17 Mitigation and compensation in environmental assessment

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In this chapter, first the key elements of mitigation and compensation are defined. This is followed by a description of how environmental impacts can be avoided and minimized. Remedial action in the form of restoration and compensation is introduced. Criteria for the successful implementation of mitigation and ingredients for good practice approaches are established. Finally, conclusions are drawn.

17.1 INTRODUCTION - THE IMPORTANCE OF MITIGATION AND COMPENSATION IN ENVIRONMENTAL ASSESSMENT

Whilst countries around the world promote economic growth, at the same time, most of them have committed themselves to reduce environmental impacts and to reverse global environmental deterioration. This is reflected, for example, in the results of the Millennium Ecosystem Assessment (MEA, 2005). Generally speaking, in the face of conflicting economic and environmental goals, it is often hard to reconcile new developments with environmental protection and nature conservation. In order to encourage sustainability of development projects and to maintain current levels of natural capital, among other things, it is necessary to innovatively use planning and decision making tools. In this context, environmental assessment (EA) has emerged as an important support tool. Whilst it is an instrument that ultimately seeks to avoid environmental impacts and to enhance positive effects, in practice its main role has often been to reduce and mitigate, and at times to compensate for negative environmental impacts. This chapter therefore looks at the mitigation and compensation element of EA.

Mitigation and compensation in EA (SEA and EIA) aims at preventing adverse impacts from happening and keeping those that do occur within acceptable levels. It is a creative and practical part of the EA process that aims at assisting in:

- developing measures to avoid, reduce, remedy or compensate significant adverse impacts of development proposals on environment and society;
- enhancing beneficial effects and lower costs for environmental protection and conservation of natural resources as an outcome of development where possible; and
- fostering better opportunities for business through positive outcomes for environmental conservation, sustainable livelihoods and human well-being.

Mitigation and compensation in EA thus have a critical role to play in encouraging positive development planning and in steering the development process in order to:

- enable better protection of environmental assets and ecosystem services;
- encourage prudent use of natural resources; and
- avoid costly environmental damage, thus also making economic sense.

17.2 Defining the key elements of mitigation and compensation

In this section, first, the terms mitigation and compensation are explained. Subsequently, the mitigation hierarchy is introduced. Finally, statutory requirements for mitigation in EU EA legislation are briefly explained.

17.2.1 Mitigation and compensation – the terms

Mitigation as an integral part of environmental assessment aims at the avoidance and reduction of project related impacts that may be connected with previous policies, plans or programmes. The EU defines mitigation in Directive 85/337/EC as 'measures envisaged in order to avoid, reduce and, if possible, remedy significant adverse effects' (European Union, 1985). Treweek (1999) defined mitigation as 'any deliberate action that is taken to alleviate adverse effects, whether by controlling the sources of impacts or the exposure of receptors to them'. Rundcrantz and Skärbäck (2003) defined mitigation as something that 'limits or reduces the degree, extent, magnitude or duration of adverse impacts'. A particular useful and influential definition of mitigation in the context of designated European Wildlife Sites was provided by the European Commission's guidance note on Article 6 of the Habitats Directive (European Commission, 2000), defining mitigation as 'measures at minimizing or even negating the negative impact of a plan or project, during or after its completion'.

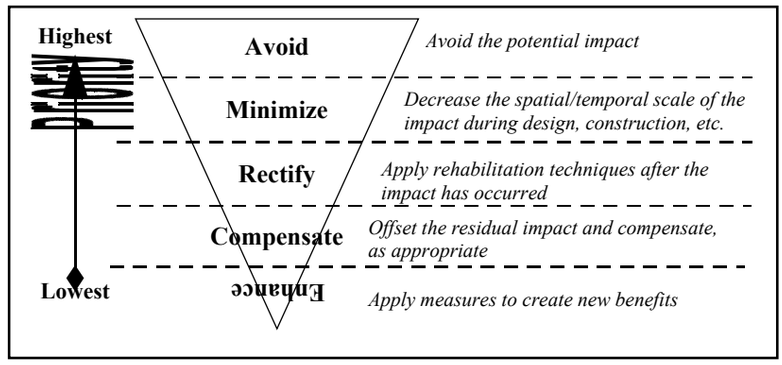
Compensation can be distinguished from 'mitigation' in the sense that it involves undertaking measures to replace lost or adversely impacted environmental values that should have similar functions equaling existing environmental values. Cowell (2000) defined environmental compensation as 'the provision of positive environmental measures to correct, balance or otherwise atone for the loss of environmental resources'. Kuiper (1997) talked about compensation in terms of 'the creation of new values, which are equal to the lost values'. If the lost values are irreplaceable, compensation concerns the creation of values which are as similar as possible. In the USA, for the purposes of the Clean Water Act, under which wetland permits are issued, mitigation is defined as: "s*equentially avoiding and minimizing impacts and compensating for remaining unavoidable impacts*". This sequential approach is also favored by Canada. European Commission's guidance

note on Article 6 of the Habitats Directive (European Commission, 2000)[1] also provides useful guidance on distinguishing compensation from mitigation on similar grounds. Currently, the only country globally with area-wide formal requirements for environmental compensation in place that go beyond protected areas and zones is Germany, based on the Federal Environmental Impacts' Compensation Rule (*Eingriffsregelung*). Other countries with environmental compensation requirements for protected areas include the USA (no net loss of wetlands, see above), Canada, Austria and Switzerland (Peters et al, 2003). Compensation in environmental assessment normally aims at biological functions and other aspects, such as landscapes and non-biotic factors are not covered. In case no adequate functional compensation can be found, most systems that have compensation rules in place allow for monetary compensation. An element that is recognized as a form of compensation is enhancement which distinguishes those compensation measures that result in greater or better environmental values than those replaced.

17.2.2 Mitigation and compensation hierarchy: The ground rules

Understanding mitigation and compensation as a sequence is an important part of addressing impacts comprehensively. The basic tenets of environmental assessment suggest that mitigation and compensation should be considered in a hierarchy, consisting of avoidance, minimization, rectification, compensation and enhancement measures (see Figure 17.1).

Figure 17.1: Hierarchy of mitigation measures



Source: Modified from UNEP (2002) and Rio Tinto (2004)

Existing guidance (DETR, 1997; Mitchell, 1997; UNEP, 2002) stresses the importance and relevance of adopting a hierarchical approach in planning mitigation and compensation measures. Priority should be given to the avoidance of impacts at source, whether through the re-design of a project or by regulating the timing or location of activities. The precautionary principle must be applied for ensuring precaution in implementation of a project where the level of uncertainty of a project is high. If it is not possible to avoid significant negative impacts, opportunities should be sought to reduce the impacts, ideally to the point that they are no longer significant. If this is not possible, but, for example, a scheme is permitted, compensation may be appropriate. The option of compensation comes much lower in the hierarchy of strategies as the inherent risk associated with this option may lead to the creation of a substitute which may not serve the same valuable functions as the original asset served (for example, creating a wetland, assuming that man-made environments are equal to natural ones). It is on a similar logic, that enhancement measures are placed still lower in the hierarchy as it is often hard to guarantee the extent of their success. The circumstances for application of different approaches of mitigation and their relative merits and outcomes are presented in Figure 17.2.

[1] As per the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC *mitigation measures* in the broader sense, aim to minimise or even cancel the negative impacts on the site itself while the *compensatory measures* constitute measures specific to a project or plan, and must be additional to provide compensation corresponding precisely to the negative effects on the species or habitat concerned. The compensatory measures constitute the 'last resort' and are used only when the other safeguards provided for by the directive are ineffectual and the decision has been taken to consider, nevertheless, a project/plan having a negative effect on the Natura 2000 site.
(Source:
http://ec.europa.eu/environment/nature/nature_conservation/eu_nature_legislation/specific_articles/art6/pdf/art6_en.pdf
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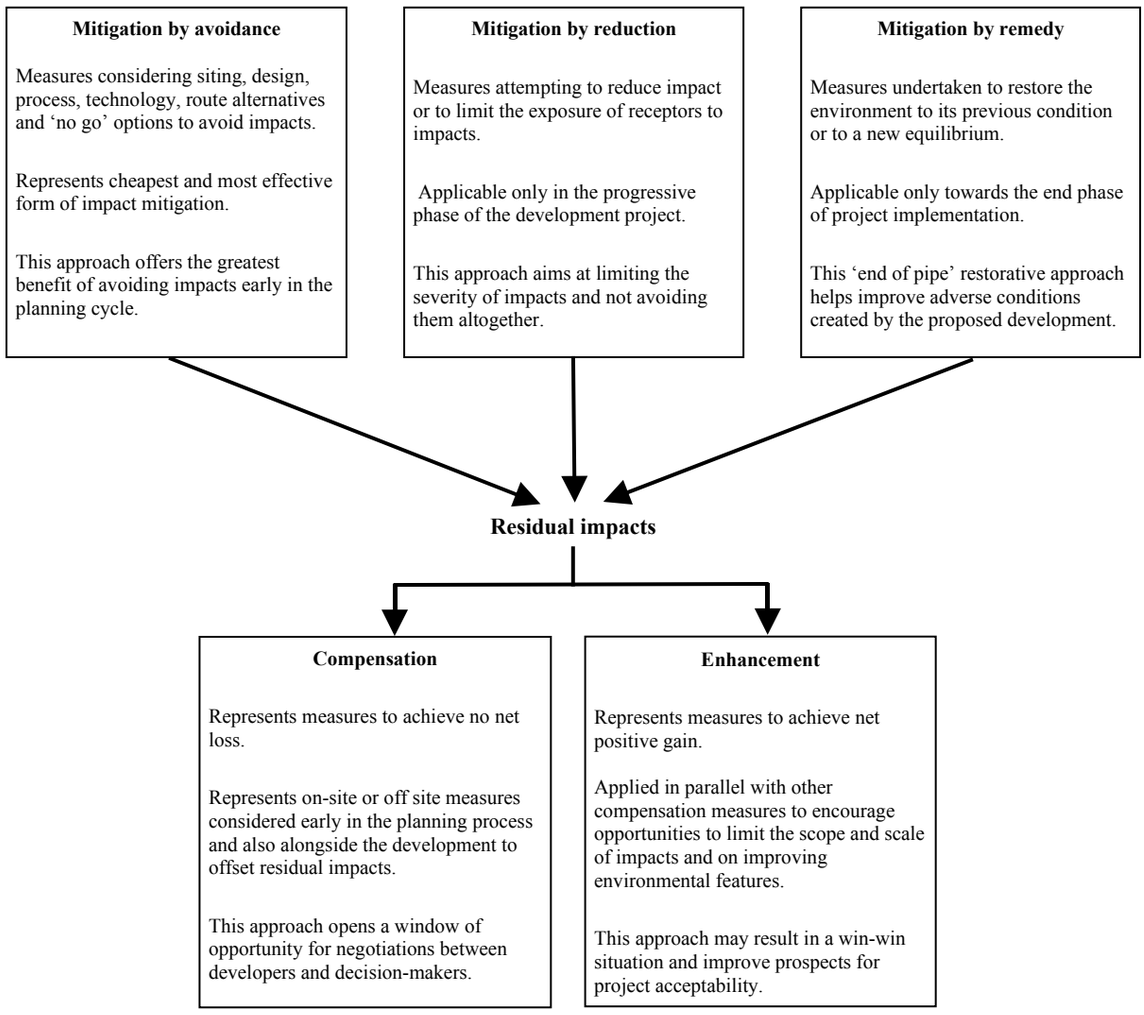
Figure 17.2: Approaches for mitigation of impacts



It is important that in policy, plan, programme and project making, mitigation, compensation and enhancement measures are considered throughout the preparation process. In this context, it is important that measures to avoid impacts are considered before measures to reduce and remedy impacts. Compensation should only be considered if all other options have been duly addressed.

