The Integration of Biodiversity into National Environmental Assessment Procedures

National Case Studies

Tanzania

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12 TANZANIA

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12.1 Introduction

Tanzania is a "mega-biodiverse" country. Regional variation in habitats and species can best be described in terms of biogeographic divisions (phytochoria) or ecological zones. Whereas the former classification is based purely on plant species distribution, the latter considers both the flora and fauna and their environment (determined by altitude, climate, topography, soils and land use). These two classifications are elaborated below:

12.1.1 Phytochoria of Tanzania

Tanzania is among the African countries with the highest number of phytochoria. Only Zaire and South Africa have more regions, while Angola, Cameroon, Nigeria, and Sudan, (like Tanzania), have five phytochoria each. As a result of this variety, Tanzania (like Zaire and Madagascar) has the highest number (11,000) of plant species in Africa, except South Africa (20,000). However, this biodiversity is not evenly distributed throughout the country, as described below.

The *Afromontane Regions* (known as the "Eastern Arc" Mountains) are particularly distinctive and rich in flora with about 4,000 recorded plant species. Of the 4,000 plant species, 80% are endemic. There are also some 16 endemic genera including the important timber tree *Cephalosphaera* and the African Violet *Saintpaulia.*

The *Somali-Masai Region* is moderately rich with around 2,500 species of flowering plants of which around 50% appear endemic to the region (Stuart *et al.*, 1990).

The *Zambezian Region's* flora is estimated to be around 8,500 species, making it the richest phytochorion with the most diversified flora on the African continent, but with a lower proportion and absolute number of endemics (54%) (Stuart *et al.*, 1990).

The *Zanzibar Inhambane Mosaic* along the east coast is botanically rich, with approx. 3,000 species of flowering plants, of which nearly 40% are endemic to the region.

The *Lake Victoria Region* consists of a mosaic of floristically impoverished variants of the vegetation which is characteristic of the five surrounding phytochoria. Very few of the plant species are endemic and there are probably no endemic plant genera.

12.1.2 Ecological Zones of Tanzania

In terms of ecological differentiation, Tanzania can be divided into six ecological zones (Stuart *et al.*, 1990). The characteristics of the six ecological zones are summarised in Table 1.

Table 1 Characteristics of the Tanzanian ecological zones

Ecological Zone (Area in km^2)	% of total land area	Area within protected areas (%)	Biodiversity quality	Amount of change
Zone I (43,551)	4.6	FR 1196 (2.8) GR 3589 (8.2) NP 431 1.0) TO 5216 (12.0)	Rich in plant sp; poor in endemic plants; Richest zone in birds and butterflies	Heavy human pressure due to cultivation, grazing and fuelwood; More than 20% of forest species lost
Zone II (63,294)	6.7	FR 8136 (12.9) GR 5264 (8.3) TO 13400 (21.2)	Botanically rich, 3000 sp. of which 40% are endemic; Habitat fragmentation threatens species survival	Over 90% of original forest destroyed; Remaining FRs too small to be viable as PAs
Zone III (58,000)	6.1	FR 10,208 (17.6) NP 2,650 (4.6) CA 3,200 (5.5) TO 16,058 (27.7)	Rich in flora, of the 4000 plant species, 80% are endemic; one fifth of tree genera also endemic; Fairly rich in mammal species with low endemism	More than 70% of land outside PAs converted to farmland, grazing or is degraded.
Zone IV (175,161)	18.5	FR 5502 (3.1) GR 7179 (4.1) NP 18903 (10.8) NCA 8136 (4.6) GCA 32903 (18.8) TO 72623 (41.4)	Moderately rich in flora, 2500 species of plants, of which 50% are endemic; rich in mammals species	Extensive areas outside PAs converted to farmland; severe rangeland deterioration due to overstocking; heavy poaching; 2-4 animal species gone extinct
Zone V (73,223)	7.7	FR 700 (1.0) GR 2200 (2.9) GCA 19621 (26.8) NP 4786 (6.5) TO 27307 (37.2)	Moderately rich in flora, 2500 species of plants of which 50% are endemic; rich in mammal species	Extensive areas outside PAs converted to farmland; severe rangeland deterioration due to overstocking; heavy poaching; 2-4 animal species gone extinct
Zone VI (554,677)	58.7	FR 121225 (21.9) GR 80402 (14.5) NP 9907 (1.8) GCA 46901 (8.5) TO 258435 (46.7)	Very rich in flora, 8500 species of plants of which 54% are endemic; famous for fine hardwoods; interesting Itigi Thicket and *Commiphora* woodlands; very rich in fauna but low endemism; about 759 bird species of which 14% are endemic; about 450 species of butterflies	Over 20% of woodland converted to farmland, grazing or degraded; Extensive deforestation for charcoal and woodfuel and overgrazing

Zone I....Moist Forest Mosaic Zone II...Coastal Forest/Thicket
Zone III..Afromontane Forest Zone IV...Acacia-Savanna Grassland
Zone V....Acacia-Commiphora Thornbush Zone VI.Brachystegia-Jubernadia Woodland

12.2 Main threats to biodiversity

The following general threats are identified:

- The highest percentage of terrestrial bio-diversity in Tanzania occurs in protected areas, as such conflicts over bio-diversity value may occur between the mineral sector and the natural resources sector when minerals also occur in these protected areas.
- Unplanned human and Livestock migrations leading to widespread deforestation and overgrazing.
- Rapid growth of rural and urban populations which leads to loss of habitats due to settlement, agriculture, grazing, mining and logging.
- Most bio-diversity hot spots including the Rufiji Delta, Coastal forests and Eastern Arc Mountain catchments remain unprotected and open to wanton destruction.
- Inadequate or lack of inventories of bio-diversity resources in protected areas hence, little knowledge of their bio-diversity potential.
- Inadequate experts in the field of physiology, pathology, anatomy and taxonomy particularly in high learning institutions, this many species disappear unnoticed.
- Not many studies have been done on ecosystems, such as wetlands and coastal forests (especially mangrove) and use of non-traditional mushrooms and medicinal plants.
- There is lack of catalogue and field guides for some plant and animal families.
- Improper execution of the established planning process and regulations in the country.
- There is lack of umbrella environmental legislation.
- Insufficient information on the resource base.
- Inadequate quality control mechanisms.
- Poor interaction between players in community and community related issues and activities.

