Framework for mainstreaming biodiversity in planning and implementation of transportation projects

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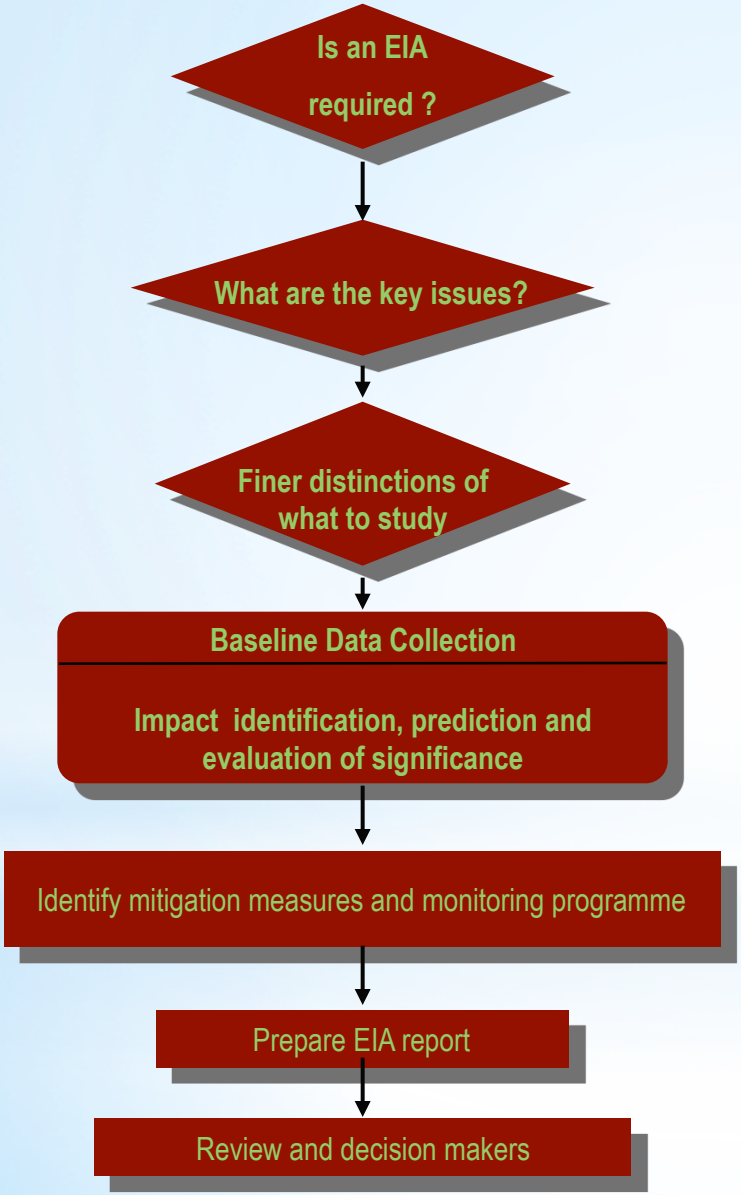
EIA framework



Screening

Scoping

Focusing

Assessment

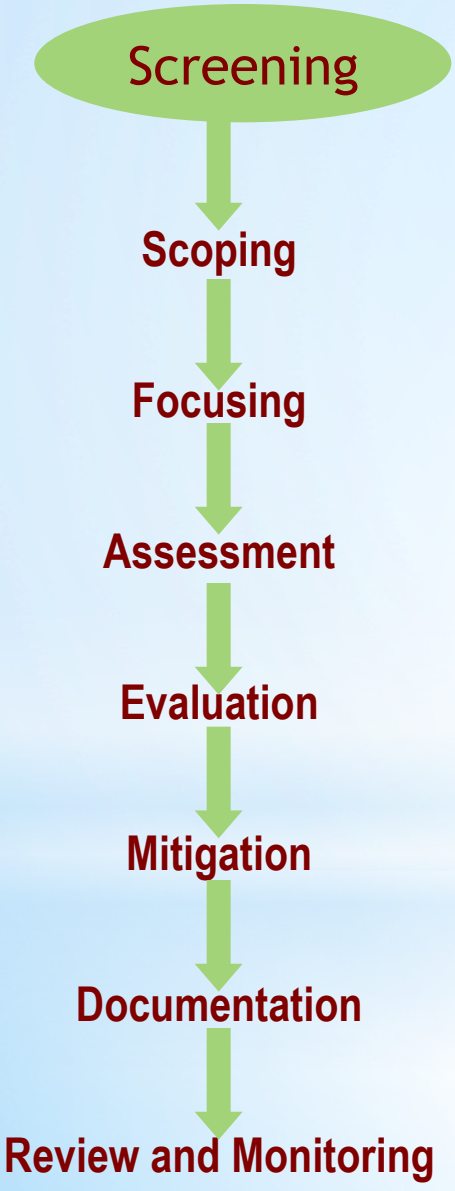
Evaluation

Mitigation

Documentation

Review and Monitoring

Is an EIA needed?



