Best practices for mitigating impacts on biodiversity

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Mitigation of impacts on biodiversity includes

Any sustained action(s) taken to reduce or eliminate adverse effects, whether by controlling the sources of impacts, or the exposure of biological and ecological receptors to them

Mitigation-A problem solving step in EIA framework

Uses the inputs from evaluation stage

- What the problem is ? (developing appropriate strategies)
- When the problem will occur and when it should be addressed ? (ensuring timeliness of corrective measures)
- Where the problem should be addressed ? (for effective mitigation actions)
- Who stands to gain or loss ? (for optimizing overall project benefits)

Mitigation seeks to

- Find better ways to doing things
- Minimize or eliminate negative impacts
- Enhance project benefits
- Protect public and individual rights to compensation

Approaches for mitigation of impacts

Mitigation by avoidance

Choice of options for location, design, process, technology, route and 'no go' to avoid impacts.

Cheap effective form of impact mitigation.

Offers the greatest benefit of avoiding impacts early in the planning cycle.

Mitigation by reduction

To reduce impact or to limit the exposure of receptors to impacts.

Adopted in the progressive phase of the project.

Aims at limiting the severity of impacts and not avoiding them altogether.

Mitigation by remedy

Restorative measures to restore the environmental conditions to original state or to a new equilibrium.

Applicable only towards the end phase of the project

This is 'end of pipe' approach to address adverse impacts of projects

Residual impacts

Compensation

On-sites or off site measures in early and subsequent phases of the project to achieve no net loss.

Opens a window of opportunity for negotiations between developers and decision-makers.

