Proceedings
Conference on Licencing Procedure for Electric Power Development and Environmental Management

Iringa-Tanzania 4-7 October 1999
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Ministry of Energy and Minerals
Chambers O.Box 2000
Dar es Salaam
TANZANIA
Tel: 255-51-117153 –7
Fax: 255-51-116719/120799

Norwegian Agency for Development Cooperation, NORAD.
P.O.Box 8034 Dep
0030 OSLO, NORWAY
Tel: (47) 22242030
Fax: (47) 22242031

Norwegian Water Resources and Energy Directorate, NVE.
P.O.Box 5091 Majorstua
N – 0301 OSLO, NORWAY
Tel: (47) 22959595
Fax: (47) 22959001
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<tr>
<td>ACE</td>
<td>Ag. Commissioner Electricity</td>
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<tr>
<td>AVB</td>
<td>Arendal Water System Management Association (Norway)</td>
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<tr>
<td>CEEST</td>
<td>Center for Energy, Environmental Science and Technology</td>
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<tr>
<td>CEP</td>
<td>Commissioner of Energy and Petroleum</td>
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<tr>
<td>DNE</td>
<td>National Directorate of Energy (Mosambique)</td>
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<tr>
<td>EIA</td>
<td>Environment Impact Assessment</td>
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<tr>
<td>IRA – UDSM</td>
<td>Institute of Resource Assessment of University of Dar es Salaam</td>
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<tr>
<td>IPP</td>
<td>Independent Power Producers</td>
</tr>
<tr>
<td>LKHP</td>
<td>Lower Kihansi Hydropower Project</td>
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<td>MEM</td>
<td>Ministry of Energy and Minerals</td>
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<tr>
<td>ML&amp;HSD</td>
<td>Ministry of Lands &amp; Housing Settlement Development</td>
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<tr>
<td>MNR&amp;T</td>
<td>Ministry of Natural Resources &amp; Tourism</td>
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<tr>
<td>MF</td>
<td>Ministry of Finance</td>
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<td>MoL</td>
<td>Ministry of Lands</td>
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<td>MW</td>
<td>Ministry of Water</td>
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<tr>
<td>MW</td>
<td>Megawatt</td>
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<tr>
<td>MW hurd</td>
<td>Megawatt-hour</td>
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<tr>
<td>NCS</td>
<td>National Conservation Strategy (Zambia)</td>
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<td>NEAP</td>
<td>National Environmental Action Plan (Zambia)</td>
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<td>NEMA</td>
<td>National Environmental Management Authority (Uganda)</td>
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<tr>
<td>NEMC</td>
<td>National Environment Management Council (Tanzania)</td>
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<tr>
<td>NGO</td>
<td>Non Governmental Organisation</td>
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<td>NORAD</td>
<td>Norwegian Agency for Development Cooperation</td>
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<td>NVE</td>
<td>Norwegian Water Resources and Energy Directorate</td>
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<tr>
<td>PPA</td>
<td>Power Purchase Agreement</td>
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<tr>
<td>PWO</td>
<td>Principal Water Officer</td>
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<tr>
<td>PBWO</td>
<td>Pangani Basin Water Office</td>
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<tr>
<td>RBWO</td>
<td>Rufiji Basin Water Office</td>
</tr>
<tr>
<td>TANESCO</td>
<td>Tanzania Electric Supply Company Limited</td>
</tr>
<tr>
<td>TaTEDO</td>
<td>Tanzania Traditional Energy Development &amp; Environmental Organization</td>
</tr>
<tr>
<td>TOR</td>
<td>Terms of Reference</td>
</tr>
<tr>
<td>TWh</td>
<td>Terawatt-hour</td>
</tr>
<tr>
<td>ZESCO</td>
<td>Zambia Electricity Supply Company (Zambia)</td>
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<td>VPO</td>
<td>Vice President Office</td>
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Preface

In 1994, the Norwegian Agency for Development Cooperation (NORAD) invited to an international conference on Hydropower and Environment in Oslo. As a follow up, the previous Director General of NORAD offered Tanzania financial and professional assistance to arrange a conference in Tanzania concerning Licensing Procedures for Electric Power Development and Environmental Management. Tanzania gave positive replies to the offer from NORAD, and also proposed to draw upon NVE’s expertise and experience in this field.

The conference was arranged in Iringa, Tanzania, 4th – 7th October 1999, with around 30 participants. The participants came from relevant ministries and concerned organisations in Tanzania, from Zambia Electricity Supply Company (ZESCO) in Zambia, and National Environmental Management Authority (NEMA) in Uganda. From Norway, a team of experts from Norwegian Water Resources and Energy Directorate (NVE), NORAD and Arendal Water System Management Association (AVB) presented the Norwegian experiences.

The Conference was arranged by the Ministry of Energy and Minerals in cooperation with NVE, and sponsored by NORAD.

The Conference Committee:

Mr. Theophilbo Bwkea, Assistant Commissioner – Electricity, Ministry of Energy and Mines, MEM, Chairman.
Mr. Mathew M. Mbwanbo, Executive Engineer, Electricity Division, MEM, Secretary.
Mr. David E.P. Ngula, Manager, Research and Development, Tanesco.
Ms. Jacqueline Maxmillian, Environment Officer, National Environmental Management Council, NEMC.
Ms. Anne K. Helgestad, Senior Adviser, International Office, NVE.
Mr. Alf V. Adeleq, Executive Engineer, International Office, NVE, Norwegian Coordinator.

Editor of the Proceedings: Mr. Alf V. Adeleq, Executive Engineer, International Office, NVE.
EXECUTIVE SUMMARY

1. The Ministry of Energy and Minerals which oversees the development of the energy sector organized a conference with a theme titled Licensing Procedures for Electric Power Development and Environmental Management in Tanzania in collaboration with the Norwegian Agency for Development Corporation (NORAD) who provided financial support and technical assistance through the Norwegian Water Resources and Energy Directorate (NVE). The conference was held in Iringa, Tanzania from 4th to 7th October, 1999 with around 30 participants drawn from Tanzania, Uganda, Zambia and Norway.

2. In recent years, electric power companies in both developed and developing countries have experienced growing public concern and opposition to the construction of hydropower stations due to what is perceived by the public as undue consideration of the environment in the whole process of the policies, plans and operations of the energy industry as a whole.

3. The Ministry of Energy and Minerals organized this conference to contribute to the power sector reform program which among other objectives will also be addressing the shortfalls in the licensing procedures for hydropower development which recognizes the balance between economic development and sustainability of the environment.

4. The purpose of the workshop was to explore the strengths and weaknesses of the existing licensing procedures, the requirements for the new restructured and privatized electricity industry, regional and international experience and influence of multilateral and bilateral financing institutions on licensing of new power projects. Participants with a wide range of expertise and experience presented the papers and a project case study was discussed. Experiences of success and failure were exchanged, methods and approaches, programs and policies were also discussed. The ultimate goal of the workshop was to assess the adequacy of the existing licensing procedures which meets the defined environmental standards for Tanzania.
5. The conference was organized around several topics:

- The present situation (Session 1)
- Plans and work for developing of a New Licensing System (Session 2)
- Water Resources Management in Tanzania and Norway (Session 3)
- Experiences from other countries (Session 4)
- Case Study (Session 5)
- Plenary and Group Discussions (Session 6).

6. The conference demonstrated that development of the power sector in Tanzania is characterized by the licensing procedure which is not coordinated with other relevant sectors. The Acts regulating hydropower development in Tanzania were found to be outdated and unresponsive to the current economic needs of the country and in meeting environmental standards in particular. Further, the conference observed that there is lack of defined and proper coordination among the relevant stakeholders charged with overseeing of the preservation of the environment in relation to hydropower development. This state of affairs has created a situation whereby the financiers including the donor community to influence the decisions in the development of the power sector by dictating the environmental guidelines and standards without taking into account Tanzania’s regulatory and legal requirements and the International Obligations of the Government of Tanzania by its participation in International Agreements.

7. Irrespective of the observation that guidelines for Environmental Impact Assessment in Tanzania have few institutional linkage, legally unbinding and thus lacking enforcement, international experience shows that EIAs should be viewed as a development tool which facilitates decision makers to optimize sustainable use of resources and not necessarily to block the project. Finally, it was observed that hydropower development in Tanzania will continue to play a significant role in powering the economic growth of the country.
8. The workshop underscored the relevance of addressing proper licensing procedures and guidelines in the ongoing reform program as a prerequisite for attracting the much needed private capital investment in the sector while acting as a guarantor for proper management of the environment.
CONCLUSION

Hydropower Development

For a long time the focus on electricity generation was directed on exploiting hydropotential, however out of available capacity of 4.0 GW only 10 percent so far has been developed. That means there is abundant untapped capacity to be developed in the future, underscore the fact that, hydropower will remain an important resource for electricity generation in Tanzania.

Electricity industry in Tanzania is governed by Electricity Ordinance, which was enacted in 1931, amended in 1957 and some minor amendment in 1961. Power development is mainly based on Power Master Plan, which is continually being revised when the need arises.

The Government will thus review licensing procedures in order to provide guidelines to a proper utilisation of this resource in parallel with fulfilling environment requirements.

Inadequate Licensing Procedures

Licensing in hydropower development is based on Electricity Ordinance. The legislation is out-dated as manifested by the following concerns:

- The time it was formulated, environment concern was not an important issue.
- The power sector is being restructured such that, new players in the sector other than TANESCO are coming.
- The existing legal and regulatory framework does not provide strong monitoring and measures to protect the environment against the construction of power projects.

Hence there is a need to make amendments to address those concerns by addressing all weaknesses in legislation and licensing procedures in general. Efforts to amend the existing legislation are underway and will be taken care under in the on-going power sector restructuring program.

Electricity development and the environment

Throughout the electricity development stages, interaction with environment is inevitable, hence the need to have EIAs.

For example, hydropower development usually requires construction of dams to create reservoirs and lakes that takes arable lands. Lakes may create changes in the microclimate, affect flora and fauna etc. It is essential for licensing procedures to emphasise the importance of interaction between hydro development and environmental management in the planning stages.

The New Power Policy calls for private participation in developing power sector. This emphasises the need to have in place EIA guidelines, which are legally binding and enforceable.
Guidelines for EIA, evaluation and mitigation measures to address environmental impact from hydropower development, for a long time have been influenced by the Financiers without taking into account Tanzania’s regulatory and legal requirements.

**Harmonising the existing laws governing hydropower development**

There is a need to harmonise the existing laws governing the electricity generation, water use, land use and EIA's guidelines.

Licensing for hydropower development is administered by the Ministry of Energy and Minerals according to the Electricity Ordinance. However, legislation for granting of Water Right is controlled by the Water Utilisation Control & Regulation Act of 1974, under the Ministry of Water.

The Electricity Ordinance is still recognising the powers of the Minister of Energy and Minerals to grant right to carry out electricity development. However, land issues now are under the authority of the Minister responsible for Land Affairs.

As the power sector is being restructured, it is most likely that, in future private sector participation will be enhanced in the development of the sector. However, the Rufiji Basin Development Authority Act (RUBADA Act 1975) gives RUBADA exclusive rights to develop hydropower potential in the Rufiji Basin, which contains over 90 percent of the country's hydropotential.

In the ongoing reform program, there is a need to harmonise all laws interacting in the licensing process for hydropower development.

**The need to strength Water Resource Management**

Reliability of water supply is an important factor in hydropower development.

Competition among water users upstream may have a negative impact on future development of hydropower generation.

There is a need to have a comprehensive framework for sustainable management of the Nation’s Water Resources that will ensure sustainable, optimum utilisation, environmentally sustainable, social and economic benefits to all water users.

The Ministry of Water is currently reviewing the existing Water Policy, which will capture the above observations.

**Experience from other countries**

Though Tanzania needs to review and enact new laws, which governs licensing in the hydropower development, there is a room to learn from other countries both within and outside the region. For example, Norway has a track record of more than 100 years in
licensing for hydro development. All issues regarding licensing in hydropower development such as water usage, environmental management are well coordinated.

In Uganda, National Environmental Management Authority (NEMA) oversees environmental enforcement. In Tanzania there is no legal framework that imposes mandatory requirements for EIA of development undertakings in the country. That means, effective implementation of both policy objectives and EIA procedures need to be backed up by appropriate legislation.
Opening Session

The Conference participants were welcomed by Commissioner for Energy, Mr. B. Mrindoko, Ministry of Energy and Minerals, Tanzania. He then gave the floor to Mrs. Cecilia Shirima, Regional Administrative Secretary in Iringa Region. She gave the following welcome note:

Mr. Chairman,

Representative from NORAD,

Distinguished participants from Norway, Zambia, Uganda,

Mozambique and Tanzania,

Ladies and Gentlemen.

It is my pleasure to welcome you all to Tanzania and in particular to Iringa to attend this Conference which will dwell on Licensing Procedures for Electric Power Development and Environmental Management in Tanzania.

Before I proceed, may I extend a warm welcome to our invited participants from Mozambique, Zambia, Uganda and Norway who flew all the way from their countries to attend this Conference. I hope your brief stay in Iringa will be a pleasant one and so I say KARIBU KWETU TANZANIA, JISIKIENI MKO NYUMBANI. (Meaning welcome to Tanzania and please feel at home).

Mr. Chairman, allow me at the outset to express sincere gratitude of the Government of Tanzania to the Government of the Kingdom of Norway through NORAD for funding this Conference. This assistance further proves the strong relationship existing between our two countries.

Mr. Chairman bearing in mind the background of the participants makes me believe that you will have interesting discussions and I am confident that you will come out with resolutions and recommendations which will address your pre-set objectives.

Mr. Chairman and distinguished participants, economic prosperity of any country is positively correlated to the amount of energy the country uses.
In other words. Although there are differences in the amount of energy required for different countries to achieve a given GNP, there is nevertheless a rather consistent relationship between GNP and energy consumption. Electricity, for instance, provides the most convenient source of energy for a wide range of human activities.

Mr. Chairman, it is a proven fact that the development of the electric power industry in the country played a significant role in promoting the growth of our national economy and in meeting social needs of our society.

Ladies and Gentlemen, the environment consists of different organisms, plants and animal life supported by a number of physical elements such as soils, water, air, climate, topography and drainage. For a given development impact, these biotic and abiotic resources and hence the environment may be affected. Conservation of the natural environment is therefore essential to the maintenance and regulation of the food, air, water-cycles on which human life depends and to socio-economic development.

Like any other human activity the harnessing and use of energy is not without environmental impacts of some kind. Large hydro electric and thermo electric power projects usually have impacts that are varied and potentially very significant. The assessment of environmental impacts resulting from the different stages, of any energy cycle is important in relation to adherance to licensing procedures in place.

Mr. Chairman, hydropower is an important renewable source of energy and constitutes an integral part of optimum overall water utilization. The Power Master Plan recognises the importance of continuing to utilise our hydro resources for medium to long term electricity requirements. It is not my intention to make an exhaustive list of the available hydro sources but it is a proven fact that Tanzania has a potential of about 4.0 GW of which 10 percent is developed.