17.2.3 Statutory requirements for mitigation in EU EA legislation

Mitigation has been said to be at the heart of the project EIA process (Wood, 2003). The mandatory requirement for the EIA of certain development schemes and the need to comply with the requirement of the EU Directives has been the most significant legal driver for ensuring adequate mitigation. (Sheate et al, 2005). Article 5 (3) of the European EIA Directive (85/337/EEC)[2] incorporated mitigation of project impacts as one of its main aims and requires that a detailed description of proposed mitigation measures be included in Environmental Impact Statements (CEC, 1985). Article 10 of SEA Directive 42/2001/EC stipulates that Member States shall monitor the significant environmental effects of the implementation of plans and programme in order, *inter-alia*, to identify at an early stage, unforeseen adverse effects, and *'to be able to undertake appropriate remedial actions'*. The need to provide adequate mitigation is also driven by the requirement to comply with Article 6 of the EIA and Habitats Directives (European Union, 1992), stating that if development must take place on a Natura 2000 site,[3] compensatory measures should be adopted to ensure that the overall coherence of the area is

[2] EU Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment (as amended by Council Directive 97/11/EC) Official Journal of the European Communities, L175, 5.7.85, pp40-48. *(Source: http://ec.europa.eu/environment/eia/full-legal-text/85337.htm)*

[3] Natura 2000 is a European network of protected sites which represent areas of the highest value for natural habitats and species of plants and animals which are rare, endangered or vulnerable in the European Community. The term Natura 2000 comes from the 1992 EC Habitats Directive; it symbolises the conservation of precious natural resources for the year 2000 and beyond into the 21st century.

protected. In April 2004, the EU passed another Directive (2004/35/CE) concerned with environmental liability and remedy (European Union, 2004) which further emphasizes the need for implementing compensation measures if there is a risk of damage on habitats.

17.3 AVOIDING ENVIRONMENTAL IMPACTS

There are a range of pre-emptive measures to avoid environmental impacts. These include the identification of alternatives, sensitive design, environmentally sustainable technology, development restrictions in sensitive areas, avoidance of certain key areas, adopting the 'precautionary approach', and finally, refraining from certain impact-causing action. These measures are subsequently explained in further detail.

17.3.1 Identification of alternatives

Identification of the least impacting alternative can mean, for example, planning the route of new linear projects through existing route corridors (e.g. road, rail, pipeline, and canal and transmission line). This can ultimately lead to avoiding impacts on sensitive environments, such as human settlements, biodiversity rich areas, habitats of endangered species, archeological and cultural sites within the route corridor of the proposed projects.

17.3.2 Sensitive design

Adopting sensitive design for construction of project related physical infrastructures can be a useful approach to avoid impacts at the project planning stage itself. The application of 'nature engineering' concepts has been widely demonstrated (Canters *et al*, 1995; Spellerberg, 1998; Forman and Sperling, 2003) in the designing of culverts, underpasses and bridges[4] in order to avoid obstruction of animal movement across home ranges and landscapes. The construction of fish ladders on dams can prevent obstruction of fish migration. Another example is the creation of artificial nests which can help to conserve rare and endangered species of birds threatened by loss of habitats (Box 17.1).

Box 17.1: Safeguarding Species Conservation by Adopting Environmentally Sensitive Designs

Exxon Neftegas Limited (ENL), the implementing agency for Sakhalin-1 Oil and Gasp Project recognized the environmental sensitivities of the project area because the marine coasts of Sakhalin Island was inhabited by the Steller's Sea Eagle ("Orlan") population. The company felt that the oil resources can be developed in an environmentally responsible manner by combining careful design practices and mitigation measures to avoid impacts on sea eagles. In the summer of 2004, ENL initiated the artificial nest and perch program to create pre-conditions to attract sea eagles to new coastal sites away from Sakhalin-1 Project. Under this program, 13 new nest and 14 perch sites were built in the area and the eagles are carefully monitored to determine the extent to which they utilize these enhancements. Researches supported by ENL indicated that predation by agile climbing brown bear was perhaps the single largest factor in fledgling eagle mortality. To address the threat to the sea eagles from bears, ENL installed approximately 20 metal sheathing devices on trees where the new nests were located and on neighbouring trees with existing nests to discourage bear predation. The use of an artificial nest for the first time in 2006, near the Chayvo well site established the effectiveness of the various mitigative measures taken by ENL under the Sakhalin Project. (Source: http://www.sakhalin1.com/en/she/envPolicy.asp)

The population of swifts and sparrows is declining in the the Netherlands. The main reason for the decline is the lack of spaces for the birds to nest due to spread of towns and modernisation of roof designs. Lafarge has designed special bird tiles which contain a cavity to let birds build their nests. These tiles designed to allow nesting of swifts have helped stem the decline of birds in the Netherlands. (Source: Lafarge, 2000)

17.3.3 Environmentally sustainable technology options

Environmentally sustainable technology options for controlling impacts and making good environmental choices during construction, post construction and progressive phases of the project can also lead to avoidance of environmental impacts (see Box 17.2).

[4] (i) McKinney, L.D. and Murphy, R. (1996) 'When Biologists and Engineers Collide: Habitat Conservation Planning in the Middle of Urbanized Development', Environmental Management, vol 20, no 6, pp955–961.

(ii) van Bohemen, H.D. (2004) Ecological Engineering and Civil Engineering Works: A Practical Set of Ecological Engineering Principles for Road Infrastructure and Coastal Management. Delft, The Netherlands, Thesis.

Box 17.2: Examples of Good Technology Options for Mitigating Impacts

The Sakhalin-1 Project, an oil and gas development project, comprising of the Chayvo, Odoptu and Arkutun-Dagi fields on the northeast shelf of Sakhalin Island is using world-class Extended Reach Drilling technology that allows wells located onshore to be drilled beneath the seafloor to oil and gas targets more than five miles offshore. This eliminates the need for some offshore structures, pipelines and associated activities. In addition, drilling mud, cuttings and produced water from all Sakhalin-1 drilling platforms and drilling sites are re-injected into the geological formations. Pipeline design includes safety features such as shut off valves, leak detection systems and extra wall thickness at sensitive locations. This state-of-the-art technology has not only been effective in reducing the high capital and operating costs of large offshore structures but has also minimized the environmental impact in the sensitive near-shore area. *(Source: http://www.sakhalin1.com/en/she/envPolicy.asp)*

For laying pipeline across major rivers in India, Horizontal Directional Drilling has been adopted as opposed to open cut method to avoid impacts on several endangered species like the mugger crocodile and Gangetic dolphin. (Source: WII, 1993)

17.3.4 Development restrictions in sensitive areas

In many countries, restrictions on locating projects in sensitive areas is governed by siting ordinances and regulations. For example, the Oregon Energy Facility Siting Council[5] ("Siting Council") regulates larger energy facilities similarly, the Coastal Zone Regulation (MoE&F, 2002) restricts any development within 500 m of the high tide line in India.[6] In Hong Kong, for general multi-storey industrial sites without chimneys, a buffer distance of at least 100m from sensitive uses is normally required.[7] In the UK, Planning Policy Statement 22[8] for renewable energy stipulates that priority should be given to locate renewable energy projects in less sensitive parts of the countryside and coasts and that these should be designed to minimize adverse impact on landscape, wildlife and amenity. In Germany, the landscape planning system identifies, in an area wide manner, sites suitable for defined developments and sites with development restrictions (Hanusch and Fischer, 2008). Development controls are now also being increasingly enforced through adoption of good practices of zoning to shield sensitive areas from exploratory activities (e.g. drilling during mineral prospecting) to avoid significant impacts even in absence of regulatory controls (Box 17.3).

17.3.5 Avoidance of certain key areas

A cheap and effective way for avoiding impacts is to avoid certain key areas, for example, estuaries, salt marshes, wetlands, shore lines and critical habitats (breeding grounds, rearing areas, over wintering sites, migration routes) during exploration, construction and implementation phases. Exclusionary criteria for designation of 'no development' zones provide additional controls developed in many countries based on legal and policy directives for safeguarding biodiversity resources of the country. A general consensus on the 'no go' zones has emerged (Box 17.4), based on various guidelines (WWF, 2002; EBI, 2004; IFC, 2004) that have been developed in the context of sector-specific developments around the world. Many institutions have already adopted a 'no go' zones approach. The US Overseas Private investment Corporation, a bilateral finance agency, categorically prohibits projects in or impacting IUCN I-IV protected areas, World Heritage Sites, and projects that involve conversion or degradation of critical forest areas or related critical natural habitats.

[5] The thresholds for Siting Council jurisdiction are determined by the Legislature and are defined in Oregon Revised Statutes (ORS) 469.300.

[6] India notified "coastal stretches of seas, bays, estuaries, creeks, rivers and backwaters which are influenced by tidal action (in the landward side) up to 500 meters from the HTL and the land between the LTL and HTL as the Coastal Regulation Zone (CRZ)". Further, activities such as industries, disposal of hazardous substances, fish processing, effluent discharge, landfilling, land reclamation, mining, harvesting ground water, construction and landscape alteration are banned within CRZ with a few exclusive exceptions. Important national activities within CRZ requiring waterfront, such as ports and harbours, defence requirements and thermal plants are regulated and cleared after critically evaluating the proposal.

[7] The Hong Kong Planning Standards and Guidelines (HKPSG), Planning Department, The Govt. of Hong Kong Special Administrative Region, Hong Kong.

[8] Planning Policy Statement 22: Renewable Energy: Office of the Deputy Prime Minister, United Kingdom

Box 17.3: Examples of siting considerations at the project planning stage for avoidance of impacts

i. In Bangladesh, seismic survey was planned by Indian Oil Corporation in an area adjoining the Sunderbans for exploring the potential gas reserves. Considering that the Sunderbans and its adjoining area is among the largest mangrove forests and a designated World Heritage Site, rich in wildlife, an impact assessment study was conducted to assess the impacts of seismic survey on biodiversity. It was established from the study that the seismic activity in the northern part of the block would pose major disturbance to rich habitat of important wild life species including the endangered Bengal tiger. As an outcome of the study, more than half the block has been made off-limit for the survey, including the total Sunderbans Reserved Forest and a 10 km buffer zone. (Source: Rashid, 2006)

ii. Bharat Petroleum Corporation Limited envisaged laying a 740 km long cross country pipeline from an existing terminal in Central Indian state of Madhya Pradesh to another terminal located in the state of Haryana for meeting the demand of the northern region for petroleum products. Several route alternatives were reviewed before finalising the proposed route of pipeline which was several kilometres longer and had added cost implications for the project authorities. The final route however significantly reduced the demand on linear stretch of forest from 80 km to 18.6 km. The routing choice avoided laying the pipeline through three important protected areas: Chambal River an important river sanctuary that harbour endangered species of Crocodile and Gangetic dolphins; Ranthambore National Park which is famous for tigers and Keoladev National Park, a designated World Heritage Site for conservation of wetland birds.
(Source: Rajvanshi et al, 2006)

iii. In Germany, local landscape plans are prepared in an area wide manner for the entire country. These identify a range of rules for future land use. Furthermore, objectives for the development of nature and landscapes are identified. The landscape plan "Rothenburg-Hänichen" in Saxony, for example, laid out conservation and enhancement measures for waters, forests, other open and settlement areas in an area wide manner. Furthermore, measures for enhancing the tourist infrastructure and other protection and enhancement measures are laid out. These can be used, for example, in later project EIA for identifying suitable mitigation and compensation measures.

(Source: Hanusch and Fischer. 2008)

The International Council on Mining and Metals, a consortium of mining companies, as well as some of the Equator Principles Banks, including JP Morgan Chase and ABN AMRO have agreed not to finance projects in World Heritage Sites. Additionally, the Bank of America will not finance projects which include resource extraction from high conservation value forests, primary tropical moist forests, or primary forests in temperate or boreal forest regions (IUCN, 2005).

17.3.6 Suitable timing of activities

Recommending suitable timing for scheduling various activities under a project to avoid overlaps with key life cycle events (e.g. flowering and seeding, nesting or breeding seasons) has been recognized as a common and effective approach for avoiding impacts on protected species.

Box 17.4: Criteria for recognising high conservation value sites as 'No-Go' zones for development

- Protected areas, core areas of biosphere reserves and Ramsar sites not included under IUCN category I-IV of PAs.
- Proposed protected areas in priority conservation areas.
- Sites that maintain conditions vital for the viability of protected areas that support the 'jewels'.
- Centres of plant diversity.
- Areas officially proposed for protection based on local and national priorities.
- Area of known high conservation value, (these may include sites of degree of endemism, rarity, vulnerability, representativeness and ecological integrity.
- Areas where there is a lack of knowledge of biodiversity.
- Areas where operations will reduce populations of any recognised critically endangered or endangered species, or significantly reduce the ecological services provided by an ecosystem.
- Areas recognised as protected by traditional local communities.
- Critical fish breeding grounds.