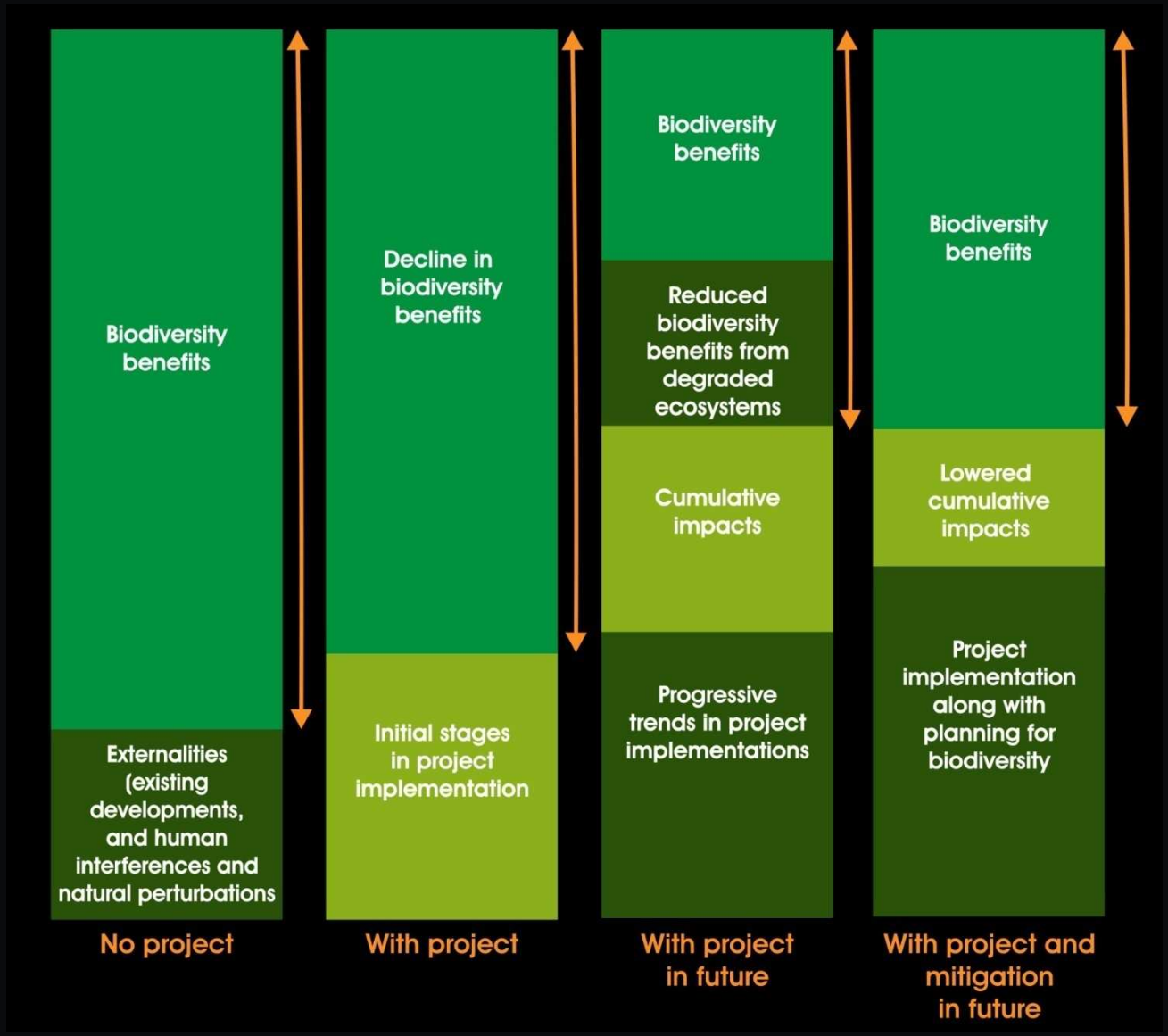
Enhancement

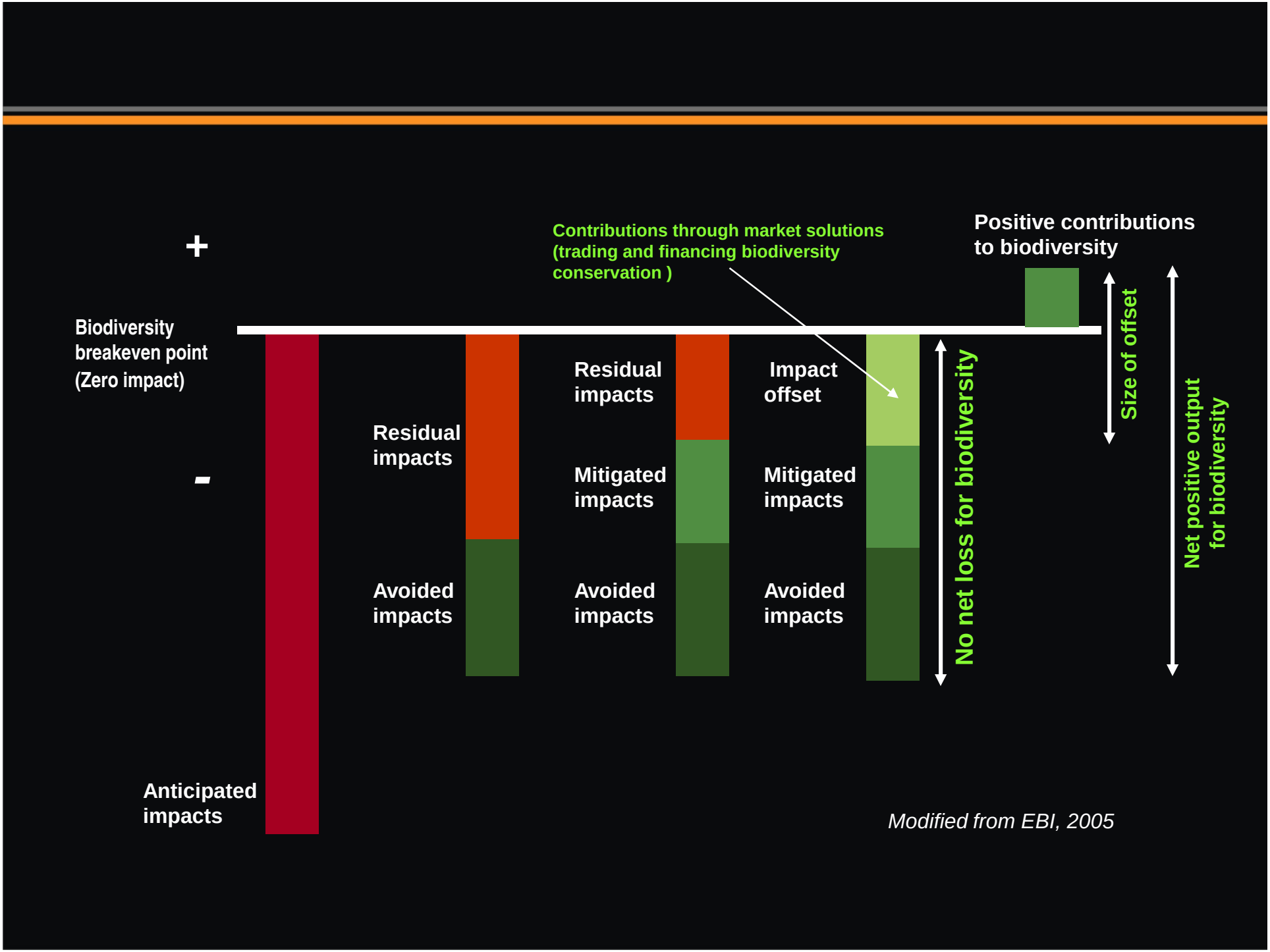
Measures to achieve net positive gain.

Applied with other measures to encourage opportunities to limit the scope and scale of impacts.