12.3 National biodiversity strategy and action plan

12.3.1 Development Process and its Adoption at National Government Levels

The NBSAP was formulated on a step-by-step basis guided by the jointly published guidelines for the National Biodiversity Planning by the World Resource Institute, UNEP and IUCN. The planning team also underwent a one-week training on the formulation of a NBSAP.

The Division of Environment in the Vice President's Office (the focal point for the Convention on Biological Diversity) was mandated to establish partnerships with Government sectors and institutions, NGOs, Community leadership as well as industry and business community, with a view to solicit balance and viable inputs for the formulation of the NBSAP. The coordinating mechanism of the NBSAP process was tailored to accommodate consultative and participatory fora.

The Vice President's Office established a National Steering Committee (composed of Permanent Secretaries from relevant institutions) and a Multi-sectoral Technical Committee to co-ordinate the implementation of the process under the assistance of three International Consultants and a National Co-ordinator. The consultants were selected with respect to their expertise in terrestrial biodiversity, acquatic biodiversity and agro-biodiversity. An international consultant was also involved throughout the process through initial training and backstopping.

The process began with a training workshop for the planning team (Technical Committee members, the Co-ordinator and tree consultants), conducted by the international

consultant in March 1998. Sectoral consultations were launched in May 1998, and accomplished coverage of over twenty government and non-governmental sectors and agencies throughout the country by August 1998.

Sectoral consultations paved room for five zonal consultative workshops. These focused on identification and analysis of threats, constraints, challenges and opportunities for conservation and sustainable use of biodiversity with accent to selected fragile areas, which elicit limited coverage by current or previous programmes. The workshops covered the following zonal areas: coastal and marine; arid and semi-arid lands; wetlands; mountaneous and agricultural lands.

The action plan that was developed is meant to address implementation of the strategic choices within the broader categories, thus:
- Policy Issues and International Co-operation
- Planning and Co-ordination
- Education and Information
- Research and Development
- Ecosystems and species conservation and sustainable utilisation
- Biodiversity Monitoring and Evaluation
- Capacity building

12.3.2 Adoption at national government level

In any successful conservation effort it is implicit that regular or continued monitoring be conducted especially to collect information on status of biodiversity, activities and processes which are likely to have adverse impacts on conservation and implementation of the NBSAP. It is therefore recommended that lead and collaborating institutions should perform the role of biodiversity monitoring and impact assessments and liaise with the National Biodiversity Technical Committee on specific tasks or actions. It is, however, the responsibility of the Vice President's Office to oversee the implementation of the strategies and report to the heads of the Government and stakeholders.

It is further recommended that biodiversity information centres at institutional national and regional levels be established to promote acquisition, storage and dissemination of biodiversity information. The approved NBSAP shall be revised after every 5 years following appropriate review and evaluation every three years. Reporting and exchange of information among contracting parties (international level) shall remain as provided under Articles 16, 17 and 26 of the CBD

12.3.3 Progress with implementation of the NBSAP

Introduction

The NBSAP is yet to be adapted by government for implementation in Tanzania. Thus, nothing can be said about the effectiveness of implementation. However, one of the potential constraint for implementing this programme will be the political will and capacity (both financial and human) by the lead and collaborating institutions to perform their roles as proposed by the programme.

In a poor country like Tanzania where financial resources are limiting, environmental issues are not quite a priority, hence the environmental portfolio always receives the least funding priority. Moreover, following the on-going Local Governemt Reform Programme, the management of biodiversity in Tanzania will devolve to the District and local levels. It may be difficult for initiatives such as the NBCSAP initiated at the national level to be effectively implemented at the level of the District and below. This is particularly so because local governments lack adequate legal powers and financial resources. Similarly, although NGO and CBOS may run environmental projects, they lack expertise and financial resources, and thus their full potential has not been realised.

Many sectoral ministries and public agencies participated in the formulation of the NBSAP. However, often times the so-called representatives of ministries or public agencies do not necessarily represent the views of the institutions. As a result, decisions reached are not binding for the institutions concerned. Thus, there is no legal basis binding the collaborating institutions to undertake their responsibilities. A similar experience was observed with the National Environmental Action Plan (NEAP) and the National Conservation Strategy for Sustainable Conservation (NCSSD) (Mwalyosi & Sosovele, 1999)**.**

12.3.4 Main Objectives of the NBSAP

❑ *Policy, Regulatory Issues and International Co-operation:*
- Strengthen and facilitate regional and international collaboration in sustainable exploitation, management and conservation of biodiversity,
- Provide support services including the institutional and legal framework to ensure sustainable utilization and conservation of biodiversity resources,
- Develop mechanism for technological and financial co-operation,
- Develop and strengthen sectoral and cross-sectoral linkages for harmonisation of management and regulatory decisions, affecting biodiversity, and
- Facilitate economic growth through formulation and enforcement of appropriate policies and regulatory services including important assessments for the manaement of biodiversity resources.