As mentioned before, hydroelectric generation has a number of environmental impacts. No dam can be built and no lake can be created without environmental costs and benefits of some kind. A dam, once built, becomes a dominant factor in the hydrological regime and sets in motion a series of impacts on physical, biological and socio-cultural systems.
Mr. Chainnanand distinguished participants, sound management of our water resources is paramount if we want to maximize these resources for the economic prosperity of our country. The ever increasing pressure on these resources is manifested in a range of conflicts among different stakeholders (irrigation, power production, husbandry, fishing etc.). Prudent licensing procedures for hydropower development can facilitate to address these conflicts. I believe there is a need of coordination and consultation among the stakeholders in order to have licensing procedures which are practical and well marked to address the present and future needs of our country.

Dear Participants, economic transformation in this country which started in the mid 80s pushes us to adopt transparent licensing and operating procedures in furthering hydropower development. The electricity industry is undergoing vigorous restructuring which will entail adopting new industry structure and privatization of TANESCO. I believe the restructured industry will consist of several players. Having several players in the industry underscores the need for establishing full fledged licensing procedures for electric power development otherwise our environment will be at a big risk of being degraded.

Mr. Chairman and distinguished participants, Tanzania is a member of East African Community, SADC and other United Nations Agencies charged with the policing of the environment. Efficient and effective licensing procedures in the region should be given its due consideration bearing in mind that electricity has become a tradable commodity beyond the borders of our countries. Learning from our neighbours as manifested by the presence of participation from Mozambique, Zambia, Uganda and Norway is a cost effective approach in updating and reviewing the existing licensing procedures.

Mr. Chairman and distinguished participants, your conference is a technical one, as such it need nothing but Technical discussions. I wish you good luck in your deliberations and I promise to communicate to the top offices in the government the recommendations emanating from this conference for serious consideration.

With these few remarks, I have the honour to declare the conference officially opened.

Thank you for your time, attention and consideration.
The floor was then given to Senior Energy Advisor, Mr. Even Sund, from NORAD, Oslo.

He explained that the background for this conference was that NORAD, the Norwegian Agency for Development Cooperation, in 1994 conducted an international conference on Hydropower and Environment in Oslo. The participants from Tanzania were very much interested in the licensing procedures for hydropower development that were established in Norway, for the possible reformulation of the procedures of granting licenses, which captures environmental concerns.

The previous director of NORAD did a follow up, and offered in a letter of March 1996 to Tanesco to fund a conference on licensing procedures for electric power development and environmental management in Tanzania. Also participants from other relevant countries were invited to participate.

A positive response to the offer from NORAD was given, and the preparation for the conference commenced in the beginning of 1999.

In Norway, we have experienced the connection between a reliable energy supply at acceptable prices and the economic development of the country. Our hydropower development started 100 years ago, and today supplies almost 100% of the electric power in the country. Hydropower has contributed largely in bringing Norway from being one of the poorest countries in Europe by the turn of the century, to being one of the richest today. Our licensing system has changed during these years, reflecting the changing political priorities. In Norway, the role and responsibility of the licensing procedures is by the Government. The main part of the energy production has to be managed in an autonomous regime reflected by correct pricing.

In the past years, some of the decisions within energy production and sales in Tanzania have to some extent been driven by financing institutions, like the World Bank, other donors etc, because of the lack of a proper licensing system. This situation should be changed, and this conference will be a part of the process to develop licensing procedures for electric power development and environmental management in Tanzania.
Session 1

The Present Situation
THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF ENERGY AND MINERALS

POLICY AND LEGAL FRAMEWORK
FOR THE ELECTRICITY SECTOR

Paper Presented
IN THE

CONFERENCE ON LICENSING PROCEDURE FOR
ELECTRIC POWER DEVELOPMENT AND
ENVIRONMENTAL MANAGEMENT
IRINGA: 4TH – 7TH OCTOBER, 1999

Presented by

Eng. Bashir J. Mrindoko
Commissioner of Energy and Minerals
October, 1999
1.0 Introduction

Electricity is one of the major sources of commercial energy in Tanzania and others are petroleum, woodfuel, coal, natural gas and solar energy.

Electricity in Tanzania is generated from hydro, petroleum fuel and coal. Hydro alone accounts for about 70 percent of all electricity generated in the country. Tanzania has abundant and untapped sources of energy i.e hydropower, coal and natural gas. Hydropower alone has a potential of 4.7GW of available capacity, but only about 10% of the potential has been developed. Until recently (before the drought of 1992) electric power has been driven mainly from hydropower which has accounted for 90 percent of all electricity generated. This ratio has been changed by the introduction of other sources of generation in order to reduce hydro dependency. Diversification of energy resources is given more emphasis especially after experiencing repeated droughts in 1994 and 1996. However, since hydro is the cheapest source of electricity in Tanzania, its development is still the long-term priority.

The electrical power utility in Tanzania, is public operated by government through a state owned company TANESCO. TANESCO is the sole company in the country which operates as a vertical integrated utility, i.e. it is involved in the generation, transmission and distribution systems. There are other licensed operators who are selling power in bulk to TANESCO under Power Purchasing Agreement (PPA), eg. IPTL - (100MW), diesel generator plant, Kiwira Coal Mines (6.0 MW) - Coal generating plant and TANWAT- (1.6 MW). Also there are micro hydros owned by religious groups NGO’s that generate electricity for own use and supplying excess to communities around the vicinity.
2.0 Policy
The electricity sub-sector is governed by the National Energy Policy which was formulated in 1992 with the following overall goals:

- to exploit the abundant hydro-electric sources
- to develop and utilise natural gas resources
- to step-up petroleum exploration activities
- to arrest woodfuel depletion by evolving more appropriate land management practice and more efficient woodfuel technologies
- to develop and utilise forest and agricultural residue for power and cooking energy production
- to minimise energy price fluctuations in order to contribute to stability of prices in general through strengthening and rationalisation of energy supply sources and infrastructure and a rational energy pricing structure and
- to develop human resources for development of energy technologies development
- to ensure the continuity and security of energy supplies

2.1 Electricity sub-sector Overview
The Policy regarding the electricity sub-sector focus towards the provision of reliable electrical energy least cost. This could be achieved by establishing efficient electricity procurement; generation, transmission, distribution and end-use in an environmentally sound manner.

2.2 Electricity to substitute biomass
About 80 percent of Tanzanians population still leave in rural areas where the major source of energy is woodfuel. About 90 percent of the total energy consumed in the country is provided by biomas. To reduce dependency on biomass and imported petroleum, the policy emphasizes the need to expand the existing transmission and distribution systems.
2.3 Electricity and gender considerations

Biomass use as a source of energy has lead to increasing burden on the part of woman who are responsible for gathering and use of fuel, in addition to other productive tasks. Where electricity is available deliberate efforts will be made to popularise simple electricity stoves and other electric appliances in order to provide enough time for other social and economic activities.

2.4 Lessons learnt

2.4.1 Diversification of resources

In 1992, 1994 and 1996, the Tanzania power industry, which is dominated by hydro faced power generation shortage due to low level of water at power generation stations. As a result of this, therefore, the Tanzania power sector development should aim towards the reduction of dependency on hydro resources and increase utilisation of other indigenous resources such as natural gas and coal in the medium and long terms.

2.4.2 Rural Electrification

Electricity consumption in Tanzania accounts for 1.2 percent of the final energy consumption and only 10 percent of the total population has access to electricity. The government through TANESCO has been implementing a rural electrification programme, aiming at supplying electricity to the majority of the population. This has been done through a number of strategies including expanding national grid, encouraging development of mini and micro hydro and othe sources of energy. Due to government low contribution, the rate of penetration has still been slow.
Environmental impact assessment have to be undertaken before the exploitation of new hydropower project.

Afforestation and reforestation campaigns, as well as protection of catchment areas, should be continued and would include, among others the creation of public awareness.

2.4.4 Regional Interconnection

Though the main emphasis to meet and electricity demand is to develop indigenous resources Tanzania also considers regional interconnection as another strategy to meet its demand, especial for border townships. In doing so, Tanzania currently imports bulk power from Uganda and Zambia for border regions of Kagera and Mbeya respectively. Another line from Mbala (Zambia) to Sumbawanga is under construction.

Several studies have been conducted to assess the viability of interconnecting Tanzania's grid system with that of neighbours. Feasibility studies for the construction of a 330kV interconnector from Zambia to Tanzania and a 132kV interconnection from Tanzania to Kenya have been done. Under the East African Cupertino, a study on the Power Master Plan is soon to be commissioned.

2.4.5 Health and Safety

Several cases have been reported on electrocutions and lung cancer in coal power stations.
2.4.3 Electricity Pricing

The electricity system in Tanzania consists of a interconnected grid and isolated generation centres. The interconnected system provides for the bulk power and contributes to the highest share of revenue generated by the utility. The distribution covers mainly urban and sub-urban areas. However, it should be the agriculture recognized areas which are rural in nature provide the bulk of export earnings which are used for retirement of loans that were used to establish the interconnected system. In consideration of this relationship one would wonder whether there is justification to the current geographically uniform pricing.

2.4.4 Environmental and safety issues

The interaction between energy and environment is evident at all stages of the electricity systems, from generation, transmission, distribution and end user. At all stages of the chain, environmental impacts must be considered. For example, the exploitation of hydroelectric power requires construction of dams to create reservoir lakes. Lakes take up arable land. The immediate areas to reservoirs have to be protected to minimise siltation. Lakes create changes in the micro-climate. Flora and fauna are likewise affected. The interaction between the energy planner and environmentalist is therefore essential in planning for hydropower exploitation.

In order for the electricity subsector to contribute to the preservation of the environment the following measures have to be taken:

• Laws and regulations regarding the protection of existing reservoirs for hydropower will be reviewed and strengthened. Where necessary new laws have to be enacted.
3.0 Legislation and Regulation

3.1 Legislation

The Electricity Ordinance (Cap 131) was enacted in 1931 and amended in 1957 and 1961, provides for the legal framework governing the production and supply of electricity in Tanzania. Under the Ordinance, the Minister responsible for electricity affairs is empowered to issue licences to generate, transmit, distribute and sell electricity inside or outside the country.

In 1975, the government also enacted the Rufiji Basin Development Authority Act (RUBADA Act 1975) which give exclusive rights to RUBADA to generate power in the Rufiji Basin. The Basin contains over 90 percent of the country’s hydropower potential.

3.2 Regulatory Framework

The Government currently plays a dominant role in establishing and implementing energy policy. The Ministry of Energy and Minerals (MEM) is responsible for the formulation of the policy on the exploitation of natural resources e.g. hydrocarbons, electricity, coal and renewable energies. Within MEM, energy sector matters are dealt by the Department of Energy. Responsibilities include the development of energy policy, evaluation of development plans and control of electricity tariffs.

On other side, TANESCO, the power utility has the right to increase tariffs by 5 percent on a biannual basis. MEM can approve additional tariff increase of up to 10 percent also on a biannual basis.
4.0 Weaknesses of Existing Laws

4.1 Electricity Ordinance

TANESCO enjoys a very high degree of monopoly in generation, transmission, distribution and sale of electricity. It is a Limited Company under the Companies Ordinance and operates under licence from Minister for Energy and Minerals as stipulated in the Electricity Ordinance (Cap. 131 of 1957) The ongoing economic reforms in the country calls for a review of many aspects of the existing Ordinance.

4.2 RUBADA Act. 1975

There may be perceived to be a conflict between TANESCO’s rule as a licence holder for power generation, transmission and distribution, and RUBADA’s direct authorisation to general electricity in the area under its control confined directly by statute. Unlike any other company or parastatal body in the country, the Act directly authorise the controlling body to generate electricity in its area.

4.3 Licensing and Environmental Management

Issues related with exploitation of lands for hydro dams and other power projects need to be well addressed. Experience in the past have shown that the aspect of environment impact assessments (EIAs) were neglected. This was due to several reasons such as lack of environmental policy in the past, and no legal enforcement requirement for environmental impact assessments, and weakness in the licensing of power projects without taking into account environment concerns. For example, there were no environmental studies conducted for Kidatu hydro power project. However, substantial information was collected concerning geology, sedimentation, hydrology, and other aspects of physical environment that directly affected the functioning and economic feasibility of the power plant.
With the increasing environmental awareness, investors have started to take initiatives to undertake EIAs to address environmental concerns and to undertake remedial measures well in advance. One of the good example is Kihansi hydropower.

4.3 Water use
The appropriate legislation with respect to water use is the Water Utilisation Control & Regulation Act of 1974. All water ownership in Tanzania is vested in the State. The Minister for Water affairs may declare any water a national water supply and may be declared to be for public purposes.

Difficulties have apparently been experienced enforcing the regulations regarding the use of water, especially when there are competing water demands.

4.4 Land use

The Electricity Ordinance recognises the powers of the Minster of Energy to grant the right to carry electricity projects such as wayleave. However, land issues now are under the authority of Minister responsible for Land.

5.0 Recommendations

5.1 Up-date Electricity Ordinance

As a result of many changes that have been experienced by the electricity industry, consideration should be given to updating the legislation, to bring it in line with conditions and requirements of present day electricity industry.
5.2 RUBADA Act

There is a need to repeal section in the Rufiji Act giving power to RUBADA to generate electricity in the Rufiji Basin without seeking licence from the Minister responsible for electricity affairs. Electricity generation should be under licence as elsewhere in the jurisdiction.

5.3 Licensing and environmental requirements

In 1997, the Government put in place the National Environmental Policy. The policy provides a framework for making fundamental changes that are needed to bring environmental considerations into the mainstream of decision making. Any electricity license granted should be tied with environmental performance criteria. As a result of reforms in the sector, the participation of independent operators will increase and therefore impact on the environment.

5.4 Health and Safety

Health issues connected with environmental conditions when using different kinds of energies. Safety concerns regarding uses of electricity to avoid injuries is another issue for consideration. There is a need to impose on the distribution companies, or other authorities, to make information campaigns on safety issues.

6.0 Conclusion

Electricity industry is currently under restructuring. The restructured industry invites more players in the power sector other than TANESCO.
The existing legal and regulatory framework does not provide strong monitoring and measures to be taken to protect the environment against electricity projects. There is need to make amendments to address those weaknesses in legislation and licensing procedures in general.

Another area which needs immediate change is harmonising the existing laws in generation, water use, land use and environment. Also there is a need to repeal all laws which gives automatic authorisation to electricity generation.

In carrying reforms in the power sector, there is a need to have a strong Board such as an independent regulator at arms length with government.

References

2. Proposal for Power Sector Restructuring Study - 1995
The Tanzania Water Resources Management Policy
By Washington Mutayoba

Conference on Licensing Procedures for Electric Power Development
and Environmental Management in Tanzania
Iringa 4 – 7 October, 1999

Dar es Salaam, October 1, 1999
Development of the Water Resources Management Policy - Tanzania

Introduction
The government recognizes the fact that water is a basic natural resource required to sustain life and to provide for various social-economic needs of the country. According to the constitution all water in the country is vested in the United Republic of Tanzania. The principal legislation governing water resources management in Tanzania is the Water Utilization (Control and Regulation) Act No. 42 of 1974 and its Amendment Act No. 10 of 1981 and Written Laws (Miscellaneous) Act No. 17 of 1989 and General (Regulations) Amendment and the last amendment of 1997. According to this Act Tanzania is divided into nine hydrological units that have been declared as River Basins (see Annex I).

Existing Policy
In 1991, the Government launched a water policy for overall development and management of water resources. The policy focuses on participatory planning, and cost sharing in the construction, operation and maintenance of community based domestic water supply systems. The policy however does not adequately address cross sectoral interests in water, watershed management or sustainable river basin management. These weaknesses in the water policy coupled with population growth, the institutional financial constraints and poor operational infrastructure pose problems in water resources management and have resulted in considerable water use conflicts. particularly in Pangani and Rufiji Basins.

