Appendix 1: Workshop on Biodiversity and Impact Assessment in Small Island States

Facilitators: Dr Jo Treweek (Technical Programme Manager for a ‘Capacity Building for Biodiversity and Impact Assessment’ project), Dr Bill Phillips (Director of MainStream Environmental Consulting and the former Deputy Secretary General of the Ramsar Convention on Wetlands, 1997-2000) and Jeremy Barker

It is impossible to include in these Proceedings the full benefits of the Workshop. However, both to act as an aide-memoire for those present and to make available a little of the valuable information to those who could not be, a small proportion of the presentations are included here. These are just in the form of the slides, rather than as all the texts and the discussions, but we hope that they give some flavour.

The background to the Workshop is included in Appendix 2, and the Conclusions and Recommendations from the workshop are included in the Introductory section of these proceedings.
Introduction to Workshop

**Biodiversity and Impact Assessment in Small Island States**

6th - 7th October 2006
Jersey
Facilitators
Jo Treweek
Bill Phillips
Jeremy Barker

**CBBIA-IAIA**

Promoting biodiversity-inclusive impact assessment

**Objectives**
- Provide practical, demand-driven support for development of capacity
- Share information and experiences, working with practitioners, policy-makers, biodiversity-related conventions and other stakeholders to build expertise and promote good practice
- Support capacity-building through knowledge-transfer, institution-building and networking
- Support the work of the biodiversity-related Conventions
- Promote, and contribute to, the further development of guidelines for incorporating biodiversity related issues into IA

**Outputs**
- A network of trained professionals
- Capacity-building activities eg workshops and training, based on needs assessment and review of current practice in participating regions and countries
- Guidance on biodiversity-inclusive EIA and SEA
- Tested training materials
- Case study material to support development of CBD and other guidance on EIA and SEA

**Regional Activities**
Focal Regions:
- Southern Africa
- South/South East Asia
- Central/ South America
- Small Island States

1. Needs/ Situation Assessment
2. Materials for regional capacity building and "road-testing"
3. Meetings and workshops
4. Future funds

**Aim**
To develop and promote Impact Assessment (EIA and SEA) as an effective instrument for addressing biodiversity considerations in decision making and the execution of projects, programmes, plans and policies.

**Activities**
- Conferences, events, training and workshops
- Working with institutions, organisations and individuals in selected regions and countries to enhance integration of biodiversity with IA laws, procedures and practices
- Small grants for review and enabling activities
- Database of contacts and mechanism for ongoing exchange of information and ideas
- Further development of guidelines on the integration of biodiversity considerations in EIA and SEA within the framework of the Convention on Biological Diversity, the Ramsar Convention and the CMS

**CBBIA-IAIA**

Promoting biodiversity-inclusive impact assessment
Support review and enabling activities primarily in countries outside main regions
2 rounds, 12 Projects completed
Results of first round presented at IAIA ‘05 and IAIA ‘06

Help suitably qualified individuals participate in IAIA conferences and events, including regional workshops and activities as well as annual conferences.

More than 100 people from 30 countries have benefited so far

Working with:
- regional partners to implement workplans
- governments, organisations, and individuals to build capacity
- professionals to build expertise and knowledge
- Governments to strengthen laws and institutions
- Biodiversity-related Conventions (CBD, Ramsar, CMS) to promote biodiversity-inclusive impact assessment
- Individuals and organisations at grass roots level who want to develop practical advice
- Students who want to learn more about biodiversity and impact assessment

CBBIA worked with the IAIA Biodiversity and Ecology Section to produce:
- IAIA Principles and Practices Series: Biodiversity in Impact Assessment
- Biodiversity and Impact Assessment: IAIA Key citations
- Available from: www.iaia.org

CBBIA: Developing Guiding Principles

Precautionary principle
Presumption in favour of biodiversity protection where knowledge is lacking to ensure effective mitigation or where it is impossible to confirm ‘no significant impact’.

www.pprinciple.net // www.iaia.org

‘No net loss’ principle
Requires status quo to be maintained or enhanced in terms of quantitative and qualitative aspects of biodiversity in line with international agreements and obligations.

Ecosystem approach’, advocated by CBD and Ramsar Convention to ensure sustainable use. Biodiversity depends on healthily functioning ecosystems and processes that have to be assessed and managed in an integrated way.

How do we overcome problems of under-valuation regarding biodiversity?
• Although biodiversity yields many economically important goods and services, these values tend to be under-emphasised or ignored in decision-making
• It is difficult for EIA results to be fully incorporated into traditional economic measures of profitability
• Negative biodiversity impacts are not systematically reflected in project and programme appraisals and assessment measures
• There is seen to be little economic benefit to conserving biodiversity and few economic costs to biodiversity degradation and loss

CBBIA participants have been exploring and developing techniques for economic valuation of biodiversity and for enhancing awareness of biodiversity values (and the costs of biodiversity damage and loss)
Biodiversity and Impact Assessment in Small Islands

Small islands tend to have:
- rich biodiversity with very high levels of endemism.
- low assimilative and carrying capacity, leading to problems with water production and storage and waste management.
- A relatively large coastal zone in relation to land mass resulting in high vulnerability to erosion.
- High vulnerability to loss of land associated with sea level rise.
- Low resistance to outside influences, allowing rapid spread of invasive alien species and consequent endangering of endemic species.
- High incidence of natural disasters including earthquakes, volcanic eruptions, cyclones, hurricanes, floods, tidal waves.
- High threats from economic development, and mass tourism in particular.

