Biodiversity IN Development

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Road infrastructure and biodiversity

The transport sector receives large development cooperation investments from the European Commission. The EC and most of its partner countries are signatories to the Convention on Biological Diversity (CBD), and Article 14 of the CBD identifies impact assessment as a key tool for achieving the conservation of biodiversity and the sustainable use of its components. Biodiversity issues therefore need to be included in impact assessments of transport policies, plans, programmes and projects.

Transport is a large and expanding EC development sector, accounting for approximately 40% of European Development Fund (EDF) expenditure. Road maintenance, upgrading and redevelopment of existing road routes dominates the programme, for which Africa, Caribbean & Pacific country projects received € 1.33 billion in 1990–95, with a further € 2.25 billion allocated in 1995–2000. Much less went to Asian and Latin American countries: € 2.5 million allocated in 1995–2000. Very little has been spent on new roads, and less than 15% of transport spending /allocations between 1975 – 2000 has been for rail, sea and air transport.

There are many ways to avoid significant impacts on biodiversity, and mitigate adverse effects. If these are considered at the earliest stages in the planning and design processes, outcomes are likely to be less harmful and transport projects will help achieve the EC commitment to ensure '*the impact of transport networks ...must not threaten ecosystems*', while supporting sustainable development.

Threats to biodiversity

Transport systems often cover large distances or form widespread networks, affecting biodiversity locally and regionally. Direct impacts include road kills (mostly mammals), disturbance (felling of roadside trees, increased noise, etc.), spills and contaminated runoff. Most such impacts occur during the construction stage, or result from vehicle operations. **Indirect impacts are generally more critical** for biodiversity, as improved access to remote areas frequently leads to unsustainable resource exploitation, and land-use and population change. Strong efforts must be made to ensure economic development is not at the expense of natural resources which support rural livelihoods.

a) Loss and disturbance of habitat

Most transport projects reduce the area of natural habitat. Losses occur in areas permanently occupied by infrastructure and also in areas mined for construction or maintenance materials. Temporary losses of habitat occur during construction, and disturbance occurs both during construction and operation. Levels of disturbance caused by traffic noise tend to be high and escalate with time, discouraging wildlife from heavily disturbed areas (up to 400 m on either side of roads in open habitat with high levels of traffic).

European Commission

DFID Department for International Development

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The careful routing of roads through already disturbed areas, avoiding blocks of little disturbed habitats, is one way of reducing negative impacts on biodiversity.

In the case of both habitat loss and disturbance, careful routing will reduce the negative impacts. Also, extra resources can be allocated to maintain or rehabilitate habitat, away from the construction sites, to offset lost and disturbed habitat. This 'exchange' of disturbed land for healthy habitat is increasingly common practice in Europe but is very costly. In very sensitive areas, screening with trees or shrubs can help reduce disturbance, although roadside planting is seldom carried out in rural areas.

b) Barrier effects occur when species are unable or unwilling to cross a transport route, which impedes gene flow within a population. Roads, railways and waterways all act as barriers, so bridges, tunnels and wildlife passes are important: for small species with low mobility; on known migration routes; or along access paths to feeding areas, watering holes or breeding sites. People can use the same constructions to reach important areas and traditional lands.

c) Habitat fragmentation and isolation occurs when natural habitats are separated, grow smaller and become surrounded by an inhospitable landscape. In general, large continuous blocks contain more undisturbed habitat, and support more species, than an equivalent area of fragmented habitat blocks. Fragmented habitats have proportionally more edges exposed to disturbance, pollution and invasion by alien species.

d) Mortality may have a variety of causes. Large numbers of mammals are commonly hunted near construction camps or maintenance facilities, and are hunted/trapped wherever improved transport systems provide quicker access to wildlife habitats and markets. Collisions with vehicles can occur anywhere, but are commoner where migration or access paths have been crossed by new roads. These collisions can be reduced using speed restrictions, road bumps, and a combination of wildlife passes (see b above) and fencing. However the practicality of introducing these measures needs careful assessment: speed limits may not be complied with; fencing may be too expensive or stolen. Projects need to take these factors into account, and focus on careful siting of transport routes as a preferred way of reducing mortality.

e) Pollution may affect air (vehicular emissions, dust), soil (oil leaks) or water (road run-off or sumping). Atmospheric deposition of pollutants and soil contamination cause changes in vegetation along roads, railways and at airports. Adjacent to sensitive vegetation, particularly wetlands, contingency plans should be made to deal with spills or leaks.

f) Invasion of alien species is commonly associated with transport corridors, often unintentionally. Weeds disperse along roads and railways and parasitic, predatory or destructive organism along waterways. Settlement along transport corridors can result in domestic livestock competing with wildlife, spread of disease, or new crops displacing local varieties.

