Figure 10.4: Sample EU checklist for EIA

Aspects of EIA	Checklist Questions Will the project:	Yes	No	Additional Data Needs
Sources of Impacts	1. Require large volumes of construction materials to be taken from local sources (e.g. gravel, rock, water by dredging, quarrying, tapping etc.)?	☑	☐	☐
	2. Result in significant quantities of wastes or eroded material (dependent upon waste type, season of heavy rainfall)?	☑	☐	☐
	3. Require significant levels of accommodation of service amenities to support the workforce during construction (e.g. > 100 manual workers)?	☑	☐	☐
Receptors of Impacts	4. Be routed such that population resettlement or compensation is required?	☐	☐	☑
	5. Be routed through areas that support conservation-worthy ecosystems, flora or fauna (e.g. protected areas, wilderness areas, wetlands, tropical forest, critical habitats, endangered species); or sites of historical or cultural importance?	☑	☐	☐
	6. Be routed across major drainage channels (rivers, canals) or surface water-bodies (lakes, lagoons)?	☑	☐	☐
Environmental Impacts	7. During construction, lead to reductions in the quality of portable water supplies or cause harm to fish and benthic communities due to the situation of water-bodies?	☑	☐	☐
	8. Present a danger to local populations due to a significant scale of traffic, e.g. heavy lorries, high frequency, transport at night)	☑	☐	☐
	9. Create barriers to the movement of conservation-worthy wildlife or livestock?	☑	☐	☐
	10. Lead to a significant increase in congestion and related smog and noise?	☑	☐	☐
	11. Present a pollution risk to portable water supplies, or to surface water bodies that support conservation-worthy or commercially significant fish, due to accidents during the transport of hazardous materials?	☑	☐	☐
	12. Lead to unplanned settlement or access to conservation-worthy ecosystems or natural resources (e.g. agricultural land, timber, minerals, squatter settlements)?	☐	☐	☑
Mitigation Measures	13. Be likely to require mitigation measures that result in the project being socially or financially unacceptable?	☐	☐	☑
Comments	Programme likely to have significant environmental impacts during construction and operation, including increased pollution, habitat destruction, unplanned settlements and hazards to human health and safety.			
	I recommend that the programme by assigned to Category B			
	Signature: Delegation ..... Desk			