17.3.7 Adopting the 'precautionary approach'

The precautionary approach is necessary to make preventive decisions in the face of uncertainty and to drive actions that will protect public health and the environment. One of the most important expressions of the *Precautionary Principle* internationally is the Rio Declaration[9] from the 1992 United Nations Conference on Environment and Development, also known as Agenda 21. Application of the Precautionary Principle recognizes the merit of delaying development consent until the best available information can be obtained through consultation with local stakeholders/experts and/or new information can be consolidated. Its use promotes action to avert risks of serious or irreversible harm to the environment (Cooney and Dickson, 2006). The Principle in a way provides an 'escape route' to anticipate and prevent threats to the environment and 'buy time' for developing appropriate and effective mitigation. The Principle has been integrated into numerous international conventions and agreements including the Barcelona Convention (1976), Maastricht Treaty on the European Union (1992), Global Climate Change Convention (1992) and Bergen Declaration on Sustainable Development (1997). One of the first countries to have included the precautionary principle into environmental legislation is Germany, where the idea can be traced back to the first draft of the clean air legislation in 1970 (Wurzel, 2006).

17.3.8 Refraining from certain developments

Refraining from certain developments means refraining from certain impact-causing actions. Box 17.5 shows an example for how impacts can be regulated through appropriate measures in sensitive areas.

Box 17.5: Regulating impacts through appropriate measures in sensitive areas

The Sakhalin-1 Project recognized the environmental sensitivities offshore Sakhalin Island. The Project's concern for the Western Pacific Gray whale population was demonstrated by the 2001 Odoptu seismic program, where the Project implemented the most extensive protection measures ever undertaken by industry. This included maintaining a 4-5 km protection zone between the seismic vessel and the Gray whales and shutting down operations if the whales were present within this protection zone. Gray whales continued to feed within their historical feeding grounds throughout the seismic survey. (Source: http://www.sakhalin1.com/en/she/envPolicy.asp)

17.4 MINIMIZING ENVIRONMENTAL IMPACTS

Minimizing the impacts of developments on the receiving environment is the next stage of the EA mitigation hierarchy. There are a range of approaches aimed to limit the degree, extent, magnitude, or duration of adverse impacts. These include control measures for preventing pollution, minimization of physical disturbances, 'good housekeeping', the installation of physical barriers, creative land management, technological fixes, promotion of compatibility, and (if possible) translocation of affected species. Reduction measures for environmental impacts are further explained below.

17.4.1 Control measures for preventing pollution

Installing control measures for preventing pollution of air, water and natural environment and adopting innovative design and technology can reduce the magnitude and severity of project related impacts. Specific examples include installation of appropriately designed chimneys for regulating emissions; sound-proofing of buildings to reduce noise (see, for example, Box 17.6), treatment of effluents before discharge in water bodies and arresting soil erosion.

Box 17.6: Noise reduction

In order to reduce the number of homes exposed to noise, the airport authorities of Billund Airport in Denmark proposed the construction of a new runway to the north of the existing runway. From the outputs of the EIA, it became clear that the same level of reduction in noise levels could be also achieved by changes proposed in the take-off procedure and the construction of a new runway was not necessary. The adoption of specific procedures for take off was incorporated as a consent condition. The positive outcome of the EIA was the environmental approval of the airport without complaints. The other benefits included less environmental impact from the airport's operations; reduction in number of homes (1000) exposed to noise above the recommended thresholds; doubling of the flying capacity; protection of 350 ha of agricultural land and an old growth Danish forest. (Source: http://www.europa.eu.int/comm/environment/eia/eia-billund-airport.htm)

Lafarge Redland Aggregates developed an innovative type of asphalt (under the trade name of Axophone) that has smaller aggregates of a modified shape and that could cut noise by up to 10db (A) This is well suited for environmentally sensitive area. Several sites in the counties of Suffolk and Hertfordshire that were first surfaced by Axophone have subsequently prompted its use in other parts of England. (Source: Lafarge, 2000)

[9] The Rio declaration stated that 'where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation'

17.4.2 Minimization of physical disturbances

Responsible operations and adoption of good practices while undertaking activities involving physical alteration of land can bring about significant reduction in land degradation, for example, during dredging and drilling for oil and mineral extraction; when clearing land and preparing sites for industrial development and when digging and trenching for roads and pipelines. Exploration activities should always be encouraged to use non-intrusive techniques, such as remote sensing and global positioning systems. The use of existing infrastructures and tracks is being invariably encouraged wherever possible to provide access to vehicles and use of existing Right of Way of utility corridors is generally opted for laying new pipelines and transmission lines. The use of lighter drilling rigs or helicopter-assisted drilling programmes to transport the equipment into sensitive or rugged terrain is also frequently being undertaken (White et al, 1996).

17.4.3 Good housekeeping

Good housekeeping, use of energy-saving appliances and cleaner production technologies are being universally promoted as minimum safeguards in industrial units for reducing environmental pollution and emission of greenhouse gases in particular.

17.4.4 Installation of physical barriers

Installing physical barriers, creating viewscapes and developing landscape buffers to reduce visual impacts of roads and buildings are some of the newer initiatives being taken by public works department in many countries.

17.4.5 Creative land management

Creative land management, landscaping and development of alternative land-use can reduce physical impacts during construction/operation and improve post project aesthetics. Applications of these measures are more commonly sited from developments in mining sector (Box 17.7).

Box 17.7: Creative management of mining pits

Sesa Goa is the largest private sector exporter of iron ore in India producing 9 million tons of iron annually for clients in Europe. The company has a full fledged team to plan, monitor and implement environmental management. The pit in Sanquelim mine in Goa, in India has been managed as a pisciculture pond and the fishery resources are being used by local communities. The mine overburden dumps are planted with native species of economic value. (Source: Patil, Personnel Communication 12 February, 2006)

The underground galleries of a gypsum quarry in France were converted into a storehouse for wines and spirits and an underground mining museum has been set up to educate the tourist about the history of gypsum mining. (Source: Lafarge 2000)

17.4.6 Technological fixes

Technologies for construction of barriers and passageways are increasingly being mandated to prevent wildlife road mortality while preserving connectivity across highways. Transportation departments in many countries are incorporating innovative designs in the development of roadways to minimize barrier effects of roads and to enhance connectivity functions of passages for animals across highways (Box 17.8).

Box 17.8: Mitigation options for reducing impacts of road transportation projects

The Key deer are found primarily on Big Pine Key, a part of the Florida Keys traversed by a 3.5 mile section of U.S. 1. Over half of the road kills of the Key Deer in the early 1990's were occurring along this section of U.S. 1. The Florida Department of Transportation (FDOT) initiated a study in 1993 to determine the best way of protecting the Key Deer on this highway while enhancing the deer habitat, even though no highway improvement project was programmed for this site. Over a period of 10 years, the FDOT worked closely with federal and state environmental agencies, local officials, and environmental groups (e.g., the Key Deer Protection Alliance) to identify a multi-faceted strategy for reducing deer mortality. This strategy has included the construction of two underpasses, fencing along U.S. 1 installation of deer guards at the four roads intersecting U.S. 1 and the creation of a travel corridor parallel to the fencing. Research is being undertaken to determine the overall effectiveness of this strategy. Not only will this effort result in reduced motor vehicle- Key Deer crashes, it will also produce habitat enhancing benefit to an endangered species.
(Source**:** http://environment.transportation.org/pdf/2003_environmental_stewardship_awards.pdf)

The Colorado Department of Transportation (CDOT) is looking at major improvements to the I-25 corridor in El Paso County, including some roads on new alignment. Each of the expected projects would have a site-specific impact on the Preble Meadow Jumping Mouse habitat – a federally listed threatened species. Although site-specific mitigation is available, the CDOT worked with FHWA and the USFWS to design a conservation package that included, 1) on-site restoration and enhancement of habitat within or near disturbance areas; 2) off-site actions to restore habitat linkages, permanently protecting 50 acres of habitat within two corridors; 3) monitoring of conservation efforts to determine the success of restoring habitat connectivity; and 4) conducting research to determine the effectiveness of design changes in culverts that would allow them to serve as small mammal ledges.

Source : Colorado Department of Transportation Roland.Wostl@dot.state.co.us

17.4.7 Promotion of compatibility

Promoting compatibility between adjacent land uses where any significant degree of incompatibility is likely to result from development related changes in land use can best be assured by providing a green belt between the proposed activity and nearby properties.

17.4.8 Translocation of affected species

Translocation of plants, animals and habitats from the sites of proposed development can ensure long term conservation of biodiversity. Relocating animals within their range, or to parts of their former range, is a legal requirement in many countries that encourages conservation of species threatened by habitat disturbances and losses induced by development projects. Similarly, translocation of plant species from sites of development threatened by clearing of native vegetation can also reduce the decline of native species (Box 17.9). Habitats translocation has also been suggested as a tool to assist the restoration of degraded habitats. Two recent policies on habitat translocation and conservation translocations of species in Britain (JNCC, 2003a & b) propose translocation as a means to reducing the impacts of damaging developments. These policies recommend moving wildlife habitats to new locations away from sites identified for possible development and protecting conservation interest of a species by moving it to a new "safe" home. With the formulation of these policies, proposals for translocation of habitats have increased recently in Britain, typically as part of development proposals affecting sites of known or potential importance for wildlife.

Translocation and relocation measures should, however be applied only as the last resort for mitigating impacts of the development after all other possible efforts of on- site protection of flora and fauna have been made.

17.5 REMEDIAL ACTION – RESTORATION AND COMPENSATION

Remedial measures include attempts of repair, reinstatement, restoration and rehabilitation with the goal of keeping the pre-development characteristics of the site intact. Furthermore, remedial measures can include compensation. The following are some of the best recognized and most frequently employed remedial measures:

- native ecosystem reconstruction and reinstatement of habitat as is generally attempted in restoration of mining sites;
- re-seeding of grassland or forest land after it has been worked;
- restocking reservoirs with fish and construction of fish hatcheries after a river diversion or damming;
- restoration of damaged hydrological functions; and
- reclamation and stabilization of degraded and abandoned sites after use.

Box 17.9: Translocations of biological components from the sites

- Great crested newts (*Triturus cristatus*) are protected under European and UK legislation, but are frequently the subject of conflict between development and conservation in England. When this occurs, the developer is legally obliged to develop a mitigation plan to reduce the impacts on the newts. In response to such legal requirements, 345 great crested newt mitigation projects took off between 1990 and 2001. (Source: Edgar et al, 2005)
- The capture and translocation of dwarf chameleons was successfully carried from the proposed light industry park to adjacent Durban Metropolitan Open Space System (D'MOSS) area in South Africa. The developer of the industrial park, Cato Manor Development CMDA also provided the funding support for maintenance of the habitat for chameleons in the release site. (Source: Armstrong, 2004)
- The Bee Orchid is probably the best known British orchid found in most counties of England and Wales. Loss of habitat to development is the main factor affecting Bee Orchids in Hull. The plant occurs on a number of disused industrial sites, most of which are scheduled for development and will be lost in the future. Conservation actions are proposed to be undertaken for large number of Bee Orchids present on an industrial site in Hull that is due to be built upon. The developers have been required to move the plants to an area of the site unaffected by the development. (Source: http://www.geo.hull.ac.uk/HBAP/html/PDF/SAP1.pd accessed on 17th July 2007)
- The North Lantau Expressway in Hong Kong is a 12.5 km-long dual three-lane expressway with a driving speed limit of 100 km per hour connecting the urban areas of western Kowloon to the new Chek Lap Kok Airport. The expressway takes the form of a linear structure along the northern coast of the Lantau Island built on hillsides and partially on reclaimed land. The construction involved excavation of 6.3 million m^3 of soil and rock and the removal of 10 million m^3 of dredged material from the surrounding sea bed, and a further 14 million m3 of marine sand fill and 4 million m^3 of seawall rock from the roadwork. During site clearance of a slope in Tung Chung, a protected species of pitcher plants *(Nepenthes mirabilis*), was observed by the resident environmental staff on routine site inspection. Through liaison meetings with concerned parties, the pitcher plants were transplanted away from the damage sites.