❑ *Planning and Co-ordination*
- Develop and strengthen sectoral and cross-sectoral institutional co-ordination for harmonisation of planning and management of biodiversity,
- Ensure national welfare by sustainably increasing output, quality and availability of biodiversity resources,
- Improve community standard of living through equitable sharing of income generated from the sustainable utilisation of biodiversity resources at national and international levels and,
- Promote national biodiversity resources at both national and international markets

- • Establish mechanisms of interaction between district authorities and central Government for the purpose of improving management of aquatic biodiversity.
- ❏ *Education, communication and Information*
    - • Establish and promote appropriate, education and awareness programmes to facilitate proper community participation in conservation and sustainable utilisation of biodiversity resources
    - • Improve availability, accessibility and exchange of information pertaining to sustainable utilisation of biodiversity resources.
    - • Carry out human resources needs assessment and prepare relevant training programmes.
- ❏ *Research and Development*
    - • Establish and promote research and development programmes with a view to building the capacity to efficiently conserve and sustainably use the biodiversity resources and,
    - • Develop and introduce new technologies that increase the productivity of biological resources in various ecosystems including rangelands and agricultural ecosystems.
- ❏ *Ecosystems and species Conservation and Sustainable Utilisation*
    - • Increase production and yield of biological resources for nutritional and socio-economic development,
    - • Protect, regulate and manage biodiversity resources productivity through prevention of habitat destruction, pollution and over-exploitation,
    - • Adopt community participation machinery at all levels of planning, development and management of biological diversity and,
    - • Promote sound utilisation of biotechnology.
- ❏ *Biodiversity Monitoring and Evaluation*
    - • Develop a reliable and sustainable monitoring and evaluation system for sustainable use and conservation of biodiversity resources.
- ❏ *Capacity Building (personnel, institutional, facilities and financial capacities)*
    - • Establish and promote appropriate training programs to build capacity and technological innovations for identification, conservation and sustainable use of biological diversity of the various ecosystems,
    - • Establish and or strengthen research and training institutions for encouraging ex-situ conservation of biological resources within the country.

12.4 The EIA system

12.4.1 Legal and Institutional Issues

Tanzania is in the process of establishing an EA system. Since the first EIA process undertaken in the country in 1980, EIA practice has evolved slowly. The adoption of national EIA policy and legislation, has been even slower, and remains incomplete. Over 50 EIA processes have so far been undertaken in Tanzania. Most of these (69%) have been undertaken to fulfil donor requirements. Generally, EA is not applied to plans or programmes.

Various national environmental policies, such as the National Conservation Strategy for Sustainable Development (NCSSD) and the National Environmental Action Plan (NEAP) have been implemented. All these policies recognise explicitly the need for an effective environmental framework, but lack the necessary legislative backing (see Hitchcock, 1994; IRA/IIED, 1995 for a review of EIA-related policy and legislation).

In recent years, there have been signs of emerging political interest in EIA in the country. In 1995, a Tanzanian delegation signed a communiqué of high level ministers pledging affirmative action to promote EIA as a planning tool (Goodland *et al*, 1995), suggesting a growing commitment to the EIA process. Recently, the President of Tanzania re-affirmed commitment to pledges made at the 1992 UNCED (WCST/IRA/Agenda, 1996). However, lack of resources, expertise, institutional capacity and political commitment continue to present formidable barriers to the implementation of these pledges, including those related to EIA. Most recently an institutional study on this has been commissioned by the Office of the vice President with the support of the World Bank.

National capacity (in terms of expertise and financial resources) to manage and implement environmental assessment has been extremely limited (IRA/IIED, 1995). The institution likely to be responsible for managing the EIA process in Tanzania - the National Environmental Management Council (NEMC), has so far fulfilled an advisory role, since it lacks legal powers for enforcement. This weakness is aggravated by the shortage of relevant expertise and its lack of representation at district and local levels. A government Division of Environment (DoE) was created in 1991 to deal with policy issues on environment in the country. Conflicts between DoE and NEMC due to unclear and overlapping mandates has often worked to the detriment of the environment.

Despite the slow progress at national level, there have been some notable initiatives to incorporate EIA at sub-national level. Thus, the Tanzania National Parks (TANAPA) policies now require the preparation of an EIA for all developments and activities within and adjacent to the national park boundaries (TANAPA, 1994). The policy includes all development activities proposed within national parks by TANAPA, as well as other government agencies and private sector proponents. EIA is also being extended to cover the General Management Plans currently being prepared for each national park. Recently, a programatic Environmental assessment of TANAPA roads was prepared.

Also, the Tanzania Wildlife Policy requires all 'significant' development proposals within Tanzania's protected areas to be subjected to EIA (Department of Wildlife, 1996). The Ngorongoro Conservation Area Authority has a similar policy. Note that these are policies not supported by legislation. The national; power agency -TANESCO have made EIA mandatory for all power generation projects and for the construction of transmission lines. A number of sectoral policies, such as those for tourism, land and energy, advocate the use of EIA in project planning. Some development legislation, such as the Mining Act (1979) also requires proponents to take account of environmental and social issues. However, neither policies nor legislative provisions are supported by guidelines, and the limited compliance.

12.4.2 National EIA Guidelines .

Draft national EIA guidelines envisage the formulation of an EIA Law. They also propose the establishment of a national Environmental Regulatory Body (ERB) which will oversee Environmental Units (EUs) at district and sectoral levels. The ERB and EUs would be responsible for screening projects and the review of EIA reports. The ERB will also be consulted during scoping, although this will be the responsibility of the proponent. ERB will also be responsible for approving terms of reference prepared after scoping. Reporting guidelines will follow standard procedures used in other countries, particularly those of the Republic of South Africa and those prepared by the Tanzanian National Parks.

In Tanzania, draft EIA guidelines propose the establishment of a cross-sectoral Technical Review Committee (TRC) to be composed of members from sectors responsible for

environment and resource management, sectors which are currently the focus for investment and relevant research institutions. Depending on the complexity and scope of the project, and independent review panel may be formed The public is notified of the EIS and requested to present their views and comments and these are collated by the EIA agency for the TRC consideration.

In a context where environmental awareness is low, and corruption and the abuse of power is pervasive, a clear legislative framework provides the only realistic option for making EIA effective. Legislation would also strengthen the government's resolve to enhance the attention given to environmental considerations in the decision-making process, a pledge recently made by Tanzania's President.

Unfortunately, disagreements between government departments have so far prevented progress on these key institutional and legal issues, and in the meantime, EIA will have to rely on administrative provisions, such as those contained within the National Conservation Strategy for Sustainable Development (NCSSD), and the National Environment Action Plan (NEAP).