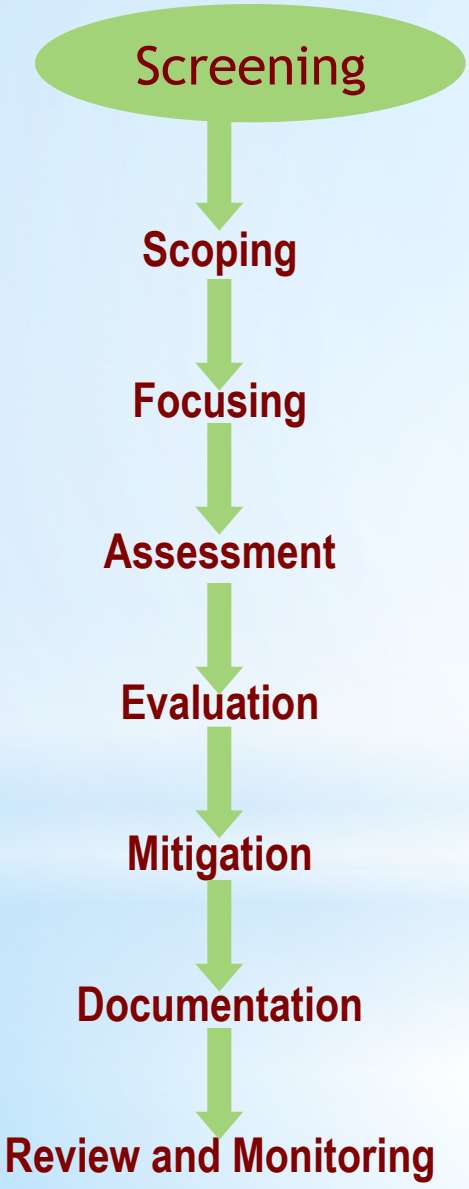
Are there important environmental concerns that require environmental impact assessment ?

Identify transportation projects with the potential to make significant negative impacts.

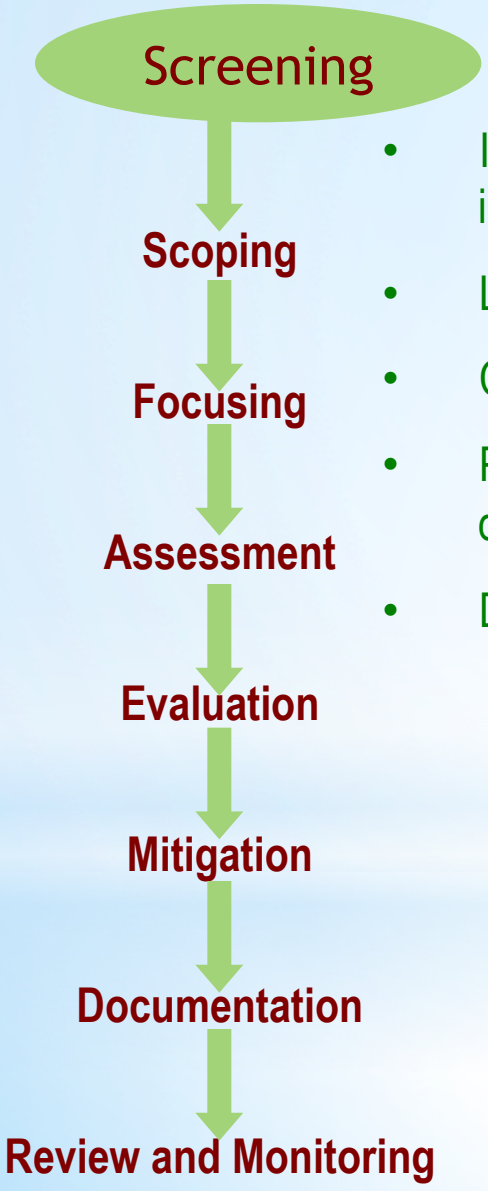
The need for EIA might be indicated if the proposed project affects:

- **designated or protected areas, or protected species**
- **areas of cultural importance (e.g. sacred groves)**
- **areas where biodiversity components support local livelihoods,**
- **watercourses, wetlands, river catchments or fragile ecosystems,**
- **large continuous areas of 'pristine' habitat, even if not protected.**

Methods



- Initial environmental examination
- Evolved sensitivity criteria (location, impact receptors and duration)
- Legislative provisions for inclusion and exclusion lists