The most important lesson of the last ten years is that the objectives of the Convention on Biological Diversity will be impossible to meet until consideration of biodiversity is fully integrated into other sectors. The need to mainstream the conservation and sustainable use of biological resources across all sectors of the national economy, the society and the policy-making framework is a complex challenge at the heart of the Convention. (Hague Ministerial Declaration from COP VI to WSSD, 2002)

Less than 10% of the world’s area is ‘protected’

Impact Assessment is an important mainstreaming tool, ensuring that biodiversity values are built into decision-making, from the strategic to the local level.

Evaluating the environmental challenges and implications for the sustainable future of Small Island Developing States.

From an international perspective:
- Biodiversity has buy-in as the ecological decision-making concept (ecology = understanding biodiversity).
- Global Biodiversity Conventions see Impact Assessment as a key tool.
- SEA has wide but limited application.
- SEA increasingly seen to be essential as a tool for mainstreaming biodiversity into development planning.

Seek to obtain the best possible biodiversity outcomes from land use change.
EIA provisions now exist in the framework environmental legislation of 55 developing countries.

At least 22 currently have specific laws, decrees or regulations, which contain criteria or procedures applicable to EIA.

Environmental Assessment (EA) applies to all World Bank lending operations through its environmental and social 'safeguard policies'. (Operational Policy OP4.01/ Bank Procedure BP4.01 on Environmental Assessment)

Impact Assessment Trends

- EIA is a mandatory legal requirement in many countries.
- Understanding of the EIA process is generally good, but implementation is poor with respect to biodiversity.
- Lack of awareness of biodiversity importance among decision makers.
- Insufficient information/baseline understanding to predict impacts reliably.
- Lack of taxonomic expertise.
- Poor involvement of affected people and other key stakeholders.
- Little effort to evaluate significance or interpret results.
- Little consideration of ecosystem scale, indirect or cumulative impacts.
- Little consideration of uncertainty, risk, gaps in information.
- Ever widening gap between demand and supply of ecosystem goods and services.

Limited institutional capacities of authorities responsible for EIAs commonly results in inadequate implementation of the regulations.

As a result there is inadequate control over development, and little monitoring of project impacts. Public participation is also minimal, despite this being a requirement of existing legislation.
Needs in Nepal:

### Awareness of biodiversity importance and values

The Millennium Assessment highlighted the vital role of biodiversity in its contribution to important ecosystem services and the benefits that people obtain from ecosystems.

Government authorities, local communities and other stakeholders are often unaware of the actual value of biodiversity within their jurisdictions. Consequently, many EIAs are narrowly focussed on certain types of impacts e.g. on particularly well-known threatened species.


### Training Needed

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### Listings and designation procedures lag behind rates of loss

Transparency and participation

Illegal and unregulated activities can represent the most serious threats

Information

Lack of reliable information on biodiversity makes it difficult to identify particularly valuable biodiversity components and ecosystem services that need to be considered in EIAs. Even if such values and services are known there is often inadequate information available to assess their status (i.e. establish baseline conditions) and reliably predict and quantify the likely impacts of proposed developments on them.

www.gbif.org

Biodiversity That Matters: a conference on conservation in UK Overseas Territories and other small island communities, page 358
Necessary for production of all other ecosystem services: soil production, nutrient cycling, primary production, evolution

Regulating services
Maintain natural processes: water flow and quality, soils, air quality, biodiversity, coastal protection

Provisioning services
Harvestable goods: firewood, food, medicines, raw materials, and pest control agents

ECOSYSTEM SERVICES

Supporting services

Cultural services
Religious, heritage, spiritual, scientific, artistic, aesthetic and other non-material benefits

Nepal - biodiversity impacts considered in decision-making

1. Impacts on Red List or Red Data Book species
2. Impacts on protected species
3. Impacts on protected areas
4. Impacts on threatened or sensitive ecosystems/environments
5. Impacts of invasive species

Issued raised by key stakeholders about important ecosystem services that could be affected
Key Trends in SEA Development

- SEA: assessing the environmental and sustainability effects of policies, plans and programmes.
- SEA is better developed at the level of plans and programmes than for policy and legislation.
- SEA development in developing countries is being catalyzed through the activities of international assistance and lending agencies, particularly the World Bank.
- Results of recent work of the Organization of the Economic Co-operation and Development’s Development Assistance Committee (OECD/ DAC) Task Team on SEA now available.
- Many countries now have SEA arrangements in place but only a few implement them and very few have in-depth experience.

Many processes that reduce genetic diversity - e.g. loss or isolation of habitats - operate at the ecosystem, landscape or global scale: SEA is one way to capture these processes as well as more local ones.