In 1993, the Ministry of Water, Energy and Minerals (MWEM) initiated a review of the Water and Sanitation Sector (WSSR) aimed at building on and supporting a number of ongoing sector initiatives. The objectives of the review were to identify constraints, plan interventions to facilitate sector progress, improve access to information to assist future planning and seek the commitment of external support agencies and non-governmental organizations to support specific initiatives.

Further to the above initiatives MWEM undertook, in 1994/95, a rapid water resources assessment (RWRA), with a view of having a quick identification of resource availability, resource use and the priority issues to be addressed in each of the nine River Basins. In this assessment it was identified that improving water resources management in the Pangani and Rufiji Basins was a priority. In both these basins there are serious water use conflicts, deterioration of resources due to misuse and lack of comprehensive planning and management mechanisms.

Major issues and recommendations from the RWRA include the need to:

(i) strengthen water resources assessments both in their quantity and quality as well as the monitoring of aquatic ecosystems. (ii) improve water rights administration and pollution control. (iii) reduce water related diseases. (iv) improve cross sectoral planning. (v) review the 1991 National Water Policy so as to make it more elaborate on river basin management. (vi) introduce participation of legitimate stakeholders in river basin management. and (vii) review the Water Utilization (Control and Regulation) Act No. 42
of 1974 with emphasis on; (a) defining the water right concept. (b) enhancement of water fees and pollution charges as an incentive for water conservation and pollution control, and as a source of funds for water regulation activities, catchment conservation and water resources monitoring, (c) strengthening pollution control program. (d) granting of water rights for specific periods of the year, and (e) involvement of stakeholders in Basin Water Boards.

As envisioned in the WSSR and detailed in the RWRA, a comprehensive water resources management strategy was deemed necessary to foster sustainable water resources development and management.

**Policy Review**

For the past two years the existing National Water Policy has been under review. The components that are being reviewed are:

- Water Resources Management,
- Urban Water Supply and Sewerage, and
- Rural Water Supply.

*(See Annex II for Policy Framework)*

The **Water Resources Management Policy** is being reviewed on the basis of detailed technical-analytical review of a wide range of issues, human resources, financing and economics, environmental, institutional framework and a number of various other issues, affecting effective water resources management.

The policy and legislative review among other things is addressing the following key issues: (i) water rights (ii) water charges and penalties; (iii) protection of water against pollution; and (iv) strengthening and broadening stakeholder participation in the institutional framework for basin management (v) priorities and criteria for water allocation, (vi) cooperative and coordination arrangements among various sectors and segments of society, (vii) information management and dissemination, (viii) drought management and contingency planning, and (ix) crises and conflict management. (x) flood management, (xi) conjunctive use of water, (xii) registration of water resources interventions, and (xiii) monitoring.

The review will also address issues related to short and long-term adjustments on water user fee, penalties for pollution, financial autonomy of river basin offices, strengthening water right administration, and making River Basin Boards centres of conflict resolution.

**Objective of the Water Resources Management Policy:**

The overall objective of the Tanzania Water Resources Management Policy is develop a **comprehensive framework** for **sustainable management** of the Nation’s water resources, and to develop an effective **institutional framework** for its **implementation**; so as to achieve optimum, long-term, environmentally sustainable social and economic **benefits** to society of from the use of the country’s water resources.
The Guiding Principles

The global principles for water resources management are:

**Principle 1:** Water is a finite and vulnerable resource, essential to sustain life, development and the environment.

**Principle 2:** Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels.

**Principle 3:** Women play a central part in the provision, management and safeguarding of water

**Principle 4:** Water has an economic value in all its competing uses and should be recognized as an economic good

These global principles have been adapted to the situation in Tanzania to get our own fundamental principles

(a) **Legal Status of Water**
All water in the country is vested in the United Republic of Tanzania

(b) **Government is Custodian of The Nation’s Water Resources**

(c) **Rights and Equity in Access to, and the Use of Water**

- Equal rights to Access and Use of the water resources
- Equitable Allocation of water and access to the benefits

(d) **Protection, conservation and sustainable use of water resources**

- achieved through instituting and maintain environmentally sustainable development approaches
- achieved through application of appropriate management principles
- through appropriate economic pricing and incentive system and their effective enforcement mechanism
- achieved through fostering good use of water, optimization of water use, and applying conservation practices
- achieved through efficient use of water, combating wastage and leakage

(e) **All sectoral interests must be considered in the planning/allocation**

- drinking water supply (rural, urban and livestock)
- agriculture/irrigation
- industrial water supply
- ecology (wildlife, riverine habitat including fish, forests, swamps-marsh lands, wetland, etc.)
- navigation
fisheries
 mining, energy/hydropower; recreation/tourism

(f) **Clearly defined water use priorities**
- water for basic social needs necessary to maintaining human health, personal hygiene and sanitation
- water for maintaining ecological minimum
The two uses shall be the reserve
- sufficient water to meet all other socio-economic water demands
- trans-boundary water uses (respecting the principles of shared water resources)

(g) **Integrated Planning Approaches**
Planning will be achieved through the following levels:
- At National Level
- At Basin Level
- District Level
- Community Level

(h) **Stakeholder Participation and Gender Considerations**
achieved through consultation, consensus building with users, and participation at all levels in the planning, management and decision-making
to involve awareness creation and education and training at all levels
to achieve participatory management of the water resources

(i) **Administrative aspects on water**
- water use shall be subject to authorization through technical-administrative processes
- water Use Permits/Water Rights-Licenses
- specified Water Permit/Water Rights duration, reviewed from time to time
- water allocation strategies to be defined
- strategic approaches for the reserve to be formulated

**Legal Framework**

Major Principles under consideration
- The national water law shall be subject and consistent with the constitution of the United Republic of Tanzania in all matters including rights and obligations of both public and private interests with regards to water
- The national water law will actively promote the values given in the constitution, the National Environmental Policy and the Global Principles
- All water whenever it occurs is a national resource
- Rights to Access and Use of Water, and Equity considerations
- Legal Status of Water
- Rights of The Environment, and Maintenance of The Ecosystems and Aquatic Life strengthened by Law
- Equity in Access to Benefits from Water
Institutional Framework

**Key issues**

- Separation of Responsibilities (operational, management, regulatory functions)
- Stakeholder Participation. Gender Issues and Awareness and Education
- Water User Associations or User Groups - play an important role in the management of water resources
- Coordinated Approach
- Human Resources Development and Management
- Research and Training
- Conflict Management
- The Private Sector Involvement, and NGOs Participation
- Duplication of Responsibilities

Conceptual Thinking in the Policy Review:

**River Basin Management:**
River Basin Management is a holistic, integrated approach to the management of land and water in a basin with the objective to save water and identify its optimal use. It is a complex undertaking that takes into account environmental, ecological and socio-economic concerns in the planning and management of the resource in a Basin, aimed at solving the problems of supply, demand and control. It involves research, technical works and administrative controls for the purpose of preserving and allocating the available water resources to the needs of society. In this case **River Basin Management** is best viewed as a three component system in which each component operates in its own environment as follows:

(i) **The physical (or resources) system:** also sometimes referred to as the *natural environment*, which supplies the resource. It is the system of rivers, lakes, groundwater aquifers including its functions on the ecosystem. This system is controlled by its climatic conditions and its geo-physical conditions;

(ii) **The socio-economic system**, which is the system of water use, demand and other water related human activities. It is formed by the demographic, social and economic conditions of the economies in the Basins;

(iii) **The administrative and institutional component:** this is the system of administration, legislation and regulation including the authorities responsible for the management of the water supplies of the physical system and the implementation of laws and regulations, bound by the constitutional, legal and political system within which it operates.
Relationships Among Basin Systems

1. **Relationship between the physical system (natural resources) and the socio-economic system**

<table>
<thead>
<tr>
<th>Natural Environment</th>
<th>Socio-economic System</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Provides natural resource supplies to society for various uses.</td>
<td>• Consumes the resources, produces wastes which could flow back to natural system and pollutes it or damages it.</td>
</tr>
<tr>
<td>• Natural extreme events or natural hazards (floods, droughts, landslides, etc) can result in loss of property or life and damage the socio-economic infrastructure.</td>
<td>• Properly defined goals and adequate planning and development would reduce or alleviate damage imposed by the natural system. Mitigation measures would restore harmony.</td>
</tr>
<tr>
<td>• Inventory and monitoring of available natural resources.</td>
<td>• Proper management of the social system using information and data from the natural environment and the socio-economic system.</td>
</tr>
</tbody>
</table>

2. **Relationship between the administrative and the physical (natural) system.**

<table>
<thead>
<tr>
<th>Administrative Systems</th>
<th>Natural System</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Provides administrative structure and measures which would deal with the natural or even man made hazards,</td>
<td>• Natural process is influenced and improved, e.g. floods are reduced, supplies increased, pollution of the environment reduced or abated, etc.</td>
</tr>
<tr>
<td>• allocates water and regulates uses, administers laws,</td>
<td></td>
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<tr>
<td>• authorises engineering measures which would regulate the natural system and which could include installation of dams, weirs, bank protection, water abstractions, etc.</td>
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</table>
3. **Relationship between the administrative and the socio-system**

<table>
<thead>
<tr>
<th>Administrative</th>
<th>Socio-economic</th>
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</thead>
<tbody>
<tr>
<td>- Institutes administrative planning, legislation, evaluating the value of water and parameters used in determining the fees, taxes and other charges, regulation, settlement of disputes. This system may influence the behaviour of people</td>
<td>Provides information on needs, perceptions, use of society, etc.</td>
</tr>
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</table>

**MAJOR ELEMENTS AT THE CENTRE OF WATER RESOURCES MANAGEMENT**

1. Information Management System
2. Administration of Water and Financing
3. Water Quality Management and Pollution Control
4. Catchment Protection and Management
5. Planning

**Building Blocks:** *(See Annex III):*

In reviewing the Water Resources Management Policy, various water resources management issues have been categorised into **five major building blocks** for building up the policy. In addition, all related existing policies, including the National Environment Policy, Agriculture Policy, Land Policy, Energy Policy, Mining Policy, Fisheries Policy, etc have been considered.

**Building Block 1: Environment and Natural Resources**

Recently carried out studies show that water scarcity in the basins, some of which could seem to be well supplied, is mainly due to increasing demand for irrigation, hydropower generation and domestic water supplies and the inefficient use of the resources especially in irrigated agriculture. Increased demand is also a result of population growth and social economic forces in the society. The situation in the two river basins, Pangani River Basin, Great Ruaha River Basin, the Lake Victoria Basin is that: (i) there are problems with the water quality (suspended matter, fecal coliforms), (ii) Municipal and industrial wastewater are mainly discharged directly to the rivers without any treatment. They are polluted with organic matter, some heavy metals and fecal coliforms. The national effluent standards are often exceeded; (iii) Mining activities take place causing erosion and water pollution due to runoff from tailings. (iv) severe land degradation and soil erosion are found in various places in the Basins. (v) the use of fertilizers and pesticides is fairly low, but some contamination of water has been observed in Arusha. There are also many large farms and other agricultural activities depending on irrigation. (vi)
Overstocking of livestock, causing erosion, is observed in Usangu, Pawaga (Great Ruaha) and Same (Pangani) and is likely to increase. Wildlife in the game reserves and other wildlife sanctuaries, as well as other sensitive ecosystems are threatened by excessive upstream water use for irrigation, deforestation and flow regulations.

Building Block 2: Social, Economic and Political Assessments

This Building Block describes the social-economic and political circumstances prevailing in Tanzania. Specific policies have been developed. The objective of this Building Block is to prepare a clear statement of objectives for water resources management in Tanzania; given current development policies and social, economic and political context. Analysis of evolving policies and context have been examined to allow consideration of how water resources management needs to be further adapted in future in order to ensure sustainable development.

Building Block 3: Economics and Financing

The economic appraisal of water resources and the financial aspects of providing access to the resource pose issues bound up with social and political processes. This is apparent in Tanzania in a range of water related activities from rural water supply to hydropower development. However, it is clear that whilst the resource base offers many opportunities for development, the scale of the interventions required to access the resource would be beyond Government capacity. Certainly new approaches to the use of economic instruments in allocating, delivering and protecting the resource are required to prevent reliance on full Government financing. In general this study will examine a wide range of economic and financing questions necessary to be considered in effective water resources management. The objective of the study is to define the economic and social value of water in Tanzania, to ensure a sound economic basis for the sustainable management of water resources, and to consider financing options for water development/management, thorough:

- Reviewing of the value of water.
- The analysis of macro and micro economic issues related to water resource management, financing of infrastructure for data gathering and management; and the role of the Water User Associations in these new structures. All the necessary economic and environmental factors are to be fully addressed.
- Appropriate pricing policies that provide economic incentives to achieve stated water management objectives; including conservation measures and water source protection efforts.

Building Block 4: Water Legislation, Regulations, and International Waters

Appropriate and enforceable water resources legislation is a pre-requisite for effective management of water resources. The effectiveness and enforceability of water laws and regulations depend to a great extent not only on the adequacy of the scope and content of such laws/regulations but also on the soundness, competence, transparency and accountability of the relevant institutions; and the participation of all the key players, and
at various levels. Thus the objective of the Water Legislation and Institutional Framework Building Block is to review existing laws/legislation related to and those affecting water resources management in order to achieve stated water management objectives in Tanzania. The process will recommend measures for strengthening or modifying exiting laws; and measures necessary for enforcement. An important strategy is to separate the regulatory functions from the supply functions of wastewater collection and delivery, to avoid conflicts of interests, ensure compliance and guarantee financial autonomy. However, the inter-linkages among all the aspects are to be well defined and strongly spelt out.

Building Block 5: Institutional Arrangements, Participation and Capacity Building

In Tanzania the institutional framework for water resources management need to be strengthened. There has been little community involvement in water resources management activities. Community participation is essential to build awareness and instill water resources responsibility and management at watershed/local level. The objective of the study has been to propose immediate and long-term institutional arrangements for water resources management, within the political, social cultural and economic context of Tanzania, and adapted to existing institutions (national, basin and local). A particularly important focus of the study is to analyze institutional and financing solutions for participatory management of watersheds at the community level, building upon traditional practices and institutions and integrating this into basin-wide approaches. The analysis is taking particular account of existing Government district focus, national policy objectives including stakeholder participation, and the concept of Water User Associations.

Program of Action

The entire program of Action for the Review of Policy, Legislation and Institutional Framework started with the review of the various study reports in order to assess what needs. Major and minor policy principles have been revisited and analyzed. The review started with MoW internal agreement and understanding of concepts, terminology, components and an understanding of global and national guiding principles. A series of stakeholder consultation workshops would be held, on both policy and legislation. The workshops would be public discussion gatherings. The results of the workshop will form basis for the final draft to be submitted to the Cabinet. The discussions and the conclusion of the workshop would form basis for the preparation of the final Draft of the Policy.