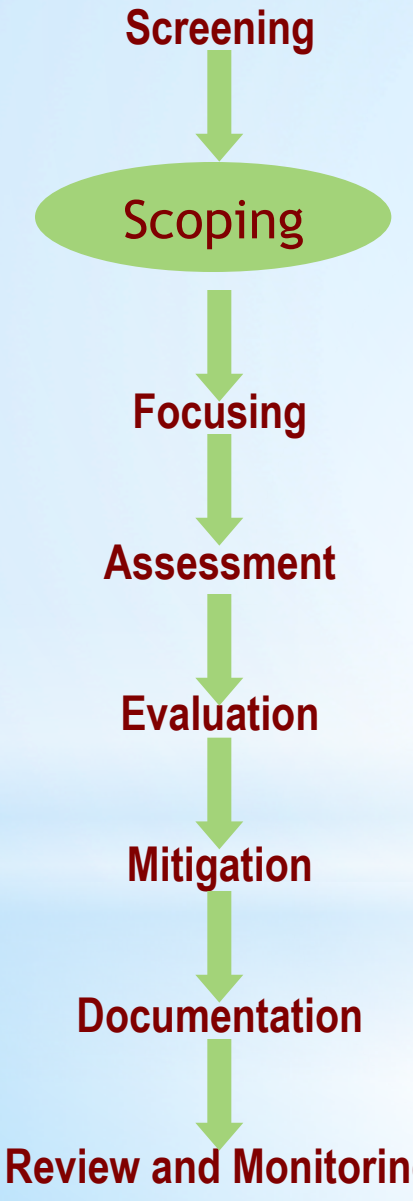


Guidance on screening

- Information about the proposal and its potential impacts
- Level of confidence in impacts
- Characteristics of the **environment**
- Planning, environmental management and decision-making framework
- Degree of public interest

'Triggers' for biodiversity inclusive assessment

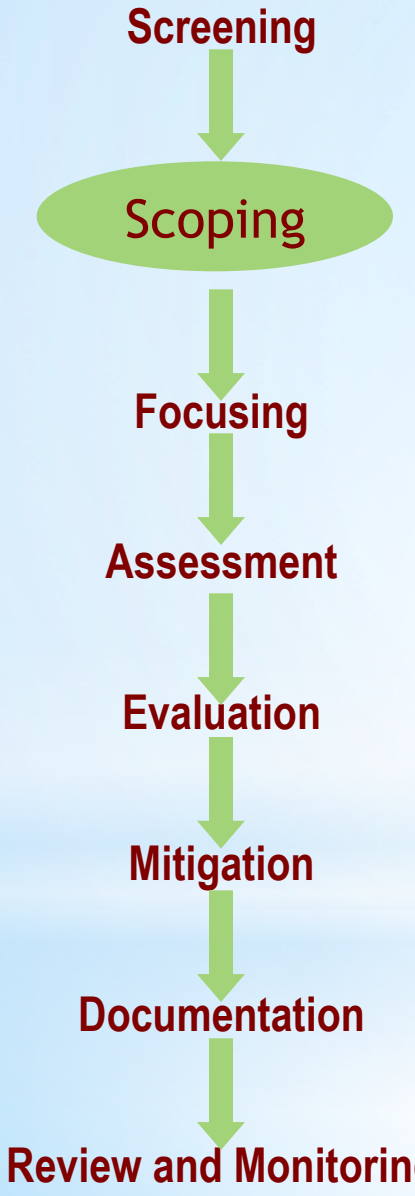
- **Potential impacts on PAs and area supporting protected species**
- **Areas under important biodiversity**
- **Areas that provide important ecosystem services e.g. shelter, resources, wetlands, breeding grounds, flood storage areas and ground water recharge areas**



All-encompassing EIAs?

Scoping stage defines key issues which should be included in Environmental Assessment and determines the scope, depth and terms of reference (ToRs) of the EIA.