Insight’s conclusions

- Biodiversity presents a significant risk and opportunity to business in several sectors.
- A new “social contract” is emerging: access to land and sea conditional on best biodiversity practice.
- Best practice will come to mean “no net loss”, as a minimum.
- There is a business case for companies to:
  - specifically offset the unavoidable harm they cause to biodiversity for new projects in areas of high biodiversity value
  - contribute to conservation activities to demonstrate a positive contribution

C……..VAL CORP &plc

Environmental Policy:
- Core values include preserving the marine environment and the pristine condition of the waters upon which our vessels sail
- Commitment to pollution prevention, regulatory compliance and continuous improvement of environmental management

CR reporting focuses on regulatory compliance and ‘end of pipe’ solutions

Ecosystem change in Southern Africa

- About 60% of ecosystem services degraded or used unsustainably.
- Increased risk of unpredictable (non-linear) and irreversible changes to ecosystems
- Harmful effects and costs borne disproportionately by the poor, contributing to growing inequities and disparities across groups and causing conflict.
- Condition and management of ecosystem services is a dominant factor influencing prospects for reducing poverty.
**The Ramsar Convention on Wetlands and Impact Assessment**

**The Ramsar Convention and impact assessment**

Dr Nick Davidson  
Deputy Secretary General, Ramsar Convention

**Presentation structure:**
- What is the Ramsar Convention?
- A short history of Ramsar and impact assessment
- Ramsar and CBD links
- How well is IA being applied to wetlands?
- Future collaboration and work

**Ramsar’s Mission**

“The conservation and wise use of wetlands through local, regional and national actions and international cooperation as a contribution towards achieving sustainable development throughout the world.”

(Strategic Plan 2003-2008)

**What is the Convention on Wetlands?**

- Oldest of the global environmental conventions
- The only global convention focusing attention on an ecosystem (wetlands)
- Covers very wide range of wetlands - from coral reefs to mountains

**Why the “Ramsar” Convention?**

- Ramsar, Iran - where Convention agreed 2 February 1971 by 18 countries
- Celebrated annually on World Wetlands Day - 2 February

**What is the “wise use” of wetlands?**

“… “Wise use of wetlands is the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development.”

(Ramsar COP9, 2005) Resolution IX.1 Annex A

**Ramsar covers:**

- Natural and human-made wetlands
- Inland/freshwater:
  - Marshes, rivers, lakes, reservoirs etc.
- Coastal/marine:
  - Mangroves, lagoons, estuaries, coral reefs, seagrass beds etc.
- Above ground and underground
  - Karst and caves
- But not deep oceans

**Ramsar Contracting Parties**

Contracting Parties commit to delivering the Convention through 3 “pillars”:
- Wise use of all wetlands
- Wetlands of International Importance - designation and management
- International cooperation

**The Ramsar Convention today**

- 152 Contracting Parties
  - Others in process of joining (accession)
  - From Africa, central Asia, Caribbean, Oceania
- Over 1600 Wetlands of International Importance - "Ramsar sites"
  - Totaling >120 million hectares
  - Size: from <1 ha to >6 million ha
Ramsar links with other organisations

Cooperation with:
- NGOs and expert networks
- regional environmental organisations
- UN agencies
- other environmental conventions
  - Joint Work Plan with CBD
  - joint activities developing with UNCCD, CMS, UNFCCC, UNESCO, MAB etc.

The Ramsar “tool-kit” – wise use handbooks

- 14 Handbooks – published 2004
  - Guidelines: COP7 & earlier COPs
  - relevant COP Resolutions and Recommendations
  - case studies
  - New 3rd edition in preparation
  - include COP9 guidance
  - Update and replace some

Some key features of the Ramsar Convention

- Not under the UN system – governed by its Parties
- recognises wetlands (goods and services) as vital for human wellbeing (food and water security) and biodiversity conservation
- supports practical wetland sustainable utilization by countries
- open, collaborative and flexible mechanisms
  - both ecosystems and species
  - both sites and broad-based sustainable use
- supports implementation - not a “compliance-based” convention
- provides practical guidance on many topics - prepared by the STRP & its collaborators

A short history of Ramsar and impact assessment

- Key basis - Article 3 of Convention text

Article 3.1:
“Contracting Parties [countries] shall formulate and implement their planning so as to promote the conservation of wetlands, including those on the List [i.e. Ramsar sites], and as far as possible the wise use of wetlands in their territory.”

Article 3.2:
“CP shall arrange to be informed at the earliest possible time if the ecological character of any Ramsar site has changed, is changing or is likely to change as the result of technological developments, pollution or other human intervention.”

Ramsar’s Strategic Plan 1997-2002

Adopted 1996:
- stressed importance of IA
- requested expansion of wise use guidance - information on environmental assessment guidelines and good practice
- take particular account of EIA and SEA when assessing impacts
- reaffirmed IA as a key Convention tool
- recognised importance of including IA as cross-cutting issue in CBD/Ramsar Joint Work Plan (JWP)

A short history of Ramsar and impact assessment

- Implicit in Art. 3.2 is to use IA to predict likely change, and to respond to its findings to deliver Article 3.1 commitments
- This link only made explicit by Parties at COP8 (2002)

Ramsar and CBD collaboration

- since 1996 (CBD COP3) Ramsar identified as lead implementation partner of CBD on wetlands
- delivered through Joint Work Plans
  - now implementing 3rd JWP (2002-2006)
  - covers thematic ecosystem themes and cross-cutting issues incl. IA
- Ramsar Scientific & Technical Review Panel (STRP) and COP8 (2002) recognised the CBD COP6 IA guidelines as fully applicable to wetlands
  - adopted and use urged - with annotations for the Ramsar context
- IAIA is the key expert link between Ramsar and CBD work