This approach may result in a win-win situation

Mitigation should bring about change in biodiversity benefits

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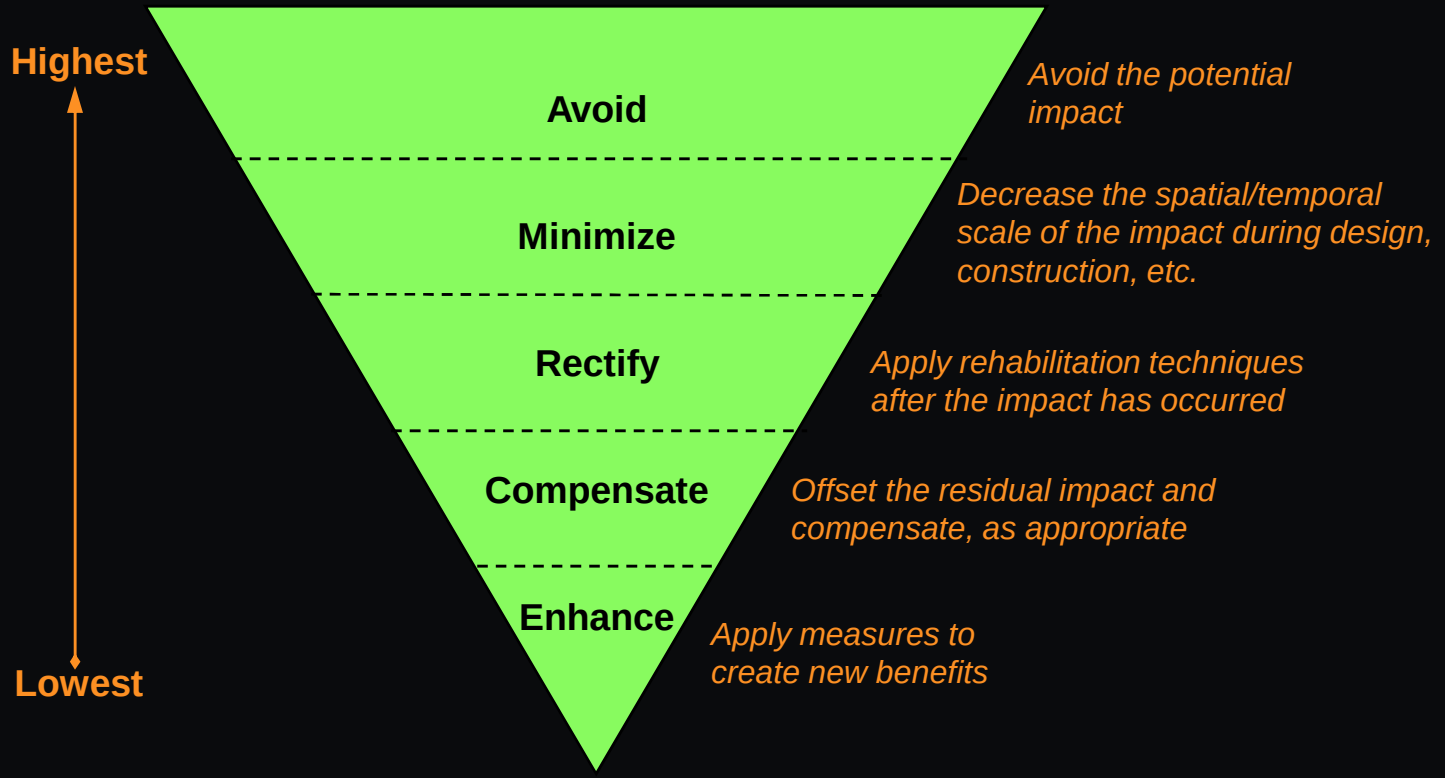
-
Biodiversity breakeven point (Zero impact)
Contributions through market solutions (trading and financing biodiversity conservation)
Positive contributions to biodiversity
Size of offset
Net positive output for biodiversity
No net loss for biodiversity
Anticipated impacts
Residual impacts
Avoided impacts
Residual impacts
Mitigated impacts
Avoided impacts
Impact offset
Mitigated impacts
Avoided impacts
Modified from EBI, 2005

Hierarchy of mitigation measures



(Modified from UNEP 2002 and Rio Tinto, 2004)

Avoidance

- Apply precautionary principle
- Sensitive design
- Siting based on least damage criteria
- Avoidance of disturbance to key areas (e.g. protected habitat)
- Timing of project activities (to avoid nesting, fawning, breeding period)
- Regulatory measures

If the consequences of an action are unknown, but are judged to have some potential for major or irreversible negative consequences, then it is better to avoid that action.

Minimization

- Substitution of techniques using BATNEEC (Best Available Technology Not Entailing Excessive Costs) (prevention of soil erosion, pollution abatement techniques to reduce emissions to the legal limits)

- Promoting bio-friendly technologies

- Controlled or regulated access during construction or operation

contd. ..

- Landscape and urban planning (e.g. design of expressway landscaping to complement natural ecology for extensions of habitats)
- Nature engineering solutions (Wildlife bridges, tunnels, fences and 'ecoducts')
- Modification of a proposal (Realignment of a road sections)
- Alternative choices (wind power as opposed to thermal power)

Rectification

Rescue, relocation, translocation

- Translocation of plant/animal/habitat component
- Removal and storage of top soil for restoration of wetland and terrestrial habitats
- Collection of seeds to ensure a supply of locally adapted native plants (useful practice in restoration of mined out areas)

Repair, reinstatement, restoration

- **Reinstatement of natural habitats**
- **Restoration of hydrological functions** (construction of check dams)
- **Stabilization of river banks** (reconstruction of riparian use by species)
- **Special measure to restore eroded areas**

Reclamation of mining areas

Restoration of mine overburden dumps using geo-textile

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

Adequate and advanced planning for reclamation of overburden dump using bio-engineering techniques

Construction of toe wall and rain water disposal drains

(Source: Singareni Collieries Ltd.)

Innovative strategies for restoration of mine dumps

Pisciculture – in reclaimed pit of Sanquelim mine of Sesa Goa group

Economic benefits to local community

Restoration of hydrological functions

Source: National Mineral Development Corporation, Govt. of India

Use of superior technology over traditional practices

Use of coco filters for arresting silt

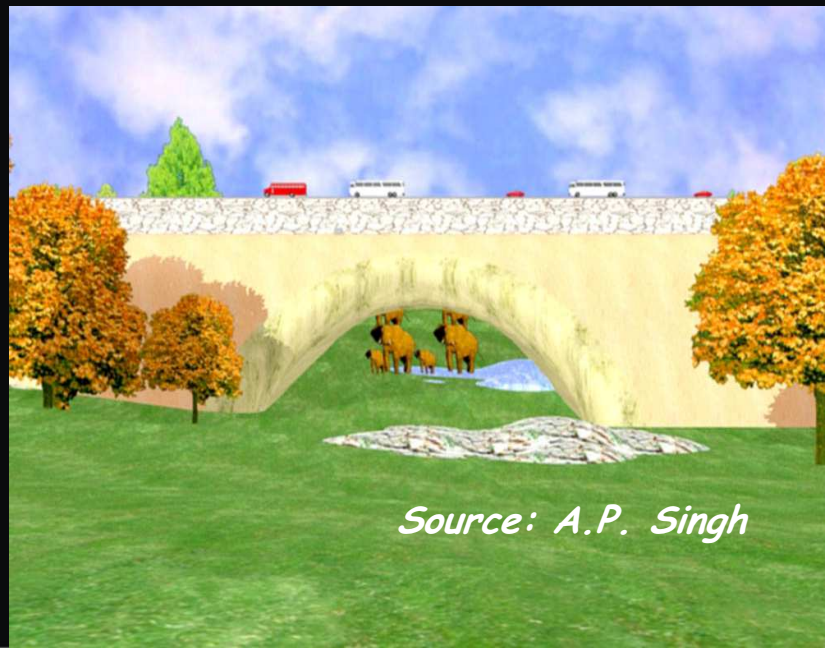
(Source: SVFU, Banglore)