Figure 10.5: Reduced matrix for a phosphate mining lease

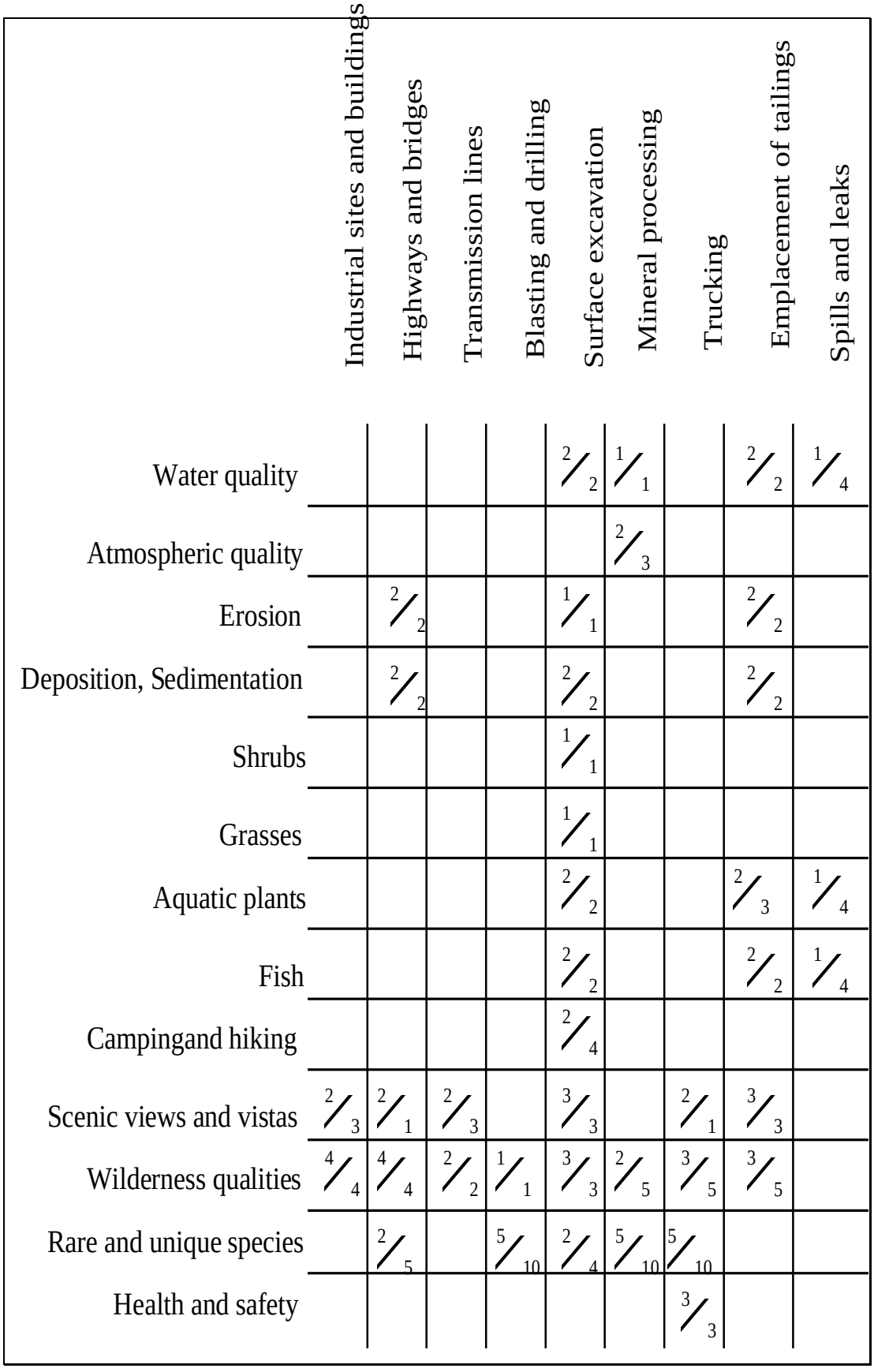
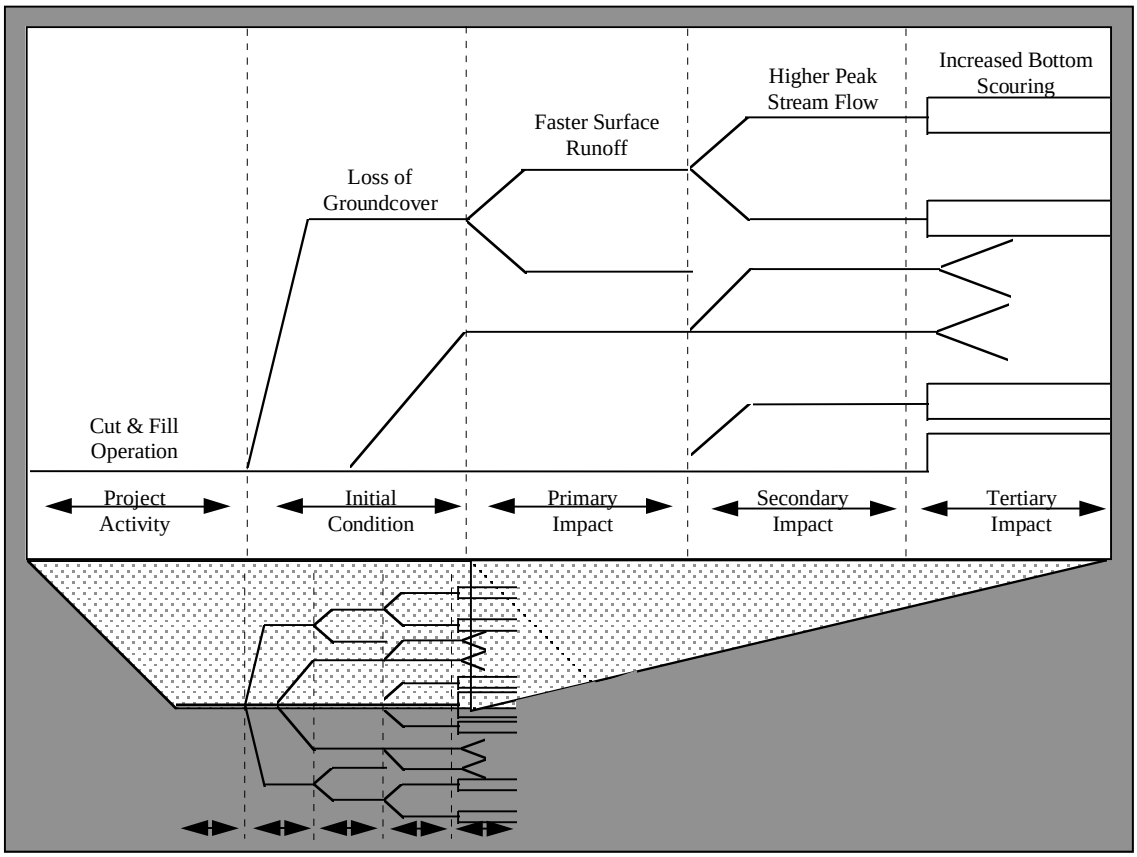