  (Source: Environmental Protection Department, Government of Hong Kong, 1997)

Box 17.10: Remedial measures for restoring ecosystem goods and services

- Great crested newts (*Triturus cristatus*) are protected under European and UK legislation, but are frequently the subject of conflict between development and conservation in England. When this occurs, the developer is legally obliged to develop a mitigation plan to reduce the impacts on the newts. In response to such legal requirements, 345 great crested newt mitigation projects took off between 1990 and 2001. (Source: Edgar et al, 2005)
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  Source: Environmental Protection Department, Government of Hong Kong, 1997

All remedial measures need to take the extent to which the alternative provides a balance of trade-off with an emphasis on long-term effectiveness into considerations. Some indicators of effective remediation include:

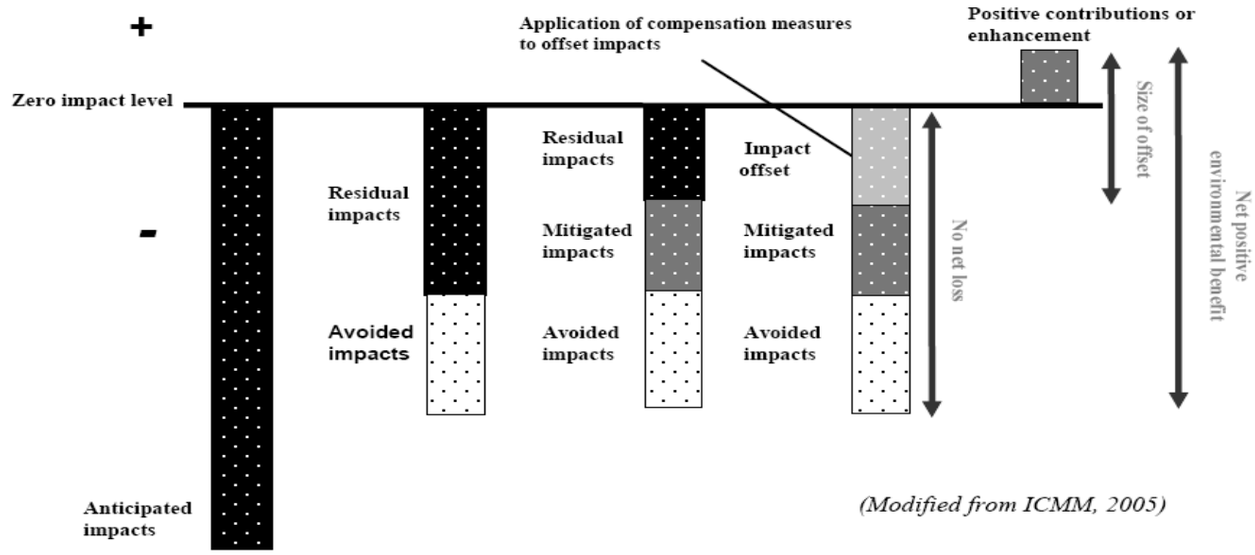
- reduction in contaminant toxicity, volume, or mobility through treatment;
- improved soil productivity after reclamation;
- improvement in biodiversity conservation benefits after remedial treatment of sites and reduction in risks to human health and prevention of hazards.

17.5.1 Compensation measures

Compensation measures include measures that compensate for the residual, unavoidable harm caused by a development project, so as to attempt to at least offset

the harm. Such compensation measures are therefore primarily aimed to ensure at least 'no net loss' but may contribute to a positive planning. (Kuiper, 1997; Vägverket, 2002; ten Kate et al, 2004). Compensation measures that lead to genuine enhancement (in terms of the net benefit or a new benefit) offer greater benefits to communities, result in new or additional opportunities for environment and biodiversity conservation or may result in improved and better management of resources, leading to win-win situations (Figure 17.3).

Figure 17.3: Compensation measures for no net loss and possible enhancement



The most recognizable forms of compensation measures are on-site and off-side compensation measures, as is explained below.

17.5.1 On-site compensation measures

On-site compensation measures focus on site remediation measures. Examples of this form of compensation include restoration of natural areas in an urban context, where original ecological or hydrologic conditions cannot be restored or where an altered environment can no longer support any previously occurring type of regional ecosystem forest. Other examples of compensation include artificially created lakes in mined out pits and managed on scientific principles as wetland ecosystems to serve as excellent replacement habitats for a wide variety of wetland birds (see Box 17.11).

Box 17.11: Examples of on-site compensation measures

- The mine void created after the mining of limestone from the mines of M/s Narmada Cements in Amreli district of Gujarat state of India has been developed into a wetland which is being visited by several migratory birds. The Cement Company is now inclined to seek the advice of the state wildlife department for its scientific management (Source: WII, 2005)

ormer sand and gravel pits. The lakes now offer wadding and preening areas for certain birds. Its increased diversity over time has earned the site designation as Site of Special Scientific Interest. It is now managed by the Jeffery Memorial trust. This is an excellent example of compensation that resulted in the enhancement of the site values. (Source: http://www.mineralsandnature.org.uk)

17.5.3 Off-site compensation measures

Off-site compensation measures involve creation of new habitat on off-site areas by strengthening conservation of species threatened by a proposed development at another site or off-site offset through a third party where, a developer purchases biodiversity credits or pays a third party to provide an offset *ex ante* (Box 17.12).

When talking about compensation measures, in-kind and out-of kind also have to be distinguished, as is explained below.

17.5.4 In-kind compensation

In-kind compensation is appropriate when significant or net residual loss or damage to the environment is likely. A range of in-kind compensation measures involving use of trading instruments to offset impacts and to assure the sustainability of development proposals are being promoted. Carbon trading and the wetland and conservation banking schemes, developed in the context of Endangered Species Act and the Clean Water Act of US regulatory regimes are perhaps the best examples of trading instruments. The state of California in USA pioneered the mitigation banking approach in 1990 as a creative way of financing the conservation of gnatcatcher habitat. Since then, private companies have been setting up wetland banks to create wetlands to serve as 'wetland credits' to be sold out to developers. Estimates indicate that these trading schemes have created 72,000 ha of wetland and endangered species habitat in over 250 approved 'banks' selling habitat 'credits' in more than 45 states in USA (Wilkinson and Kennedy, 2002; Fox and Nino-Murcia, 2005). The bio-banking scheme of Australia (NSW) and the area pools (*Flächenpools*) in Germany (in the context of the *Federal Environmental Impacts Intervention Rule)* are founded on similar principles.

17.5.5 Out-of-kind or monetary compensation

Traditionally, compensation has meant payment for loss of land or amenity resulting from a proposal. This approach can be appropriate in certain circumstances; for example, when private property must be expropriated to make way for a road, pipeline or other public infrastructure project, or land owners are paid rents or lump sum compensation for access to or use of their property to drill for sub-surface resources. In addition, compensation packages, containing a range of offsets, may be negotiated with affected communities. These may include direct monetary payments, for example, in the form of entrance fees for protected areas, payments for water services and taxes for extracting resources such as sand and gravel from water courses or in the form of a capital investment by the proponent (e.g. construction of a fish hatchery for lost fish spawning areas). In Eastern Europe, taxes are applied for extracting minerals from river beds and for discharging of effluents into water sources. A fee is charged to tourists visiting the Greek Island of Zakynthos to reduce the pressures on the sea turtle (Caretta caretta) (Bräuer, 2006).

Compensation measures may be adopted during the planning process to develop 'like for like' options for developing long term benefits for offsetting the environmental impacts or for achieving 'value enhancement' benefits. Compensatory measures may be timed to be implemented after the construction of the project by utilizing funds from the project generated revenue stream or from local, national or international funds or may be taken up as a simultaneous attempt.

Despite various associated problems, compensation measures are a viable option to address less complex impacts but may often pose several challenges in addressing impacts involving sensitive sites (e.g., protected areas and species) and vulnerable targets (for example certain indigenous communities). It is often assumed that area-for-area replacement of the same type of wetland habitat (i.e. in-kind), at the same location as the filled wetland (i.e. on-site), will assure that any lost ecological function is offset. Too often, the ability of a replacement wetland to mimic the ecological function of the filled wetland is questionable. The no net loss goal of compensation thus poses contradictions that are not easy to resolve.

Box 17.12: Examples of off-site compensation measures

(ι). Chad-Cameroon Petroleum Development and Pipeline Project involved construction of a 1070 km pipeline to transport crude oil from three fields in south western Chad to a floating facility 11 km off the Cameroon coast. Cameroon has some of the most biologically diverse and important forests in Africa. The project threatened valuable ecosystems, particularly in Cameroon's coastal rainforest where the corridor of the pipe cuts straight across these sensitive ecosystems. The World Bank Group applied its safeguard policies to the project and related infrastructure, and worked with the sponsors to ensure that the pipeline avoided areas of high biodiversity, whenever possible. Other conservation efforts included setting up of two new large national parks in Cameroon to offset a small but unavoidable loss of forest. The parks, which help protect biodiversity, are being independently managed. Source: http://www.ifc.org/ifcext/africa.nsf/AttachmentsByTitle/ ChadCamProjectOverview/$FILE/ ChadCamProjectOverview.pdf)

(ιι).BP has three petrochemical plants in Terengganu, Malaysia and there are significant oil and gas reserves off the east coast of the state. Terengganu is home to about 70 percent of Malaysia's turtles and the sanctuary is an important nesting habitat for three species of marine turtles and the painted terrapin. In June 1999, BP Petronas Acetyls, a joint venture between BP and Petronas, partnered with the Malaysian Department of Fisheries and the World Wide Fund for Nature Malaysia to create the Ma'Daerah Turtle Sanctuary in the state of Terengganu, Malaysia. It is the first turtle sanctuary to be funded by the private sector and the second largest sanctuary in Malaysia. (Source: EBI, 2003)

(ιιι).The Lesser Horseshoe Bat is a protected species under the Habitats Directive and implementing legislation in Ireland (European Communities (Natural Habitat) Regulations, S.I. 94/1997). The EIA for the Ennis Bypass identified impacts on the lesser horseshoe bat as a potential likely significant impact of the scheme and recommended that appropriate mitigation measures be implemented in agreement with the National Parks and Wildlife Service (NPWS). The mitigation strategy for the Lesser Horseshoe Bat involved a number of measures aimed at the provision of new habitat, restoration of previous or existing habitat and measures to establish a bat commuting corridor. As part of the construction of the scheme, farm buildings known to house the Lesser Horseshoe Bat were to be demolished. The mitigation strategy required the contractor to provide an alternative bat house in the area. The design of the bat house is being developed by a firm of UK architects and will be in place before the demolition of the farm building. In addition, a bat roost identified through earlier surveys, but subsequently destroyed, is being restored as a suitable bat roost as part of the mitigation strategy. Mitigation measures are also being put in place to establish a commuting corridor along certain sections of the scheme. The corridor consists of post and rail fencing with a native shrub hedge planted inside the fence line. In addition, where tree roosts or building roosts have to be removed to construct the road, bat boxes are being

17.6 CRITERIA FOR SUCCESSFUL IMPLEMENTATION OF MITIGATION AND INGREDIENTS FOR GOOD PRACTICE APPROACHES

Good mitigation practice has multiple facets – it should allow the management of key anticipated impacts for responsible economic development; contribute to resolution of environmental and social problems and optimize the benefits from development. Yet, experience of many EIA professionals tend to promote a skeptical viewpoint that mitigation is merely a device that enables development to proceed with adequate safeguards without ensuring whether the recommended safeguards have been really secured in place. However, there is evidence from a growing number of large scale mitigation projects from around the world that good practice is emerging (Rosenfeld et al, 1997; Sweeting et al, 2000; EBI, 2007; Patricia and Ernst, 2007).