12.4.3 Practical Experience of EIA

The first 'formal' EIA process in Tanzania was undertaken for the Stiegle's Gorge Power and Flood Control Project undertaken in 1980 (RUBADA, 1980). There is no documented list of EIAs so far undertaken in Tanzania. Mwalyosi & Hughes (1998) identified over 40 documents described or purporting to be environmental assessments. Of these, only 26 were considered to be 'genuine' EIAs. Since 1998 more EIAs have been undertaken mainly related to the transportation, energy and mining sectors.

12.4.4 EIA implementation

Interviews and meetings with a broad range of stakeholder as well as review of EIA statements and detailed case study review in Tanzania (Mwalyosi & Hughes, 1989) gave the following results:

❑ *Legal and Institutional Issues*
  - Most government agencies support the introduction of EIA legislation
  - Reluctance to adopt EIA is still prevalent within the private sector
  - There is a need to adapt EIA to the national context
❑ *The EIA Process*
  - EIA processes in Tanzania have been output-oriented
  - EIA processes are initiated too late in the project cycle to influence project design
  - EIA processes generally finish 'too early'
  - EIA processes do not include comprehensive biodiversity assessment
  - EIAs are generally undertaken as 'stand alone' processes, thus learning opportunities have been missed
  - Integration between EIA and project design has been minimal in Tanzania
  - EIA expertise is frequently inappropriate to the types of project being assessed
  - Foreign expertise dominates the environmental assessment industry in Tanzania
❑ *Public Involvement and Ownership of the EIA Process*
  - Strong consensus exists that stakeholder involvement should be central to EIA practice Little attention is given to involving local people
  - Little attention is given to involving other stakeholder groups
    Inadequate scoping, ToR and time availability constrain public involvement
  - Widespread misconceptions exist that EIA documentation is 'confidential'
  - Non-governmental organisations are distrusted by the private sector and parts of central government.
  - Local stakeholder involvement in compliance monitoring has not been encouraged
❑ *EIA Review*
  - EIA review is *ad hoc* or non-existent in Tanzania.
  - There is seldom feedback from government regulatory or donor agencies of draft EISs
  - Responsibilities for undertaking EIA review at government level is poorly defined
  - There is chronic lack of expertise and resources for review
❑ *Monitoring and Audit*
  - Post-completion follow-up is almost non-existent in Tanzania
  - Compliance is unenforceable in the absence of legislation, inadequate law enforcers and lack of motivation to motivate as well as rampant corruption.
❑ *Use of Tanzanian Expertise*
  - The use of national (Tanzanian) expertise can bring long term benefits to EIA
  - Training a professional cadre of Tanzanian EIA professionals is needed urgently
  - Mechanisms are required to enhance and maintain quality control amongst consultants
❑ *'Cost/Benefit' Perceptions of EIA*
  - EIA is sometimes perceived as impeding development

- • EIA can help to avoid environmental damage and costs
- ❑ *Balance*
  - • EIA practice is perceived as being biased against development
  - • Donor EIA guidelines are perceived as inappropriate to national needs
  - • Commissioning and review procedures would improve the balance of EISs
- ❑ *The Quality of EIS for Decision-Making*
  - • Early commissioning of EIA leads to greater influence over project design
  - • Proponents rarely accept the findings of EIS
  - • In general, EIAs are descriptively strong, but analytically weak
  - • Key components of many EIAs are weak or missing
  - • Most EISs are balanced in nature, where bias occurred in presentation, it generally favoured the proponent.
  - • None of the EISs looked at cumulative impacts, even where these proved to have a direct impact on project performance. e.g. Pangani
  - • Compliance issues were often unclear in the statements, poorly presented statements can obscure findings, recommendations and commitment to compliance.

12.5 Biodiversity and EIA

12.5.1 Screening

Potential impacts on biodiversity are rarely taken into account during screening. However, the proposed methods for screening EIAs in Tanzania (see NEMC,199.**check guidelines**) include determination of environmental sensitivity of the area in question. Accordingly, one way for determining environmental sensitivity is to determine the importance of the individual components (or characteristics) of the area in terms of its subjective and objective values. The proposed criteria to aid identification of environmentally sensitive areas include biological diversity of communities, rarity values and provision of habitat for rare and endangered species. Implementation of these screening guidelines requires highly specialised expertise which is very limited or lacking in the national agencies responsible for screening. Thus, biodiversity data and their quality are not useful for decision-making. Thus, for example, despite the knowledge that the Lower Kihansi Hydropower Project (LKHP) would be located in the Eastern Arc Forests well known for their species endemism and rarity, the project EIA did not evaluate the sensitivity of the area in order to provide the critical information for decision-making. The EIA missed the recently discovered Kihansi Spray Toad (*Nectophronoides asperginis*) in the Kihansi Gorge. No lists of protected species, lists of threatened species, locations of habitats or species protected under NBSAP (see biodiversity of Udzungwa Mts)

12.5.2 Scoping

TORs rarely include assessment of impacts on biodiversity. When they do, they do so indirectly by requiring assessment of biological/ecological impacts which are usually limited to consideration of large animals and plants. Thus, at least only the ecosystem and species diversity level is usually considered. Usually, ToR requiring assessment of impacts on biodiversity are usually those for projects planned in protected areas where authorities are more keen on environmental issues (see IFC, 2000; Norconsult, 1996).

Tanzania's draft EIA guidelines (NEMC, 1998) includes a checklist of environmental characteristics which have to be considered for any project EIA. The checklist includes rare and endangered species, diversity of communities, animal and ecological functioning

of natural systems. However, it is difficult to set EIA study limits to 'capture' biodiversity impacts because of the detailed nature of biodiversity assessment, which requires more time, expertise and financial resources which are usually all limiting in traditional EIA.