Figure 10.6: EIA network



10.5 SUMMARY

Environmental assessment has a long history at the project level. The EIA of a project plays an important role to include environmental and social impacts. It extends the impacts outside of the project and its time frame. This information forms the base of a new cash flow. Some impacts can be valued. Those that cannot have to be described to allow the decision-makers to consider them in the final comparison of alternatives. A number of useful tools have been developed to assist in carrying out an EIA at the project level including checklists. Screening lists are used to distinguish between projects that have more serious impacts (and thus will require an EIA) and those that do not generally have major impacts. The rational for screening is efficiency and cost-effectiveness. There is little point carrying out a large EIA for a small project that will generate few environmental and/or social impacts. A more recent trend has been to extend EA principles to regional and sectoral levels to capture broader

impacts. Also, EA has been applied to economic policies to show linkages between policy change and the environment.

ANNEXURE 1 – SEA, Sectoral, Regional EA

A. Sectoral EAs with Project Design Impacts

1. Mexico: Second Solid Waste Management (FY94)

This project is designed to improve environmental quality by financing development of a modern system of municipal solid waste management throughout the country. The Bank suggested to the Mexican government that a sectoral EA coupled with project-specific EAs for individual landfills would be the most appropriate and cost-effective approach, allowing for a full overview of the sector in terms of the regulatory and institutional framework as well as targeted impact assessments at particular sites.

In large part, the design of the project grew out of the sectoral EA, which was a fully integrated part of the project identification and preparation process. The EA effectively identified and responded to specific gaps and overlaps in the regulatory and institutional frameworks. It clarified sectoral needs in terms of environmental norms and regulations and institutional strengthening. The sectoral EA was aided by integrated solid waste management plans already developed for seven cities. Eventual design of investment and technical assistance subprojects will be guided by the findings of the sectoral EA and the institutional strengthening activities which were introduced in the project came as a result of the EA work.

2. Bolivia: Proposed Environment, Industry and Mining Project

In the earliest stages of planning for this project it was decided that a sectoral EA should be undertaken covering both mining and industry. This EA effectively became the foundation on which the project is being prepared.