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2nd Strategic Plan (2003-2008) continues IA importance

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Ramsar and IAIA

- IAIA invited to contribute expertise to STRP’s work since 1999 & 2006-2008 work plan
- formalised through 2001 MoC between IAIA and Ramsar Bureau
- COP8 & COP9 (2005) formally appointed IAIA as STRP observer organisation

1999 expectations of IA implementation

Resolution VII.16: The Ramsar Convention and impact assessment: strategic, environmental and social

- Parties to strengthen efforts to make sure potentially damaging developments to wetlands are subject to rigorous IA procedures
- Parties to ensure IA process is transparent and participatory - including local stakeholders

How well are Ramsar Parties applying IA?

1999 expectations of IA implementation

- Parties to strengthen efforts to make sure potentially damaging developments to wetlands are subject to rigorous IA procedures
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1999 expectations of IA implementation

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How well are Ramsar Parties applying IA?

COP8 National implementation Reports (130 countries)

Globally:
- 75 countries (63%) - EIA required for any action which can potentially affect any wetland
- 33 countries (25%) - EIA required for some wetlands (e.g. Ramsar sites) only
- in total 91% - some wetland EIA activity required

Regional differences:
- Asia: no EIAs for wetlands in 52% of countries
- Neotropics: 65% have legislation requiring EIA for all wetlands, but
  - only 40% have actually carried out EIAs for threats to Ramsar sites
- Mediterranean Basin countries: only 29% have undertaken EIAs for all cases for Ramsar sites
  - although 69% require it
- Africa: 82% countries EIAs required - but little information on extent of application

Conclusions?

- Legislative requirements widely in place
- But not being widely or consistently applied
- Countries need support and urging to do more EIA
- benefit to both wetlands and IA practitioners!

Latest decisions: Resolution VIII.9 (COP8, 2002)

Ramsar Parties to:
- make use of the CBD guidelines
- indicate their precise needs for further information, guidance and advice in IA relevant for wetlands
- provide relevant material
  - lessons learned, case studies, guidelines, advice sources etc.
- establish contact with relevant national focal points in IAIA networks
  - to identify sources of expertise and advice to assist in wetland IA

Resolution VIII.9

Further guidance work - STRP to:
- report a synthesis of lessons learned from case studies
- identify current wetland-related guidelines, and investigate ways of filling gaps
- review existing IA references in Ramsar material; and correct any inconsistencies in approach
- prepare advice on SEA in context of other Ramsar guidelines
Latest developments - 2005-2006

- **IF-WIAM:** integrated framework for wetland inventory, assessment & monitoring
  - Explains inter-relationship between different types and purposes of assessments
  - Supported by Information Paper describing types of assessment
- Wetland Rapid Assessment Guidelines
  - Jointly with CBD
  - Published March 2006 as CBD Technical Series 22 & Ramsar Technical Report 1

Latest developments - IF-WIAM

- There is a wide range of different types and methods of wetland assessment relevant to different aspects of Convention implementation, with each suited to, and designed for, different purposes and situations. These include:
  - i) Environmental Impact Assessment (EIA)
  - ii) Strategic Environmental Assessment (SEA)
  - iii) Risk Assessment (RA)
  - iv) Vulnerability Assessment (VA)
  - v) Change (status and trends) assessment
  - vi) Species-specific assessment
  - vii) Indicator assessment
  - viii) Resource (ecosystem benefits/services) assessment
  - ix) Assessment of values of wetland benefits/services
  - x) Environmental water requirement (environmental flows) assessment

**IF–WIAM** - how different assessments fit together

- Strategic Environmental Assessment
  - Helps determine need and parameters for:
- Environmental Impact Assessment
  - Helps determine need and parameters for:
- Wetland Risk Assessment
  - Provides baseline, limits to Action
- Vulnerability Assessment
- Rapid Assessment of biodiversity
- Wetland Valuation
- Policies, Plans, Programmes
- Compliance, Regulation
- Projects
- Compliance, Regulation, Monitoring
- Sites, Direct Drivers, Pressures
- Monitoring, incl. Early Warning Indicators
Latest developments - 2006-2008

STRP finalising more assessment guidance:
- Vulnerability assessment
- Economic valuation of wetland services
- Environmental water requirements (environmental flows) assessment methods

Latest developments - 2005-2006

- CBD COP8 (March 2006) adopted expanded EIA & SEA guidance
  - Replaces the earlier EIA guidelines
  - Ramsar STRP will be asked to review the new guidelines for their relevance to wetlands
  - Take to Ramsar COP10 (2008) for endorsement

Thank you
Environmental Impact Assessment process: general stages

**EIA Process:**

- General stages

  - The EIA process has procedural stages which vary from country to country depending on legislation in place.
  - Different methods exist for undertaking each step.