12.5.3 Impact prediction

No deliberate efforts are usually taken to undertake field studies to collect biodiversity data. The little biodiversity data that is usually collected is limited to ecosystem level and species of large plants and animals. As such, biodiversity impacts are rarely identified. As pointed out above, the intensity of study and level of detail of biodiversity assessment is influenced by biodiversity importance of the area in question. Thus, in the absence of reliable data (e.g. rainfall and micro-climatic), the EIA of the LKHP, no definite and objective conclusion could be made on the actual impacts of the project on biodiversity.

12.5.4 Evaluation

In the absence of legal and procedural requirements for inclusion of biodiversity assessment in EIA processes, issues and impacts related to biodiversity are usually skipped or ignored and are thus not considered during mitigation, impact evaluation and review. However, where major impacts on biodiversity have been identified, sometimes mitigation measures are recommended, but not necessarily implemented. Thus, having admitted that data was inadequate to make conclusive statements on the impacts of LKHP on biodiversity values of the Kihansi Gorge, a number of mitigation measures (such as collection of additional baseline data, on biodiversity, detailed micro-climatic data; review of institutional arrangements for the project; granting of formal water rights; development of a catchment management plan) were recommended and have been largely undertaken. Similarly, the ESIA of the Boundary Hill Project recommended several mitigation measure to protect biodiversity in the area in question. The commitment by the project proponent to implement these mitigation measures constitute conditionalities for getting IFC loan for the project.

To-date, no formal review procedure exists in Tanzania, although draft guidelines (for procedure and criteria) for review have been prepared by the National Management Council (NEMC, 1998). Until these are legalised, EIA review will remain ad-hoc. Thus, any review recommendations, may not be respected. Review of biodiversity coverage in EIA is more specialised and hence requires specialised expertise which may be currently lacking or inadequate.

12.5.5 Decision-Making

Biodiversity issues are always over-ridden by economic factors. The LKHP is a typical case. Complains from TANESCO managing hydropower generation in the country as well as very senior government officials have openly complained about the donors and environmentalists caring more about the rare Kihansi Spray Toad against the economic advantages of generating 180 MW of electricity from the LKHP plant. An article in the East African News paper carried out statements such as,"…..TANESCO officials say the LKHP has been generating below capacity because of water being used to spray over the toad's habitat". In another statement reporting on the question of 'why the issue was kept under wraps?', the TANESCO Director of projects told the East African "how can you tell a Tanzanian that a one inch toad has prevented TANESCO from generating adequate power? No body will appreciate the problem".

On the positive side, there are a few cases where projects have been disallowed to proceed largely on biodiversity grounds. Thus, it has been impossible to allow major road

improvement between Makuyuni and Musoma through the Serengeti National Park and Ngorongoro Conservation Area on the grounds that the two protected areas are World Heritage Sites. An alternative access has had to be considered outside these two Protected areas.

12.5.6 Monitoring and post-project audit

Biodiversity issues usually not taken on board easily manifest themselves during post project or post-EIA. There are cases where biodiversity monitoring has been recommended. Thus, the LKHP environmental assessment study recommended several monitoring issues as an essential and fundamental component of the impact mitigation strategy. Examples include establishment of permanent sample plots and transects to monitor possible long term changes in the Kihansi Gorge. These activities are being implemented.

12.6 Illustrative examples or case studies

12.6.1 The Lower Kihansi Hydropower Project

❑ *Background*

This was an Initial Environmental Impact Study undertaken at the request of the Tanzania Electric Supply Company Limited (TANESCO). The study was undertaken to identify the anticipated adverse impacts of project construction and operation on the local environment, and to establish the baseline conditions of the project area human and natural environment so that the project impacts could be measured.

The project had an initial capacity of 180 MW and a planned ultimate capacity of 300 MW. The project has little storage (1000 m^3), with mostly underground waterways and an underground powerhouse. The water diverted through the turbines will be returned to the Kihansi River, approximately 855 m below the diversion point.

❏ *The EIA Process*

The EIA was preliminary in nature, and was undertaken after the power project had already reached advanced stages (for example, construction had already been initiated). Thus, some of the activities normally carried out as part of the EIA (e.g. identification and evaluation of alternatives; public involvement and; economic/financial project and mitigation/ compensation cost analyses), were not undertaken.

The EIA concentrated on baseline studies within the Direct Impact Zone (DIZ) – the area which will experience the greatest and most focused impacts of the project construction and operation. This area covered approximately 5,500 ha. Thus, the original data collected for establishment of baseline conditions is almost exclusively from the area adjacent to the major civil works activity.

The baseline studies were organised along the categories of public health and geology/hydrology/water quality. Terrestrial ecology studies included issues related to mammalian wildlife, entomology, ornithology, botany and herpetology. The studies involved at least one, and sometimes several, project site visits with field-work in the dry and wet seasons. The socio-economic and cultural studies have included specialist studies of the sociology, economics and archaeological aspects of the project. The aquatic ecology studies focused on fisheries while public health studies considered malaria, onchocerciasis and other disease vectors. Generally, every specialised team worked independently of each other. The sectoral reports were later integrated into one EIS.

❏ *Key Biodiversity Issues*

The Government of Tanzania is committed to certain procedures and actions in connection with the Convention on Biological Diversity, in addition to its own domestic regulations and laws regarding the conservation of the natural environment. Because one of the objectives is to preserve the biodiversity and natural ecology of the Kihansi Gorge to the degree possible, while another is to maximise the benefits (production) of LKHP, some trade-offs had to be worked out.

The Kihansi Gorge is part of one of the Eastern Arc Forests, which are of global and national importance for biodiversity conservation (Lovett & Wasser, 1993). The forests are important in terms of their degree of endemism and wide variety of flora and fauna found there. The Eastern Arc Forests are particularly vulnerable due to the fragmented nature and relatively small size of forest patches in which they now remain.

The EIA yielded useful information on biodiversity (several species and subspecies) and endemism as part of the baseline survey. For example, several species identified in the project area are classified as 'threatened' or 'endangered' by the IUCN or WWF. Other species and subspecies observed are yet to be identified because of the lack of studies to date in the ecosystems of this type in which the project is located.