Through its institutional analysis the sectoral EA helped design project components aimed at strengthening environmental management and planning capacity in the two sectors and regulatory and enforcement capacity in the Ministry of Sustainable Development and Environmental Protection. One project component, for example, will establish an operative EA system in Bolivia as well as environmental standards for industry and mining. A series of concrete recommendations were directly related to the environmental problems caused by activities in the two sectors. Recommendations that were incorporated into project design

included: (i) broad policy, legal and institutional reforms and improved environmental legislation; (ii) major mitigation activities in connection with the privatisation of mines and industries; and (iii) river basin environmental management planning in regions particularly affected by mining and industry.

B. Biodiversity Conservation Project in Indonesia: Regional impacts of conservation

This project aims at conserving biological diversity and improving natural resource management and economic opportunities for local communities in and around the Kerinci-Seblat National Park on the island of Sumatra.

A regional EA was prepared to assess the environmental, land use and socio-economic development implications of this project and help design appropriate policy, administrative and fiscal responses from national and local governments. The REA was an integral part of project development from the earliest stages and evaluated the following:

the extent to which the design of the project met GEF criteria and objectives for natural resource and biodiversity conservation;
the potential impacts of adjacent development activities on biodiversity conservation and park integrity; and
the impacts (positive and negative) of the project on adjacent human communities and on opportunities for future economic development.

The REA included detailed baseline surveys of the natural environment and of socio-economic conditions in the project area. These surveys enabled the EA consultants to evaluate the evolving project design and give concrete recommendations in a number of areas. For example, the REA found the park boundaries to be inadequate from a biodiversity conservation perspective, and that a clear commitment from the Government of Indonesia to rationalise the boundaries progressively over a five-year period would be needed.

Perhaps the most important finding of the REA was that current levels of deforestation and land degradation are so high in the area that in order for the project to be viable, immediate and strong measures are required. Logging, agricultural encroachment, mining and road

development are all areas where immediate control and enforcement measures are needed. The REA outlined a number of such measures. The REA also discussed how the proposed project might influence regional development opportunities. It concluded that the project has a low opportunity cost because remaining land areas with biodiversity value have major use limitations. Suitable land for agriculture has already been converted. Further logging and conversion to agriculture and other uses are already causing major erosion problems as remaining forested areas are typically in steep hillside areas. While the project is not likely to make a significant regional economic contribution in the short-term, it might lead to a significant slowing in the degradation of land, water and biological resources. Over the medium to long term, park-based tourism could become an important source of income.

C. Paraguay: Natural Resources Management: Regional EA Feeding Project Design

The primary objective of the project is to promote environmentally sustainable development and natural resource management in the agriculture sector in a major part of the Parana watershed in Paraguay. There has been a huge influx of people to this area over the last 10-15 years, resulting in high rates of deforestation (12.5 percent per year), soil erosion, water contamination, and a deterioration of living conditions among local indigenous people. Administrative capacity in the area is inadequate, especially for proper environmental management, and adequate incentives and regulations to promote sound land use are lacking.

The project was prepared in a bottom-up fashion, with strong emphasis on local, public participation. The various components emerged through discussions of a number of alternatives with local farmers. The project, as it is currently being implemented, promotes: (i) an integrated approach to agricultural development and natural resources protection, using rainfall catchment areas as the basic planning units; (ii) decentralisation of the Ministry of Agriculture; (iii) intensive training of producers and their families in the areas of organisation, resource use, and marketing; and (iv) rehabilitation and realignment of existing roads to reduce soil erosion problems and improve safety.

The project was given a Category A classification because of the existing environmental problems in the region as well as concern with the impacts of the roads component. However, since it was clear that the project was being designed to improve environmental management, it was agreed that the EA, like the project, should be regional in nature and should seek to assess:

(i) whether the various project components would have the positive environmental impacts that were claimed; (ii) whether something more or different could be done to maximise and broaden such impacts; (iii) whether mitigation of "residual" negative impacts could be improved or such impacts avoided altogether; and (iv) whether the proposed institutional (management and monitoring) and policy measures were adequate and, if not, how they might be improved.

