeguards to be implemented
6. Public consultation
7. Final decision

The different stages are sequential, but cyclic as well. Completion of a stage might necessitate re-examination of an earlier stage.

EIA Process

Project design and planning

One of the early steps, done before getting any official approval
EIA can be started at this stage

EIA process should consider

other (better) options in achieving project objectives, including abandoning the project

examine alternative locations (eg. Mining project)

alternative designs, site layouts etc. which might prove better.

The goal should be to find out the most environmentally compatible option while accommodating the interests of the developer.

Rapid Environmental Screening can eliminate a number of alternatives.

Perhaps it is not ideal to inform the public at this stage.

EIA Process

Baseline study

One of the most important activity of EIA process.

Land

Land use pattern
Topography
Soil quality

Air

Air quality
Noise level
Wind pattern

Water

Water availability
Water discharge
Water quality

Are there (cultural heritage) structures which might be affected?

Would the air/water currents lead to an increase in pollution levels?

Biological parameters: fisheries, cropping, livestock, forest cover etc.

Socio-economic parameters: human settlement, demographic pattern, income distribution etc.

The relative importance of parameters depend on the type of project.

EIA Process

Baseline study

Table

Physical environment	Biological environment	Socio-cultural environment	Ecological relationship
<p>Land. Landuse, topography and drainage, mineral and other resources, soil quality, groundwater table, special geological features.</p> <p>Water. Water availability, water discharge, water recharge, and surface and groundwater quality.</p> <p>Air. Ambient air quality, noise level, temperature, meteorology (micro and macro).</p> <p>Processes. Flood, erosion, air movement, stability (slides, slumps), stress-strain (earthquake)</p>	<p>Flora. Trees, shrubs, grass, crops, microflora, aquatic plants, endangered species.</p> <p>Fauna. Birds, land animals including reptiles, fish and shellfish, benethos, insects, micro fauna, endangered species, barriers, corridors.</p> <p>Human beings. Human settlement, demography (language, religion, caste, community, gender break-up), indigenous population, community health, population density etc.</p>	<p>Socio-economic. Occupation, economic distribution, social division, special cultural practices, employment, health and safety.</p> <p>Aesthetics and human interest. Recreational facilities (hunting, fishing, boating, trekking, swimming, camping, picnicking, resorts, etc.), scenic views, open space and wilderness qualities, unique physical features, parks and reserves, rare and unique species or eco-systems, monuments, historical and archeological sites and objects, religious sites, etc.</p> <p>Cultural. Cultural pattern (lifestyle) particularly of indigenous population.</p> <p>Constructed facilities. Structures, transportation network, utility network, waste disposal, barriers, corridors, etc.</p>	<p>Biodiversity, salinization of water sources materials, eutrophication, disease-insect vectors, food chain etc.</p>

EIA Process

Impact Assessment

Aspects: identification, evaluation and prediction

Impact is felt is on

- i. environment (air water and land)
- ii. living beings (humans, flora etc.)
- iii. Build environment
- iv. Social environment (economics, culture, social system)

Environment

air quality: from air pollution

Water: quality (water pollution, thermal pollution) availability: (demanding?)

Landuse, landquality : soil erosion, chemical residue deposition

Living beings: pollution, changes in leisure activities, agriculture (pollution, less area), forest (deforestation)

EIA Process

Impact Assessment Environment

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Living beings: pollution, changes in leisure activities, agriculture (pollution, less area), forest (deforestation)

Build environment: damage levels, aesthetics

Social: Economic growth, there could disparity in wealth distribution, loss of traditional skills & livelihood etc. new settlement to displaced people cannot replace the original one. The original cultural life is hardly revived.

Hazard risks, Construction stage 1 (pollution, insanitation, migrant population issues) stage 2 (all of the rest), secondary impacts (long term: non local conflicts
Other support industries)

EIA Process

Impact Assessment

EIA process is concerned with assessment of significant environmental impacts

Significance dependent on type of project and nature of environment

Some considerations on EIA process are

Is the impact likely to threaten existing environmental standards?

Is the impact likely to threaten overall national policies, objectives and plans?

Is the impact likely to cause concern to national and international environmental interest groups?

Various tools are used to assess significant impacts. Some examples are

Check list (list of features of the project that can give rise to significant impacts)

Matrices (combined use of project parameters and environmental impact)

Cause-effect diagrams (each impact is shown as a cause effect diagram)