The Kihansi River below the Kihansi Falls has significant fish life in terms of species variety, biomass and local economic and nutritional significance. Kihansi Falls is an impassable barrier for fish, so that there is no fish migration between the upper project area and the lower project area. The first life above the project location is relatively sparse, in terms of species variety, biomass, economic and nutritional significance.

❏ *Technical Issues*

The EIA concentrated on baseline studies within the Direct Impact Zone (DIZ) – the area which will experience the greatest and most focused impacts of the project construction and operation. This area covered approximately 5,500 ha. Thus, the original data

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The EIA was preliminary in nature, as it was undertaken after the power project had already reached advanced stages (for example, construction had already been initiated). Thus, some of the activities normally carried out as part of the EIA (e.g. identification and evaluation of alternatives; public involvement and; economic/financial project and mitigation/compensation cost analyses), would be unlikely to be completed in time to provide information to decision-makers. Had these elements been studies at an earlier stage of the project cycle the project could have been substantially altered.

The EIA identified direct impact of project operation on the natural environment to be the manner in which the project would be operated for peaking purposes, maintenance of reservoir level and continuous power production and the bypass flow. However, no attempt was made to assess the impact of a change in the flow over Kihansi Falls and through the Kihansi Gorge on the aquatic, riparian and adjacent ecology of the area surrounding Kihansi Falls, hence the study did not specify the necessary bypass flows required, or the necessary bypass flow characteristics to maintain the Kihansi Gorge ecosystem.

❑ *Lessons Learnt*

The EIA was commissioned too late in the project cycle for the results to change project designs or build in the project implementation process relevant mitigation measures. Under these circumstances, the EIA was only useful as a rubber-stamp to obtain funding for the project.

Following the commissioning of the LKHP project, most of the water over the Kihansi Falls is now diverted from the Kihansi Gorge. This has resulted in extensive changes in the ecology of the Kihansi Gorge, especially the spray wetlands an important habitat for the recently discovered Kihansi Spray Toad which is threatened by extinction. In order to minimize this impact, TANESCO may be forced to operate the power project below the installed capacity so as to maintain some bypass flow along the Kihansi Gorge.

The Government of Tanzania is now negotiating a major financial package that will help (i) implementing the captive breeding programme for the toad for 'safekeeping' of the species; (ii) develop rapidly a full-scale artificial spray system considered likely to help the Kihansi spray toad's habitat to re-expand to its original size; (iii) continue the search for the toad outside the Kihansi Gorge. Moreover, TANASCO will be expected to commit itself to maintaining the existing bypass flow of a minimum 1.5 to 1.9 m^3/s, and forfeit …MW of electicity.

TANESCO applied for a Provisional Water Right to dam and abstract 41.5 m^3/s of water from the Kihansi River. The Provisional Water Right was granted in November 1996 and expired in December 1997. Since then TANESCO has been operating the LKHP without a final water right. The Rufiji Basin Water Office should have established the LKHP operating rules and criteria which would form conditions for the final LKHP water right, the legal basis of which TANESCO is permitted to divert water. This points to the lack of comprehensive water policy and clear environmental policy and institutional framework in the country.

12.6.2 Environmental and Social Impact Study for the Boundary Hill Lodge Project

❑ *Background*

The project involves construction of a 16-bed lodge at Boundary Hill, within the Lolkisale Game Controlled Area (LGCA), adjacent to the north-eastern boundary of Tarangire National Park (TNP). The lodge site is located about 126 kilometres south-west of Arusha town. As part of the project, a Wildlife Management Area (WMA) is planned within the LGCA, in Lolkisale Village. The project will cater for the up market tourists and will be utilised as a base for clients visiting TNP. In addition, the planned WMA will facilitate night game drives, tree camping and walking safaris as well as act as a night stop on three day walks from Naitolia Camp.

The project proponent is 'The Boundary Hill Lodge Company', a joint venture between the Lolkisale Village Council (LVC) and the Tarangire Conservation Company Ltd. of Arusha, each holding a 50% stake in the company. The LVC will contribute a 100 acre for the development of the lodge. In addition, the LVC will lease to BHL, for a period of at least 15 years, another 30,000 - 35,000 acres for the establishment of the WMA. TCCL will contribute some existing assets as security for the long-term loans.

❑ *The EIA process*
According to the International Finance Corporation (IFC) from whom the project sponsors are seeking a long-term loan, the proposed project is a "Category A Project". Such a project is assumed to be highly risky or contentious or may involve serious and multidimensional environmental concerns. Thus, this ESIA is seen as a tool that can facilitate orderly establishment and management of the lodge facility and the WMA with minimal adverse impacts on the natural resource base, the social, cultural and economic environment of the area.

The scoping involved the collation/collection of data and information about the physical and biological characteristics of the project area. Relevant key stakeholders (wildlife managers, commercial hunters, tour operators, large and small scale farmers and livestock keepers) were consulted for their views and concerns about the project. Both the semi-structured and unstructured questionnaire was used to gauge relevant information. Some of the stakeholders were consulted more than once in order to cross-reference vital information. The project site was visited for detailed studies, focussing on sensitive issues related to infrastructure layout, water supply, waste management, security, biodiversity and potentials for environmental degradation of the area.

The Matrix Method was used to predict significant impacts. The evaluation of impact significance was largely done qualitatively based on subjectivity and intuition. To a large extent, decisions were also based on past experience, expert judgement and stakeholder views and concerns. Impact significance or importance was decided after intensive discussion between members of the EA team.

A number significant biodiversity-related impacts were identified and practicable mitigation/enhancement measures recommended. The EIA team indicated the important project activities, identified key actors and recommended the time frame for implementation of activities. Also, the study indicated the important issues requiring monitoring, identified key actors, suggested parameter to be monitored, methodology to be used, frequency of measurement and tentative costs.