The Process

Since the Water Policy touches upon many other policies, its review process has to be comprehensive, consultative, involving public discussions to accommodate a broad based consensus on the various issues raised. A multidisciplinary Task Team from the following Sectors, led by MoW, has been instrumental in carrying out the process (See Annex III):

1. Energy – Hydropower
2. Minerals
3. Lands
4. Environment
5. Irrigation
6. Livestock
7. Industries
8. Forestry
9. Fisheries
10. Wildlife
11. Community Development, Women and Children
12. Tourism*
13. Local Government*

An Analytical Structure has been followed in guiding the process through the following steps:
1. Determination of the Importance of Water
2. Identification of Key Problems and Critical Issues
3. Quantifying/Ranking of Pressures/Demands on Water Resources
4. Identifying Options for Mitigation
5. Evaluation of Proposed Solutions
6. Policy Formulation
7. Preparation of an Action Program
Steps 1 – 4 have been packaged into Matrixes (see Annex IV as an example)

**Status to date**
The review of the Water Resources Management Policy is progressing well. To-date the output of this process is the Zero Draft of Water Resources Management Policy and the review team is harmonizing and consolidating the document, identifying critical gaps that would be filled in the still ongoing consultation process.

**Conclusion**
We are reviewing the existing Water Policy in a comprehensive manner, addressing all issues analytically. We fully recognize the challenges that we are facing. In the past few years we had power outages that had serious negative impacts on the national economy, irrigated agriculture has suffered and the environment is seriously degraded. Sectoral conflicts have escalated in some of the Basins. Sectoral approach to planning coupled with dwindling government resources to the sector have had negative consequences on our water resources. Non participatory approaches have alienated stakeholders and disrupted their trust in government initiated interventions. These are challenges that are being addressed.
Framework for the National Water Policy

Water Resources Management

Rural  Urban  Irrigation  Hydropower  Fisheries  Ecology  Mining  Navigation  Others...
# WATER RESOURCES MANAGEMENT POLICY

## MULTIDISCIPLINARY TEAM & BUILDING BLOCKS

<table>
<thead>
<tr>
<th>BUILDING BLOCK</th>
<th>MAIN ISSUES/ELEMENTS TO BE ADDRESSED</th>
<th>MOW RESOURCE PERSON/COUNTER PART</th>
<th>INTERNATIONAL CONSULTANT</th>
<th>LOCAL EXPERT</th>
<th>RESPONSIBLE PCT-TEAM MEMBER</th>
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</thead>
<tbody>
<tr>
<td><strong>Building Block 1:</strong> Environment and Natural Resources</td>
<td>Environment and ecosystem, pollution, water quality; catchment degradation, protection and management</td>
<td>H. Mjengera Mrs. Mwabeza O.H. Rumambo</td>
<td>Environment-water Quality Expert</td>
<td>Environmentalist Forest Expert</td>
<td>I.E. Mwakalinga</td>
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<td>Information systems, water balance, water scarcity, water rights, water allocation</td>
<td>W. Mwaruvanda R.J. Mngodo I.E. Mwakalinga</td>
<td>River Basin Modeling Expert</td>
<td></td>
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<td></td>
<td>Groundwater resources, groundwater development and management</td>
<td>L.E. Kongola Hamza Sadiki Mrs. G. Nsanya</td>
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<tr>
<td><strong>Building Block 2:</strong> Social-Economics and Political Assessment</td>
<td>Water supply, sanitation, water demand, water utilization</td>
<td>Alex Kaaya B.A.S. Luhumbika S.A. Faraji</td>
<td>Basin Management Advisor</td>
<td>Hydropower Livestock Irrigation/Agronomist Fisheries</td>
<td>S.A. Faraji</td>
</tr>
<tr>
<td></td>
<td>Water resources management, integrated planning</td>
<td>B.A.S. Luhumbika S.A. Faraji L.E. Kongola</td>
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<tr>
<td><strong>Building Block 3:</strong> Economics and Financing</td>
<td>Water economics, value of water, water charges, fines, pollution charges, incentives, financial autonomy and self financing, cost recovery</td>
<td>S.M. Kamugisha W. Kasanga O.H. Rumambo</td>
<td>Water Resources Economist</td>
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</tbody>
</table>
| **Building Block 4:** Water Legislation, Regulations, and International Waters | Water administration, legislation, regulations | R. Swai  
W. Mwaruvanda  
I.E. Mwakalinga | International Basin Management Advisor |  | I.E. Mwakalinga |
|  | International waters | J.M. Mihayo  
S.A. Faraji |  |  |  |
| **Building Block 5:** Institutional Arrangement and Participation, Capacity Building | Stakeholder participation, stakeholder awareness and education, institutional arrangement, coordination, capacity building | L.B. Haulle  
W. Kasanga  
O.H. Rumambo |  | W. Mutayoba |  |
|  | Information products, dissemination | I.E. Mwakalinga  
Hamza Sadiki  
R.J. Mngodo |  |  |  |
# REVIEW OF WATER RESOURCES MANAGEMENT POLICY

## ANALYTICAL REVIEW OF CRITICAL PROBLEMS AND ISSUES

### BLOCK 1.1 Environment

<table>
<thead>
<tr>
<th>No.</th>
<th>PROBLEM</th>
<th>EVIDENCE</th>
<th>SOURCE OR CAUSE</th>
<th>RELATIVE IMPORTANCE</th>
<th>MITIGATION OPTIONS</th>
</tr>
</thead>
</table>
| 1   | Pollution of water sources | • 68% of industries discharge untreated waste water to streams  
• Most industries do not have sanitary land fill  
• Most of waste water treatment facilities are not in operation, (e.g in tanneries, sisal and textile factories) | • Use of inappropriate technologies  
• Most of the industries did not conduct EIA prior to establishment and did not have environment management plans  
• Lack of coordination between industry and water sector | • Pollution from industries if not properly handled will cause deterioration of water quality and hence increase of diseases occurrence | • To accommodate EIA requirement in the Licensing and Registration Act  
• Promote Cleaner Production Technologies.  
• Awareness raising to politicians, industrialists and the public  
• Institute polluter pays principle  
• Promote the establishment of Environmental Management Plan of Industries constructed without EIA (it should have a legal backing) |
| 2   | Water quality deterioration | • Increased incidence of water borne diseases  
• High nitrate and bacteria in water  
• Incidence of baby-blue and cancer  
• Marine pollution from various vessels | • Indiscriminate disposal of domestic, municipal and industrial wastes  
• Excessive use of agrochemicals in farms near water sources  
• Weak enforcement of laws  
• Inadequate legislation | • Unsafe water will cause disease to the population and force them to incur financial expenses for medical treatment which otherwise would have been used for other beneficial purposes | • Conduct EIA  
• Carry out integrated planning  
• Protection of catchment areas  
• Require industries to adopt clean production technologies  
• Institute effective and implementable standards  
• Involvement of women in creation of awareness on the importance of water resources management |
EXISTING POLICY AND LEGAL FRAMEWORK REGULATING ENVIRONMENTAL MANAGEMENT IN TANZANIA

A.F. TILLYA
VICE PRESIDENT'S OFFICE DIVISION OF ENVIRONMENT
SUMMARY

Tanzania has a National Environment Policy which co-ordinates and guides the management of the environment. Hand in hand with this there are Sectoral and Cross-Sectoral policies. At the moment, Tanzania does not have an overall National Environmental Legislation to guide the management of environment; however, a number of environmental related legislation exists at sectoral level.

This paper gives an overview of the National Environmental Policy; the existing sectoral legislation and the weakness of those legislations. It also give an overview of the current efforts/strategies to mitigate the existing weaknesses. The experience of Malawi in implementing Environment and Law programme is taken as a guiding example on how to develop a National Environmental Legislation and to harmonise it with Sectoral Legislation.
1.0 INTRODUCTION

Tanzania has a National Environmental Policy which co-ordinate and guides the management of the environment. Hand in hand with this there are sectoral and cross-sectoral policies. At the moment, Tanzania does not have an overall National Environmental legislation to guide the management of the environment, however a number of environmental related legislation exists at sectoral level. Efforts are on place to develop an Environmental legislation for Tanzania together with a legally binding institutional arrangement for managing the environment.

2.0 THE NATIONAL ENVIRONMENTAL POLICY

The National Environmental Policy tries to address the six major environmental problems as identified in the National Environmental Action Plan (NEAP) in 1994. These problems are:-

a. Land degradation
b. Lack of accessible, good quality water for both urban and rural inhabitants
c. Environmental pollution
d. Loss of wildlife habitat and biodiversity
e. Deterioration of aquatic systems; and
f. Deforestation.

2.1 The Overall Objectives

The policy seeks to provide the framework for making fundamental changes that are needed to being environmental consideration into the mainstream of decision making in Tanzania. It seeks to provide policy guidance to the determination of priority actions and provide for monitoring and regular review of policies, plans and programmes. It further provides for sectoral and cross-sectoral analysis in order to achieve compatibility among sectors and interested groups (NGOs, Private Sector, Local Communities etc). The policy seeks to balance economic growth with efficient management of the environment and sustainable use of natural resources. This means pursuing both economic growth and environmental objectives by integrating
environmental concerns and approaches into national development programmes.

Tanzania recognises that investment in development is vital for environmental protection because the environment is the first victim of acute poverty, urban overcrowding, overgrazing, shrinkage of arable land and desertification. However development which focuses only on increasing the production of goods without regard to the long-term sustainability of the resource on which such production is based will sooner or later, run into problems of declining productivity, which also will impact adversely on poverty. Economic development is unsustainable if it increases vulnerability to environmental crisis.

The overall objectives of the National Environmental policy are therefore:-

a. to ensure sustainability, security and equitable use of resources for meeting the basis needs of the present and future generations without degrading the environment or risking health or safety;

b. to prevent and control degradation of land water, vegetation, and air which constitute our life support systems;

c. to conserve and enhance our natural and man-made heritage, including the biological biodiversity of the unique ecosystems of Tanzania;

d. to improve the condition and productivity of degraded areas including rural and urban settlements in order that all Tanzanians may live in safe, healthful, productive and aesthetically pleasing surroundings;

e. to raise public awareness and understanding of the essential linkages between environment and development, and to promote individual and community participation in environmental action;

f. to promote international cooperation on environment agenda, and expand our participation and contribution to relevant bilateral, sub-regional including implementation of Treaties.

2.2 Sectoral and Cross-Sectoral Policies

The National Environmental Policy analyses and give direction on the following sectoral policies:- Agriculture, livestock, Water and Sanitation,

It also gives direction on cross-sectoral policies to address; Poverty, Demographic dynamics, Land Tenure, Technology, Biodiversity, Public participation and Education, Private Sector and NGOs and Enhanced Role of Women.

2.3 Policy Instrument

Achievement of proposed policy objectives on sectoral and cross-sectoral environmental concerns suggests the use of the most effective means. Such means must ensure that the exploitation of natural resources, the direction of investment and the orientation of technological development are all in harmony and enhance both the current and future potential to satisfy human needs and aspirations. In their combined effect, effective policy instrument must promote these important aims, namely:- anticipatory and preventive response rather than reactive responses; voluntary compliance as a first resort; economic growth objectives and environmental objectives which are mutually supportive; and long-term and short-term objectives which are reconciled.

The following have been identified as being priority policy instruments towards achieving the objectives. These are:-

- environmental impact assessment
- environmental legislation
- economic instruments
- environmental standards and indicators
- precautionary approach and
- international cooperation.

3.0 LEGISLATION

According to the report on Existing Legislation Pertaining to Environment prepared in 1993-94 by the Division of Environment, Tanzania has nearly one
hundred Acts and Ordinances and additional subsidiary legislations which guide to environmental management.

For the purpose of this paper only some of them are presented and are grouped into three categories. Those which related to:

a. Land Use
b. Natural Resources Conservation and
c. Pollution Control.

3.1 Land Use:

- Town and Country Planning Ordinance Cap. 378, supp. 61 was established with the purpose of establishing a land use planning scheme for designated areas.

- Local (District and Urban) Authorities Acts of 1982 give various powers to establish by-laws regarding protection of soil, agriculture, water supplies and other natural resources. The Rural Land (Planning Utilisation) Act 1973 empowers the President to establish specified areas for purposes of the Act, with respect to which the Minister may issue regulations on construction activities, farming including forestry, mining, reservation for gardens, forests or parks, revocation of nights of occupany etc.

- Range Development and Management Ordinance establishes a mechanism for managing natural resource use, including livestock management on declared “range-land development areas”. The Act permits the Ministers responsible for animal husbandry to declare rangeland development areas and to establish Range Development Commission for each area.

- The Land Act of 1999 vest all land in the President as trustees on behalf of all citizens of Tanzania. The President, or every person to whom the President may delegate any of his functions under the Act is to exercise those functions, powers and discharge duties as a trustees for all the land in Tanzania so as to advance the economic welfare of the citizens.
Grass Fires (control) Ordinance Cap. 135, requires individuals to have permission from the District Commissioner and to notify neighbours before burning grass on their own properties.

The Plant Protection Ordinance Cap. 133 gives the Minister for Agriculture authority to make rules for preventing and controlling attacks of disease by spread of pests, including quarantines, destruction of plans etc.

3.2 Natural Resources and Conservation Areas

The National Parks Ordinance - gives authority to the President to designate protected areas, within which hunting, taking of vegetation, occupation and travel require prior permission of the Director of the Department of Wildlife.

Wildlife Conservation Act of 1974 permits the President of the Minister responsible for wildlife to establish different categories of protection of geographic areas and specified animals outside national parks; the commonly known protection schemes are game reserve, game controlled areas and partial game controlled areas.

Fisheries Act of 1970 regulates the fisheries resource by requiring a license to “take” fish or marine products. The Minister is also given authority to establish marine reserves or parks for any purpose.

The Forestry Ordinance of 1959 regulates the forestry resources by requiring a license to “take” different categories of forest and plant produce from certain lands. It also permits establishment of different categories of protected areas in unreserved public lands, Forestry Reserves, and Forestry Plantation. Such reservations may be managed by local or central government authorities. It established fees for taking various forest products. Certain restrictions are also imposed on
unreserved forest areas, requiring prior permission for taking forest products for particular uses. Removal of forest products from unreserved areas is completely restricted for some uses only.

- The Mining Act of 1998 requires possession of licenses, to participate in different stages of the mining process for minerals; reconnaissance, prospecting and mining. The Act also requires that, where the mining operations intended to be carried out fall within a scale of mining operations set out in the Regulations the applicant for the mining licence or gemstone mining license to commission and produce an Environmental Impact Assessment on the proposed mining operations.

- The Local Government (District and Urban) Authorities Acts allow local authorities to regulate forests and forest produce, wildlife, building minerals and other natural resources.

- The supply of water as a natural resource is addressed by the waterworks Ordinance, the Urban Water Supply Act, and the Water Utilization and Control Act.

- Waterworks Ordinance Cap. 281 establishes Water Authorities to be responsible for supply of water in those areas designated by the Minister.

- Urban Water Supply Act, 1981, establishes NUWA to secure water supply for those towns specified under the Act. NUWA is also given power to advise the government on conservation and use of water and to formulate potable water standards.

- Water Conservation and Control Act establishes a central water Board and Water Basin Boards to manage water utilization in designated “National Water Supply Sources” and Pollution. The Act is
administered by the Principal Water Officer through the Minister for Water and Regional Water Engineers.

3.3 Pollution

- Waterworks Ordinance Cap. 281 specifies that pollution of water supplies in certain instances are offences under the Ordinance, punishable by penalty.

- Urban Water Supply Act, 1981, gives the National Urban water Authority power to make rules regarding surface or ground water pollution and specifies that it is an offence to pollute water supplies, and, in certain instances, punishable by penalty.