Several factors determine the reliability, practicality and successful implementation of mitigation measures that have been identified from mitigation experience from around the world. In this context, Tomlinson (1997) warned that 'promises' and commitments to mitigation made in EIAs may not be delivered unless built in the consent procedures. Mitigation measures must therefore be translated into action in an effective way and at the right time if they are to be successful. A written plan that includes a schedule of agreed actions should be prepared for this purpose. Various EA professionals have recommended the use of plans more commonly referred to as Environmental Management Plans (EMPs) to improve the link between EA reports and stipulating consent conditions. Preparation of such EMPs is an inherent part of EA systems of the World Bank (World Bank, 1999), Western Australia (Wood, 2003), Germany (taking the form of accompanying landscape plans) and of the EA systems of many developing countries.

Good EMPs should expand on the mitigation measures described in the EA. Inclusion of technical details, justification for measures proposed, financial allocations, and schedules for implementation will increase the likelihood that mitigation measures described in the EA report will be implemented. The generic format (Table 17.1) should be useful in summarizing mitigation measures proposed in an EIA.

Table 17.1: Format for summarizing mitigation outcome for developing EMP

Project activities	Type of impact	Potential impacts	Where the impact is likely to happen	When the impact is likely to occur	Magnitude of impacts	Mitigation measures	Anticipated costs	Institutional responsibility	
								Implem-entation	Supervision

For good outcomes, mitigating measures should not be afterthoughts or measures introduced at the final design stage merely to offset the most obvious environmental impacts. Mitigation should be a continuous, iterative process throughout the life of the project as each of the stages of the project may require different mitigating measures.

The environmental effects of measures themselves may sometimes require to be assessed. Measures that may have been added at a late stage in the project lifecycle may not have been assessed in the environmental report. Sometimes, the mitigation measures themselves may have significant effects on communities and natural heritage through further loss of resources base and habitat or by the obstruction of wildlife corridors or intrusion into the landscape or obstruction of views (Box 17.12).

Another important factor that can determine the certainty of good outcome of mitigation is the soundness of the recommended measures which is greatly dependent on both, the level of expertise of the EA professional proposing such measures and the confidence of the developer in implementing such measures based on past examples of successful applications. This places the greatest urgency for good grounding of trainers, academicians, EA professionals and practitioners for promoting best practices and innovative approaches that can ensure that the proposed development incorporates appropriate 'checks and balance' and leaves the smallest practicable footprint.

Box 17.12: Review of impacts of proposed mitigation actions for better project outcome

Creation of Protected Areas has been envisaged to address the impacts of constructing dams on river Narmada in central Indian state of Madhya Pradesh. The objectives of setting up the protected areas are to fulfil the twin objectives of conserving wildlife in remnant areas falling outside the submergence area and providing sustenance to forest dependent communities. The EIA report provided a detailed plan for setting up the protected areas to protect habitats that would be lost due to filling of the dam's reservoir and the sizes of the PAs. The state wildlife department before implementing the recommendations of setting up of the proposed PAs, identified the need to review the social-economic impacts of setting up of these PAs on local communities. Studies have been commissioned by the State Wildlife Department to undertake assessment of impacts of creating the PAs to avoid conflicts with local people and improve the efficacy of conservation planning in response to the development of hydropower project. (Source: Official records of the Narmada Control Authority)

17.7 CONCLUSIONS

The chapter has attempted to communicate the important message that implementation of mitigation measures is vital for EIA to live up to its potential as a decision support tool to protect the environment and encourage sustainable development. This ideology underpins the rationale for advocating the integration of sound mitigation practices in pursuing economic development priorities outlined, for example, in the Millennium Development Goals and for reversing the negative ecological trends that are clearly reflected in the outcome of Millennium Ecosystem Assessment.

Mitigation and compensation have been discussed as attractive concepts for preventing and reducing adverse impacts of development proposals on environment and society and also as means of enhancing project's benefits, where feasible. A wide range of practical examples presented in the chapter have illustrated that mitigation and compensation can be versatile and most promising tools for safeguarding environmental resource conservation, bolstering economic development and for supporting the decision- aiding function of impact assessment.

The chapter makes strong recommendations for respecting the mitigation hierarchy while choosing various options for mitigation. Finally, the chapter shares practical challenges involved in implementing the mitigation plans and suggests ways and means for overcoming various contextual and procedural constraints for ensuring positive outcome from impact assessment. It is hoped that the contents of the chapter will serve as a useful guidance source for EA community to gain newer insight and better skills to foster innovative good practices for mitigating the impacts of development projects.

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18 The importance of EIA follow-up[10]

By Jos Arts

This chapter discusses the concept of EIA follow-up. First what EIA follow-up is and why it is important is outlined. Subsequently, who is involved in EIA follow-up, which regulations for follow-up are relevant, and how it can be done is established. Then, attention will be paid to follow-up at strategic level (SEA follow-up) is discussed, also looking at barriers and success factors in practice. Finally, principles of EIA follow-up are addressed as well as challenges for the future. The chapter includes a short overview of the historic development of the concept. Furthermore, key sources of reference for follow-up are listed.

18.1 INTRODUCTION

Follow-up is seen as one of the core elements of good quality EIA. As a consequence, the history of EIA follow-up is almost as long as EIA practice itself. The concept of EIA follow-up first came up in the 1980s. In subsequent years, many practical experiences were gained with follow-up. More recently, it has also been extensively discussed at international workshops, resulting in e.g. a handbook devoted to EIA and SEA follow-up (Morrison-Saunders and Arts 2004a), a special issue on EIA follow-up of the IAPA journal (edited by Morrison-Saunders and Arts 2005), and the publication of "International best practice principles for EIA follow-up" by the IAIA (Morrison-Saunders et al. 2006). This chapter builds on these publications. More information about key sources and references is provided at the end of this chapter. Although in the past, much work has been done on developing the concept and there is an increasing amount of practical experiences gained around the world, it seems that EIA follow-up is still not used to its full potential in practice. By doing EIA follow-up, by applying SEA and by including broader issues (like health, social and economic considerations), EIA may become a true instrument for safeguarding sustainable development (see e.g. Principle 17 of the *Rio Declaration on Environment and Development,* 1992, and IAIA 1999, 2002). Follow-up may fill the gap between plan and project preparation and operation. Doing this, it may provide important means to manage environmental risk and to learn from past experiences. Without some form of follow-up, the process of EIA remains incomplete and it is not possible to determine the environmental performance of plans and projects. Without follow-up, SEA and EIA may just become 'paper tigers'. As the saying goes: "The proof of the pudding is in the eating" (Arts 1994).

18.2 WHAT IS EIA FOLLOW-UP?

EIA follow-up can be defined as: *"The monitoring and evaluation of the impacts of a project or plan (that has been subject to EIA) for management of and communication about the performance of that project or plan"* (Morrison-Saunders et al. 2006, see also Morrison-Saunders and Arts 2004b, p.4).

18.2.1 Key components

EIA follow-up can be said to comprise four key components (Arts et al. 2001), as follows:

- *Monitoring* – the collection of activity and environmental data and comparison with standards, predictions or expectations. Baseline monitoring refers to measuring the initial state of the environment before activity implementation and provides the basis for prediction and evaluation in the EIS. In the post-decision stages, monitoring may relate to both, compliance and impact of the decision. Closely related to the continual activity of monitoring is auditing, which is the periodical objective examination of observations by comparing them with pre-defined criteria (standards, predictions or expectations);
- *Evaluation* – the appraisal of the conformance with standards, predictions or expectations as well as the environmental performance of the activity. This may involve (policy-oriented) value-judgments. Ex-ante evaluation is forward looking and predictive in nature (an example is the preparation of an EIS). Ex-post evaluation has a backward looking nature, involving the appraisal of a policy, plan, program or project that has been or is currently being implemented;
- *Management* – making decisions and taking appropriate action in response to issues arising from monitoring and evaluation activities. Ongoing management responses may be made by both, proponents (in response to unexpected impacts) and EIA regulators (e.g. reviewing consent conditions and management requirements). An environmental management system (EMS) is a (often voluntary) system of compliance that operationalizes the implementation of environmental protection and management measures; and
- *Communication* – informing the stakeholders about the results of EIA follow-up in order to provide feedback on project/plan implementation, as well as feedback on EIA processes. Both, proponents and EIA regulators may engage in communication on follow-up and communication may extend beyond simple informing about results and management responses but may also include direct stakeholder participation in the monitoring, evaluation and

[10] Acknowledgements: the author wants to thank Angus Morrison-Saunders for his valuable comments on a draft of this paper and with whom the author had the pleasure to write many publications on EIA follow-up on which this chapter is based

management.

18.2.2 Forms of EIA follow-up

Various forms of EIA follow-up can be distinguished (Arts and Morrison-Saunders 2004b). Follow-up can thus be applied:

- to different abstraction levels ranging from micro- (EIA project/plans) to macro- (EIA system) and meta-levels (EIA concept);
- to different strategic policies, plans and programs (SEA level) and to operational projects (EIA level); and
- to singular or multiple projects/plans at a local or regional scale.

Follow-up in relation to EIA can be conceptualized at three different scales and levels of analysis (Morrison-Saunders and Arts 2004b, Sadler 2004), as follows:

- *Micro scale follow-up* – monitoring and evaluation at the individual proposal level. This is conducted on a project-by-project basis and relates directly to specific components of EIA (or SEA) such as impact prediction, impact monitoring, compliance auditing, and implementation of mitigation and environmental management actions; a key question here is: was the project and the impacted environment managed in an acceptable way?
- *Macro-scale follow-up* – evaluation of EIA systems. This examines the effectiveness of an EIA (or SEA) system as a whole in a certain jurisdiction (for instance, the influence of the EIA process on decision-making, efficiency of EIA procedures and utility of EIA products); a key question here is: how efficient and effective is the EIA system as a whole?
- *Meta-scale follow-up* – evaluation of the utility of the concept of EIA. This is closely related to the previous level, but going a step further to determine whether EIA (or SEA) is a worthwhile process and concept overall; a key question here is: does EIA work?

This chapter focuses on micro level follow-up. Macro and meta level follow-up are discussed in more detail in Chapter 12 of the handbook.

Environmental assessment can be carried out at various *levels*, ie EIA for operational projects and SEA for strategic policies, plans and programs (PPP). In this chapter, the term EIA follow-up is used as a generic term, referring to both, EIA and SEA follow-up. If a distinction is needed, the more specific term SEA follow-up is used. In addition, the term plan is used as a more generic term to refer to the strategic level of policies, plans programs, unless a distinction is relevant. Section 18.7 will discuss in more detail specific aspects of SEA follow-up.

Follow-up may not necessarily be restricted to singular activities at the local level. It can also be applied to *multiple projects/plans* and be undertaken at a local or *regional scale*.

18.3 WHY IS EIA FOLLOW-UP RELEVANT?

The rationale for follow-up is similar to that of EIA itself: *getting a grip on uncertainty* intrinsic to planning, decision-making and management of new development. The difference is that EIA focuses on pre-decision analysis and follow-up focuses on the stages after the consent decision. Although a thorough pre-decision analysis, provided by EIA or SEA is a necessary pre-requisite for informed decision-making, it is not sufficient for sustainable planning, decision-making and management of projects. There will always be uncertainties and gaps in knowledge of both EIA, and its follow-up.

Ultimately, follow-up is essential in determining the outcomes of EIA. By incorporating feedback into the EIA process, follow-up enables *learning from experience*. It can and should occur in any EIA system to prevent EIA being just a pro-forma exercise. At the micro-scale level (see Box 18.1), learning about the impacts of a proposal and the effectiveness of mitigation measures to control or contain impacts is especially important. Feedback from follow-up programs can also facilitate learning about pre-decision EIA in general (e.g. the accuracy of impact prediction methods). This knowledge can be utilized by regulators and proponents alike to improve future EIAs. At the macro- and meta-scales, learning about the outcomes of EIA enables the effectiveness and utility of EIA procedures and concepts to be evaluated; again, with the aim of improving future EIA practice (Morrison-Saunders and Arts 2004).