EIA Process

Environmental impact	Development component									
	Land acquisition	Construction	Site development	Road construction	Civil construction	Machinery installation	Plant operation	Road material	Dumping of solid waste	
Landuse	-1	-1	-1	-1	-1	0	-2	-1	-2	
Forest	-1	-1	-1	-1	0	0	0	-2	0	
Agriculture	-1	-1	0	-1	0	0	-1	0	-1	
Soil	0	0	0	0	0	0	-2	-1	-2	
Fisheries	0	+1	0	0	0	0	-2	0	-2	
Health	0	-1	-1	-1	-1	-1	-2	0	-1	
Socio-eco.	-1	+1	+2	+1	+2	+1	+3	+1	0	
Water Quality	0	-1	0	0	0	0	-2	-	-1	
Air Quality	0	0	-1	-1	-1	0	-2	0	-1	
Odour	0	0	0	0	0	0	-2	0	0	
Noise	0	-1	-1	-1	-1	-1	-2	0	-1	
Safety	0	0	-1	-1	-1	-1	-2	-1	-1	
Built Structure	0	-1	0	+1	+1	-1	-1	0	0	
Livelihood Contest	-1	+1	+1	+1	0	+1	-1			

EIA Process

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Fisheries	0	+1	0	0	0	0	0	0	-2
Health	0	-1	0	0	0	0	0	0	-1
Socio-eco.	-1	+1	0	0	0	0	0	+1	0
Water Quality	0	-1	0	0	0	0	0	-	-1
Air Quality	0	0	0	0	0	0	0	0	-1
Odour	0	0	0	0	0	0	0	0	0
Noise	0	-1	-1	-1	-1	-1	-2	0	-1
Safety	0	0	-1	-1	-1	-1	-2	-1	-1
Built Structure	0	-1	0	+1	+1	-1	-1	0	0
Livelihood Contest	-1	+1	+1	+1	0	+1	-1		

Key

- 3 High significance
- 2 Medium significance
- 1 Low significance
- 0 No significance
- + Beneficial impact
- Adverse impact

EIA Process

Impact Assessment

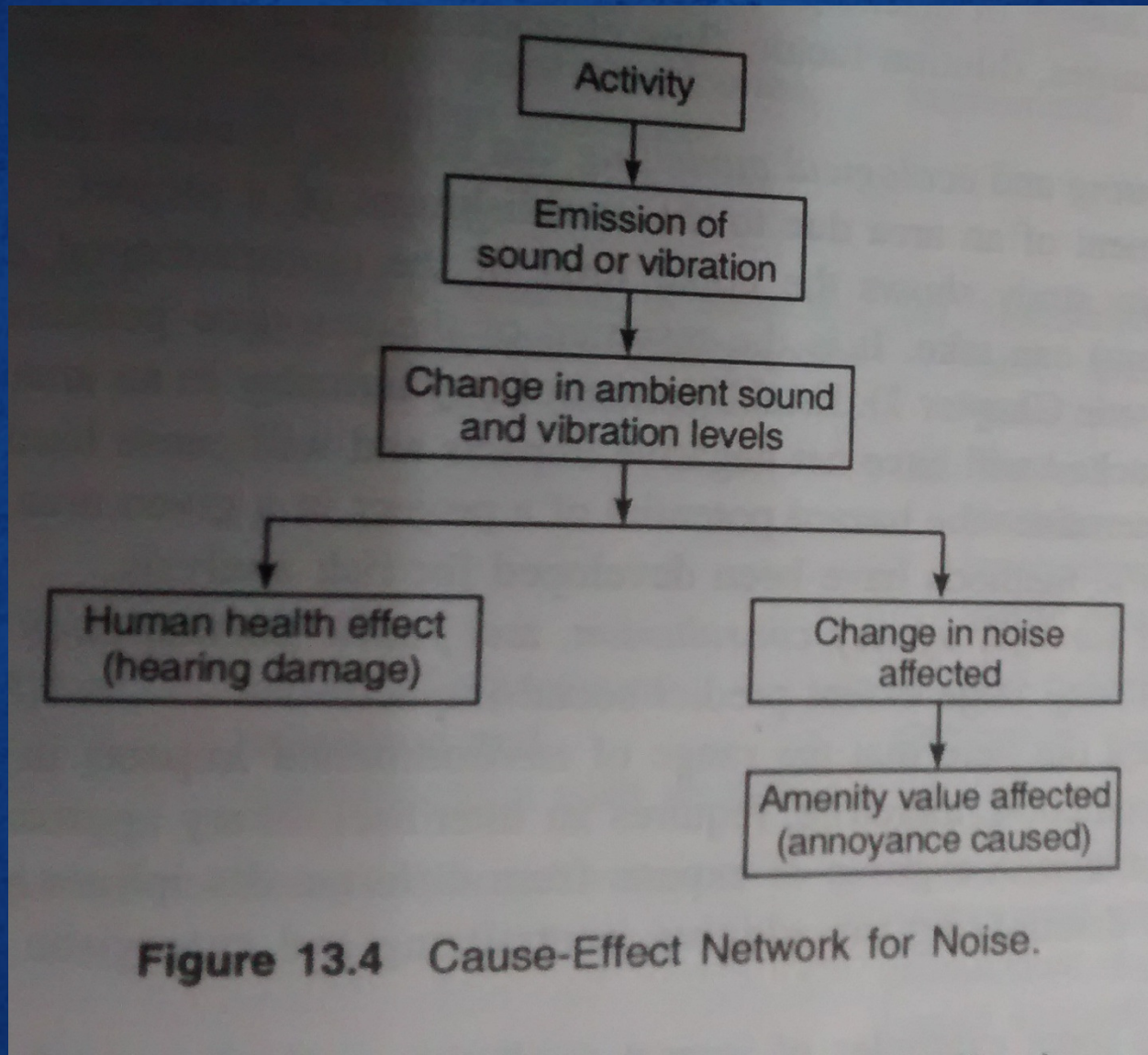


Figure 13.4 Cause-Effect Network for Noise.