- Public Health Sewerage and Drainage Act gives municipal and town authorities power to construct public sewers in those areas declared by the Minister for Works. The Act specifies that prohibitions exist on draining certain substances into public sewers.

- National Industries (Licensing and Regulations) Act creates an Industrial Licensing Board, through which all industries classified as large and medium-sized must acquire a licence in order to operate. The Minister is given an option to impose conditions in licenses.

Several Acts address water pollution indirectly. For example:

- The penal code stipulates that “fouling of water” is a misdemeanour, punishable with imprisonment for a term exceeding two years, or with a five, or both.
The Fisheries Act, 1970 gives the Minister responsible for fisheries the authority to make regulations regarding preventing obstruction and pollution of territorial waters.

The Tanzania Fisheries Research Institute Act, 1980 established the TAFIRI and gives it the authority to research programmes designed to facilitate the discovery of the causes, ways of abating and preventing marine pollution.

The Tanzania Bureau of Standards Act establishes the Tanzania Bureau of Standards which has the authority to "approve" products achieving certain standards by issuing a "standard mark" for production processes and products which meet those standards.

The Local Government (District and Urban Authorities) Acts of 1982 give particular powers to local governments to protect public health and regulate pollution problems including water pollution.

The Penal Code Cap. 16, establishes penalties for voluntarily vitiating of the atmosphere so as to make it noxious to the health of persons in the vicinity.

The Merchant Shipping Act, 1967, prohibits emission of dark smoke from ships for more than five minutes in any hour within limits of a port.

The Protection from Radiation Act, 1983, establishes the National Radiation Commission to advise the government and to establish licensing system for matters related to import, installation, operation and disposal of radioactive materials. The Act also establishes an insurance fund and Radiation Protection Advisory Committee to advise on safety, use and disposal questions, legal measures to be taken, determination of extend of risk and exposure, inspection of premises, and dissemination of information to the public.
Fire and Rescue Services Act, 1985, establishes the National Fire Brigade and gives the Brigade authority to for fire safety. The Act also gives the Commissioner general powers for determining fire hazards and abating fire hazards.

The Factories Ordinance, Cap. 297, is in place to regulate worker safety, also contains sections regulating dangerous liquids and fumes in factories.

Pharmaceutical and Poisons Act, 1978, regulates the sale of pharmaceuticals by requiring manufacturers, importers and sellers of those substances fitting the definition to be licensed by the Pharmacy Board, also created under the Act.

The Explosive Act, Cap. 538, requires prior permit from the Commissioner for Mines to transport, acquire, possess, manufacture, dispose of, store or use explosives.

The Tropical Pesticide Research Act, 1979, created the TPRI to regulate the manufacture, import, and scale of pesticides in Tanzania. No pesticide may be manufactured, imported or sold without prior registration with TPRI.

The Rufiji Basin Development Authority Act, 1975 created the Rufiji Basin Development Authority, which creates a regional management authority for the river area, with authority to regulate, among other activities, pollution discharge in the area.

4.0 WEAKNESS: RELATION BETWEEN EXISTING LAWS WITH OTHER SECTORS

Agenda 21 stresses the need to move from a development model in which sectors act independently of each other, where decisions take into account intersectoral effects, to improve intersectoral co-ordination. The current
legislative structure includes a wide range of laws affecting the environment which in turn empowers various sectors of Government to implement and enforce them. In other words, the laws are sectoral with no legally binding provision for inter-sectoral co-ordination. Much of this legislation is out of date given new information regarding sustainable environmental management. Currently many different sectoral entities engage in informal co-ordination in management of specific programmes and projects. However, few if any formal requirements for sectoral co-ordination have existed until now. Thus any coordination which does exist may come out of project or programme or the requirement of the National Environmental Policy rather than because it is legally binding.

5.0 STRATEGIES TO MITIGATE EXISTING WEAKNESSES

Following the Rio Conference on Environment and Development Tanzania has initiated a number of policy and legislative reviews to meet changing national priorities and emerging environmental challenges. After the adoption of the National Environmental Policy in 1997 a number of sectoral have been reviewed and others are on the process. Examples are the Forestry, Agriculture, Wildlife, Science and Technology, Beekeeping and Land Policies. Other sectors like Water and Human Settlement are on the process of reviewing their policy.

Tanzania is aware that Environmental Legislation is an essential component of an effective environmental management. It is among the six instruments identified as being the means to achieve the National Environmental Policy Objectives. The broad range of areas covered under the field of environment, the structure and division of Government functions, and the numerous number of major players necessitate the formulation of a framework environmental legislation and a related set of setoral legislation to provide the legal basis for effective and comprehensive environmental management. In this context the Government through the Vice President’s Office has initiated a formal review of the institutional and legal arrangement for environmental management through the Institutional and Legal Framework on Environmental Management Project (ILFEMP).
The goal of the ILFEMP is to establish a highly operational and authoritative framework for environmental management in Tanzania. Objective is to establish the basis to enable the government make an informed decision on the preferred institutional structure for future environmental management. This in turn will inform the drafting of a new Framework Environment Bill (ILFEMP Phase II) to provide the legislative underpinning for institutional reform and the future management of Tanzania environment. The desired outcome is that Tanzania will have a harmonized and affective institutional and legal framework that will enable the stakeholders to play their part in achieving sustainable development.

Phase one of the study involve legal analysis of the existing legal structure for a purpose of:-

a. Identifying the critical legislation and case law affecting Environment and Natural Resources policy and management;

b. Assembling and summarising this body of law;

c. Identifying and explain governmental responsibilities and where they reside (local and central);

d. Explaining law or group of law (for example, how water law relates to land law), and;

e. Explaining significant legal requirements and steps of relevant regulatory, planning, or decision processes,

f. Assessing how and whether required regulations comport with legal mandates.

The final report is intended to held decision makers understand what laws require, how various laws interact, what legal responsibilities and requirements overlap, and what legal uncertainties exist that significantly affect or might affect Environment and Natural Resources Management. The report will among, other
things, provide a baseline to help decision makers determine how or whether legal responsibilities are in fact being met and how Environment and Natural can be improved by new or revised law and other administrative reforms.

6.0 EXPERIENCE WITHIN THE REGION

Malawi has embarked itself on a similar Environmental and Law Programme - the Environmental Law and Policy Reform Project, to address critical environmental and natural resources problems as unidentified in their National Environmental Action Plan (NEAP) in 1994.

The objectives of the project were to assist the government of Malawi:-

(a) to review the existing legislative and institutional framework for the management of priority natural resources;
(b) to adapt such legislation to the emerging policy orientation and environmental management requirement i.e emerging environmental framework and multilateral agreements;
(c) to finalize the Environment Management Bill, 1995;
(d) to finalize and formulate priority regulations under the propose bill and;
(e) to build capacity of relevant Government departments in environmental policy and administration through training and provision of materials for reference.

Major activities under the project were to

♦ finalise the Draft Environment Management Bill, determine the need for sectoral legislation reform and implement regulations
♦ Draft priority implementing regulations and
♦ Harmonize priority sectoral legislative regulations.

The Environment Management Bill 1995 was reviewed and tabled as a Bill in Parliament and it was passed in June 1996 and assented to in August the same year.

Finalization of the Environment Management Bill 1995 was followed by evaluation of on going activities on environment and natural resources in Malawi, of legislative nature, review existing legislation in order to identify the need for review, gaps,
inconsistencies and where necessary to give clear direction on options for review and harmonization.

The sectoral legislation review process revealed a number of areas requiring immediate reform and the extent and status of on going activities. The following were identified as key issues: Land Use and Management; Forestry Act 1997 and Review of Subsidiary Legislations; Review of National Parks and Wildlife Act 1992; Fisheries Conservation and Management Bill 1997; Water Resources; Waste Management and Sanitation.

Review is being done accordingly and a number of them has already been finalized. The Fisheries Bill was finalized and enacted in 1997. It provides for among other things, the regulation, conservation and management of fisheries of Malawi; and related issues. It provides for the role of communities, which includes establishment of beach village communities. It also provides for the protection of fish stock from effects of pollution and siltation.

The Ministry of Agriculture and Livestock Development in consultation with Environmental Affairs Department proposed a study and the possible drafting of legislation to government land use and management. A final copy of the Draft National Parks and Wildlife Act (Amendment Bill) has been submitted by the consultant who was assigned with the task. The draft has provided for participation of communities. It is anticipated that the Bill could be tabled for debate in the National Assembly later in the year.

Sanitation and Waste Legal Review consisted of the preparation of report and drafting regulation. Both the report and regulations, have covered in detail aspects of solid waste management in accordance with the requirements of Basel Convention and Bamako Convention.

Regarding toxic substances and chemicals, it was felt that there was a need to clarify first the technical issues pertaining to the regulation of toxic substances and chemicals, and then to develop the appropriate legislation. There was a feeling that
this would best be achieved through subsidiary legislation under the Environment Management Act, 1996. Work on this commenced on 1st April, 1999.

CONCLUSION

Tanzania is determined to effectively manage the environment, and a lot has been done towards achieving this goal. Currently there are in place the National Environmental Action Plan, the National Environmental Policy, and a number of sectoral policies and some laws have been reviewed to include the concept of sustainability. Section 3, subsection 1 paragraph (e) of the Land Act 1999, require all persons exercising powers under, applying or interpreting the Act to ensure that land is used productively and that any such use complies with the principles of sustainable development. Section 64, subsection 1 of the Mining Act 1998 require an applicant for mining licence or the gemstone mining licence to commission and produce an impact assessment on the proposed mining operations in the cases where the licence fall within a scale of mining operations set out in the Regulations.

Tanzania is on the process of developing a National Environmental Legislation. Phase one of the project on the Institutional and Legal Framework for Environment Management is nearing completion. The outcome of this phase will inform the drafting of Environmental Legislation which is Phase 2 of the project. It is expected that in a very near future Tanzania will have in place, an effective legal framework to regulate environmental management.
THE EXISTING LICENSING PROCEDURES
ELECTRICITY SUB-SECTOR

Paper Presented by:

Theophillo Bwakea
AG. ASSISTANT COMMISSIONER – ELECTRICITY
MINISTRY OF ENERGY AND MINERALS

TO THE CONFERENCE ON LICENSING PROCEDURES
FOR ELECTRIC POWER DEVELOPMENT
AND ENVIRONMENTAL MANAGEMENT
IN TANZANIA: IRINGA 4TH – 7TH OCTOBER, 1999
A: Electricity Development in Tanzania – Historical Perspective

The first public supply of electricity in Tanzania was established in 1908 at Dar es Salaam. It served the railway workshops and a part of the town. When Tanganyika territory was mandated to Great Britain in 1920, a government electricity department was formed under the Tanganyika Railways to take over and operate the public services left by the Germans.

In 1931, the Government handed over the undertakings at Dar es Salaam, Dodoma, Tabora and Kigoma to two private enterprises to undertake the development of public electricity supplies in Tanganyika.

One of these companies was the Tanganyika Electric Supply Company Limited (TANESCO). It was given a concession area of 100km radius centred on the Grand Pangani Falls near Tanga. Tanesco was wholly owned by the East Africa Power and Lighting Company Ltd. which was operating public electricity supplies in Kenya under license from the Kenya Government.

The other company was the Dar es Salaam and District Electric Supply Company Limited (DARESCO) which was given the rights for production, distribution and sale of electricity in four concession areas of Dar es Salaam, Dodoma, Tabora and Kigoma. Daresco was owned partially by the Tanganyika Government and partially by Tanesco.

The rights and obligations attached to the concessions were contained in licenses issued to Daresco dated January 21, 1931 and to Tanesco dated April 22, 1931. The period of the license granted to Daresco extended to September 29, 2011, while the license granted to Tanesco was to expire on April 24, 1991. In 1957 all licenses of other power companies were revoked and a single license to cover a
period of 55 years was issued to Tanesco under the Electricity Ordinance (Cap.131) of 1957.

In 1937, Daresco was operating a small hydro plant to supply power at Moshi and by the end of 1951 the company was very active in Dar es Salaam, Tabora, Dodoma, Mwanza, Mbeya, Iringa, Lindi, Mtwara and Morogoro. Generation in all the stations was largely dependent on imported diesel oil.

By 1933, Tanesco had developed Grand Pangani Falls, about 65km from the Coast on the Pangani River to supply power to Tanga town and the sisal estates. In 1936, Tanesco had constructed a dam 90m long across the Pangani River and had commissioned two generators totalling 5MW. In 1947, 1952 and 1959, three more sets were installed, bringing the total capacity up to 17.5MW. In 1945, the company was exporting power to Mombasa, Kenya whereby the contract was terminated in 1965.

In 1964, three years after independence, the Government of Tanzania bought 100% shares of Tanesco which also meant Daresco was 100% owned by the Government. In 1968, the two companies were merged into a single organization called Tanzania Electric Supply Company Ltd. (TANESCO). The main functions of the Company are to generate, transmit, distribute and sell electricity on the mainland portion of the United Republic of Tanzania. Starting in 1980, Tanesco provided bulk supply to the Zanzibar State Fuel and Power Corporation through a 132KV submarine cable.

As a public utility, Tanesco operate under both the country’s Company Ordinance Act (Cap.212) of 1931 and the Electricity Ordinance Act (Cap.131) of 1957. From its creation, Tanesco had an effective monopoly on the generation and supply of electrical energy on the mainland of Tanzania.
B. **Hydropower Generation**

Tanzania has extensive hydroelectric resources with a proven potential of 4.0 GW. Up to date, it is only 10% of this potential which has been developed as indicated below:

<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1964</td>
<td>Hale Power Station (21MW) commissioned.</td>
</tr>
<tr>
<td>1969</td>
<td>Nyumba ya Mungu Power Station (8MW) Commissioned.</td>
</tr>
<tr>
<td>1975</td>
<td>Kidatu hydropower station Phase I (100MW) Commissioned.</td>
</tr>
<tr>
<td>1981</td>
<td>Completion of Mtera dam and Kidatu Phase II (+100MW) Commissioned.</td>
</tr>
<tr>
<td>1988</td>
<td>Mtera Power Plant (80MW) commissioned</td>
</tr>
<tr>
<td>1995</td>
<td>New Pangani Falls Power Station (68MW) Commissioned.</td>
</tr>
<tr>
<td>2000</td>
<td>Expected Commissioning of Lower Kihansi Hydropower Plant (180MW).</td>
</tr>
</tbody>
</table>

C: **Power Master Plan**

Electricity demand in Tanzania reached a peak demand of about 400MW in the third quarter of 1999. The total energy demand in 1997 amounted to 1,978 GWh and is expected to grow by 10% per annum so that by the year 2003 energy demand will amount to 4000GWh with peak demand of about 700MW.
The Power Master Plan has been recently reviewed to capture this trend and the following identified hydro sites have been studied for possible implementation in the future:

<table>
<thead>
<tr>
<th>Site</th>
<th>River</th>
<th>Level of Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rumakali</td>
<td>Rumakali</td>
<td>Feasibility</td>
</tr>
<tr>
<td>Ruhudji</td>
<td>Ruhudji</td>
<td>Feasibility</td>
</tr>
<tr>
<td>Mandera</td>
<td>Pangani</td>
<td>Feasibility</td>
</tr>
<tr>
<td>Stieglar's Gorge</td>
<td>Rufiji</td>
<td>Prefeasibility</td>
</tr>
<tr>
<td>Mpanga</td>
<td>Mpanga</td>
<td>Prefeasibility</td>
</tr>
<tr>
<td>Masigira</td>
<td>Ruhuhu</td>
<td>Prefeasibility</td>
</tr>
<tr>
<td>Upper Kihansi</td>
<td>Kihansi</td>
<td>Prefeasibility</td>
</tr>
</tbody>
</table>

Funding of hydro projects identified in the Master Plan is obtained from Donors and Multilateral Funding Agents. The candidate sites are included in the Master Plan after undergoing full feasibility studies in order to ascertain the technical and economic viability of the sites. According to these studies, the sites are ranked according to their attractiveness and projected load demand. Environmental Impact Assessments (EIA) are mandatory and form part of the studies. Issues which are normally addressed in the EIA include:

(i) Change of hydrological regime (due to construction of dams, reservoirs and water falls) in the vicinity of the project and downstream with physical and socio-economic effects.
(ii) Economic and ecological sustainability in the catchment area.
(iii) Changes in terrestrial and aquatic biota.
(iv) Public health due to the creation of habitats for disease vectors.
(v) Reservoir sedimentation and depletion of storage capacity.
(vi) Change of biodiversity.
(vii) Flooding of outlying areas, its effect on local flora and fauna; etc.
D: Legislation

The main Acts regulating hydropower development in Tanzania are:-

(i) Electricity Ordinance (Cap.131) of 1957 – license to generate, supply and sale electrical energy under specific conditions.
(ii) Water Utilization (Control and Regulation) Act, 1974 (Section 15) - grant of a Water Right (Provisional/Final).
(iii) Tanesco’s Company Ordinance Act (Cap.212) of 1931 – general rules and regulations as required by the public companies in the country.