Box 18.1: Objectives of EIA follow-up

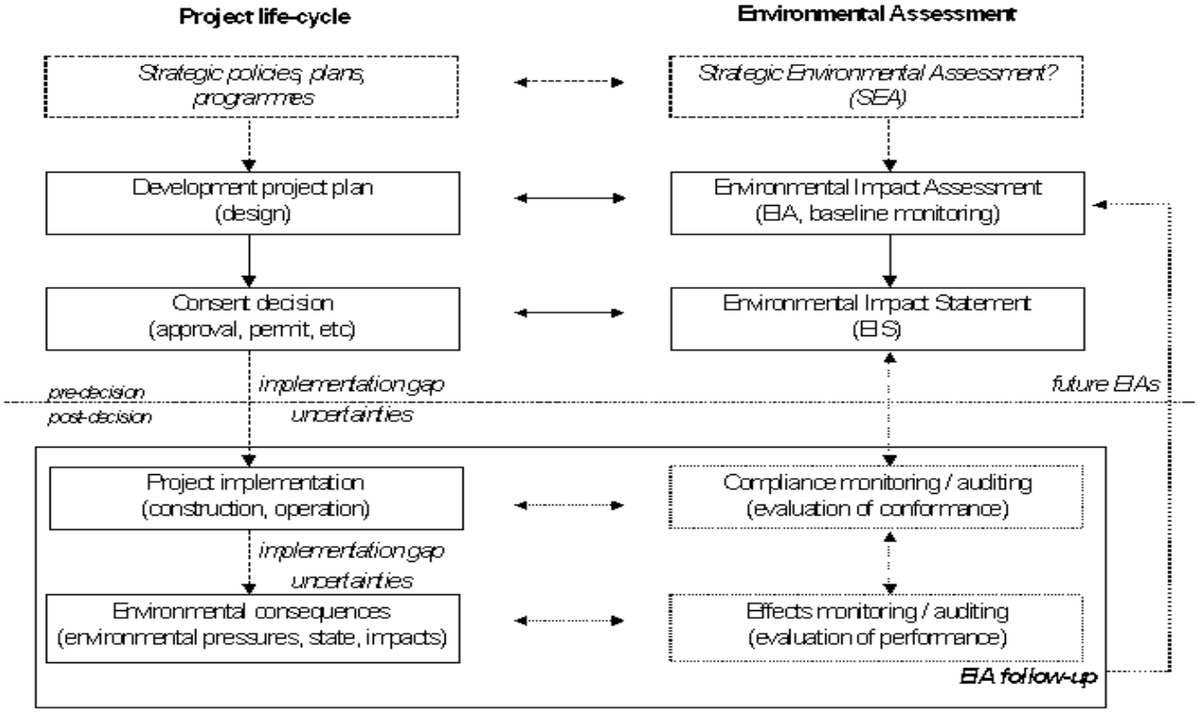
- *Controlling,* checking and adjusting the plan/project and their impacts for the purpose of controlling (environmental) risk, maintaining decision-making flexibility and allowing adaptive management responses;
- *Learning* by providing feedback on EIA processes, predictions and actual effects – i.e. learning for the plan/project, for EIA in general or for enhancing scientific and technical knowledge;
- *Communication* about the environmental performance of the plan/project. This may include informing stakeholders about mitigation measures and management of potential impacts on the environment, which is relevant for

improving e.g. public awareness and acceptance.

Follow-up links the pre- and post-decision stages of EIA, thereby *bridging the implementation gap* (Dunsire, 1978) (see Figure 18.1) that arises when there is a considerable difference between project/plan proposals (and their related EISs) and their implementation (Arts et al, 2001). Pre-decision EIA is predictive; based on an uncertain future. Follow-up can address such uncertainties and deficiencies, which are intrinsic to EIA planning and decision-making processes, thereby rationalizing these processes. Ultimately, it is not the predicted impacts, but rather the real effects that are relevant for protecting the environment. Follow-up not only provides information about the consequences of an activity as they occur, but it also gives proponents and/or EIA regulators the opportunity to implement measures to mitigate or prevent negative effects on the environment.

Naturally, there is a cost associated with EIA follow-up in terms of financial and staffing demands, and it is important to realize that it may not be necessary to undertake ('full-blown') follow-up for all proposals undergoing EIA as much monitoring and auditing activities already may take place (Arts and Nooteboom, 1999). This highlights the need for careful screening and scoping in EIA follow-up. Evidence provided to date suggest that the costs and effort put into EIA follow-up are justified and outweighed by the benefits accrued (see e.g. Marshall, 2004; 2005 and Sanchez and Gallardo, 2005).

Figure 18.1: EIA follow-up a link between EIA and project implementation



Source: Morrison-Saunders and Arts 2004a

18.4 WHO IS INVOLVED IN EIA FOLLOW-UP?

Generally, three principal groups of stakeholders (parties) are involved in EIA follow-up: the proponent of the project/plan, the (EIA) regulator and the community where the initiative takes place. All three parties can be involved in EIA follow-up as initiator, conductor or participant (Morrison-Saunders et al 2003):

- *Proponents* are the private companies or governmental organizations who develop a project. Just as project management and mitigation of impacts is normally the responsibility of proponents in EIA, they are often expected to perform most follow-up activities. Follow-up driven by proponents (also called *1st party follow-up*) may include self-regulatory or industry-led initiatives, such as environmental management systems (EMS). This may serve some EIA follow-up functions (Marshall 2004);
- *EIA regulators* (sometimes known as competent authorities) are a government agency or a funding agency such as the World Bank, which is responsible for administering and implementing EIA processes. Follow-up carried out by regulators (*2nd party follow-up*) typically focuses on ensuring that proponents comply with EIA approval conditions as well as learning from experience to improve EIA processes in the future;

- The *community* refers to a body involving the public or other independent persons and may range from individuals directly affected by a proposal or interested persons including non-governmental organisations (NGOs), academics and the wider scientific community. The extent of community participation may range from direct involvement in follow-up programmes to simply being kept informed of follow-up activities and outcomes. Pressure arising from community scrutiny of development projects is often a driving force for proponents and regulators alike to implement EIA follow-up programs. Follow-up activities carried out or initiated by the community (*3rd party follow-up*) may range from formal committees or agencies established to oversee or sometimes conduct follow-up activities through to independent action by community members concerned about environmental effects in their neighbourhood. Involvement of the community in EIA follow-up can be an important source of specialist or local knowledge.

As a consequence, EIA follow-up can take many forms – ranging from proponent driven self-regulation to requirements imposed by EIA regulators or initiatives motivated by public pressure and community involvement (Morrison-Saunders et al 2001). Morrison-Saunders et al (2003) provide for a more detailed discussion how these stakeholders can become involved in EIA follow-up with respect to the EIA regulations and institutional arrangements in place, techniques used in follow-up, resources and capacity available for follow-up and the type of activity being undertaken. Hunsberger et al (2005) reported on opportunities for community involvement in sustainability-centred EIA follow-up through citizens-based monitoring using local knowledge.

18.5 WHEN? REGULATIONS FOR EIA FOLLOW-UP

The recent growing interest internationally in EIA follow-up has been accompanied by the development of new follow-up procedures and regulations in many countries and jurisdictions. There is a prevailing recognition of the importance of and the need for some form of follow-up to EIA activities in the literature. In practice, however, such follow-up in the post-decision stages is performed in only a minority of cases. This seems to be a weak point of EIA practice in most jurisdictions and it appears that EIA is not being used to its full potential.

Since the 1990s, there is a slow but steady growth in development of formal regulations and institutional arrangements for follow-up in EIA systems. Legislative requirements for follow-up of project based EIA can be found in The Netherlands, the US, the UK, Hong Kong, Western Australia, California and Canada, as well as the European Commission Directive on strategic proposals. Morrison-Saunders et al (2003) also note that legislation for EIA follow-up exist in other countries such as Portugal, Australia, Malaysia, Nigeria, Brazil and elsewhere and that there appears to be an upsurge in legal requirements for EIA follow-up (Arts and Morrison-Saunders 2004a). For instance, the Canadian Environmental Assessment Act (amended in 2002) strongly emphasizes follow-up, focusing on monitoring of the accuracy of predictions and the effectiveness of mitigation measures (Baker 2004, Noble and Storey 2005). Also, the Hong Kong regulations and system for EIA follow-up is strong.

The European EIA directive (85/337/EEC, amended 97/11/EC) does not contain specific requirements to follow-up projects that have been subject to EIA. When preparing it in the early 1980s, the inclusion of follow-up requirements was discussed intensively. The original draft directive on EIA (CEC 1980) did include a special section on follow-up of EIA projects. However, later on, this was excluded from the final directive, which may be seen as compromise only establishing minimum requirements (Wood, 1995; Arts, 1998). The so-called Espoo Convention on 'EIA in a transboundary context' (UNECE, 1991) does include in Section 7 a (discretionary) requirement on follow-up stating that parties involved can decide that on request a country must undertake an ex post evaluation of a project. The European SEA Directive (2001/42/EC) does include requirements for follow-up in article 10, with respect to the need to "monitor the significant environmental effects of the implementation of plans and programmes", and to propose mitigation measures, inviting member-states to use existing monitoring systems to avoid duplication (Partidario and Arts, 2005).

The legislative approaches for EIA follow-up range from prescriptive command and control requirements (eg Hong Kong and to a lesser extent Canada) to more open interpretive arrangements (eg the UK and Western Australia). Regulatory frameworks vary amongst countries in relation to the specific cultural and institutional context. In many systems the proponent is required to carry out EIA follow-up (e.g. Canada, Hong Kong). However, in the Netherlands the authority giving consent is made responsible for EIA follow-up and the proponent has to cooperate in providing necessary monitoring information (Arts and Meijer, 2004). While it is generally agreed in the literature that having EIA legislation in place is an essential precursor to effective practice (eg Sadler, 1996; Wood, 2003), a legal requirement is not sufficient on its own to guarantee follow-up. A clear commitment of regulators is needed to ensure that follow-up regulations translate into effective action in practice. Voluntary self-regulation may fill the gap here.

In essence, three basic regulatory settings to EIA follow-up can be seen internationally, although also a mix of these might be found (Arts and Morrison-Saunders, 2004a):

- *command and control* – requirements by government regulators laid down in formal EIA regulations and focussing on compliance with law, insight in environmental and EIA system performance. These might link up with environmental permits, standards, surveillance, enforcement and prosecution/offences for legal breaches;
- *self-regulation* – by proponents. This will often be related to instruments like environmental management systems (EMS), or environmental management plans (see Chapter 17). Examples of this are formal systems, such as ISO 14001 and EMAS (see chapter 8). The output usually focuses on third party accreditation (e.g. contractors), compliance with

industry standards, management of the activity and a green profile.

- *public pressure* – created by community stakeholders. This might be achieved via public concern, interest of the media, studies or lobbying by interest groups. The focus might be transparency and accountability of management of the activity, information about the project, enhancement of local environmental knowledge, public participation. Public pressure might be a very strong driver for EIA follow-up.

Having prescriptive EIA follow-up arrangements clearly establishes the 'rules' for all stakeholders. However, these need to be combined with a scoping mechanism as not all impacts or projects/plans will warrant follow-up. Moreover, if no systematic follow-up is required by EIA regulations, this does not necessarily imply that the EIA process is unbalanced. Many jurisdictions provide other ways – outside the EIA framework – for dealing with uncertainties after giving consent to an activity, for instance, permit compliance monitoring by proponents or area-wide monitoring by regulation authorities (Arts and Nooteboom 1999). Actually, many recent EU regulations contain such monitoring and auditing requirements, often combined with requirements to provide for some management. The latter may involve preparing management plans and/or management activities, responding to issues observed in practice by monitoring. Examples of such regulations include; the Habitat Directive (1992/43/EEC), the Air Quality Framework Directive (1996/62/EC), the Noise Directives (2000/14/EC, 2002/49/EC), the Water Framework Directive (2000/60/EC), the Environmental Liability Directive (2004/35/EC), and the INSPIRE Directive (Directive on Infrastructure for SPatial InfoRmation in Europe).

Various EIA regulations include requirements for a periodic systems evaluation of the EIA regulations and practice. Examples of such *macro-level follow-up* can be found in the EU (the European SEA and EIA Directives) and the Netherlands (Environmental Management Act), which both require a 5 year review of the EIA regulations and practice. Similar provisions can be found in e.g. Canada, Australia and Hong Kong (see e.g. Wood 2003).