**Integrating biodiversity in EIA:**

- Analysis of change in biodiversity characteristics, richness and role

  - Pre project
    - Composition of ecosystem (biological diversity and richness)
    - Structure (spatio-temporal distribution of biodiversity resources)
    - Functional aspects (pollinator, top predator, food chain component)
    - Uses and values
    - Future consequence (what happens if...)
  - Post project

**Expected outputs of good EIA practice**

- Positive planning ‘hierarchy’ for biodiversity:
  - Enhance biodiversity
  - Avoid impacts on biodiversity (no net loss of genetic variability, range, abundance)
  - Minimise unavoidable impacts on biodiversity (no irreversible damage to ecosystem characteristics and functions)
  - Ensure sustainable use of biological resources

**Getting Biodiversity into IA**

- **Screening:** Are there important ecological/biodiversity-triggers for IA?
- **Scoping:** Which ecological aspects should be addressed and how? (Consider spatial and temporal coincidence of proposal activities and the features/resources affected)
- **Refine TORs** on the basis of biodiversity values: consider importance of features and resources and people who might be affected. Consider criteria which will be used in decision-making.

### Diagram:

- **Screening:** Does the project require EIA?
- **Scoping:** What issues and ecological aspects require further investigation (public consultation)?
- **Baseline studies:** Assess the baseline (consider the different approaches)
- **Alternatives:** Consider the different approaches
- **Impact prediction:** Forecast ecological impacts
- **Monitoring:** Monitor (where impacts of project)
- **Impact assessment:** Determine the impacts
- **Mitigation:** What can be done to alleviate negative impacts?
- **EIS preparation/review:** (Scoping the Outline EIA findings)
- **Public consultation:** (before finalisation)
- **Refine TORs:** (consult general public and NGOs)

**Biodiversity That Matters:** a conference on conservation in UK Overseas Territories and other small island communities, page 366
**Screening: is EIA required?**

**Different Approaches:**
- positive and negative lists (e.g. Philippines)
- use of thresholds, definition of environmentally sensitive or ‘critical’ areas (e.g. Malaysia)
- combinations of the above (e.g. EU)

**Screening - using thresholds or criteria**

Thresholds may be based on:
- characteristics of the development (size, use of natural resources, processes, area of land required, risk of accidents)
- location of development (existing land use, absorption capacity of natural environment, proximity to designated areas)
- characteristics of the potential impact (e.g. level of emissions, likely extent – geographical area and size of affected population)

**Screening: thresholds EU**

<table>
<thead>
<tr>
<th>Description of development</th>
<th>Applicable thresholds and criteria</th>
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</thead>
<tbody>
<tr>
<td>Intensive fish farming</td>
<td>The installation resulting from the development is designed to produce more than 10 tonnes of dead weight fish per year</td>
</tr>
<tr>
<td>Installations for hydroelectric energy production</td>
<td>The installation is designed to produce more than 0.5 megawatts</td>
</tr>
<tr>
<td>Motorway service areas</td>
<td>The area of development exceeds 0.5 hectare</td>
</tr>
</tbody>
</table>

Screening using listings:
- **Category 1** – project not expected to result in any significant adverse impact on biodiversity resources (No EIA required)
- **Category 2** – projects likely to cause significant adverse impacts unless appropriate mitigation taken (EIA required)
- **Category 3** – projects likely to cause a range of significant adverse impacts with unknown magnitude demanding detailed study/ EIA

Screening - combination of methods

The UK uses a combination of thresholds: positive and negative lists, case by case consideration:
- **EIA is mandatory for Schedule 1** * projects (positive list), eg installations for storage of petroleum, petrochemical or chemical products with a capacity of 200,000 tonnes or more
- **Certain projects are exempt from EIA** (emergency works, national security) *(negative list)*
- **Other projects reviewed case by case and need for EIA depends on project size and environmental sensitivity (Thresholds)**


Scoping: Establishing Terms of Reference

Scoping should be carried out as a collaborative exercise involving the developer, the competent authority, relevant agencies and, ideally, the public

**Key agencies**
- National government ministries (Mining, Agriculture, Health & Welfare, Water Resource, Forest & Environment, Industry etc.)
- Local government bodies
- Private sector organisation
- NGOs: public
- EIA experts
- Local people

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From the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 (S.I. No. 203)
Scoping involves:

- Review of activities (extent, timing, duration etc)
- Review of biodiversity distributions, structure, function
- Review of baseline condition and likely responses and changes with & without project (preliminary impact assessment)
- Design of surveys or information gathering to ‘capture’ all relevant effects
- Explanation of proposed process and methods

Key functional attributes and processes:

- Nutrient cycles (can affect 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 monitoring 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)

To focus the assessment using VECs, eg for species:

- Charismatic and emblematic species
- Economic importance
- Protected status
- Rarity
- Endangernent/conservation status
- Susceptibility and/or responsiveness to defined impacts (indicators)
- Umbrella species
- Important ecological role (e.g. position in food chain, keystone species)
- Availability of consistent survey methods
- Expendiency/tractability for survey