E: Other Procedures

Projects identified in the Power Master Plan will be considered for implementation. As mentioned earlier, in 1917, licenses for the other power supply companies were revoked and a single license was issued to TANESCO under the auspices of the Electricity Ordinance. However, small projects (less than 1MW) don’t appear in the Power Master Plan but are considered separately for licensing possibilities.

F: Consultations

Consultations on EIA in determining what impacts are important and evaluation of mitigation measures is always done among the Financiers, TANESCO, NEMC and Ministry of Energy and Minerals, Consultants and River Basin Water Officers. Hydropower projects smaller than 1MW are not included in the Master Plan. Licensing of these mini-hydro projects normally considered under the theme of furthering rural electrification and are licensed to and implemented by different
entities like Missionary Settlements encompassing hospitals, convents and schools for their own private use. Examples of such projects are:-

<table>
<thead>
<tr>
<th>Entity</th>
<th>River</th>
<th>Installed Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uwemba Mission</td>
<td>Hagafiro</td>
<td>200KW</td>
</tr>
<tr>
<td>Lugarawa Mission</td>
<td>Lugarawa</td>
<td>250KW</td>
</tr>
<tr>
<td>Tosamaganga Mission</td>
<td>Tosamaganga</td>
<td>300KW</td>
</tr>
<tr>
<td>Kotako Farm</td>
<td>Mchombe</td>
<td>1000KW</td>
</tr>
</tbody>
</table>

**G: Licensing Procedures for Mini-hydros**

Licensing of mini-hydro is done through the Ministry of Energy and Minerals. The following are the basic procedures:-

(i) Submission of the application for the license to the Ministry;
(ii) Submission of the feasibility study;
(iii) Evaluation of the study by the Ministry (technical, economic, financial and environmental evaluation);
(iv) Consultation among the Ministry, Consultant, and Applicant,
(v) Preparation of the generation license;
(vi) Signing of the license by the Minister;
(vii) Collection of the licensing fee by the Secretary/Electricity Licensing Board; and
(viii) Collection of the license by the applicant.

The Ministry of Energy and Minerals is also responsible for licensing private thermal generation operators for standby basis when there is no power or in case the power supply from Tanesco power lines does not meet the quality required for the intended job. The Ministry of Energy and Minerals is also responsible for
licensing electrical contractors who are operating in the country. The contractors are registered in classes (Class A – E) according to qualifications and experience.

H: Terms of License and Rules of Operation

The Electricity Ordinance (Cap.131) of 1957 provides the legislation for the licenses. The Electricity Ordinance has been amended several times in 1957 and 1961 to match with the operation requirements and the socio-economic changes taking place in the country during that time.

The license for Tanesco was issued in 1957 and is scheduled to expire in the year 2011. This means that licensing of the hydro facilities to meet the demand until year 2011 has been automatic. For private power companies, licenses have time limit, the terms contained in the license can be referenced in the attached standard format of the license. Rules of operation for reservoirs and water rights are supervised by the Water utilization (Control and Regulation) Act, 1974 (Section 15).

I: Restructuring of the Electricity Industry

The restructuring of the power sector will have a direct impact on the existing licensing procedures. The monopoly position of TANESCO was ended in 1993 when the parliament endorsed to restructure the power sector with eventual privatization of Tanesco.

Since then, a number of independent generation facilities and other supply initiatives have been established and a number of others are being planned such as:-
A private developer (Independent Power Tanzania Limited – IPTL) has completed a 100MW diesel generation facility in Dar es Salaam, the commissioning of the plant is awaiting the finalization of the final tariff.

Tanesco buys excess power from the Kiwira Coal Mine (6MW) and the Taniganyika Wattle Company Limited (TANWAT – 1.5MW).

Tanesco imports power from Zambia at 33KV for distribution in Mbozi District and from Uganda at 132 KV for distribution in the Kagera Region.

Private generation based on the Songo Songo natural gas deposits (112 MW) is in the final planning stages.

Private generation on the Mnazi Bay Natural gas deposits (12 – 15MW) is being negotiated with would be investors.

A number of mining firms and some industries are planning to install their own generation facilities.

A number of power-based cooperatives are being formed, and two are currently in operation, one at Urambo and the other at Mbinga.

The new industry structure entails to unbundle vertically and horizontally existing Tanesco system into several business units in generation and distribution. New generation companies (hydro and thermal) will have to be licensed under new terms. New generation will be procured under transparent competitive bidding. Since the industry will be comprised of different players, an independent Regulator will be put in place in order to provide level playing field for all players.
J: Adequacy of Tanzanian Procedures

As mentioned earlier, Tanesco is the sole utility which was given the license to generate, transmit, distribute and sell electricity since 1957. Tanesco continued to be a monopoly until 1993. Up to date, Tanesco continues to be a dominant player in the electricity industry, controlling a market share of about 98% of the total generated capacity of which 62% is from hydro resources.

The Electricity Ordinance (Cap.131) of 1957 which supervises and regulates the industry is out-of-date and does not match with the socio-economic changes which have taken place in the country.

The Government being the owner, financier and regulator of Tanesco has created a situation whereby procedures for licensing and legislating the development of hydro power in the country to be non-transparent and non-responsive to the economic needs of the country and in meeting required environmental standards in particular.

There are no defined and proper coordination procedures among the relevant stakeholders charged with the overseeing of the preservation of the environment in relation to hydro power development.

Guidelines for EIA, evaluation and mitigation measures to address adverse impacts emanating from construction of hydropower plants are not clear and to some extent are confusing. It has been the practice to follow guidelines and standards set out by the Financiers without taking into account Tanzanian regulatory and legal requirements and the International obligations of Tanzania Government by its participation in International Agreements such as the Convention of Biodiversity.
K: Recommendations

(i) In order to achieve the objectives set out in the exercise of restructuring the power sector, new licensing procedures for hydropower development should be prepared in parallel with the restructuring of the power sector.

(ii) The roles of different stakeholders should be worked out in order to maximize the benefits of our hydro resources to the economy while maintaining the sustainability of the eco-system and biodiversity of our water resources through sound water resource management.

(iii) The Electricity Ordinance (Cap.131) governing the electricity industry should be reviewed and updated to match with the changes which have taken place in the country.

(iv) An independent regulator should be appointed who will balance the interests of all players in the industry and specifically with licensing obligations and monitoring of environmental mitigation measures for existing and construction of new hydropower plants.
ELECTRICITY ORDINANCE (Cap. 131) of 1957

It is notified that, the Minister has entered into an agreement with in the terms set out in the First Schedule to this notice and, pursuant to that agreement, has granted to licence to generate, transmit, distribute and sell electrical energy in the terms set out in the Second Schedule to this notice.

FIRST SCHEDULE

THE AGREEMENT

An agreement made the ..........day of .........., 1996 between the Minister responsible for Energy (hereinafter called the Minister, which term shall be deemed to include his successors in the said office) of the one part and (hereinafter called the Company, which term shall be deemed to include its successors and assigns) of the other part:

WHEREAS the Minister intends to grant to the Company a licence in the form in the Second Schedule annexed to these presents (hereinafter referred to as the licence), conferring upon the said Company a licence to produce, transmit, distribute and sell electrical energy in certain areas of the Country:

AND WHEREAS it is desirable that agreement should be reached on certain matters incidental and relating to the licence;

NOW THEREFORE, IT IS HEREBY AGREED AS FOLLOWS: -

1. (a)(i) The Minister may offer to the Company, as occasion in his opinion arises, opportunities for electrical development in areas and townships not included as area of supply in the licence on terms not less favourable than those contained in the licence;

(ii) The Company will within a period of six months from the date of receipt of such offer, notify the Minister whether they decline or are prepared to accept the same, and if they are prepared to accept shall state the terms and conditions, if any, of such acceptance;

(iii) If the Company does not reply to the offer within the said period of six months or if they decline the offer, or if the terms and condition upon which the Company is prepared to accept are not acceptable to the Minister, the offer may unless the development is to taken by the Government be made by advertisement to the general public and the Company shall not be barred by any omission to reply or by any previous action taken by them under paragraph (ii) of this sub-clause, or otherwise from accepting the same or acting in relation to it in all respect as a member of the
general public;

(iv) If the Company accepts the offer, the Minister will grant the Company a licence under subsection (1) of section 4 of the Electricity Ordinance (Cap. 131) of 1957 subject to such terms and conditions as may be agreed in accordance with law.

(b) Where in the opinion of the Minister development in any such other area or township might be carried out more efficiently and economically and in the interests of consumers generally by the Company operating in connection with one or more societies, persons or bodies of persons, the Minister, after consultation with the Company, may in the manner specified in sub-clause (a) hereof offer such opportunity to the Company jointly with such other societies, persons or body of persons.

2. The Minister will not, in regard to the licence, save by agreement with the Company:-

(i) Exercise the powers granted to him in paragraphs (a), (b), (c), and (d) of subsection (4) of section 4 of the Electricity Ordinance (Cap. 131) of 1957 by altering or varying the boundaries of any zone within any area of supply, by altering or varying the boundaries of any area of supply, where in his opinion such variation would be "uneconomic" to the Company. For the purpose of this clause "uneconomic" means that within a period of two years from the date of the said deletion, alteration, variation or declaration the annual revenue to be obtained from the area in respect of which the deletion, alteration, variation or declaration is made will amount to a sum representing less than fifteen per centum per annum above the overdraft rate of the National Bank of Commerce on the capital already expended in the area and that projected by the Company to be expended during the period of two years from the date of the said deletion, alteration, variation or declaration in such area.

(ii) Exercise the powers granted to him in paragraph (a) of subsection (4) of section 4 of the Electricity Ordinance (Cap. 131) of 1957 to delete from the area of supply granted the whole or any part any residual zone save where the Company is in default as provided for in the Electricity Ordinance (Cap. 131) of 1957 and the Minister is satisfied that the Company is unable or unwilling to provide an adequate supply and that there is another party (which term shall for the purposes of this clause be deemed to include the Government) who might be able to do so. Upon deletion in the manner aforesaid notwithstanding anything contained in clause 1 of these presents the Minister may make such arrangements for the granting of a new license, to cover the residual zone deleted from the area of supply.

3. Except where already covered by the provisions of the Electricity Ordinance (Cap. 131) of 1957 in respect of wayleave, the Company shall apply to the Minister responsible for land for right of occupancy for all Public lands that may be necessary for the development of any power development reserves including but not by way of limitation the erection of the power houses transformer stations, poles, standard overhead lines, underground cables and the necessary building premises, offices, warehouses, houses, stores and other establishments and conveniences of the Company for the production transmission distribution or sale of electrical energy within the area of supply or for other
purposes approved by the Minister. The Company shall for the period of the license pay a reasonable rent to be fixed by the Minister for lands and any statutory survey and registration fees subject also to reservation by the Minister of all rights to minerals, mineral oils and precious stones under such Government lands and facilities for winning, working and getting the same. The Minister shall pay proper compensation to the Company for any damage and financial losses caused to the Company by reason of the working or exploitation of any of the rights reserved to the Minister by this Clause. For the purpose of this clause Public lands means lands in respect of which an immediate right of occupancy may be granted under the provisions of the Land Ordinance (Cap. 113).

4. On receipt of an application from the Company and when the Minister is satisfied that all reasonable and probable demand for electricity requirements inside the area of supply are or will be satisfied by the Company and that no other electricity license projected by the Minister or already granted or licensed in any area reserved by the Minister to be served with electricity by a public company or other person would be thereby infringed, the Minister will authorize the Company to produce, transmit, sell and distribute electrical energy to consumers outside the area of supply or to some third party for such third party to supply energy to consumers outside the area of supply except that in this context this agreement specifically grants the Company at the company's discretion and without further reference to the Minister the right to sell energy to TANESCO or other entity who may purchase electricity in bulk.

5. a. If within or after expiration of the license, the Company wants to sell part of the Undertaking of the Company in connection with the generation and distribution of electrical energy, including lands and other interests there in, buildings, plant machinery works and apparatus of the Company used in producing motive power and generating electrical energy and all transmission and distribution systems belonging to the Company and used in connection with the Undertaking the Company shall first give not less than six months notice of its intention to the Minister and the Minister shall have the first option to purchase the same at a negotiated price agreed to by both parties.

b. The Minister shall have six months from receipt of the Company's notice to notify the Company of his intention to exercise this option after which time the option shall be deemed to have lapsed and the Company shall not be further restricted by it.

c. For this purpose "Undertaking" shall mean that part of the Company's assets constructed exclusively for the purposes of production, distribution and sale of electricity together with the rights and obligations that the company may have under contractual arrangements (including the License) for the production, distribution and sale of electricity. "Undertaking" shall exclude all buildings, plant, machinery and equipment that are required for the continuance of operation of the Company's coal mines and other production facilities. Purchase of the Undertaking by the Minister shall include assumption of the Company's contractual liabilities relating thereto.
6. a. If in connection with Clause 5 any question arises:

i. As to the assets or liabilities under contracts to be transferred to the Minister or

ii. As to the price to be paid to the Company for the Undertaking or any part thereof acquired by the Minister or

iii. As to any other question under or in connection with Clause 5 hereof;

then such question shall be determined by agreement between the parties, and failing upon such agreement the Minister and the Company shall each appoint an arbitrator to determine the question, and failing such determination an independent umpire shall be appointed by agreement by such arbitrators, and failing such agreement he shall be nominated by the Chairman of the Institution of Engineers in Tanzania for the time being.

Such reference shall be deemed to be submission to arbitration under the Arbitration Ordinance (Cap. 15);

b. Nothing in this Clause shall place the Minister under any obligation to provide any supply of electrical energy otherwise than under a contract for supply of electrical energy existing at the date of the said notice given by the Minister under Clause 5 (b) above.

7. Three months prior to the termination of the licence by affluxion of time the licensee may apply to the Minister for renewal of the licence for another specified period.