❑ *Key Biodiversity issues*
   · The lodge would be established very close to the TNP boundary and is a joint venture between an investor and a local community. It provides a possible alternative to managing biodiversity outside protected areas.

- Creation of the WMA could help to stem further encroachment of commercial farming and rangeland degradation around TNP.
- The project will provide the local community with an alternative income source and minimise pressure from farming and livestock grazing, thus contribute to the preservation of the Tarangire Ecosystem.
- The project will give further protection to the migrating wildlife outside TNP, contributing to the conservation of the greater Manyara-Tarangire Ecosystem.
- The proposed conservancy with exclusive use for non-consumptive tourism will help to deter poachers, stop farming and commercial hunting in the area, thus minimise harassment and poaching of game animals in the area.
- Prohibition of tree-cutting and charcoal-making as well farming activities within the conservancy will stop the ongoing deforestation and allow natural regeneration of vegetation thus, improve the habitat quality and biodiversity of the area, with long-term implications on wildlife conservation in the Tarangire ecosystem .
- Mismanagement of wastes, oils and chemicals at the lodge site could lead to pollution of a nearby Gosuwa wetland used for watering and feeding by a variety of game animals especially during the dry season. Pollution of these wetlands would severely affect their ecological functioning and the local biodiversity.

❑ *Technical issues relevant to biodiversity*
It was difficult to come up with environmental management plan (EMP) for the proposed WMA because of lack of national guidelines on the same. Information for evaluating the prospects of the community-based wildlife management was lacking. None of the LVC, TCCL, or BHL has experience in the management of a wildlife conservancy. An essential step in the management of the conservancy is to conduct ecological studies to determine estimates of carrying capacity and identify specific factors likely to constrain animal population sizes.

Actual management of wildlife populations requires considerable knowledge of population dynamics of the key species to determine desirable population structures for maximum efficiency. Although this type of information is available in wildlife management literature for some of the most popular savanna game species, for others, it is not, and may require undertaking fresh field studies. This will normally involve expertise in ecology, botany, etc. which is lacking. Together with basic ecological and life-history knowledge, there would also be need for a good monitoring programme to track habitat change and animal populations in the field. These studies require resources and time which were not available during the study.

❑ *Lessons for biodiversity policy*
- National guidelines on the establishment and management of WMA are essential

12.6.3 EIA on the Makuyuni-Musoma Road
❑ *Background*
This was an EIA of the proposed Makuyuni to Musoma Road, carried out on behalf of the Ministry of Works Communications & Transport of Tanzania. The EIA considered several alternative routes for linking the two locations and made a comparative judgement of the various alignments. The proximate purpose of the project is to improve road communication and opportunities for commercial traffic operating between Makuyuni and Musoma. The overall intention is to improve transport and communication

between the whole north-western quarter of Tanzania and, by extension, including Arusha, Moshi and the port of Tanga.

❑ *The EIA Process*

Given the fact that both SNP and NCA are World Heritage Sites and substantial baseline data exists from the various researches conducted in the area, it was considered unnecessary to conduct a conventional EIA, oriented towards the generation of a set of mitigation measures to cushion unintended adverse impacts of an otherwise acceptable project, would be appropriate in this instance. Vast though this database is, naturally it is not oriented to this project. Thus, the available research material was supplemented by other information drawn from reconnaissance, special surveys, and consultation with local people and institutions visitors; local, regional and national government agencies; and informed opinion from a wide spectrum of people and institutions who were advised at an early stage of the proposal and invited to contribute their knowledge and views.

The key issue was not, as is usually the case, how divergent environmental, economic and engineering considerations could be reconciled. Rather it concerned the fate of the project as a whole. Serengeti and Ngorongoro would probably remain on the list of sites designated for their natural value if the World Heritage Commission reduced the global number from 250, or so, to six. In terms of global heritage, they rank alongside the Grand Canyon and the Great Barrier Reef. However, an important imperative requirement is the obligation not to compromise the integrity of Serengeti and Ngorongoro, i.e the need to link the Lake Victoria regions of Tanzania and, by extension, the adjoining land-locked states, with the coastal ports by better means of transport than exist at present. The key issue was to provide decision-makers with information to guide a choice between Alignment-A; Alignment-B; and Alignment-C

Alignment-A includes all the most environmentally-sensitive stretches of the Serengeti National Park and Ngorongoro Conservation Area. Alignment-B avoids the Serengeti National Park but still bisects the sensitive Northern Highlands Forest Reserve and Ngorongoro Crater rim thereby avoiding the most ecologically and easthetically sensitive section of both road alignments-A and –B, but it incurs a construction cost penalty for so doing. Alignment-C could involve up-grading the existing road between Babati and Singida: but detailed consideration of this option lies outside the terms of reference of this EIA. Choice of alignment-B and its variant, or abandonment of both, requires evaluation of the trade-off between adverse environmental impacts, in the case of alignment-B, and cost in the case of its variant. The key EIA decision is whether the additional cost of routing through Oldeani exceeds the value of natural heritage at risk by routing through the NHFR and Ngorongoro Crate rim.

The EIA was designed to present decision makers with a clear basis for environmental assessment in the form of bar-charts which were the final outputs of the EIA Model. In so doing it resembled the economists' reduction of all relevant data to a single figure (NPV or IRR) which encapsulates the economic worth of the project. Understandably, there are no generally accepted units if environmental impact. Thus, the charts did not have quantified units because the comparison was relative and not absolute. Rightward extension of the bar on each bar-chart reflects the environmental adversity of the option. Leftward extension of the bar indicates that benefits are considered to outweigh adversity.

For each alternative alignment, potential direct and indirect impacts were identified, predicted and evaluated for significance. The conclusions drawn from the EIA are that routing a major trunk road through Serengeti National Park and Ngorongoro Conservation Area would:

- ❑ Contravene the purpose of Tanzania's accession to the World Heritage Convention;
- ❑ Contravene the policies of TANAPA and the NCAA;
- ❑ Contravene the management plans for those protected areas;
- ❑ Prejudice the survival of several rare and endemic species of plants and animals;
- ❑ Cause massive mortality of migratory species;
- ❑ Diminish the value of Serengeti and Ngorongoro as tourist attractions;
- ❑ Deprive future generations of the chance to experience the wideness in a pristine state; and
- ❑ Negate past efforts to conserve the wildlife and wilderness in the region.