Impact Assessment

<table>
<thead>
<tr>
<th>Project Characteristics</th>
<th>Characteristics of Ecosystems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location and size</td>
<td>Distributors and ranges</td>
</tr>
<tr>
<td>Schedule of construction and operation</td>
<td>Species composition</td>
</tr>
<tr>
<td>Activities, emissions, disturbance</td>
<td>Structural organisation</td>
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<tr>
<td>Extent, magnitude and duration of</td>
<td>Population size, stability</td>
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<tr>
<td>Alternatives for site and design</td>
<td>Rarity, endemism</td>
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<td>Past, current and future proposals</td>
<td>Endangement</td>
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<td>Associated developments</td>
<td>Extraction risk</td>
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<tr>
<td></td>
<td>Genetic diversity</td>
</tr>
</tbody>
</table>

Impact evaluation

(Prediction of outcomes relative to baseline taking into account the the range and magnitude of the impacts) and the resilience, fragility, stability, conservation significance, threat status, uniqueness of biodiversity affected

Biophysical changes

- 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 destruction of habitat)
- Habitat fragmentation (e.g. barrier effect of road and pipeline)
- Disturbance (physiological and behavioural)

Ecological 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 causing reduced breeding success
- Altered prey-predator relationships

Cumulative impacts (time- and space-crowded effects)

- 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)

At some point it is necessary to define the ‘baseline’ against which future impacts can be assessed

- The baseline study should anticipate the future state of the environment assuming the project is not undertaken - the ‘no action alternative’
- New field based data are necessary (e.g. biodiversity survey) if information is not available, or is old and not relevant to the assessment

Although, many EIs fail to consider alternatives, alternatives are really at the ‘heart’ of the EIA. Many EIA professionals consider them as essential ‘raw material’ of good EIA.
Impact assessment:
Involves evaluation of magnitude, extent and significance of environmental impacts.

- Significance can be determined through professional judgement, reference to regulations and criteria evolved.
- The conclusions of the impact assessment can ultimately be used by decision-makers when determining the fate of the project application.

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Questions to ask when evaluating impact significance:
- 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?

Examples of potential impacts of road on wildlife:

<table>
<thead>
<tr>
<th>Project characteristic</th>
<th>Activity 1</th>
<th>Activity 2</th>
<th>Cumulative synergistic impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clearing of vegetation</td>
<td>Loss of degradation of habitat</td>
<td>Reduction in habitat use</td>
<td>Decline in wildlife population and diversity</td>
</tr>
<tr>
<td>Increase in traffic volume</td>
<td>Increased road traffic</td>
<td>Increased access to pristine wildlife habitat areas</td>
<td>Change to habitat composition</td>
</tr>
<tr>
<td>Road alignment through wildlife habitat</td>
<td>Increased access to pristine wildlife habitat areas</td>
<td>Decline in habitat quality</td>
<td>Decline in habitat quality</td>
</tr>
<tr>
<td>Land acquisition for road</td>
<td>Displacement of people</td>
<td>Colonization pressure in untraced areas</td>
<td>Species decline</td>
</tr>
</tbody>
</table>

Impacts vary in nature, magnitude, extent, timing, duration and reversibility.

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<td>Species decline</td>
</tr>
<tr>
<td>Number of individuals killed per year</td>
<td>Wildlife habitats and the nature of roads on which mortality is reported</td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>---------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tadoba Tiger Reserve</td>
<td>Sariska Tiger Reserve</td>
<td>Gir National and Park Sanctuary</td>
</tr>
<tr>
<td></td>
<td>FR</td>
<td>SH</td>
<td>SH</td>
</tr>
<tr>
<td>Chital</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Sambar</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nilgai</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Wild boar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leopard</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tiger</td>
<td>2</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Langur</td>
<td>17</td>
<td></td>
<td>37</td>
</tr>
<tr>
<td>Civet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Porcupine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barking deer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mongoose</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hyaena</td>
<td>2</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Jungle cat</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total road kills</td>
<td>29</td>
<td>8</td>
<td>6</td>
</tr>
</tbody>
</table>

**EIA is a part of the development control process and not research!**

**Basic characteristics of a good EIA:**

- **Balance** - Complete, unbiased and practical
- **Relevance** - Development, location
- **Significance** - Focussed, Ignoring trifles and side issues
- **Thoroughness** - Quality of contents
- **Clarity** - To public and decision makers

**Main elements of an EA report**

**Executive summary**

**Main report**

- Aims and objectives of the proposal
- Analysis of site selection and alternative sites
- Description of expected environmental conditions (biophysical and socio economic)
- Description of impacts Relationship to current land use policies
- Significance of impacts
- Evaluation of alternatives
- Impact management, mitigation plan
- Monitoring plans, contingency plan
- Terms of reference
- Appendices (glossary, explanation of acronyms, ToRs and a list of persons consultants for the study and documentation.)

**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
Valuing biodiversity for impact assessment

**How do we overcome problems of biodiversity under-valuation?**

- Although biodiversity yields economically important goods and services, these values tend to be under-emphasised or ignored in decision-making.
- It is difficult to incorporate EIA results into traditional economic measures of profitability.
- Negative biodiversity impacts are not systematically reflected in project and programme appraisal and assessment measures.
- There is seen to be little economic benefit to conserving biodiversity and few economic costs to biodiversity degradation and loss.

**BUT...**

- Multinational air, cruise and hotel interests often benefit over local communities.
- Tourism’s import discontinuities mean that short-run economic benefits often disguise cumulative longer run costs.
- Limited infrastructure and capacity can mean that ability to regulate impacts is restricted.