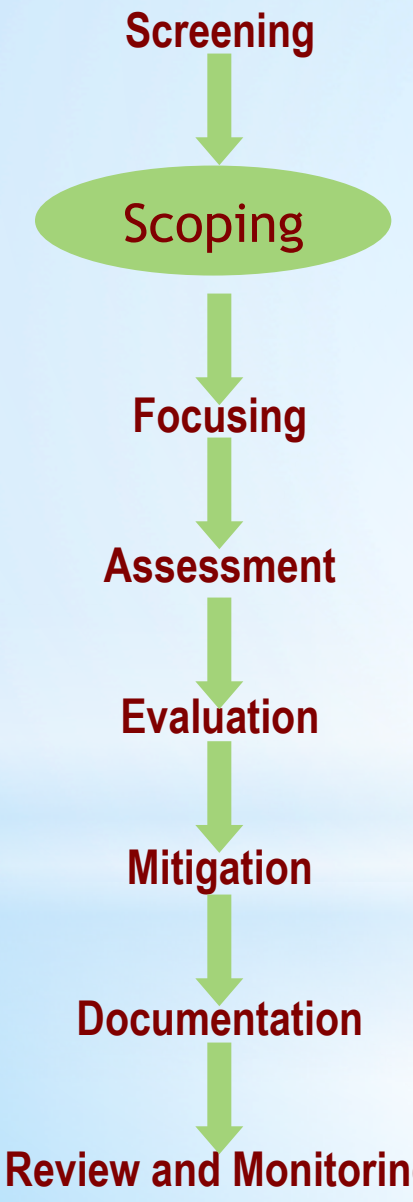
Consult widely and early with all stakeholders, especially people with dependence on biodiversity in the affected area, and widely circulate the scoping report.



Stakeholders in Scoping

Scoping is carried out in discussions between the developer, the competent authority, relevant agencies and, ideally, the public

- Sectoral agencies: Planning, Agriculture, Health & Welfare, Water Resources, Forest & Environment, Other Industry
- Local government bodies
- Private sector bodies
- NGOs and CSOs
- EIA experts - disciplines
- Ecological economists
- Local; indigeneous peoples (traditional knowledge)



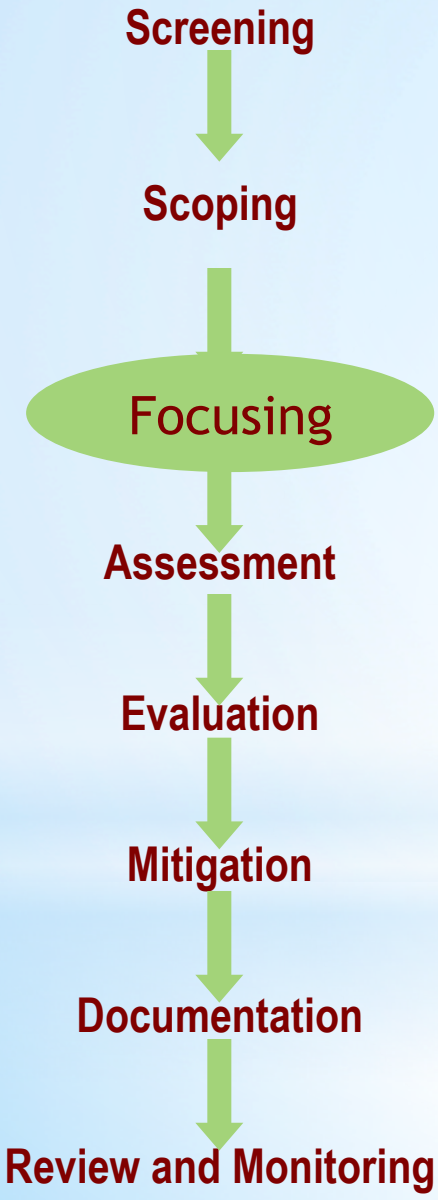
Scoping for biodiversity inclusive EIA

- Impact on an established or proposed protected area
- Impacts on threatened species
- Introduce invasive alien species
- Release of living modified organisms (LMOs)
- Impact on the knowledge, innovations, and practices of indigenous and local communities
- Impact biodiversity in an ex situ context
- Impact on availability of ecosystem goods and quality of services

Key functional attributes and ecosystem processes for consideration in EIA

- **Nutrient cycles** (can effect system productivity and species composition)
- **Energy flow** (affects ability of systems to 'support' component species)
- **Productivity** (affects ecosystem function and species composition)
- **Eutrophication** (a form of increased productivity with implications for species composition)
- **Succession** (knowledge of patterns of succession is important for predicting community change over time)
- **Colonization** (can be a key in maintaining populations)
- **Dispersal** (can be key in maintaining populations and is also important with respect to ability to recover following impact)
- **Competition** (altered competition has implications for species composition and patterns of succession)
- **Assimilative capacity** (can affect ability of a system to absorb or recover from pollution)
- **Population processes** (breeding, migration)

(Source: Treweek, 1999)



Focusing

Refine the ToR on the basis of biodiversity values, which will be used in decision-making.