8. Except as otherwise expressly provided in Clause 6 hereof, every dispute and difference which shall at any time arise between the Minister and the Company touching the construction, meaning or effect of these presents or any clause herein contained or the rights or liabilities of the said parties respectively under these presents or otherwise howsoever in relation to the licence, shall be referred to the arbitration of two persons (one to be appointed by each party to the reference) or their umpire and this shall be a submission to arbitration within the meaning of the Arbitration Ordinance (Cap 15).

9. The Minister will give all reasonable assistance to the Company with a view to the effective working of the licence.

10. The Company shall not be liable for any breach of their obligations under this agreement or the licence if caused by wars, or civil commotions, act of God, damage or injury resulting from the act of third parties not under the Company's control, industrial disputes, unavoidable accident or any cause other than the acts or omissions which amount to gross negligence or wilful misconduct on the part of the Company or its employees.
11. In the event that the Electricity Ordinance (Cap.131) of 1957 shall be revised or replaced the Minister shall maintain the Agreement and the Licence on terms no less favourable to the Company than those prevailing under the said Ordinance.

In witness whereof the Minister has hereunto set his hand and the Company has caused its seal to be hereunto affixed the day and the year first hereinbefore mentioned.

Signed and delivered by

Minister Energy and Minerals

in the presence of

Commissioner for Energy and Petroleum Affairs

The Common Seal of

was affixed in the presence of:

1. General Manager
2. Company Secretary
SECOND SCHEDULE

THE ELECTRICITY ORDINANCE
(Cap. 131) of 1957

LICENSE

1. The Licence may be cited as the Electricity (Kiwira Coal Mines Limited) Licence, 1996.

2. The Honourable Minister responsible for Energy, (hereinafter called the Minister), hereby grants to a licence conferring upon the said Company (hereinafter called the licensee) a licence to produce, transmit, distribute, supply and sell electrical energy in the Area of supply during the period and within the areas and upon conditions hereinafter specified in consideration of the licensee's obligations hereunder.

3. In this Licence the area of supply means the area agreed between the Minister and the Licensee shown in the attached map.

4. Subject to the provisions of this licence the licensee shall have the right within the area of supply to produce, transmit distribute, supply and sell electric energy for any public or private purpose. This licence shall be for a period of 10 years from the date hereof subject to the proper observance by the licensee of the provisions and conditions of the Ordinance and this licence, but shall expire prior to completion of such period in the event of the purchase of the Undertaking by the Minister in the terms of the agreement, (the First Schedule), between the Minister and the licensee dated the ............... the day of..........

5. Except for electricity generated and distributed for its own use, the licensee shall generate and transmit three-phase alternating current at 50 cycles and shall distribute at standard voltages approved by the Minister a twenty-four hours supply of such current each day to all persons receiving under this licence.

6. The licensee shall supply electrical energy to any person within any area of supply who may require such supply on the same terms and conditions as those to which any other person in the same zone of any area of supply is intitled in similar circumstances to a corresponding supply thereof.

7. The licensee shall at all times during the continuance of this licence carry on and work the business of generating supplying and distributing electrical energy under and in accordance with this licence in a proper and efficient manner and shall maintain the plant and machinery in accordance with accepted safety standards and the procedures of a prudent operator. The licensee may subject to the provisions of section 16 of the Electricity Ordinance (Cap. 131) of 1957, enter into and carry into
effect contracts, agreements and arrangements for and with respect to all or any of the following matters (that is to say);

a. supply by the licensee of electrical energy

b. the price to be charged for and the terms and conditions of such supply; and

c. the execution or exercise by the licensee of any works or power relating to the supply or use of electricity:

Provided that without the prior approval of the Minister no such contracts, agreements or arrangements shall extend beyond the period of which the licence is granted.

8. The licensee shall at all times take adequate and appropriate measures as may be reasonable to protect all persons and property from danger of injury arising from or caused by lines and other appliances of the licensee in accordance with the laws for the time being in force.

9. The licensee shall submit to the Minister application for carrying out works as per section 12 of the Electricity Ordinance (Cap. 131) of 1957, and obtain approval thereof.

10. In accordance with section 36(2) of the Electricity Ordinance (Cap. 131) of 1957, the licensee shall pay compensation for disturbance of or any damage proved to have been caused by the licensee to any one or any community in the exercise of any of the rights conferred upon the licensee by these presents and in the absence of any agreement between the licensee and any one or any community the decision of the Minister as to the amount of such compensation shall be binding on the licensee.

11. The licensee shall at all the times during the continuance of this licence keep at their registered office in the United Republic of Tanzania in such manner as may be prescribed by law proper books of accounts in respect of electricity generating, electricity distributing and electricity sales activities of the licensee showing the capital expenditure for the time being upon the undertaking and also all receipts and expenditure by the licensee on revenue account in connection with the undertaking, and the Minister and all persons authorized by him in writing may at all reasonable times inspect such accounts and may make copies thereof or take extracts there-from.

12. Neither this licence nor any of the licensee's right hereunder shall be assigned or transferred by the licensee without the previous consent in writing of the Minister which shall not be unreasonably withheld.

13. The licensee shall have their registered office in the United Republic of Tanzania and shall at all the times during the continuance of this licence provide and maintain an office in the area of supply and appoint and retain there a duly qualified representative for the transaction of the electricity generating, electricity distribution and electricity sales activities of the licensee.
14. The tariffs chargeable by the licensee shall be approved by the Minister or in case of selling power in bulk to TANESCO, shall be agreed upon between the licensee and TANESCO or any other entity who may purchase power in bulk from the licensee.

15. If the licensee shall go into liquidation, this licence shall become void and of no effect but without prejudice to any rights and remedies of the Minister hereunder. In the event of the licensee desiring to abandon their rights under this licence in respect of any area of supply before the expiration hereof they shall give to the Minister not less than six months previous written notice of such desire and such notice shall constitute notice as defined in Clause 6 of the Agreement of the licensee's intention to sell the part of the undertaking in the area concerned. Should the Minister not notify the licensee of his intention to exercise the said option to purchase the part of the Undertaking under Clause 6 of the Agreement and or at the end of the above mentioned six months, the licensee shall be at liberty to remove, sell, or dispose of in any way the Undertaking or part of the Undertaking in the area concerned.

Given under my hand and the public seal of the United Republic of Tanzania at Dar es Salaam on the ..........day of .........., 

Minister of Energy and Minerals
PROCEDURES FOR GRANTING WATER RIGHTS
(TANZANIA MAINLAND)

By:

Jeremias Majaliwa Kobalyenda
Principal Water Officer

1.0 INTRODUCTION:

Water as food and shelter is one of the basic necessities for human life and the ecosystem as a whole. As a finite basic natural resource it provides for various social needs and economic development.

The availability of water in Tanzania is highly variable. Water is becoming an increasingly scarce commodity due to, among others, rapid urbanization, expanded social and economic activities and rapid population growth etc. In addition, the competition among various user groups i.e. water for domestic use, agriculture, hydropower generation, livestock, wildlife, industries, transport, mining, recreation etc- for the use of water has now become more intense requiring better management of this resources, and mechanisms for conflict management or resolution.

Beside, human health concerns are widespread because of lack of access to safe drinking water and inadequate sanitation or sewage collection systems, and pollution of water bodies. Therefore, the country's long term socioeconomic development is closely associated with sustainable use of natural resources, including water, forests, land and better management of the environment in which they exist.

2.0 EXISTING LAW ON WATER RESOURCES MANAGEMENT

The regulatory and institutional framework for water resources management in Tanzania (Mainland) is provided for under the Water Utilization (Control and Regulation) Act No.42 of 1974 (the Principal Act). It has been amended three times namely Amendment Act No.10 of 1981, Written Laws (Miscellaneous Amendments) Act No.17 of 1989 and the Water Utilization (Miscellaneous Amendments) Act No.8 of 1997.

The water utilization legislation provides, among others, the legal basis for:

- Water resources management at national and basin levels,

- The administration to legalize, grant, modify and diminish water rights (i.e. water allocation) to the use of water by those entrusted with responsibilities for water resource management,
• To protect water rights for all legitimate water users hence monitoring the quantity and quality of water sources is very essential,

• Collection of water application and user fees,

• Water use conflict management or resolution,

• Sanctions, penalties and fines against the authors of offenses as defined in the legislation, and

• Water pollution control and other related issues like water conservation.

In order to facilitate for the above functions, three offices are provided for in the Act namely:

• Office of the Principal Water Officer,

• Central Water Board, and

• Basin Water Boards.

To effectively carry out the mandated water resources management roles and functions, data and information has to be sought from various institutions including the following:

• Surface water quantity (data and information from hydrological services is required),

• Groundwater quantity (data and information from hydrogeological services in needed),

• Water quality both for surface and groundwater (services from various water quality laboratories in different institutions are required - mainly on pollution issues),

• Land Use (data and information from Ministries responsible for Lands and Agriculture is required

• Consumptive water use (data and information from different users through relevant public and private sector institutions as well as NGOs is required

• Non-consumptive water use (data and information is required from hydropower generating institutions and those involved in fish farming)
- Water source protection (data information from the Forestry Department and villages is required),
- Wetland issues (data and information is required from the Department of Natural Resources and the National Environment Management Council, NEMC).
- Environmental issues (Department of Environment in the Vice ?
- Cultural and customary considerations (data and information is required from individuals and Village Governments)

The above are some of the institutions which facilitate or assist the mentioned Statutory Offices in decision making and at the same time to ensure that justice in granting water rights to different users exercised. Tanzania recognises the importance of water; hence steps are being taken for its conservation and proper use.

3.0 GRANTING OF WATER RIGHTS

"What is a Water Right"?

A water right is a written Legal consent granted according to the country's legislation to have access to the use of water occurring in natural water sources. In order to dam or divert or store or abstract from a water source and put it to beneficial use on or in connection with the land one has to apply and obtain a water right. The question of legal rights to the use of water is a result of scarcity of water relative to demand.

According to Section 8 of the principal Act, all water in Tanzania (Mainland) is vested in the United Republic. In this context, the Ministry of Water is mandated to deal with all matters pertaining to the use of water e.g. granting water right for different purposes including domestic, livestock, irrigation, hydropower, industries, mining etc.

Any person having lawful access to a water source may abstract and use the same for domestic purpose without the necessity of obtaining a water right on condition that no civil works are made for abstraction of the same. Sections 8 and 10 of Act No.42 of 1974 are relevant.

The legislation governing the use of water must in some way specify different categories of such use. In Tanzania the categories are classified in an order of priority as guide only and not as a directive. In granting of water right, the use of water for domestic is given the first priority and then the use for livestock, Irrigation, hydropower generation, Industrial, mining etc. A water right has of necessity to stipulate the extent of use for different purposes.
3.1 APPLICATION CONDITIONS:

Before a water right is granted, an application for the same has to be made to the Water Officer. The applicant is required by the Water Utilization (Control and Regulation) Act No.42 of 1974 (Section 15) to fill in an appropriate form and pay an application fee. It is worth to note that there are many water users who have not applied for water rights. This is partly due to the fact that there is lack of awareness on the part of the users. On the other hand many water users are not aware of the existence and the requirement of the Law. Please refer to Form A (Application for a Water Right) which is attached.

3.2 DECISION MAKING PROCEDURE:

Before decisions are made on the granting of water rights the following action are to be taken:

- The applicant fills in Water Right Application Form in 4 copies (Quintuplicate).
- The Application Forms are submitted to the Water Officer directly or through the Regional Water Engineer's Office with an appropriate application fee.
- In most cases the application is to be accompanied by a letter from the Village Government where the project will be executed. This is to show the authenticity of both the applicant and the project.
- The Water Officer will acknowledge receipt of the Application Forms and Registration Fees.
- In most large water use projects the applicant is required to submit an Environmental Impact Assessment (EIA) Study Report to the Board.

After receiving an Application Form for a water right together with the Registration fee, the Water Officer shall register it and prepare a notice setting out the particulars of the application and caused it to be:

(a) Published in the Government Official Gazette

(b) Served upon all person named in the application as being liable to be affected by the grant of the right for which the application is made and upon such other persons as he/she thinks fit, and

(c) Display at the District Office of the District in which the water right for which the application is made will, if granted, be exercised.
The Water Officer on receiving the required reports i.e. Hydrological, Hydraulic Agricultural and Natural Resources Technical Report, and Administrative Reports and Stakeholders' objections (if any), the application is submitted to the Water Board for deliberation and decision. The time specified by the present legislation is 40 days before the application can be submitted to the Board for decision.

Section 15(2) of the Principal Act requires that any interested person may notify the Water Officer that he objects to the grant of a water right and may specify the grounds for such objection, and shall, if he so requires, have a right to be heard thereon by the Water Board.

After this procedure, the Water Officer may grant such a right or dismiss the application following the Water Board's advice.

A water right may be "Personal to the grantee". This means that it cannot be transferred to any other person without the consent of the Water Officer or "appurtenant to the land" which means that it can be transferred with the land whenever the ownership of the land or part of the land changes hands.

One issue which has been a subject for discussion is in connection with Natural or Customary Rights. After the introduction of Water Basin Management and advocating written legal water right concept, it touches on people's traditional or constitutional rights.

3.3 SPECIAL CONDITIONS:

Under Section 17 of Act No.42 of 1974 the granting of water right for activities like mining, forestry or for industrial purposes and generation of power is subject to the following basic conditions:

(a) That the water used:

(i) Shall be returned to the stream or body of water from which it was taken or to such other stream or body of water as may be authorized by the Principal Water Officer or Basin Water Officer as the case may be,

(ii) Shall be substantially undiminished in quantity, and

(iii) Shall not be polluted with any matter derived from such use to such extent as to be likely to cause injury either directly or indirectly to public health, to livestock or fish, to crops, orchards or gardens which are irrigated by such water or to any product in the processing of which such water is used, and
(b) That precaution shall be taken to the satisfaction of the Principal Water Officer or Water Officer to prevent accumulation in any river, stream or Water course of silt, sand, gravel, stones, sawdust refuse, sewerage, sisal waste or any other substance likely to affect injuriously the use of such water by other users.

A consent for effluent discharge should be sought and granted by a Water officer

Section 17 of the Principal Act states that any person granted with a water right shall before direct discharge into receiving waters be treated or modified to comply with the standards given and that he or she shall make periodical returns to the water officer setting out the nature of wastes or effluents produced by use of such water, and hence shall install or facilitate at a point discharge, some mechanism such as machinery or facilities for taking water samples.

For better control of water pollution the Amendment Act No.10 of 1981 incorporates schedules specifying effluent and receiving temporary water quality standards. Any user of water who will not comply with the standards prescribed in relation to effluents and receiving waters shall be guilty of an offence under the provisions of the Act and liable to legal action. The above mentioned conditions are some of the several measures taken by the Government in order to protect water sources from being polluted.

3.4 WEAKNESSES ON THE PROCEDURE:

- According to the present legislation, Water Boards have an advisory role on issuing Water Rights. The Water Boards are not happy with this.

- The current practice in processing water rights is lengthy. Under the present regulations, Water Boards shall meet at least twice a year. This needs to be reviewed to respond to the existing situations in particular where the applicant gets an investor.

- Different segments of the society are not guaranteed ownership of water rights, which will provide for sufficient and equitable share of water resources, within the context of national and local priorities. We expect that the "River Basin management and Smallholder Irrigation Improvement Project" will address, among other issues, the nature and content of the water right.