**Some typical environmental, economic and socio-cultural problems:**

- Infrastructural (water, electricity, etc.) capacity problems and disruptions (Jackson 1986),
- Displacement of traditional economic activities (Johnson and Thomas 1996), import of labour when growth exceeds local labor supply (Kakazu 1994),
- Real estate inflation,
- Congestion and noise (Wall 1982),
- The increase in man-made attractions to replace lost natural amenities (Butler 1980),
- Escalating crime, prostitution,
- Steady erosion of cultural traditions, and
- The appearance of inauthentic cultural attractions (de Albuquerque and McElroy, 1995c; Pattullo, 1996).

**Tourism in the small-island Caribbean accounts for a third of all trade, a fourth of foreign exchange earnings, and a fifth of all jobs.**

**Coral Reefs make a contribution to the economy of the Turks and Caicos Islands - estimated at $47.3 million a year.**

**Department of Environment & Coastal Resources (DECR)**

**Estimation of value of Lao PDR biodiversity to national economy**

- **Per capita GDP:** 75%
- **Employment:** 92%
- **Exports & foreign:** 59%
- **Government revenues:** 31%
- **Foreign investment:** 46%

**Large scale transformational infrastructure and resort complexes constructed along delicate coastlines result in:**

- Beach loss and lagoon pollution from sand mining, nearshore dredging, and hotel sewage dumping.
- Reef damage from diving, yacht and cruise ship anchoring and marina development.
- Filling in of wetlands and mangrove destruction from resort construction.

**THE BOTTOM LINE**

- Multinational air, cruise and hotel interests often benefit over local communities.
- Tourism’s import discontinuities mean that short-run economic benefits often disguise cumulative longer run costs.
- Limited infrastructure and capacity can mean that ability to regulate impacts is restricted.
**Tana-Grand Falls Hydro Dam, Kenya**

- **Catchment area**: 100,000 km²
- **River-adjacent area**: 18,000 km²
- **Tana Delta**: 1,300 km²

**Estimation of ecosystem costs of reduced waterflow**

<table>
<thead>
<tr>
<th>Ecosystem</th>
<th>Economic Use</th>
<th>Costs of flood loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floodplain grasslands</td>
<td>Dry-season grazing</td>
<td>US$16.5 million</td>
</tr>
<tr>
<td>Over-bank flooding</td>
<td>Floodplain agriculture</td>
<td>US$0.8 million</td>
</tr>
<tr>
<td>Lakes and wetlands</td>
<td>Wetland, riverine and marine fisheries</td>
<td>US$14.0 million</td>
</tr>
<tr>
<td>Riverine Forest</td>
<td>Forest utilisation</td>
<td>US$1.5 million</td>
</tr>
<tr>
<td>Surface and groundwater</td>
<td>Domestic water supplies</td>
<td>US$14.2 million</td>
</tr>
</tbody>
</table>

- **Floodplain grasslands**
- **Over-bank flooding**
- **Lakes and wetlands**
- **Riverine Forest**
- **Surface and groundwater**

**Value of wetland waste water treatment based on estimates of replacement costs for other technical options**

- **Replacement cost**: upgrading coverage of piped sewerage supply, improving slum sanitation facilities, instituting industrial treatment processes $1 million
- **Mitigative expenditures**: increased treatment costs for city water intake $1.75 million
- **Less costs of managing wetland for waste treatment**: $235,000

**How do we get biodiversity values recognised in decision-making?**

You are about to board an aircraft, and you notice a man on a ladder busily popping rivets out of the wing. You approach him and ask what he’s doing.

“I’m taking these rivets out of the wing,” he replies.

“Why?”

“Growthmania Airlines, who own the plane, sell them for US$1.00 each and I get US$0.50 from them for each one I pop.”

“Are you crazy? The wing will be weakened and sooner or later it’ll fall off!”

“Don’t worry, I’ve popped out a lot of rivets, and nothing has happened yet.”
Approaches to mitigation of biodiversity-related impacts

Mitigation of impacts on biodiversity includes any action(s) taken to avoid, reduce or eliminate adverse effects, whether by controlling the sources of impacts, or the exposure of biological receptors to them.

Mitigation options

- Alternative ways of meeting the need
- Changes in planning and design
- Improving monitoring and management
- Monetary compensation

Avoidance

- Pursue a different option
- Site based on least damage criteria
- Avoid disturbance of important/sensitive areas (e.g. protected habitat)
- Time activities to avoid critical periods (e.g. avoid nesting, breeding period)

Timing of project activities

Location of Hazira-Bijapur-Jagdishpur gas pipeline, M.P., India

Avoid nesting, breeding period of Great Indian Bustard

Reduction, moderation, minimization

- Substitution of techniques
- Promoting bio-friendly technologies
- Regulated access during construction or operation to control disturbance

Eg alternative technological options

Recognizing the ecological benefits of Horizontal Direction Drilling technology over Open Cut method for laying pipeline across a river.

(Source: WII and Bharat Petroleum Corporation Ltd)

Contd...

Contd...
Construction of fences and subways for small animal movement

Landscape planning

Raise clumps of trees in the flight path of birds to make them fly higher.