On environmental grounds, therefore, this project is unacceptable as alignment-A and alignment-B. Alignment-B variant remains as a possibility but it would be technically difficult and subject to strict controls where it impinges upon any designated area. The most environmentally acceptable policy to meet the stated aims of the project would be to adopt alignment-C, or a variat thereof, passing south of Lake Eyasi and not likely to encroach upon any known area of exceptional conservation value.

No detailed mitigation measures were proposed because adverse environmental impacts would be mitigated by abandoning the project.

Key Biodiversity Issues
Both SNP and NCA are famous World Heritage Sites. SNP is in the category of Protected Area receiving maximum protection (only non-consumptive use activities are allowed). The existing route (alignment –A) traverses both the SNP and NCA. There is a need to protect the integrity of the Serengeti ecosystem (including NCA) in any proposed development scheme. Unlike SNP, Ngorongoro is a multiple-use zone in respect of which up-grading an existing road would not be totally unacceptable. The existing road across the SNP and most of the NCA traverses open savannah woodland where adverse environmental impacts could, in all probability, be mitigated to a substantial degree by careful design and effective traffic management. However, the stretch of twenty kilometers up the scarp through the NHFR and around part of the rim of Ngorongoro Crater are forested relatively steep. Thus, Criteria applicable to steep slopes in tropical moist forest and around the periphery of the crater are, by necessity, very different from those applicable to open Savannah.

Within the designated areas (SNP and NCA), however, the ecological impact of this project would be very significantly adverse and, moreover, incapable of effective mitigation. Given the international importance of these areas in terms of conservation of biodiversity and taking into account their vital positions as Tanzania's premier tourist attractions, any development that may jeopardize the integrity of these designated areas must be rejected.

The major lesson learnt relates to the fact that the EIA did not support the proposed alternative roads through Serengeti NP and NCA largely because of their international conservation status, rather than because of biodiversity reasons i.e. according an area international global conservation status can help to conserve biodiversity.

12.7 Future Actions to Improve Effectiveness of Biodiversity Conservation and Sustainable Use

- ❑ Establish and promote training programmes for ecologists, taxonomists and para-taxonomists to deal with identification and conservation of biodiversity.

❑ Hasten the process of preparing the NBSAP and adopt it for immediate implementation.
❑ Develop a comprehensive national research/capacity-building programme on biodiversity monitoring
❑ Prepare guidelines for undertaking biodiversity assessment
❑ Undertake capacity building in the districts and local level in EIA including biodiversity assessment
❑ Prepare simple and effective tools to planning and managing biodiversity in the rural areas.
❑ Integrate biodiversity conservation in national and local economic planning. Produce and circulate guidelines and handbooks for bottom-up planning.
❑ Establish EIA guidelines for different activities/projects
❑ Establish national, institutional and regional biodiversity databases/information centres and strengthen existing ones.

12.8 Final Conclusions

EIA performance in Tanzania to-date has been extremely poor, to the extent that EIA has had only a marginal impact on decision-making and planning. Apart from the lack of EIA policy and legislation as well as lack of supporting guidelines to 'set the rules' for EIA, there are many weaknesses related to quality control mechanisms, poor enabling environment for EIA, inadequate stakeholder involvement, and inadequate local EIA capacity.

In addition to the above weaknesses, biodiversity impact assessment has never been an important element of Tanzanian EIAs. After all, the National Biodiversity Strategy and Action Plan is still being formulated. Therefore, it should not come as a surprise that the impact of EIA on biodiversity conservation and its sustainable use has been largely insignificant. Thus, in the absence of a robust legal and institutional framework for EIA in Tanzania, EIA will continue to be undertaken on ad-hoc basis, and thus will never address biodiversity concerns adequately.

The current EIA practice does not address biodiversity comprehensively and adequately. Experience in Tanzania's national parks – where EIA policy and guidelines exist – indicate that legislation, if backed by regulatory and compliance monitoring powers, can make an important contribution to effective EIA and biodiversity conservation. Supporting guidelines should take account of the deficiencies identified in this review. For example, it is important to ensure that screening procedures and guidelines include clear biodiversity criteria, so that projects with potentially detrimental effects on biodiversity are subject to comprehensive EIA. Also, the scoping stage should require that identified impacts related to biodiversity are adequately addressed in the full EIA. Finally, the post-project monitoring and audit stages determine whether or not biodiversity impacts were predicted accurately, and if recommended mitigative measures are effective.

Traditionally, EIAs do not address biodiversity impacts per se. Where ecological impacts are included, these have focused on brief habitat surveys and species lists of commercial/tourist importance. They have been less likely to address other aspects of biodiversity such as diversity between species and habitats, trends over time, species abundance and distribution, and the functional components of biodiversity. A more ecosystem approach is needed, which looks at potential impacts on the ecosystem as a whole. More important the approach should seek to identify opportunities for sustainable use of resources and enhancing biodiversity. Thus, biodiversity impact assessment demands a more sophisticated investigation and analysis of potential impacts on an

ecological unit and the species and communities within it. Biodiversty impacts can be considered to be a sub-set of ecological impacts, looking at the wider relationships between organisms and their environments at species, community and ecosystem levels. To address these adequately, biodiversity impact assessment requires specialised techniques and tools, which are currently inadequate or are lacking.

Changes are required at all levels of impact assessment, from legislative requirements, guidelines, training and EA practice, if the objectives of NBSAP and EIA are to be achieved. These changes will definitely take time. However, in the meantime, good practice in considering biodiversity can be established and promoted. For example, case studies should be identified and publicised, to illustrate what can be achieved.

12.9 References

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