Enhancement and replacement

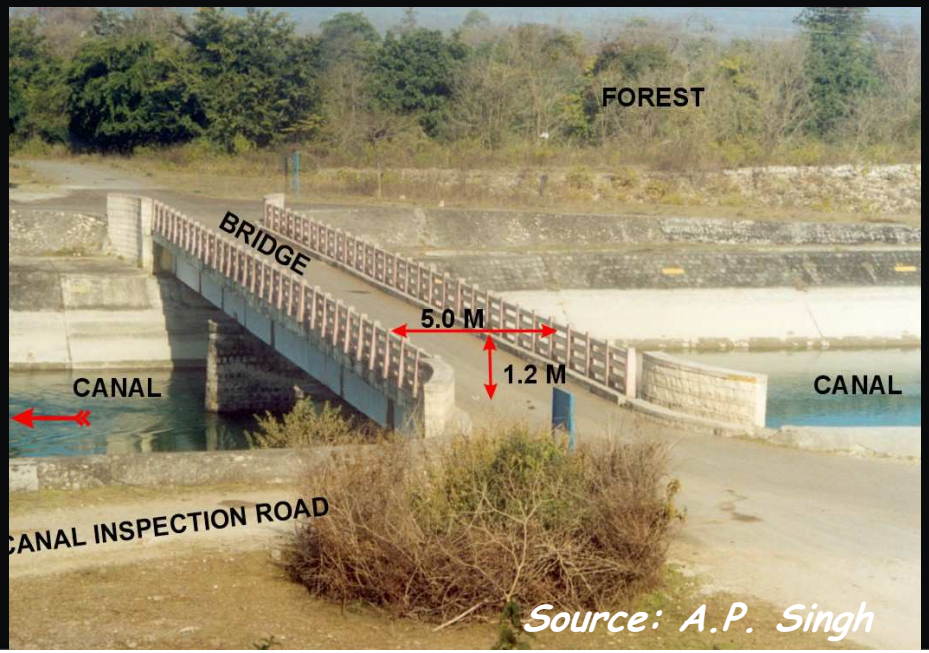
- Enhancing existing degraded habitats and creating additional habitats to mitigate the loss of those removed by the project
- Creating new habitat on alternative sites (re-vegetation of vacant lands, landfills, exposed rocks)
- Alternative substitutes for enhancing habitat use and value (e.g. artificial nests for improving habitat use)