Select biodiversity components for more detailed study, e.g. focus on:

- indicators (e.g. of disturbance or pollution),
- species valued for hunting, medicines, ecotourism,
- crop/livestock gene stocks,
- keystone species (on which others depend)

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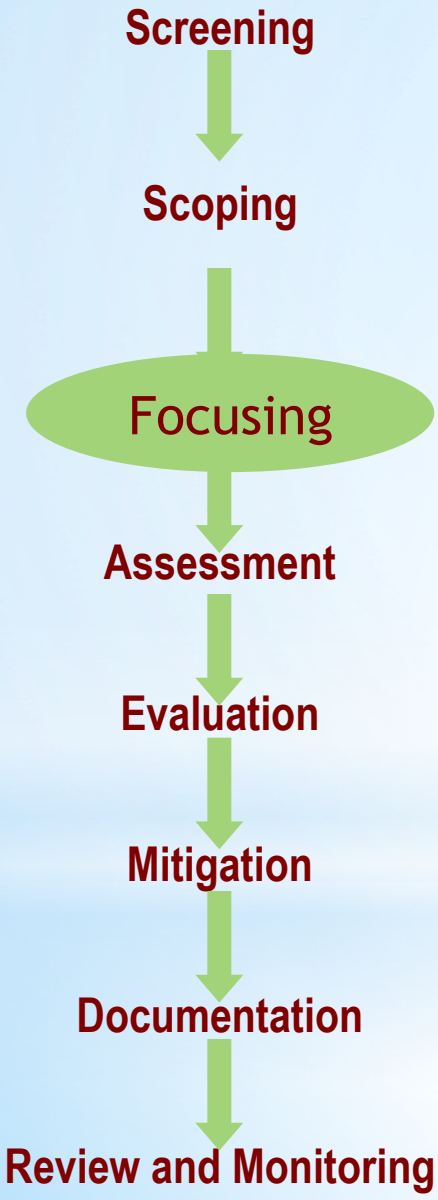
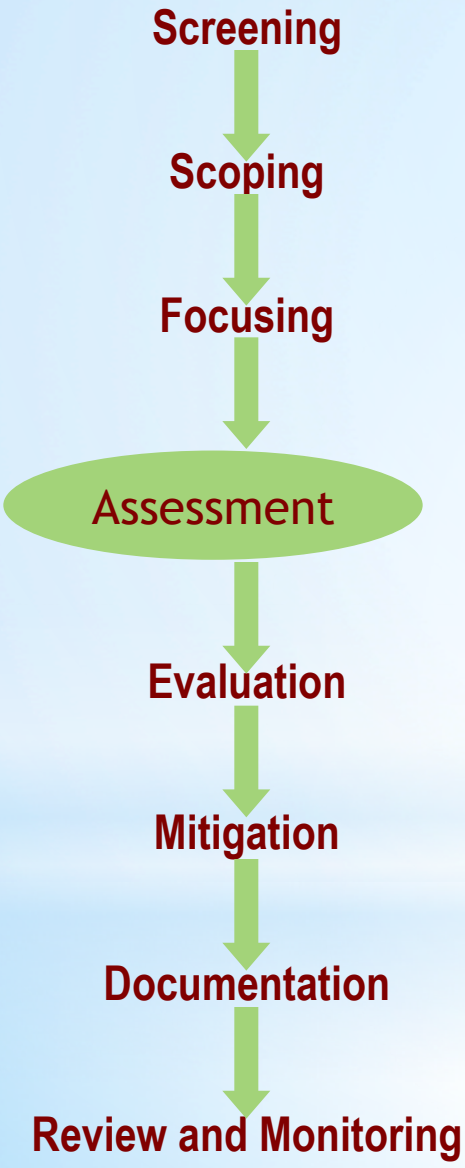


Focusing

Refine the ToR on the basis of biodiversity values, which will be used in decision-making.

Select biodiversity components for more detailed study, e.g. focus on:

- important ecosystem functions (e.g. flood attenuation provided by wetlands),
- key breeding or feeding sites, especially for protected species,
- migratory routes and stopover sites.