Procedures

For impacts on biodiversity to be managed effectively, impact assessment must be discussed with all stakeholders and integrated with programming and project implementation from the first stages of planning (see EC Environmental Integration Manual, 2001). Thereafter, mitigation measures must be written into road construction contracts.

a) Environmental Impact Assessment (EIA)
This is designed to balance environmental (including biodiversity), economic and social considerations in development planning. It is commonly applied at project level, often as part of consent procedures for individual proposals. An EIA should be initiated at the same time as pre-feasibility or feasibility studies. At the project level, impacts on biodiversity may be attributable to:

1. route selection or siting;
2. construction activities;
3. operation or use (including maintenance of infrastructure).

Integrating biodiversity considerations with project EIA

EIA Procedural Stage	Biodiversity considerations
Screening Are there important biodiversity concerns that indicate the need for EIA?	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.
Scoping Derive terms of reference (ToR) for the EIA	Ensure EIA takes account of potential impacts on biodiversity: include assessment of biodiversity in ToRs. Consult widely and early with all stakeholders, especially people with dependence on biodiversity in the affected area, and widely circulate the scoping report.
Focusing Refine the ToR on the basis of biodiversity values, which will be used in decision-making.	Select biodiversity components for more detailed study, for example, 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), ■ important ecosystem functions (e.g. flood attenuation provided by wetlands), ■ key breeding or feeding sites, especially for protected species, ■ migratory routes and stopover sites etc.
Impact Assessment Predict impacts: identify, describe and provide the data necessary to quantify the effects of proposal(s) on measures of biodiversity.	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, ■ proportion of population to be disturbed, ■ quality of remaining habitat for key species, ■ ecosystem functions lost or impaired etc. (e.g. hydrology of watersheds).
Impact Significance Rank impacts, taking into account biodiversity values and the reversibility of 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, ■ 'utility' and sustainability of valued biodiversity components, ■ ability of affected habitats, populations or species to recover.
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 always the best form of mitigation. To what extent will proposed mitigation measures reduce impacts? Have they been successful elsewhere? Mitigation for biodiversity may require land acquisition for compensation.
Impact Evaluation Are the impacts identified important or significant?	How important or significant are residual impacts on biodiversity?
Environmental Impact Statement (EIS)	Explain biodiversity impacts clearly, and disseminate baseline information widely. Provide detailed, practical advice concerning measures to protect biodiversity during construction or to mitigate for operational impacts. Provide a schedule for activities, clear maps and a contingency plan in the event of mitigation failure.
Review and monitoring What really happened?	■ Did impacts on biodiversity happen as predicted? ■ Were mitigation measures effective and implemented successfully? ■ What was the outcome for biodiversity?

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Route selection should take account of sites, which are important for biodiversity and avoid them if possible. These might be sites supporting protected species, important feeding or breeding areas, staging posts on migration routes, sites supporting unusual local variants or endemic species, or simply hotspots which are relatively rich in biodiversity. Construction activities should be timed to avoid sensitive periods, e.g. bird breeding seasons, and should be carried out according to an environmental management plan.

Qualified advice must be sought from the earliest stages of project design, and examples of the biodiversity considerations which should be taken into account at different stages in an EIA are listed in the table (see page 3).

b) Strategic Environmental Assessment (SEA)

SEA is intended to identify the environmental, economic and social impacts of policies, plans and programmes, by identifying impacts on biodiversity further in the planning process, over a longer timeframe, and often for wider geographical areas than with an EIA. A project EIA can help improve project design, but it does little to address the cumulative impacts of different projects in a geographical area or sector, and allows little flexibility for avoidance or mitigation of impacts on biodiversity at a national scale.

SEA operates in this wider frame, provides opportunity for integrated analysis (social, economic and ecological) of alternative options. An SEA should be applied to a National Transport Policy, a regional transport plan or a road-building programme, when they are being negotiated as part of Country Support Strategies or Country Strategy Papers.

Biodiversity considerations for SEAs are well reflected in the table on EIAs, but rather than taking a local focus, adopting a national or regional perspectives, and longer time horizons.

Further sources of information:

- European Commission (2000) Promoting sustainable transport in development cooperation [COM (2000) 422].
- EC (2001) *Environmental Integration Manual Volume 1: Procedures*; *Volume 2: Source Book*.
- European Environment Agency (1998) Spatial and Ecological Assessment of the TEN: Demonstration of Indicators and GIS Methods. Environmental Issues Series no 11. EEA, Copenhagen http://www.eea.eu.int.
- Forman R T T and Alexander L E (1998) Roads and their major ecological effects. *Annual Review of Ecological Systematics* 29: 207-231 http://www.annualreviews.org
- International Association for Impact Assessment (IAIA) http://www.iaia.org
- RSPB, WWF, English Nature and the Wildlife Trusts (2000) Biodiversity and Environmental Impact Assessment: A New Approach. RSPB, Sandy. http://www.rspb.org.uk
- Strategic Environmental Assessment (SEAN): http://www.seanplatform.org
- World Bank Biodiversity and Environmental Assessment Toolkit http://www.worldbank.org/biodiversity
- reference to other Biodiversity Briefs is denoted as (see BB#).

Website

All Biodiversity Development Project (BDP) documents can be found on the website: http://europa.eu.int/comm/development/sector/environment