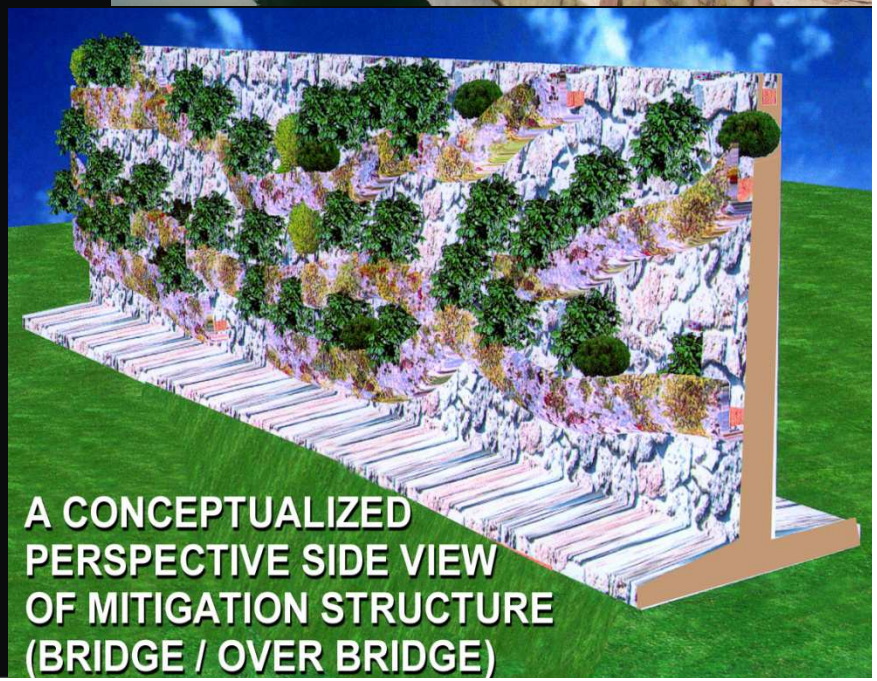
Thank you all…

Sensitive design



Ecologically sensitive design planning





Conservation of Steller's Sea Eagle

Artificial nests and perches

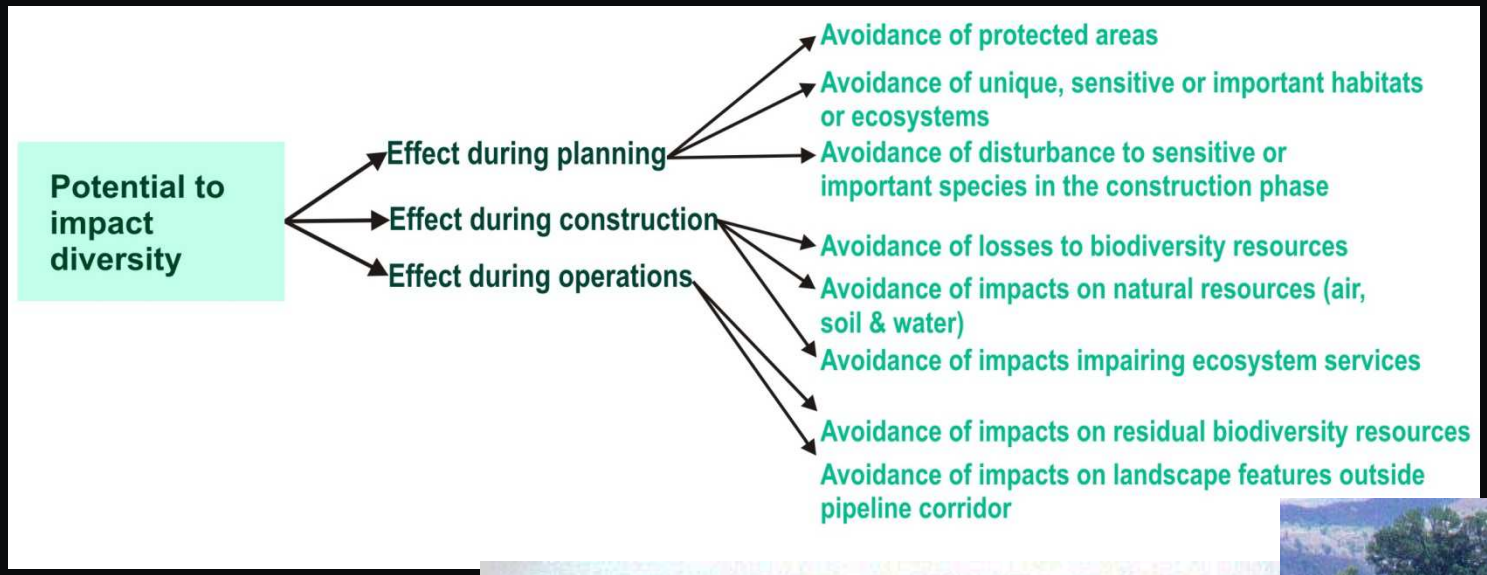
13 new nest and 14 perch sites built to attract sea eagles to new coastal sites away from Sakhalin-1 Project Facilities.

In 2006, Steller's Sea Eagles used an artificial nest for the first time, near the Chayvo well site

Metal sheathing devices have been installed on trees with new and existing nests to discourage bear predation.

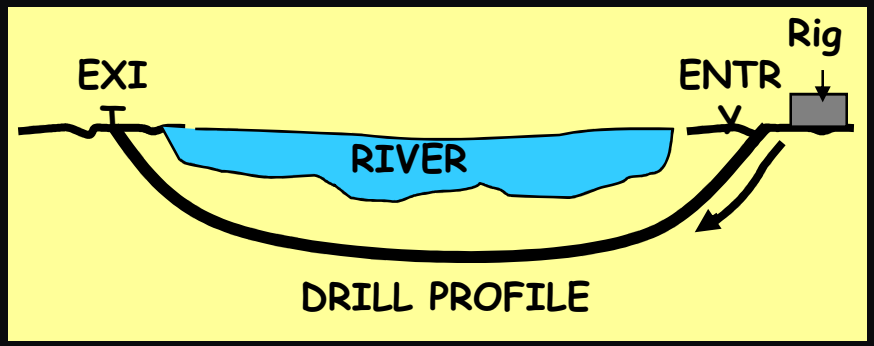
Source: http://www.sakhalin1.com/en/she/envPolicy.asp

Siting options for least damage



Alternative technological options

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



(Source: WII and Bharat Petroleum Corporation Ltd)

Conservation of Gray Whales under Sakhalin-1 Project

- Maintaining a 4-5 km protection zone between the seismic vessel and the gray whales
- Shutting down operations if the whales were present within the protection zone. (Gray whales continued to feed within their historical feeding grounds throughout the seismic survey).
- Supporting research to study the population, behavior and habitat use by the whales, as well as to characterize the natural environment including ambient sound.

http://www.sakhalin1.com/en/she/envPolicy.asp

Timing of project activities

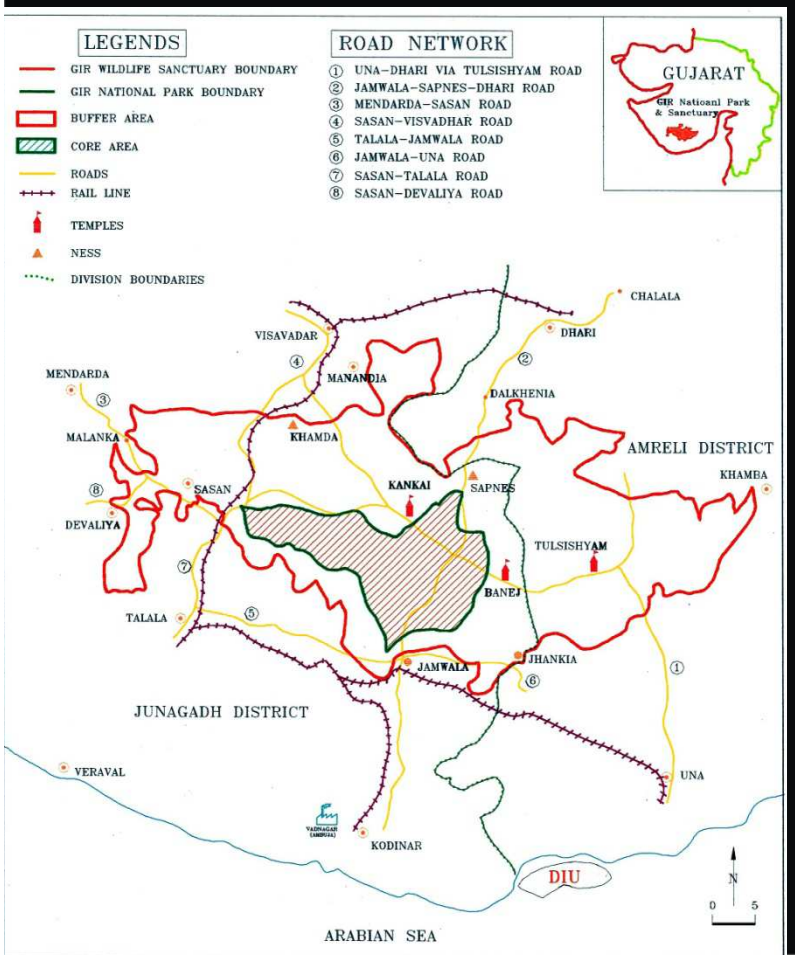
Location of Hazira-Bijapur-Jagdishpur gas pipeline, M.P., India