The EA was carried out by local consultants and fully met the Bank's requirements. The project incorporated almost all the EA recommendations, including important strategic changes in relation to road rehabilitation and the alignment of new roads, as well as institutional measures. Significant quantities of environmental and social baseline data were gathered by the consultants, including data, which had not previously been available. One particularly important design change was the demarcation of new indigenous protected areas as a result of consultation serving the protection of the Tupi Guarani Indians. This measure will also impede the further destruction of fragile ecosystems.

D. Morocco: Large-Scale Irrigation II Sectoral EA as Part of Sector Planning

The Government of Morocco and the Bank agreed to conduct a sectoral EA as a complementary activity in the preparation of this project. Although a full EA or SEA was not required for the proposed project under OD 4.01, both parties saw the potential added value a SEA could bring to the integration of environmental concerns into the long-term development of the irrigation sector. The investment component of the project, focusing on the rehabilitation of existing irrigation infrastructure, was meanwhile placed in environment screening category "B" and was thus the subject of a field-based environmental review. A joint venture of two French consulting firms, financed with a Japanese grant, was contracted following a competitive selection process. Its task was preparing both the SEA and the environmental review.

The SEA examined the long-term environmental implications of proposed future investments in the sector, evaluated environmental concerns associated with system operation and maintenance, and analysed institutional, legal and regulatory aspects. The SEA proposed an environmental management framework focused on the development of environmental units for irrigation at both the national and district levels. Support for the initial phase of implementation

of the institutional strengthening and training recommended in the SEA was included in the project. The SEA preparation and review process resulted in significantly increased awareness of the diversity and complexity of environmental issues in this sector by Moroccan officials and participants in the study.

The SEA also included recommendations for: (1) the creation of new institutions responsible for policy and strategy formulation, environmental monitoring, and training; and (2) the development of new laws and regulations for improving management and overall performance in the sector. Major technical activities recommended in the SEA included: (1) the protection of watersheds; (2) water use planning; (3) soil conservation; (4) protection of ecologically sensitive habitats and species; (5) public health programs and monitoring; and (6) training and special studies.

A group of Moroccan and foreign environmental specialists, in close liaison with the Ministry of Agriculture and the nine Irrigation Districts, is finalising a detailed Environmental Action Plan, covering policy and strategy for the subsector, legislative updating, institutional streamlining, preparation of training programs, definition of field actions, and monitoring and evaluation. Committees for environmental protection have been created at the regional and central levels to follow up on the Environmental Action Plan.

E. Sectoral EA for Programmatic Projects: Asia Region

Extensive experience with programmatic lending has spurred development of a standard EA approach in the Bank's Asia region, aimed at ensuring a cost-effective consideration of all possible impacts on the environment. The first step is a sectoral EA, which should help establish:

a screening process designed to identify subprojects having potentially significant issues that would need to be addressed in an EA;
a general assessment of the kinds of impacts that might be associated with the different types of subprojects; and

a sectoral environmental action plan aimed at eliminating, minimising or mitigating impacts identified in the sectoral EA, and at providing guidelines for long-term management and monitoring.

Environmental screening of the subprojects is included in the sectoral EA, in two categories:

subprojects that may create a few minor and easily recognisable environmental problems, but no significant ones; and
subprojects with potentially adverse impacts that warrant project-specific EA work.

The first category of subprojects is addressed primarily through the sectoral EA itself, in addition to standard guidelines or codes of practice for different types of subprojects. These guidelines or codes cover areas such as construction practices, site selection, resettlement and compensation, and consultation/participation.

F. India: Haryana Water Resources Consolidation Project

India is currently expanding the agricultural output from irrigated farmland through more efficient operation and maintenance of existing facilities, rather than new systems. A series of Water Resources Consolidation projects (WRCP) prepared by three State Governments and supported by the Bank facilitate this change of direction. The new approach is consistent with the findings of the Bank-prepared Irrigation Sector Review. It was agreed to undertake sectoral EAs for each of them, because: they are programmatic in nature; and the major challenge was not to address the impacts of new construction but those related to existing operations across the sector as a whole. There is an urgent need to improve sector management in order to protect and improve water quality. The state governments need technical advice on how to cope with these challenges at an institutional and policy level, and sectoral EAs were seen as the best way to generate sound advice and help put in place institutional capacity to address environmental concerns related to water resource management.