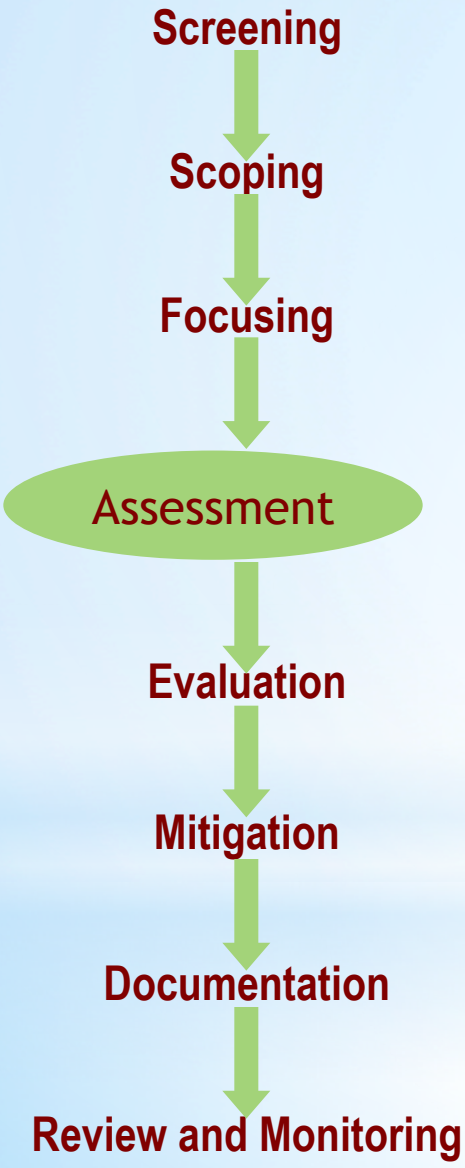
Impact Assessment

Predict impacts: identify, describe and provide the data necessary to quantify the effects of the proposed project on measures of biodiversity.

Build up **baseline**: This stage provides the 'baseline against which future impacts can be assessed, and

to explore alternatives of location, design, scales, technology and timing for project implementation.

Impact Assessment



- The baseline study should anticipate the future state of the environment assuming the project is not undertaken – the 'no action alternative'

Other alternatives:

- For each alternative site so that the relative severity of the impacts for each alternative can be assessed

- Primary data collection (e.g. biodiversity survey) if the secondary information is not available, or outdated and not relevant for the needs of the assessment

Impact Assessment

- Specify magnitude (and quantify where possible),
- duration and range of impacts

e.g. for:

- areas of habitat to be lost (include breeding, feeding, refuge areas)
- habitual routes to be severed (number and relative importance to maintenance of mobility in the landscape)
- number of individuals likely to be killed

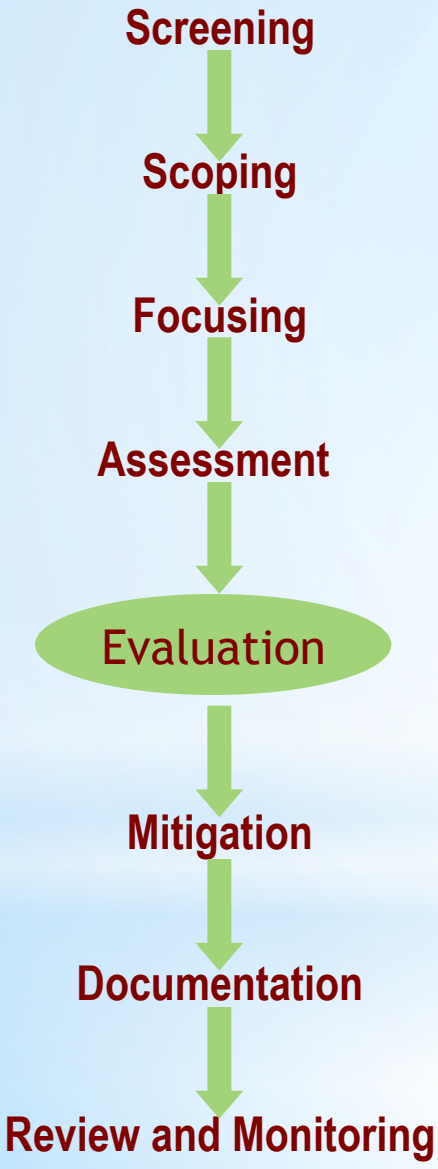
contd.

Impact Assessment

- Specify magnitude (and quantify where possible),
  - ➢ proportion of population to be disturbed
  - ➢ quality of remaining habitat for key species
  - ➢ ecosystem functions lost or impaired etc. (e.g. hydrology of watersheds)
  - ➢ effects on ecosystem services