Avoid nesting, breeding period of Great Indian Bustard

Right of Way management in transportation corridors

Regulating speed

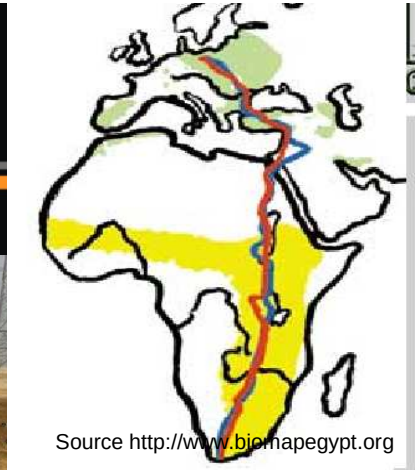
and controlling access

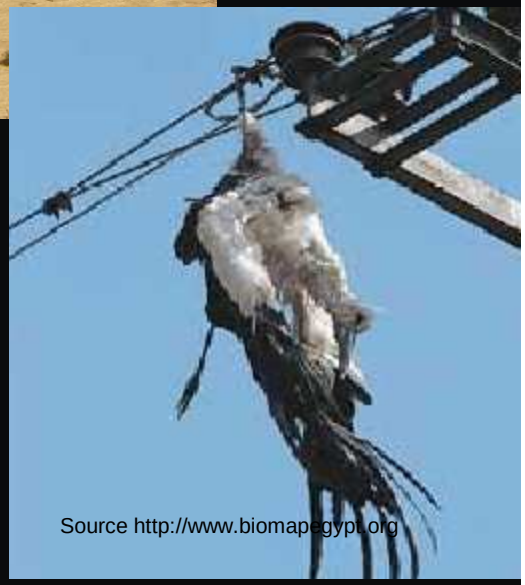


The Kingdom of Saudi Arabia is a home to several thousands of migratory birds that visit during the winter and fly back to their respective home countries for their spring. The possible risks of migration are:

Electrocution

Disease transmission


Source http://www.biomapegypt.org


Source http://www.biomapegypt.org

Strategy to reduce threats to populations

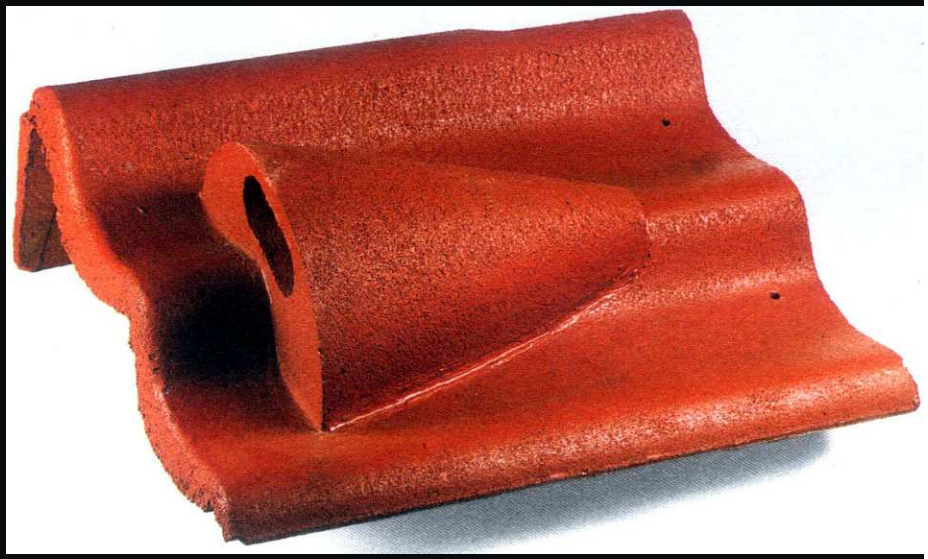
The Ministry of Interior, in cooperation with the NCWCD, regulates the hunting season in the Kingdom.