The project is geared to optimising the use of water within the approximately two million hectares (ha) of cultivable land within the State, through a lining of canals, the extension and lining of watercourses, a rehabilitation of drainage and flood control facilities, and a series of

institutional measures. The sectoral EA analysed the existing environmental situation in Haryana, particularly with regard to water resources. It also reviewed the environmental implications of the WRCP project, and identified the optimum approach for environmental management in the sector.

The analysis of the environmental situation allowed EA consultants to evaluate the WRCP from a broad, sector-wide basis for the State of Haryana as a whole. The impact analysis examined a broad range of potential sector-wide impacts, such as tribal displacement, waterlogging and soil salinity, sedimentation, deteriorating water quality, groundwater depletion, changes in flora and fauna, wildlife disruptions, fisheries impacts, and public health impacts. The EA concluded that the project with its identified types of subprojects was unlikely to have any major negative environmental impacts. On the contrary, it would provide substantial long-term benefits through water conservation and improved efficiency in water use. However, the EA prepared detailed recommendations for the mitigation and avoidance of more minor impacts and for a proper notification of works to local communities.

The institutional recommendations were largely incorporated into the project and directly influenced the reorganisation of the Haryana Irrigation Department (HID). For example, the report's recommendation that an Environmental Affairs Office be established in the Haryana Irrigation Department was incorporated in the SAR. The SAR was also amended to provide more detail about tasks, responsibilities, staffing and training requirements, and budgetary needs and allocations.

G. Estonia: District Heating Rehabilitation Project

The project will support improvements in district heating (DH) systems in Estonia's three largest cities, Tallinn, Tartu and Parnu, and in smaller towns and villages throughout the country. It will reduce fuel costs and import requirements by increasing the use of indigenous peat and wood in heat production. The project also introduces energy conservation and increases efficiency of major DH systems through rehabilitation and introduction of modern technologies.

A sectoral EA was prepared by a team of Swedish and local consultants to evaluate the potential short, medium and long-term environmental impacts, and mitigation, management and monitoring issues associated with the harvesting of peat and wood, and their processing and use as fuels in the DH systems in Estonia. The sectoral EA analysed possible alternative programs for the sector as a whole, including a business-as-usual scenario (i.e., continued reliance on high sulphur heavy fuel oil in the district heating sector); the introduction of more modern boilers and heat distribution networks using imported fuel and modern air pollution control equipment; and a reliance solely on peat or wood fuel. Looking at all the economic, social and environmental factors, the proposed program, which uses a mixture of fuels and technology upgrading, was found to be the best option for the sector. In addition to the sectoral EA, environmental analyses were carried out for various subprojects.

The EA process produced a series of concrete mitigation, monitoring and management recommendations for each of the subprojects, on types of activities within the subprojects, as well as on the policy for the sector as a whole. These were incorporated as parts of the project. Responsibility for implementing these measures rests with the Ministry of Environment in Cupertino with the project implementing organisations. For example, the Ministry of Environment, which administers Estonian natural resources, is responsible for ensuring that most of the harvesting of peat take place in locations which are presently developed or have been previously drained to allow for harvesting, and that harvesting of peat and wood is not conducted in protected or ecologically sensitive areas. The mitigation plan includes a number of technical measures to improve wood and peat harvesting operations and environmental training.

The impact of the sectoral EA and additional environmental reviews on project design was significant, in large part due to the fact that the Ministry of Environment took an active role in the project preparation process, and recommendations of the sectoral EA were used directly in the project design.