EIA Process

Impact Prediction

EIA process is concerned with assessment of significant environmental impacts

The degree of impact of a project on the environment should be known to arrive at an informed decision. This should be known in a quantitative or semi-quantitative form. This is not the case usually.

A good deal of imaginative skill and experience is needed to make predictions

Some methods have been developed to make such predictions.

Dispersion models (can predict fallout of pollutant in land, water etc.. Extensive input data is required)

Resource accounting (prediction about depletion of resources)

Carrying capacity study (prediction about population of various species)

EIA Process

Impact Prediction

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Risk analysis (predicts the hazard potential of a project on an area)

Social surveys (predict social impact of a project)

We need to use a combination of several methods to make a good prediction because none of the method is perfect.

EIA Process

Impact Prediction

Sl. no.	Impacts	Types of predicted impact (Example)	Predictive methods (Indicative)
1.	Air pollution	Impact of emissions on ambient air quality (point and non-point sources)	Mathematical models of different types along with expert panel discussion.
2.	Noise pollution	Impact of plant machineries, construction equipment, highway traffic on ambient noise levels	Mathematical models
3.	Water pollution	Impact of effluents of surface and ground-water quality (point and non-point sources)	(a) Mathematical models along with other approaches like expert panel discussion. (b) Methods based on hydraulic analyses, mass balance analysis along with expert panel discussion.
4.	Land pollution	Impact of disposal of hazardous and non-hazardous solid wastes	Material balance, expert panel discussion
5.	Visual impacts	Visual impact of a new road	Various methods of simulation of post-project situation like perspective drawing, computer-based simulations
6.	Industrial hazards	Accidental release of toxic gas in upset conditions	Risk analysis
7.	Higher order impacts	Biological impacts	Expert panel discussion, surveys of receptors, monitoring and ecological modelling (with limited survey)
8.	Socio-economic impacts	Loss of livelihood and skill	Social survey, discussion with all stakeholders and interest groups, expert panel discussion.

EIA Process

Documentation

Final report should be written carefully.

Should be unbiased, truthful and informative.

All sources of information and methodologies should be clearly shown.

Comparison between pre-project and post project implementation condition should be shown.

A good executive summary also needs to accompany the report.

Additionally an environment management plan also has to accompany the report.

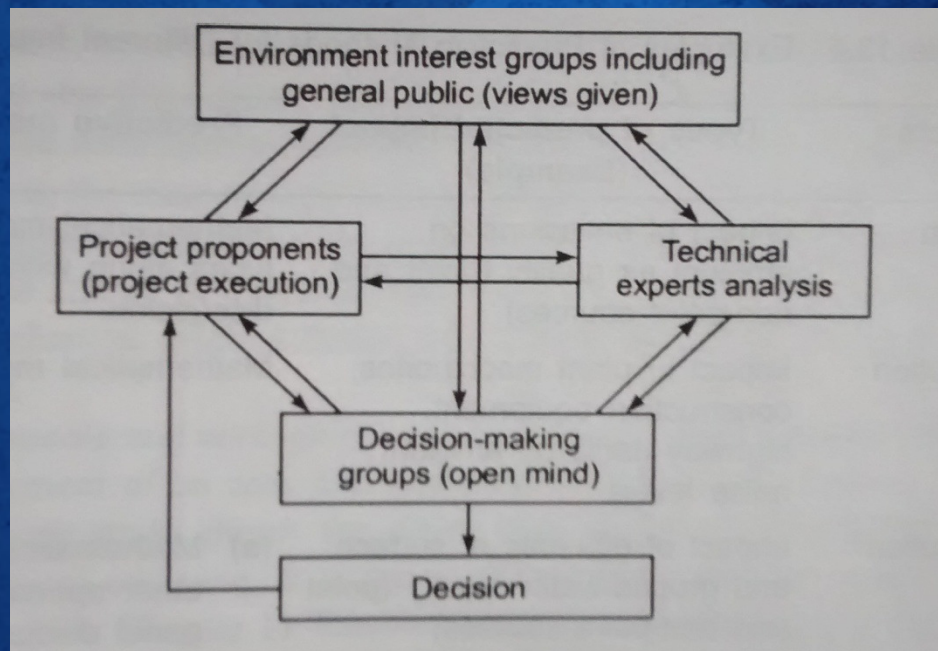
EIA Process

Public Consultation

Decision by a select group of experts tend to be faulty.

They might fail to account for the social aspects well.

A sound decision making process needs to be transparent and all stake holders should be allowed to participate in the decision making process.



Thank you