"The year is divided into eight hunting seasons, six of them aredevoted to birds

Source http://www.biomapegypt.org

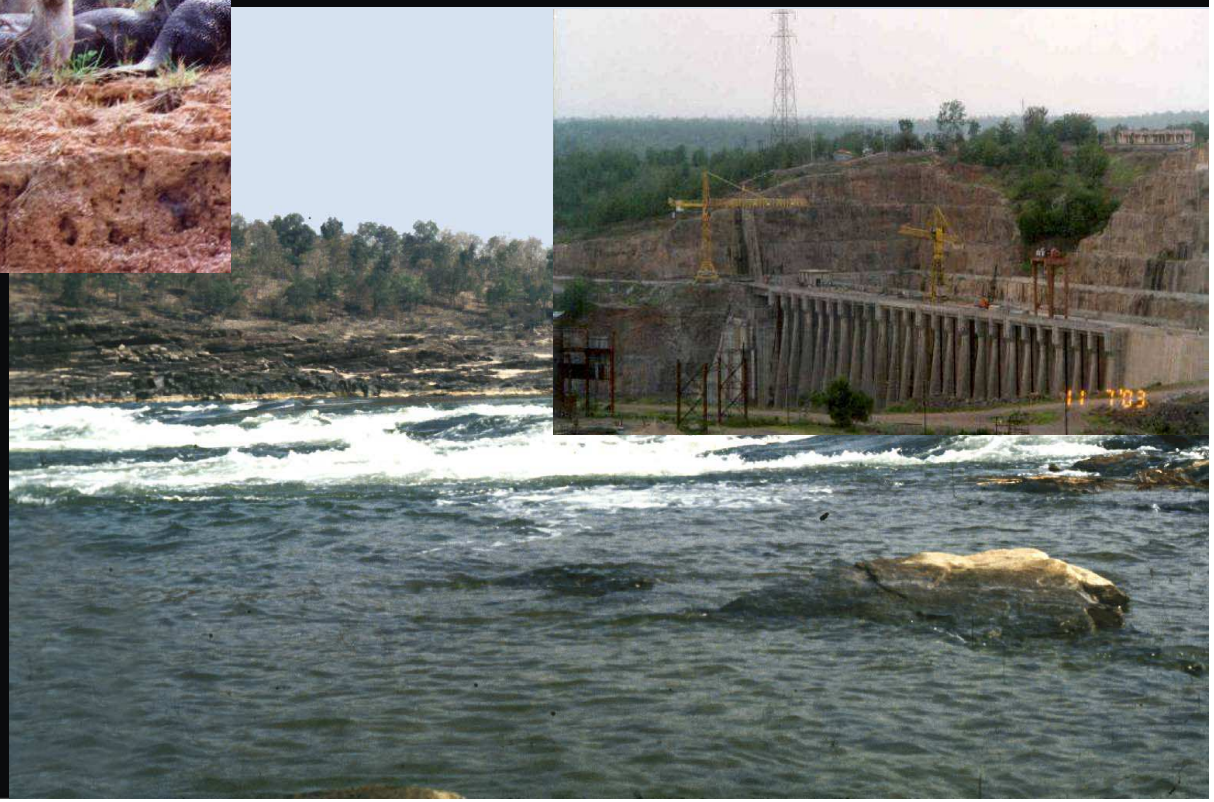
Biodiversity friendly technological options

Design of tiles to allow swift and sparrows to build nests



Design of tiles for protection of bats

(Source: M/s Lafarge)



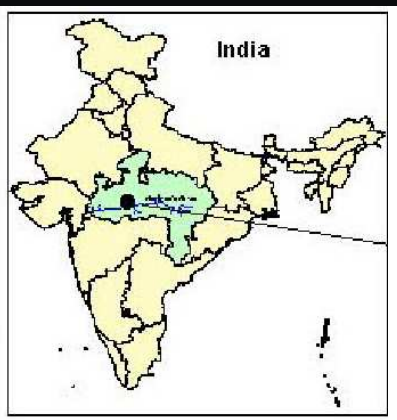
Translocation of Dwarf Chameleons in Durban

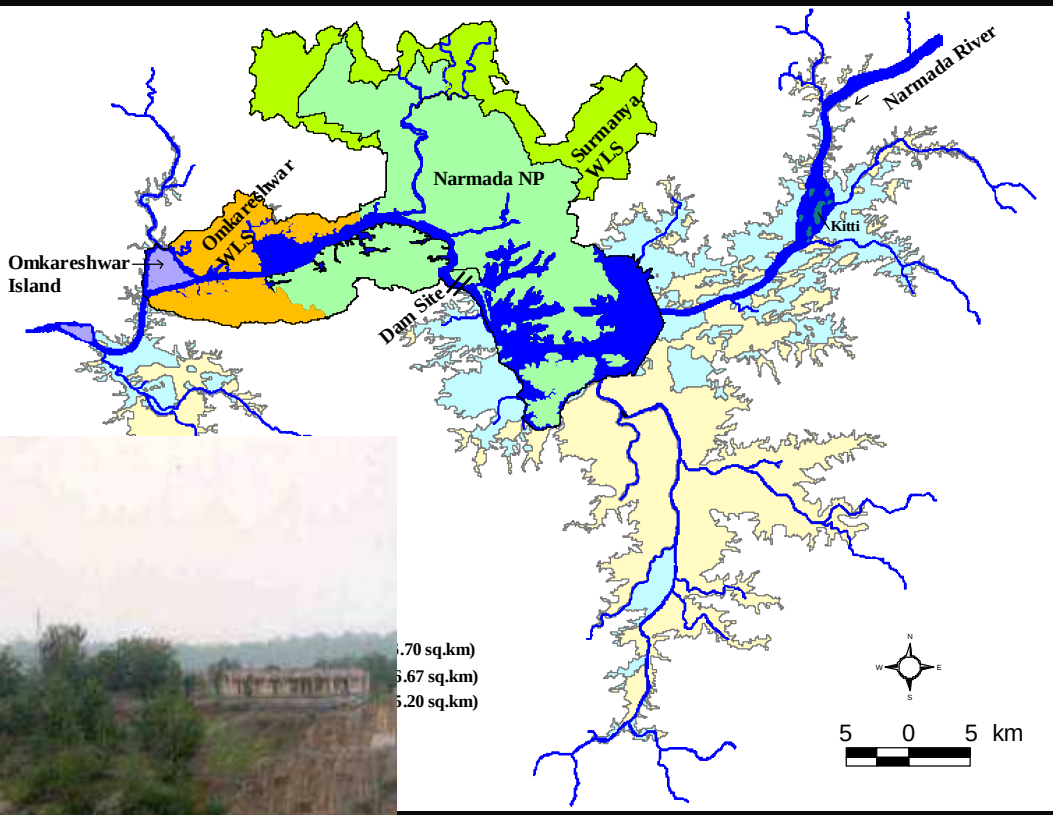
Capture and translocation of dwarf chameleons from the proposed industrial development in Durban

A total of 68 dwarf chameleons (24 adult, 28 sub-adult and 16 juvenile) were translocated as per the *Guidelines for Re-introductions* by the Species Survival Commission of the IUCN.