H. Ceará Urban Development and Water Resource Management Project: Using Sectoral EA to Assess and Manage Cumulative Impacts within River Basins

This project seeks to strengthen local governments and water resource management in the drought-ridden north-eastern Brazilian State of Ceará. Its specific objectives are to build local government financial management and institutional capacity, and strengthen the state's urban development and water resource management agencies. It also seeks to improve living conditions in selected poor urban neighbourhoods through infrastructure investments; to increase the efficiency of water use through river basin planning and management; and to provide reliable, economic and safe water supply to communities in critical need through investments in water storage, conveyance and distribution infrastructure.

Consistent with the requirements of both Brazilian law and Bank policy, different approaches were taken to the environmental assessment (EA) of the project's two major infrastructure components. All investments under the urban development component, which will not involve significant adverse environmental impacts or any involuntary resettlement, will be submitted to environmental review and the preparation of mitigation plans that must be approved prior to the initiation of civil works, and subsequently monitored by the state environmental agency (SEMACE). The thirty or so medium-sized dams and reservoirs expected to be financed under the water resource management component, however, will each be subject to a full EA, and involve detailed mitigation, management and monitoring plans. As some rural residents will need to be resettled locally due to installation of the new reservoirs, resettlement plans consistent with the requirements of Bank Operational Directive 4.30 will be prepared.

A sectoral environmental assessment is now being carried out to determine the potential cumulative impacts of the water resource investments and to propose any needed mitigation, compensatory and institutional strengthening measures at both the river basin and state-wide levels. All project-specific and sectoral EA activities are being overseen by a newly established environmental management unit within SRH and by SEMACE, which, under Brazilian federal and state law, must review and approve all environmental assessments prior to licensing the construction and operation of new dams and reservoirs. Bank approval of the respective EAs and resettlement plans is a condition of disbursement for each of the subprojects. The basin-level EA studies will be integrated with the broader river basin planning and management work

to be carried out by the recently created state Water Resources Management Company (COGERH).

ANNEXURE 2 EIA for Port of Durban, South Africa: The no-Project Option[6]

Durban Bay provides one of the very few opportunities along the KwaZulu-Natal coast for deepwater berthing facilities for container vessels; an important economic activity of the region as illustrated by the following estimates. A plan was developed to expand the capacity of the port facilities through four phases. One of the major concerns of the port authorities was that by not expanding, Durban could lose shipping and container business to other areas on the coast. The economic benefits of this development were estimated as follows:

- The container terminal development is expected to add R2.0 billion in direct annual local expenditure, and Phase One would account for most to the additional capacity in the first few years of operation;
- At final full capacity of 252,000 TEUs[7], Phase One would generate R327 million in direct annual expenditure, and a further R 727 million in indirect annual expenditure[8];
- The gross benefit of Phase One (excluding costs) is close to R1 billion per year;
- Development of Phase Two depends on Phase One, and this phase is estimated to be worth R163 million in direct and R 360 million in indirect annual expenditure;
- 1,000 jobs would be created annually; and
- The overall development would reduce ship waiting time, the costs of which are usually passed on to the consumer – about R200 million per year in total.

It is clear that the overall economic impact of "losing" Port-related business is significant. These benefits should be considered, however, in the light of the value of Durban Bay as a natural resource, which can be used in a variety of ways. The natural attributes of the Bay however also have significant economic value, but these are not always apparent and hence often too easily ignored. The following estimates give some indication as to the value that might be attached to the "Little Lagoon" area that would be lost if Phase One were implemented as proposed.

[6] From Common Ground Consulting, Cape Town who carried out the study.

[7] TEU can be thought of as a 'standard container unit'; it is an acronym for twenty-foot equivalent unit, a term used to refer to a standard unit of measure of the number of containers. It allows for variations in the size of containers, e.g. a 40 foot container would represent 2 TEUs.

[8] This assumes that every additional TEU generates R 1,300 in direct annual expenditure, and R2,885 per TEU in indirect annual expenditure (Portnet, 1997, *Concept Plan for Discussion*, p. 14).