18.6 HOW TO DO EIA FOLLOW-UP?

The process of doing EIA follow-up is rather similar to the process of preparing an EIS (see Baker, 2004). Key steps are:

- *screening* – determining the need for follow-up. Here, criteria can be used, such as: regulatory requirement; degree of uncertainty in the EIS, including new techniques or models; degree of uncertainty of the effectiveness of mitigation measures; complexity and magnitude of a proposed activity, involvement of new or unproven technologies; sensitivity of the area where the activity is proposed; degree of risk of incorrect implementation; political and/or societal sensitivity (public concern); intervening developments and events. The screening criteria for follow-up are similar to those for screening of the need to prepare an EIS.
- *Scoping* – defining the content of EIA follow-up. Relevant scoping criteria are: possible residual effects; the effects that are considered to be most adverse, including cumulative effects; affected valued ecosystem components; gaps in knowledge; significant level of uncertainty of the predictions; public sensitivity to an issue; being objective-led;
- Designing a *follow-up program*. This includes determining the roles and responsibilities of all stakeholders; documenting the result of the scoping; selection of methodologies and tools fitting with the scope defined; determining timing, costs of monitoring, evaluation, reporting activities and organization; and documenting it; preferably prepare a (draft) EIA follow-up program prior to project/plan approval; follow-up requirements can then be included into the terms and conditions of the consent decision.
- *Implementation* of a follow-up program. First, this relates to specific *monitoring* activities (baseline, effects and compliance monitoring). Many other tools and approaches can be used, including: collecting data from other sources such as measurements; registrations and reporting pursuant to environmental permits; environmental audits; site visits and environmental inspections; information from an EMS, multi-stakeholder advisory committees; environmental inspectors; communal knowledge; general investigations of the state of the environment.
- *Evaluation* of results and outcomes. This includes: controlling of completeness and accuracy of follow-up data gathered (by responsible agency, regulator or proponent); the appraisal of the conformance with standards, predictions or expectations as well as the environmental performance of the activity (see also section 18.2).
- Issue *management* – taking action in response to follow-up outcomes. Management responses may range from doing nothing (as follow-up results are positive), to carrying out extra mitigation measures, modifying construction, project operation, adjusting permit provision or EMS, or even decommissioning activities. Management measures can be made by both, proponents (in response to unexpected impacts) and EIA regulators (e.g. reviewing consent conditions and management requirements).
- *Communication* – about follow-up results and management response which may be laid down in a follow-up report. Preferably, communication is not only restricted to the stage of reporting the results but also includes communication of stakeholders at earlier stages of EIA follow-up. Moreover, as stated earlier, communication may extend beyond simple informing about results and management responses but may also include direct stakeholder participation in the monitoring, evaluation and management.

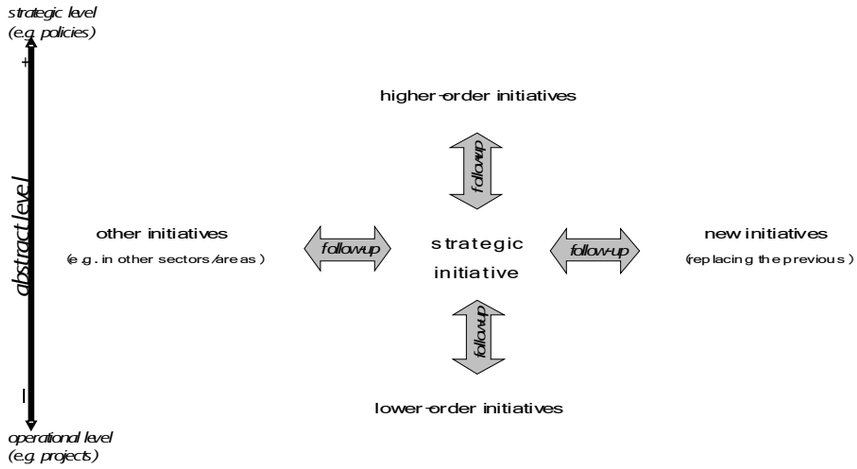
18.7 SEA FOLLOW-UP

Strategic Environmental Assessment is developing quickly. A major driver is the EU SEA Directive (2001/42/EC), which includes a requirement for post-decision monitoring (see section 18.4). Accordingly to these developments, attention for SEA follow-up of policies, plans and programs (PPP) is also growing in the literature and in SEA practice. SEA follow-up is in many respects similar to EIA follow-up and may be defined analogously (see section 18.2). Monitoring, evaluation, management and communication are also key elements of SEA follow-up. Simply put, SEA follow-up is about life after the approval of a policy, plan or program, when options have been closed. Here, SEA follow-up for PPP differs considerably from EIA follow-up for projects. When dealing with projects, follow-up is quickly related to project implementation – including activities like construction and operation. Strategic actions are not directly affecting physical reality, but addressing subsequent policy- and decision-making. Policy, plan and programme decisions have a strategic nature which is based on desired intentions and/or planned actions, and are foreseen in a long-term perspective. Moreover, a strategic initiative may have complex and indirect effects through their influence on other initiatives of different levels. This may relate to subsequent decision-making at lower-order activities such as project consent, decision-making at the same level in other sectors, areas or a new (replacement) PPP or higher-order strategic initiatives – this might be called the 'splash' effect (see Figure 18.2, Partidario and Arts 2005). As a consequence, SEA follow-up may relate to various directions and impacts may become difficult to trace through complex chains of causality. Moreover, when changes in environmental conditions are observed, their attribution to a specific strategic initiative may be problematic, as such environmental changes will usually also result from many other factors. Its complexity is related to (Cherp et al, forthcoming):

- *Uncertainties* in determining environmental implications of a strategic initiative. These are typically more profound than those found with regard to environmental impacts of an individual project;
- *New circumstances* are more likely to emerge in relation to a strategic initiative whose implementation arena is much less controlled by the proponent than project operation is controlled by the developer.
- *Deviations* from initial designs are more usual for strategic initiatives than for projects, which normally tend to follow more closely the original plans.

The last point is especially important. The rationale for SEA follow-up is linked to its promise to promote strategic change towards environmental sustainability. This means that SEA should be able to help shaping not only formulation of strategic initiatives, but also their implementation. At the same time, the link between formulation and implementation of strategic initiatives is often much weaker than is the case at the project level. Thus, follow-up is needed to expand the focus of SEA from merely ensuring 'green rhetoric' in PPPs to safeguard environmentally sound patterns of activities arising from these.

Figure 18.3: The 'splash effect: follow-up directions to a strategic initiative



Source: Partidario and Arts 2005

Because of its specific nature, SEA follow-up calls for a specific approach with respect to:

- *Monitoring and evaluation*: a multi track approach (Partidario and Arts 2005) is needed. SEA follow-up cannot rely only on one form of monitoring based on environmental indicators that measure a direct relationship between environmental change and the strategic initiative. The various tracks that might be relevant include: (1) monitoring actual changes (state of the environment monitoring); (2) achievement evaluation of stated objectives (goals-achievement); (3) evaluation of performance of the strategic initiative in subsequent policy and decision-making; (4)

checking conformance of subsequent decision-making with original strategic initiative and SEA; and (5) monitoring and evaluation of the actual impacts of an initiative on the environment (trying to establish causal relationship between strategic initiative and final environmental change). These five tracks are not mutually exclusive and may be combined. While monitoring may often use external systems for data collection, evaluation should be directly connected to the strategic initiative in question. It may be conducted within the same organizational and procedural framework as the strategic initiatives themselves. For example, formal regular evaluations of policies or reviews and revisions of plans may provide convenient time-points for SEA follow-up evaluation ('evaluative moments' in the planning process, see Arts,1998);

- *Management*, which is probably even more complex component of SEA follow-up (Cherp et al forthcoming). The management component should ensure that SEA and SEA follow-up recommendations are translated meaningfully into decisions and actions implementing the strategic initiative and protecting the environment. Two questions arising here are: (a) which 'decisions and actions' should be targeted; and, (b) how can these be influenced? The first relates to the complex implementation of strategic initiatives and may regard: (1) decisions on revising and amending the strategic initiative itself (e.g. periodic review and renewal of land use plans); (2) actions directly prescribed in the strategic initiative and often implemented by the proponent (e.g. a transport plan may prescribe road construction); (3) decisions and actions implemented by other actors but controlled by the strategic initiative through formal frameworks (e.g. a land-use plan restricting certain developments in particular zones); (4) all other decisions and actions, which are affected by a strategic initiative (e.g. a national energy policy influencing consumer and investor behaviour without directly controlling it). The importance of different types of management actions and decisions depends upon the nature of the strategic initiative. Moreover, all four overlap to a certain degree. With respect to the second question: how can these decisions and actions be *influenced* by SEA follow-up, for the decisions and actions of types 1-3, there may be legal, administrative or other institutional conditions that directly support influence. This is related to the concept of tiering. However, many relevant management responses may be of type 4. This is closely related to the challenge of institutional ownership of SEA follow-up. Parties who have the competence to take management responses of type 4 are rarely not the 'owners' of the original SEA. Thus, their participation in the SEA follow-up should be assured by specific organizational, communication or other arrangements. In certain cases, such arrangements may be provided by Environmental Management Systems (EMS);
- *Communication* - at the project level, EIA follow-up communication may be primarily designed to provide information about the actual impacts and conformance to those who are affected by or have a statutory responsibility to oversee the development. In general, SEA follow-up should perform similar tasks, although its audiences may be even wider and more diverse than at the project level. In the context of SEA follow-up, communication should work in two ways. (1) An open process that includes all relevant stakeholders is important as strategic plan formation and implementation often involves not only enforcement actions but also processes of negotiation, learning and persuasion (Woltjer, 2000). (2) It is also important to clarify the intentions, values, needs, wishes, knowledge and views of the network of actors for effective implementation of a strategic initiative. Communication can be considered as both, a separate component, but also as a component of monitoring, evaluation and management of SEA follow-up. Communication plays an important role in learning, formation of cultures, networks and institutions, which are key components of societal change. Moreover, SEA follow-up might provide a useful mechanism for ongoing communication and learning. Therefore, it should be the central element of SEA follow-up if SEA aims to achieve strategic change for sustainable development.

In comparison with EIA follow-up, SEA follow-up has a wider scope, arising from complexity of implementation of strategic initiatives. Finally, it should be emphasised that SEA follow-up is basically about managing the policy-making and/or planning implementation process. In this way, learning from experience is enhanced, as well as dealing with the uncertainty intrinsic in policy-making and planning.

18.8 LESSONS LEARNED: BARRIERS AND SUCCESS FACTORS FOR EIA FOLLOW-UP

As stated earlier, although the importance of EIA follow-up has been acknowledged widely in the literature, practice of EIA follow-up is still limited. This relates to the following key barriers that still hinder the implementation of EIA follow-up:

- *Limitations of EISs* – EISs are often descriptive rather than predictive, containing vague and qualitative prediction statements that are difficult to test. Other limitations include gaps in information and outdated assumptions about future developments.
- *Limitations of techniques for follow-up* – the methods and techniques for follow-up are less developed than other components of EIA. Most methods can be considered only minor variations on the standard research design. In addition, knowledge about dose-effect is limited and cause-effect relationships between activities and environmental change are difficult to establish. Also, baseline information is inadequate (Arts and Morrison-Saunders, 2004a).
- *Limitations in organisation and resources* – monitoring environmental changes and linking them to a source (a project or plan) may require considerable time, money, staff, expertise and the involvement of many parties. The division of tasks, responsibilities and costs may be unclear. During the long time period the EIA follow-up may cover, the project may be

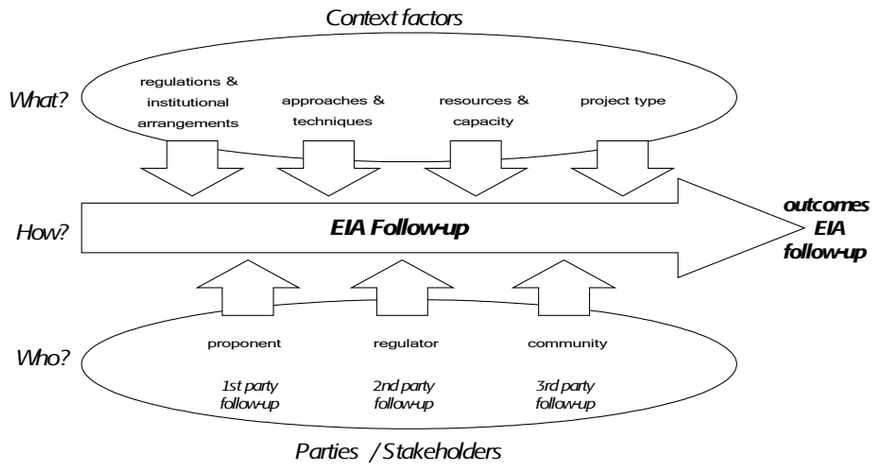
handed over to others, or there may be changes in personnel. The task of organizing an EIA evaluation may be complex while little guidance and training exist.