The developer(Cato Manor Development Association) also provided the funding support for maintenance of the habitat of chameleons in the release site for twelve years

(Source of information and photos: Adrian Armstrong
http://www.kznwildlife.com/export/sites/kzn/content/Downloads/Chameleon.pdf


India


Narmada River
Sirmaniya WLS
Narmada NP
Omkareshwar WLS
Omkareshwar Island
Dam Site
Kitti
.70 sq.km)
6.67 sq.km)
5.20 sq.km)
N
W
E
S
5 0 5 km

BP has three petrochemical plants in Terengganu, Malaysia which is home to about 70 percent of Malaysia's turtles

Sanctuary is an important nesting habitat for three species of marine turtles and the painted terrapin.

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)*

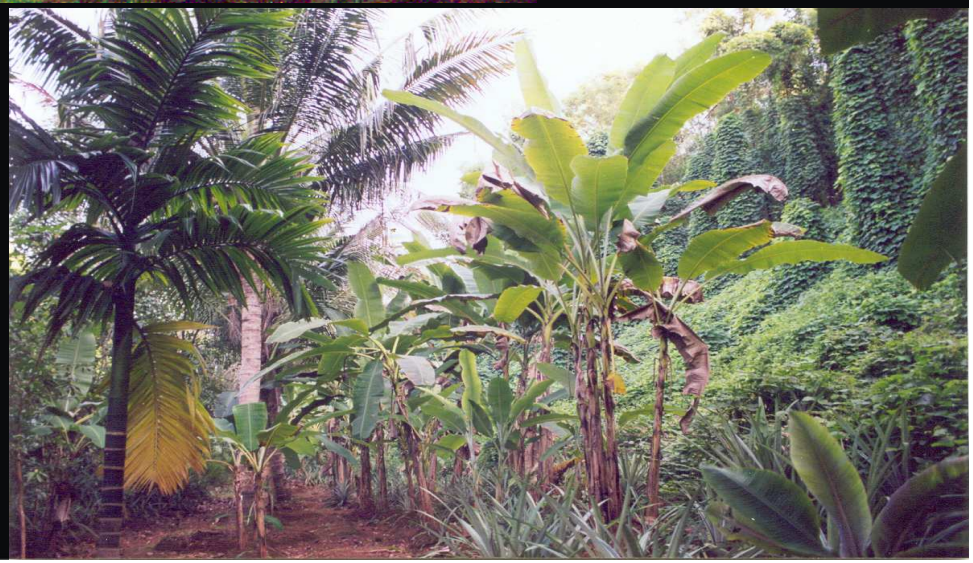
Enhancement

- The Sevenoaks Wildfowl Reserve, situated in the River Darrent in Kent, UK, consisting of several lakes was created in former sand and gravel extraction 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.
- This is an excellent example of compensation that resulted in the enhancement of the site values.
- The site represent the first such conversion of a gravel-pit anywhere in the United Kingdom.

http://www.picturesofengland.com/England/Kent/Sevenoaks/Sevenoaks_Wildfowl_Reserve

Source: http://www.mineralsandnature.org.uk

Collection of seeds to ensure a supply of locally adapted native plants



Landscape planning

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

(Source: Public works department, Government of the Netherlands)

Nature engineering solutions for road related impacts

Source: Public works department, Government of the Netherlands)

Construction of fences and subways for small animal movement

(Source: Public works department, Government of the Netherlands)

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

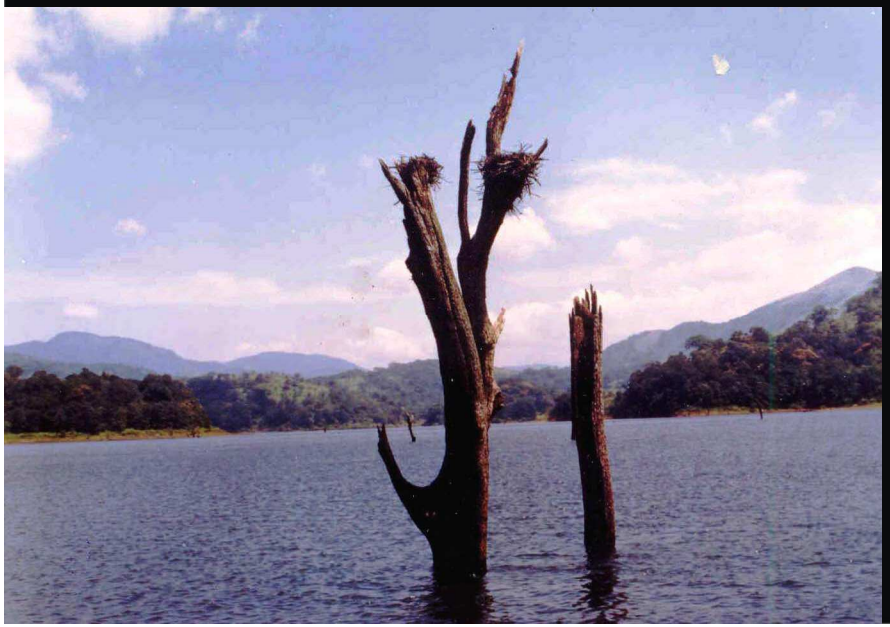
Alternative habitat creation and management

Naturalisation of mine void as a wetland habitat

Creative management of alternative habitats

(Source: M/s Narmada Cement Ltd.)

http://www.americanartifacts.com/smma/per/b11.htm



Reservoir of the
Periyar dam