Assessment of effects on ecosystem services

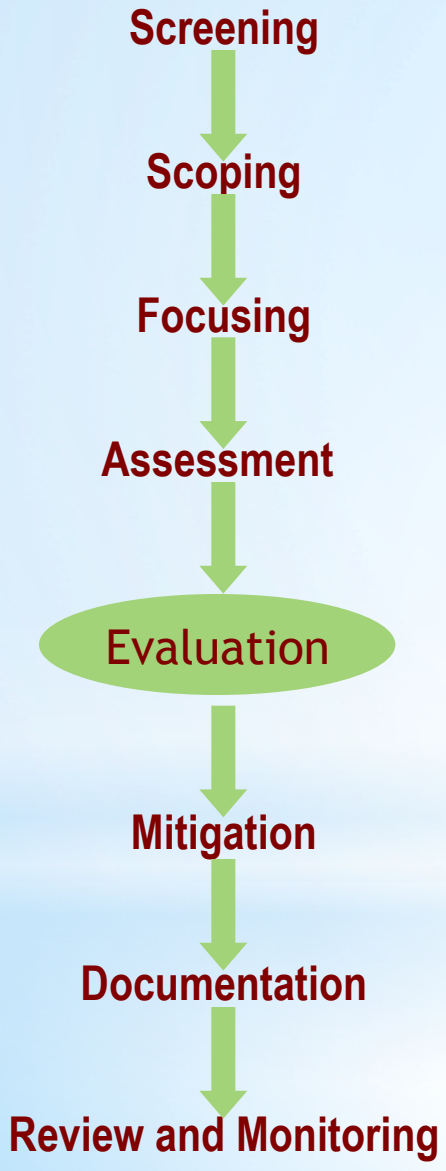
- How does proposed project affect service production, and how does service delivery relate to the condition of an ecosystem?
- How does production of one service interact with production of others?
- Who uses and produces ecosystem services?
- What is the spatial relationship between ecosystem service supply and consumption?
- How well can technology substitute for ecosystem services?



Impact Evaluation

A step in EIA involving evaluation of magnitude, extent and significance of environmental impacts

- Impact significance: Rank impacts, taking into account biodiversity values and the reversibility of impacts.
- The conclusions of the impact assessment can ultimately be used by decision-makers when determining the fate of the project application



Impact Evaluation

A step in EIA involving evaluation of magnitude, extent and significance of environmental impacts

Consider:

- magnitude, duration, timing and reversibility of impacts, along with their predictability,
- effectiveness of mitigation measures,
- post-development carrying capacity of remaining habitat,
- viability of remaining populations,
- sustainability of valued biodiversity components,
- ability of affected habitats, populations or species to recover.

Categories of ecological impacts

Direct impacts

A direct result of project activities or decisions. They are predictable, usually occur near to project activities, occur during the project lifetime, and are easily identified during planning and the EIA.

- Habitat loss or destruction (e.g.vegetation clearing)
- Altered abiotic/site factors (e.g. soil removal and compaction)
- Mortality of individuals (e.g. through collision)
- Loss of individuals through emigration (e.g. following loss of habitat)
- Habitat fragmentation (e.g. barrier effect of road and rail)
- Disturbance (physiological and behavioural)

contd. ...

Indirect or secondary impacts

Result from interactions of the project with social, economic, political and environmental factors and also with actors such as local communities, migrants, government and project personnel.

Compared to direct impacts, indirect impacts often have:

- a larger geographical scope (cover a broader area)
- a lower intensity (a lower impact per unit affected)
- a lower predictability,
- and thus more complex a priori mitigation
- a higher likelihood of involving third parties not directly related to or under project authority
- unclear boundaries of responsibility

Indirect or secondary impacts

- Mortality of individuals due to better access
- Reduced population (due to reduced habitat, size and quality)
- Altered population dynamics (due to altered resource availability)
- Increased competition (due to shrinking resources)
- Altered species composition and habitat changes (due to fragmentation)
- Reduced gene flow (due to restricted migration)
- Habitat isolation
- Reduced breeding success
- Altered prey-predator relationships

Cumulative impacts

Successive, incremental and combined direct and indirect impacts of project development4. They arise from compounding additional activities of a project or projects

- Habitat 'nibbling' (progressive loss and fragmentation throughout an area)
- Reduced habitat diversity, e.g. at the landscape level (associated with reduced biological diversity at other levels in organizational hierarchy)
- Habitat fragmentation over time, resulting in progressive isolation and reduced gene flow
- Reduced genetic diversity can result in loss of resilience to environmental change and increased risk of extinction
- Irreversible loss of biological diversity (e.g. through destruction of unique population units)

Evaluation phase of the study should be able to provide answers to biodiversity concerns

- What impact will the project have on the genetic composition of each species?
- Do major systemic or population changes appear to be taking place?
- How will the proposal affect ecosystem processes? Is this proposal likely to make the ecosystem more vulnerable or susceptible to change?
- Does the proposal set a precedent for conversion to a more intensive level of use of the area?
- Is the biological resource in question at the limit of its range?
- Does the species demonstrate adaptability?
- What level of confidence or uncertainty can be assigned to interpretations of the effects?