Loss of the "Little Lagoon" area would curtail boardsailing activities. Fish species, upon which recreational and subsistence anglers depend, could decline. Birdwatchers would lose an area rich in migrant waders. Educators and researchers would lose a rich source of information. Flows of nutrients and nutrient cycling may be disrupted.

An order of magnitude estimate of the value of Durban Bay as a natural resource should is that it would be counted in the tens of millions of Rands – a value illustrative of the fact that the use of the environment is not for free. The order of magnitude is motivated by the consideration of one alternative use of the Bay, namely shore-angling. This activity has been well-studied and data are readily available.

The revenue generated annually by shore-angling in South Africa is R2,407 million per year[9]. Shore-angling is particularly popular in KwaZulu-Natal with the Province gaining 30% - 40% of this revenue, some R722-963 million[10].

Some 60% of the species commonly caught by shore-anglers depend on habitats such as the "Little Lagoon" area as a nursery during their vulnerable juvenile phase. The Biophysical Specialist Team indicated that this habitat is unique in KwaZulu-Natal.

What is unknown is the percentage of the shore-angling catch in KwaZulu-Natal would be lost if the "Little Lagoon" habitat were destroyed. Even if this were as little as 5%, the value would be on the order of tens of millions of Rands[11].

Beyond these values, the Bay provides many valuable services not reflected in the market, yet which are of critical importance to the maintenance of the metropolitan and provincial economies. Although we do not currently pay for important ecological services, such as nutrient cycling and disturbance regulation, we need to invest in maintaining the integrity of the ecosystem in order to sustain the flow of these beneficial services. According to the Green Paper on Coastal Policy, the value of nutrient cycling on the South African coast is R125 billion per year. This suggests that the value of nutrient cycling in Durban Bay would

[9] Shore-angling involved 412 000 people in 1995 and accounted for a value of R1 653 million in that year(M. McGrath *et al.* 1997, *An Economic Valuation of the South African Line Fishery* in **SA Journal of Marine Science** 18: 203-211). The number of anglers grew to 600 000 by 1998 (R. van der Elst, pers.comm.), and the extrapolated value was R2 407 million.

[10] 32% of the membership of the South African Angling Union were based in KZN in 1987; in addition, significant numbers of non-residents use KZN shores on holidays.

[11] R 2 407 million * 0.3 * 0.6 * 0.05 gives R21.66 million each year; using 40% would total R28.88million p.a. The figures are rounded to correspond with the certainty of the estimates made.

be in the billions of Rands per year, depending on the significance weighting of the bay in the national context.

What is clear is that the benefits from container development can not be compared to zero benefits from not having development. Other uses have value, which need to be considered together with those of container handling. This also needs to be considered in the context of the vision for Durban Bay as formulated during the IEM process. Based partly on the EIA's inclusion of rough values for environmental assets at risk, a decision was made to not expand the port facilities, but rather improve existing handling systems and general efficiency. This meant that the Port of Durban could increase its output while protecting the various environmental assets and values in the bay area.

> "To have in Durban, a Bay where all sectors (shipping, tourism, conservation, etc.) and systems (economic, socio-political and natural environmental) co-exist in harmony. To have a Bay where economic development benefits not only national, parastatal and private companies but also local people, and takes place without irreversible detriment to the natural environment." (Decision Document, p.14)

REFERENCES

Therivel, et. al (1992), Strategic Environmental Assessment, London: Earthscan Books

European Union (1993), Environment Manual – Environmental Procedures and Methodology Governing Lome IV Development Co-operation Projects, Brussels

READINGS

World Bank (1995), EA Sourcebook Update: Methods for Identifying and Predicting Environmental Impacts. Washington, D.C.

Jones, G. C and M. Gough. Ecozone: A computer Knowledge Management System for Sensitising Planners to the Environmental Impacts of Projects. Project Appraisal (9): 37-45.

FAO (1994), *Ecozone*. Policy Analysis Division Training Service. Rome, Italy.

Ministry of Mines, Environment and Tourism (1997), 'Environmental impact assessment guidelines', Harare.