Nature engineering solutions for road related impacts

Landscape planning

Right of Way management in transportation corridors

Perspective view of proposed eco-friendly over bridge on existing railway line and highway through Rajaji National Park

Alternatives at the planning stage may be useful in offsetting biodiversity losses

Repair/reinstate/restore:

Restoration of mine overburden dumps using geo-textile

Repair/reinstate/restore

Use of coco filters for arresting silt

Creative management of alternative sites

Habitat compensation

Creation of wetland habitat in a mine void

(Source: The Netherlands Commission for EIA)

(Source: The Netherlands EIA Commission)

(Source: A.P. Singh)

(Source: SVFU, Bangalore)

(Source: M/s Sesa Goa)

(Source: Codli Mines, M/s Sesa Goa)

(Source: M/s Narmada Cement Ltd.)
Enhancement

- Enhance existing degraded habitats and create additional habitats to partially offset the loss of those removed by a project.
- Create new habitat on alternative sites (re-vegetation of vacant lands, landfills, exposed rocks).
- Enhance habitat use and value (e.g. artificial nests for improving habitat use).

Types of Offset activities

- Enhancing PA protection or management eg by replanting degraded areas/ strengthening management capacity.
- Safeguarding unprotected areas: entering into agreements with local communities or creating new PAs.
- Addressing underlying causes of biodiversity loss: working with communities to address livelihood needs to support alternative livelihood to stop unsustainable activities.
- Establishing corridors/ migration paths eg securing conservation management of land between PAs.
- Establishing buffer zones
- Entering into land management agreements with private land owners.

Biodiversity Offsets

Benefits of biodiversity offsets

For governments

- Better balancing of costs and benefits of conservation and economic developments
- Opportunities for national governments to fulfil commitments under Millennium development goals and Convention on Biodiversity

For developers

- License to operate, new market opportunities and competitive advantages

For conservation communities

- A mechanism to reconcile conservation into development planning and biodiversity into the investment plans
- More incentives to promote in situ conservation initiatives and better conservation outcomes
- Focussing on high biodiversity value habitat and conservation priorities instead of highly compromised sites

Trade-offs have to be made at an appropriate scale:

Country specific regulatory mechanism

USA


California was the first state to authorize the use of conservation banking and has established 50 conservation bank since 1995


The Environmental Liability Directive makes specific reference to biodiversity and operates on the ‘polluter pays principle’ requiring companies to undertake compensation for environmental damage or imminent environmental damage.

No set criteria, but offsets must ensure that the overall coherence of the Natura 2000 network is protected.

Regulation require rural property to maintain a forest reserve of at least 20%. Where a development has a significant environmental impact, it must compensate for this by supporting a unit within a National System of Conservation Units (SNUC).

The sum paid depends on the degree of environmental impact of the project. It must be at least 0.5% the total investment costs and in rainforest areas may be above 6%.

Proposed PAs as Biodiversity Offsets

- Narmada National Park (496.70 sq.km)
- Omkareshwar Wildlife Sanctuary (126.67 sq.km)
- Surmanya Wildlife Sanctuary (165.20 sq.km)
- Non Forest
- Forest inside Submergence

Features of new PA

- All vegetation communities in submergence zone are represented
- All large mammal spp present in the project area have been recorded
- Incorporates the only residual portion of free river between Narmadasagar and Omkareshwar projects
Environmental Impact assessment in the Marshall Islands

Marshall Islands
- Micronesia
- 29 low lying atolls
- 60,000 people

RMIEPA 2003
- Strong, clear legislation for EIA and Coastal Zone Management Plans
- No experience or knowledge of EIA
- No scientific capacity to carry out EIA in-country
- Cultural/social barriers to imposing regulations

Approach
Capacity-building at all levels:
- Institutional
- Organisational
- Professional/individual
- Community

Institutional Capacity
- GIS Information System
- Coastal Zone Management Plans for 4 most developed atolls
- Develop and describe explicit EIA process and promulgate regulations
Organisational Capacity
- EPA- experience of development and facilitation of the process- seeing the process from START to FINISH
- “Centre of Excellence” for GIS
- Private sector- worked very closely with local development proponents in partnership.

Professional Capacity
- 2 staff and manager in EPA
- Learn by experience- by DOING on the job not by TRAINING off the job.

Community Capacity
- Implement prescribed public information process and public hearings

DRYDOCK!!!
- 2 months after Caleb’s arrival
- No tested process in place
- Drydock all set to go…. ($$$ changed hands)

So…
Process was started- proponents required to do EIA…. Public meetings held…

What happened?
- Public engaged powerfully- high degree of interest and care
- EIA was carried out and heavily criticised – initial project was rejected
- Social implications- employment, prostitution
- Environmental implications- lead paint, waste disposal, pollution and impact on lagoon water quality and biodiversity, aesthetic issues
- Basically- strong public discussion of issues related to these kinds of development for the first time

Other results of EIA
- Handling differently small developments and large developments
- Have moved 2 coral heads with endemic species
- Have established process now and changed community expectations of EPA (ie have mitigated social barriers to EPA)

Capacity-Building
- Long-term live-in expertise
- Brings knowledge and experience
- Get to know culture and environment
- Can gain trust and develop relationships
- Is outside the social/ familial barriers
- BUT- must be the right person!
- The problem with training….