Impact Assessment

Project Characteristics

- Location and size
- Schedule of construction and operation
- Potential sources of impact
- Nature of emissions
- Receiving environment for emissions
- Extent, magnitude and duration of disturbance
- Alternatives for site and design
- Past, current and future proposals
- Associated developments

Characteristics of Ecosystem Components

- Naturalness and integrity
- Habitat quality
- Population viability
- Rarity
- Endangerment
- Extinction risk
- Genetic diversity
- Alteration in home ranges
- Resilience
- Fragility
- Stability
- Conservation significance
- Uniqueness

Impact evaluation

(*Prediction of ecological outcomes relative to baseline taking into account the the range and magnitude of the impacts*)

Impact Mitigation

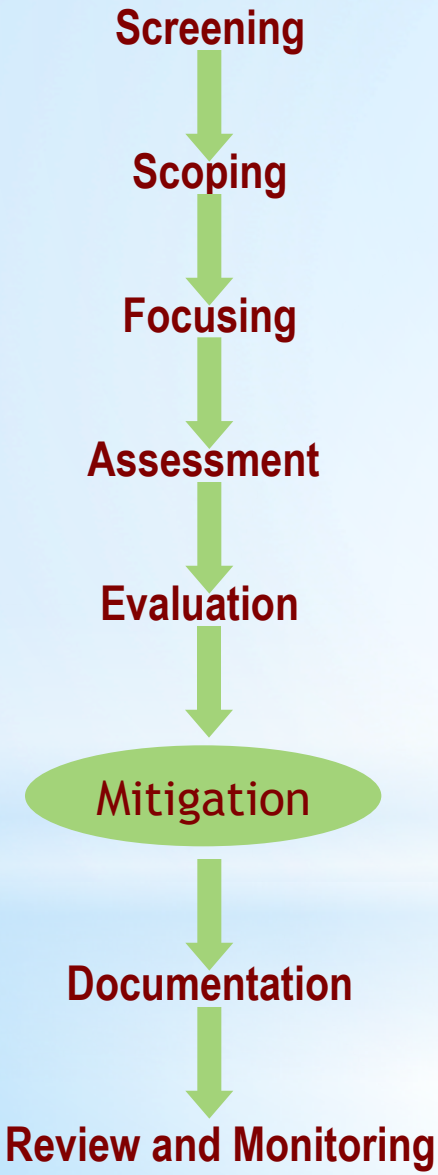
Problem solving step that helps in seeking:

- better ways of doing things
- minimizing the severity of negative impacts
- enhancing the project benefits

Involves developing strategies and options to adopt the mitigation hierarchy:

Avoid - Reduce - Remedy - Compensate – Enhance

Residual impacts



Impact Mitigation

Most EIA law requires proponents to suggest measures to avoid, reduce or remedy adverse impacts.

- Ensure mitigation is recommended for significant adverse impacts on biodiversity.
- Avoidance is key in mitigation.
- To what extent will proposed mitigation measures reduce impacts?
- Have they been successful elsewhere?
- Mitigation for biodiversity may require land acquisition for compensation.

Documentation of the Results:

The EIA Report

- Environmental Impact Assessment report (EIA report)
- Environmental Impact Statement (EIS)
- Environmental Assessment report (EA report)
- Environmental Review
- Environmental Effects Statement (EES)
- Local usage

Review and Monitoring

EIA is an on-going process of review, negotiation and incremental decision-making, culminating in the essentially political action of making a final decision about whether or not the proposal is to proceed and under what conditions.

Review and Monitoring

What really happened?

The step in the EIA process that determines whether the EIA report is an adequate assessment of the project impacts related impacts and is of sufficient relevance and quality for decision-making.

Review of biodiversity inclusive EIA

- Did impacts on biodiversity happen as predicted?
- Were the suggested alternatives, mitigation strategies appropriate and effective?
- What was the outcome for biodiversity?
- Did the EIA incorporate views of all concerned
- Presentation of information to the public and to decision-makers

Steps in reviewing an EIA report

- Set the scale of the review
- Select reviewer(s)
- Use public input
- Identify review criteria
- Carry out the review
- Determine remedial options
- Publish the review report

Range of review methods

- General checklists, Project specific checklists
- Ad hoc processes
- Expert opinion, accredited reviewers
- Public review
- Panels of inquiry, independent commissions
- Legal approaches

Monitoring

Predictive

- Identifies a disturbance and source
- Provides early detection of trends.
- Determine the effect and magnitude of environmental change.
- Assist in the cumulative assessments.

Regulatory

- Assess the utility/futility of steps and control procedures to prevent or minimise the likely change/impact.
- Tests compliance with regulations.

Challenges?

- Biodiversity data
- Lack of adequate budgets for EIA.
- Time lines: project Vs species, processes
- ToRs: poorly defined
- Failure to address indirect impacts, cumulative affects
- Ecosystem services
- Incorporating local and traditional knowledge
- **Compliance**: Inconsistent and insufficient mechanisms
- Enforcement
- …….
- ……

Thank you