- *Limited support* for conducting EIA follow-up – in general, authorities and proponents alike seem to give EIA follow-up a low priority. In many jurisdictions, EIA follow-up is part of the EIA framework. Reasons for this lack of support relate to eg expected benefits of EIA follow-up and its added value in relation to the costs are unclear; EIA follow-up may overlap with other evaluative instruments and activities; the extent to which EIA follow-up can perform all of the potential functions may be less than expected; it may be considered threatening and a burden on both, the proponent of the activity and the authority that had originally given consent; and, external pressure may also be lacking.
- *Uncertainties about benefits and cost-effectiveness* – there seems to be an imbalance between the various 'stick' and 'carrot' factors (enforcement vs incentives). As a consequence, in practice there seems to be an attitude of 'wait and see'. The stick is usually perceptible to practitioners, unlike the carrot, which may be less obvious.

Factors for successful EIA follow-up relate to both, the three stakeholder groups (see section 18.3 and Figure 18.3) and a number of important contextual factors. The context in which EIA follow-up occurs is a function of the interplay of the following four factors (Morrison-Saunders and Arts, 2004a):

- *Regulations and institutional arrangements* that have been put in place. In order for EIA follow-up to be successful, the following issues are important; having a formal requirement for follow-up in the EIA system is an important prerequisite; strong commitment by EIA regulators for follow-up; industry self-regulation tools may fill in gaps; public pressure is an effective driver; quality control in EIA follow-up may be improved through external (independent) bodies.
- *Approaches and techniques* – This relates to such issues as: careful screening and scoping to ensure that follow-up is effective and efficient; making use of existing data and monitoring activities where available; rigorous approaches may be needed, but simple straightforward techniques may be sufficient; flexibility and a mix in approaches to monitoring; approaches need to be in accordance with the local 'culture' for EIA practice.
- *Resources and capacity* – EIA follow-up can easily comprise long periods of time, become complex and require much effort in money, time and staff resources. However, follow-up does not need to be complex and expensive. Important factors for success include: EIA regulators must reserve capacity and budgets; proponents need to be committed to carrying out follow-up (here, contractor agreements may be a relevant instrument); public involvement can be a resource in its own right (local, communal knowledge and feedback on project implementation; local community and stakeholders will welcome becoming involved, provided that they are genuinely consulted; sufficient resources to communicate EIA follow-up findings is essential; education, training and capacity to support follow-up procedures; staff continuity in both, proponent and regulator organisations improves effectiveness.
- *Project type* – the characteristics of the project/plan that has been subject to EIA are important for determining on how to conduct EIA follow-up in a relevant manner. The design of the follow-up needs to consider the project type, relating to issues such as: large/small capital investment; long-term/short-term; private/governmental development; spatial extent; and strategic/operational nature. In addition to controlling functions, informing and learning may be useful for more complex projects. SEA follow-up will be different from project-related EIA follow-up (eg focus on subsequent tiers of decision-making and less directly on tracking detailed environmental changes – see section 18.6).

Figure 18.3: Contextual factors and stakeholder groups for successful EIA follow-up



Source: Morrison-Saunders et al 2003

For enhancing practice, the International Association for Impact Assessment has issued 'International best practice principles for EIA follow-up' (Morrison-Saunders et al 2007). These principles relate to the success factors discussed above. Box 18.2 provides an overview.

Box 18.2: Best practice principles for EIA follow-up

Guiding Principles, relating to core values *(why?):*

- Follow-up is essential to determine EIA (or SEA) outcomes.
- Transparency and openness in EIA follow-up is important.
- EIA should include a commitment to follow-up.

Guiding principles, relating to the nature of EIA follow-up *(what?):*

- Follow-up should be appropriate for the EIA culture and societal context.
- EIA follow-up should consider cumulative effects and sustainability.
- EIA follow-up should be timely, adaptive and action oriented.

Operating principles, relating to roles and responsibilities *(who?):*

- The proponent of change must accept accountability for implementing EIA follow-up.
- Regulators should ensure that EIA is followed up.
- The community should be involved in EIA follow-up.
- All parties should seek to co-operate openly and without prejudice in EIA follow-up.

Operating principles, relating to roles and responsibilities *(how?):*

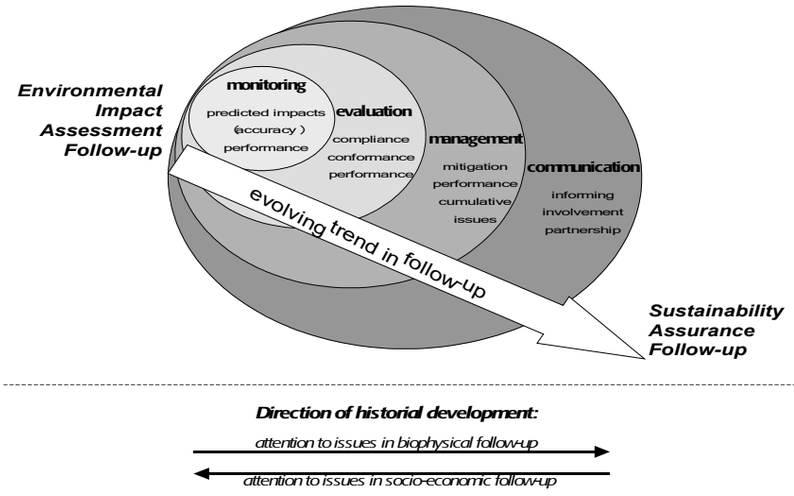
- EIA follow-up should promote continuous learning from experience to improve future practice.
- EIA follow-up should have a clear division of roles, tasks and responsibilities.
- EIA follow-up should be objective-led and goal oriented.
- EIA follow-up should be 'fit-for-purpose'.
- EIA follow-up should include the setting of clear performance criteria.
- EIA follow-up should be sustained over the entire life of the activity.
- Adequate resources should be provided for EIA follow-up.

Source: Morrison-Saunders et al 2007

18.9 FUTURE CHALLENGES

The historical development of EIA follow-up is reflected in the literature on the topic. The issues in EIA follow-up appear to shift from purely technical and scientific to management aspects. Key issues in the early literature on EIA follow-up addressed the accuracy of impact predictions and the quality of the environmental impact statements. These documents were expected to contain testable hypotheses, and monitoring and follow-up focused on predictive accuracy and compliance issues. Later, attention was paid to plan and project implementation, including mitigation and project management. More recently, the focus has widened to include communication issues and the roles and stakes of the various parties involved, as well as resources and capacity building. In addition, more attention is now paid to socio-economic issues (relating to social impact assessment) and follow-up at strategic levels for policy, plan, program SEAs (Morrison-Saunders and Arts, 2005). As a consequence, a move towards follow-up as a means for sustainability assurance might now be happening (see Figure 18.4). In general, there seem to be parallels with the historical development of EIA and the scientific literature in the field of planning and decision-making.

Figure 18.4: Evolving trends in EIA follow-up



Source: Morrison-Saunders and Arts, 2005

In conclusion, there is no single means to achieve successful EA follow-up but it is important:

- to consider contextual factors and the role of different parties;
- to adopt a pragmatic and flexible approach that is objective-led, and focused on the management (re)action potential;
- to use common sense;
- to have clear procedure, tasks and responsibilities in place; and
- to have open communication between stakeholders and an understanding among the stakeholders of each others needs in this process.

Further needs (challenges) for follow-up include:

- development of formal procedures;
- development of guidelines;
- education and capacity building; and
- promotion of continuous improvement through national and international networks; and
- moving beyond project-oriented EIA follow-up, i.e. further development of EIA and SEA follow-up into sustainability insurance.

The latter involves measuring sustainability, which may require new approaches to impact assessment follow-up that are not yet fully clear. It thus provides an ongoing challenge to us all.

Literature and other sources on EIA follow-up

There is a considerable body of international literature on EIA follow-up. This focuses on a range of issues such as:

- definition *of terms, general introductions* e.g.: McCallum (1985, 1987), Munro et al (1986), Tomlinson and Atkinson (1987a, 1987b), Thompson and Wilson (1994), Arts and Nooteboom (1999), IAIA (1999), Arts and Morrison-Saunders (2004b); Morrison-Saunders and Arts (2004a, 2004b), Morrison-Saunders et al (2007), and finally the yearly training course on EIA follow-up at IAIA conferences by A Morrison-Saunders (2007);
- *relevance and rationale,* e.g.: Holling (1978), Bisset (1980), Sadler (1988), Arts (1994), Dipper et al (1998), Arts and Morrison-Saunders (2004a), Marshall (2005);
- proposed *methodologies* for EIA follow-up, e.g.: Marcus (1979), Bailey and Hobbs (1990), Davies and Sadler (1990), UNECE (1990), Bailey et al (1992), Serafin et al (1992), Bass and Herson (1994), EPD (1996), Sippe (1997), World Bank (1997), Arts (1998), Shepherd (1998), Wilson (1998), Baker (2002), Baker (2004);
- evaluating *technical aspects* of the EIA process such as accuracy of predictions and quality of EISs, e.g.: Beanlands and Duinker (1984), Bisset (1984), Canter (1985), Culhane et al (1987), Sadler (1987a, 1987b), Bisset and Tomlinson (1988), Elkin and Smith (1988), Buckley (1991), Lee et al (1994), Barker and Wood (1999);
- relationships with *monitoring* and *environmental management*, e.g. Canter (1993), Glasson (1994), Petts and Eduljee (1994), Au and Sanvicens (1996), Brew and Lee (1996), Sanvicens and Baldwin (1996), Morrison-Saunders and Bailey (1999), Marshall (2001), Marshall et al (2001), Marshall (2004), Morrison-Saunders et al (2004);
- *SEA follow-up* e.g.: Arts and Voogd (1996), Arts (1998), Barth andFuder (2002), Noble (2003), Noble (2004), Partidario and Fischer (2004), Cherp (2005), Hanusch (2005), Marshall and Arts (2005), Partidario and Arts (2005), Gachechiladze (2006), Persson and Nilsson (2006), Cherp et al (forthcoming).
- *approaches and case studies* in follow-up (both developed and developing countries), e.g. Sadler (1987a, 1987b), LEU (1996), Fundingsland (2000), Ross (2000), Arts et al (2001), Morrison-Saunders et al (2001), Ross et al (2001), Hulett and Diab (2002), Marshall (2002), Morrison-Saunders et al (2003), Storey and Jones (2003), AU and Hui (2004), Arts and Meijer (2004), Gallardo and Sanchez (2004), Glasson (2005), Lavallée and André (2005), Lima and Marques (2005), Ortolano and May (2004), Ross (2004), Gachechiladze (2005), Hunsberger et al (2005), Lawe et al (2005), Noble and Storey (2005), Petäjäjärvi (2005), Sanchez and Gallardo (2005), Slinger et al (2005), Storey and Noble (2005), Jha Thakur (2006), for a wealth of EIA follow-up case material see also the tri-lingual (English, French, Spanish) SEFA-site produced in Quebec (Canada) at http://sefa.asp.visard.ca
- *Macro- and meta-level follow-up*, e.g.: Hollick (1986), Ortolano (1987), Devuyst (1994), Sadler (1996), Wood (1995), Arts (1998), Emmelin (1998), Wood (1999), Annendale (2001), IAIA (2002), Wood (2003), Sadler (2004).

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