- Although the present system of issuing Water Rights is transparent, Stakeholders have no system of electing their representatives to the Water Boards. Besides the present law does not require the applications to be discussed at community level before proceeding to the Water Boards.
4.0 WATER RESOURCES CONFLICTS:

There exists several water use conflicts particularly in the Pangani and Rufiji Basins. Uncoordinated developments by different sectors that utilize and/or affect water and land resources have resulted in big conflicts among various user groups. Conflicts have been experienced between the hydropower sector and the farmers, between groups of farmers (upstream and downstream), between the farmers and pastoralists, and between water managers and farmers. These conflicts are highlighted below:

4.1 Hydropower Interests Versus Irrigators/Farmers. In both basins, TANESCO is blaming the increased water abstractions for irrigation by farmers upstream of Nyumba ya Mungu and Mtera Dam as causing the water deficit and low water levels in the reservoirs. While the farmers, perceive basin management as ploy by TANESCO, to deprive them from exercising their customary rights to use water for irrigation.

4.2 Groups of Farmers. In the Pangani Basin, upstream of Nyumba ya Mungu Dam, conflicts between groups of farmers using irrigation water have intensified.

4.3 Pastoralists and Farmers. In the Usangu Plains upstream the Mtera Dam, tensions have mounted between pastoralists and farmers near and within the Utengule Swamp over access to land and water. The number of cattle has increased the requirement for dry season forage and water.

4.4 Farmers and Water Managers. Poor land use activities in the upstream catchments of the Soni and Sigi Rivers in the Pangani Basin have resulted in costly damage to the water resources infrastructure.

4.5 Institutional Conflicts:

The Irrigation Department under the Ministry of Agriculture and Cooperatives would like to have irrigation areas expanded, although priority should have been given to rehabilitation and improving the existing ones especially traditional irrigation schemes.

4.6 Other Users and the Environment

In a water basin, water users have given the question of environmental conservation. In some cases Investors cut trees and use the areas for agriculture without controlling erosion and other land degradation effects. This has very serious effects on river flows in the areas concerned.

4.7 Political Interests
5.0 CONCLUSION AND RECOMMENDATIONS:

In order to manage, and manage the various water use conflicts, there is need to harmonize the different Legislations. Awareness creation among stakeholders the basin on the value of water, its conservation and protection should be raised.

Effective water resources management and sustainable use of the Basin' Water Resources requires participation and involvement of stakeholders at all levels. There is need to establish some institutional framework which will enable water users to take part in decision making involving granting of Water Rights. The day to day water use conflicts should be handled at the lowest appropriate level. For big water use conflicts these can be resolved at Basin or National level depending on the magnitude of the conflict.

The National Water Policy and Law should allow a minimum amount of water for certain uses. This amount should not be subjected to a Water Right.

It is recommended that: water allocation and conflict management or resolution should focus on demand and water use efficiency. Another aspect is that water rights be issued for a specific period e.g. every 10 years. The current practice is that water rights are issued for an indefinite period.

There is need for cross-sectoral coordination in planning for effective resource allocation and utilization.
THE PROPOSED FRAMEWORK FOR ENVIRONMENTAL CLEARANCE AND MONITORING IN TANZANIA.


BY

EJC Kerario
National Environment Management Council (NEMC),
Directorate of Environmental Impact Assessment,
P. O. Box 63154, Dar es salaam, Tanzania.
Telephone/fax: 255 51 121334.
ABSTRACT

The relevance of hydro electric power production for boosting urgently required socio-economic development in any nation and her citizen cannot be overemphasized. However cognizant of the dependence of hydropower systems on the amount of water stored at reservoirs, the question of water management and land use activities among others in the catchment or river basin becomes more critical. Uncontrolled and/or unregulated abstractions upstream could seriously affect power production. But also power production on the other hand could affect other water uses including food production, conservation of biodiversity and ecological integrity downstream. In view of the multiple uses of water i.e. for agricultural and livestock production, for domestic use including sanitation and industrial use, supporting inland fishery, wildlife, recreation etc. difficulty choices and decisions have to be made on how to balance the imperatives of environment and development in general and various water demands between power production versus other immediate values of water use, without compromising any one of them.

In this paper, the main environmental and socio-economic impacts of hydropower production are discussed. Given the nature and magnitude of the likely environmental and socio-economic implications of power production, a critical consideration of these kind of projects from an environmental point of view is necessary. Henceforth, a generic procedure for environment clearance and monitoring through environmental impact assessment is stipulated so as to internalize the environmental costs and benefits early in the planning, designing, implementation stages and relevant follow-up stages. The overriding objectives is to reduce. and/or mitigate the likely negative impacts and enhance positive impacts in a win-win approach.

1.0 BACKGROUND

1.1 Main Environmental Impacts of Hydro Projects and Justification for Environmental Impact Assessment

Notwithstanding the positive impacts of hydropower development project in terms of electricity production for industrial and domestic development and creation of employment, there are important negative impacts that are associated with hydropower projects which includes construction of dams, tunnels, power houses, transmission lines, to mention a few. For instance, an act of impounding water causes a series of negative impacts to natural environment as well as human environment, some being irreversible effects. In most cases, it adversely affect the ecological systems and livelihood of local communities living within and around the project area.

Some of the main impacts include:-

(i) Social, ecological effects of reservoir inundation (i.e. loss of agricultural lands, forestry, grazing land, involuntary population resettlement; effects on wildlife and wildlands, cultural property and values.

(ii) Effects on hydrology and water quality of the river i.e. changes in downstream hydrology can impact ecosystems dependent on seasonal flooding, including areas that
are important for fisheries (floodplains, lagoons, marshes, mangroves) or for traditional flood-recession agriculture. Suitability of water for various purposes both within reservoirs and downstream due to pollution from agricultural leachates, pathogens, industrial effluents etc.

(iii) Effects of rivers fisheries and other animal and plant life

(iv) Health effects due to increase incidences of waterborne and water related diseases e.g. malaria, schistosomiasis, onchocerciasis etc.

(v) Impacts of altering river flow regimes on the ecology of the floodplain, and economic activities/land use on the flood plain (agriculture, livestock production).

(vi) Impacts of altering water supply on urban, industrial and rural users.

(vii) Potential environmental and social impacts by planned and unplanned (spontaneous) immigration into the areas.

(viii) Impacts on terrestrial and aquatic wildlife, by creating of the reservoir, disruption of migratory routes, alteration of flood plain ecology and population impacts.

(ix) Effects of existing and predicted land use in the watershed on the functioning and longevity of the dam and reservoir i.e. upstream erosion in the catchment area leads to sediment transport and siltation of the property.

(x) Risk effects associated with uncontrolled flooding due to dam breaching

(xi) Proliferation of floating water weeds i.e. water hyacinth and water lettuce can impair water quality, increase disease sectors and water loss through evapo-transpiration. Clogging impairs navigation, recreation, fisheries and irrigation.

The above factors calls for subjection of these kinds of projects to a category of comprehensive Environmental Impact Assessment accompanied by an effective monitoring programme. EIA a process that aims at identifying, predicting and evaluating foreseeable impacts of development activities and provide mitigation measures to reduce, eliminate or minimize the negative adverse impacts and optimize positive impacts.

EIA thus serve the following functions:-

- integration of environmental considerations into development planning and decision making (as a complement to the traditional economic and technical factors)
- anticipation and prevention or minimization of damage (as a precautionary and preventive principle)
- ensures participation and involvement of the public, private proponents and government departments and sectors of economy in environmental management.

As an integral part of the planning process, EIA provides information to decision makers in a clear and systematic way that brings better understanding of the linkages between ecological, socio-economics and political systems and tries to clarify the trade-offs between environment
and development. Furthermore as a open and transparent process it helps to improve institutional co-ordination and co-operation thus reduce sectoral conflicts of interests and improves relationship between the developer, planning authorities and local communities. It helps avoid long-term problems, thus improves project design and reduces costs.

For a natural resources based country like Tanzania, one of the major challenge is to decided whether or not a particular development activity is in the long term interest of the country for advancing economic prosperity and poverty alleviation. EIA can assist in figuring out the environmental costs and benefits of a project, leading to a better informed and rational decision about whether or nor a particular project is good or bad.

2.0 EMERGENCE OF ENVIRONMENTAL ASSESSMENT AND MANAGEMENT:

Historically, Environmental Assessment originated from the introduction of the US National Environmental Policy Act (NEPA) in 1969. NEPA required that every undertaking proposal be accompanied by the Environmental Impact Statement (EIS) with a clear description of all potential impacts, and the proposed mitigation measures to the adverse effects. Following the 1972 UN Conference on Human Environment in Stockholm, most of the developed countries adopted EIA as an environmental management tool. The Brundtland report on Environment and Development introduced the concept of Sustainable Development which focused on the integration of economic growth and environmental protection for the benefits of both present and future generations.

The 1992 global consensus on Environment and Development, through UNCED (Rio Conference) Principle 17 of the Rio declaration puts emphasis on the EIA as a national instrument shall be undertaken for proposed activities that are likely to have significant negative impacts on the environment.

Tanzania as signatory to numerous World conventions and protocols on environment and having ratified majority of them. is obliged to abide by the agreed commitments. In short the Rio Conference has reinforced the relevance of institutionalising EIA in the country. However, since mid 1980s both bi-lateral and multi-lateral donors have been operationising EIA as one of the conditions for the proposed activities to obtain funding.

3.0 THE PROPOSED EIA FRAMEWORK FOR ENVIRONMENTAL CLEARANCE IN TANZANIA:

The proposed framework in which all undertakings must follow in order to secure environmental clearance, involves the following stages (Figure 1):

3.1. Registration:

The proponent (be it government or private developer) is required to register his/her intended undertaking or project concept with the National Environmental Agency (NEMC) or under specified circumstances should register with District Environmental Committees (DECs). The DEC/NEMC will advise and provide the proponent with relevant documents such as policies, legislation, guidelines, etc.
3.2. Screening:

This is the classification of a proposal in determining the level at which the environmental assessment will be carried out (i.e. If full, partial or no formal assessment is required). The responsibility of determining the appropriate level of assessment lies within NEMC with assistance from the cross-sectoral Technical Review Committee (TRC) at national level.

3.3. Scoping:

This is done by the proponent and/or his/her consultants to identify the main issues of concerns in consultation with the Council, Environmental Units (EUs) in relevant sectors, as well as affected and interested parties. The objective of solicited stakeholders’ views and opinions is to determine how their concerns will be sufficiently included in the terms of reference that guide the EIA study. The terms of reference should be approved by the national environmental agency prior to the EIA study. The final outcome of the study is an EIA report popularly known as Environmental Impact Study (EIS). Preparation of this report follows standards report writing guidelines.

3.4. Review:

Draft EISs, Preliminary Environmental Reports (PERs), Screening and Scoping Reports, Monitoring and Audit reports are supposed to be prepared by the developer, and be submitted to NEMC. The cross-sectoral Technical Review Committee will assist NEMC in the review process following standard review criteria. The main aim of the review is to evaluate the strengths and weaknesses of the submitted report in terms of contents, comprehensiveness, adequacy organizational presentation and accuracy of information presented in the report.

Review assist in determination of the quality of the EIA report (i.e. focus on key questions about the proposed action, scientific technical soundness and clarity of presentation); obtain stakeholder inputs and assessing the acceptability of the proposals (complies with TORs and existing plans, policies and standards).

The review criteria used in Tanzania is that of UK’s Institute of Environmental Assessment (1990) with modifications to suit local circumstances. The four main areas are: the descriptions of development, local environment and baseline conditions; identification, analysis and disessment of impacts; consideration of alternatives and mitigation of impacts and the public involvement and communication of results.

Local authorities should form District Environmental Committees (DECs) with various experts that represent all key sector ministries to handle small-scaled projects which do not require intervention at national level. Among others, the mandates by DECs’ should include project review, approve and monitoring within their localities.

Whenever a strong public concern in related to the proposed undertaking is shown or/adverse impacts are likely to be extensive and far reaching, DEC at the district level or NEMC in collaboration with TRC at the national level, shall organise a public hearing as part of review process. Other critical factors that may necessitate public hearing include:
• sensitivity of the project area (fragile or/part of a complex ecosystem)
• type and scale of proposed project
• type of technology to be used
• multiple land use considerations and other specific project related factors.

3.5. Environmental Clearance Permits:

Based on the review results, a decision has to be taken by TRC/DEC whether to accept/reject the EIS proposal, or accept it with conditions. Upon the acceptance of the proposal, the chief executive of NEMC or District Executive Director, shall serve the developer with the environmental clearance permit that appears in two stages:

Provisional Environmental Permit (PEP):

This allows the developer to finalise other necessary formalities (including licences for carrying out the undertaking) and start implementation. The validity of PEP is 2 years from its date of issue. In case the project has not started within this period, PEP becomes invalid and, the proposal shall need a fresh EIA study.

Environmental Permit (EP):

The developer shall be served with EP within 2 years from the date of issue of PEP, if the undertaking provide evidence of adherence to conditions of operation served with PEP, which among others include: satisfactory commencement of development, operations and performance; compliance with recommended mitigation measures and other environmental management plans proposed in the EIS; submission of the first annual environmental report. Failure to fulfil the above requirements shall render withdrawal of the PEP.

Appeals

Both the project proponent and the public have the right to appeal if they are dissatisfied with the outcome of the review. Minister for Environment will handle the appeals.

3.6 Environmental Monitoring and Auditing

Following environmental clearance of the EIA report, the overall project decision is made regarding whether the project should be accepted for implementation. During project implementation, monitoring which involves the measuring and recording of physical, social and economic variables associated with development impacts is undertaken to provide information on the characteristics and functioning of variables in time and space and in particular on the occurrence and magnitude.

Environmental monitoring reports (quarterly/annual reports) shall be submitted to NEMC and DECs, and the responsibility for ensuring effective monitoring lies within the proponent, NEMC, sectoral Environmental Units, DECs and the general public. However, the developer is solely responsible for preparing and implementing an appropriate monitoring programme during implementation of the undertaking. Monitoring provides:- verification of impact reduction, evaluation of the proposed mitigation measures, adherence to the approved environmental management plans and general compliance to the agreed terms and operative
conditions stipulated in the Environmental Permit. The responsibility for monitoring lies with project proponents, the government and the public.

For effective environmental management, the monitoring programme should identify the following aspects:

- Parameters and indicators to be monitored during pre-construction and operation phase. Baseline information in the pre-construction phase should be adequately researched from the field, and if obtained from secondary sources, should be reliable.
- Type of checks i.e. “site visits”, “sampling and testing” etc.
- Frequency of checks, time and duration of monitoring. Periods of checks with respect to both the nature of impacts (parameters/indicators) and annual seasons need to be carefully considered during planning for the monitoring programme.
- Data analysis and interpretation. Wherever necessary, interpretation, evaluation and inference making should base on statistical analyses,
- Personnel and equipment requirements. Since a number of parameters and indicators may be involved in the monitoring exercise, special equipment and qualified staff are both needed for sampling, sample analysis and data analysis.
- Costs involved. Whether contracted or done by project staff, monitoring exercise has significant financial implication.

3.7. Environmental Auditing:

At anytime NEMC/DEC shall undertake an independent assessment of the positive and negative impacts of the projects as part of environmental auditing. This is expected to give a clear comparison of actual situation and the predicted/reported one. It also provide feedback on project management and environmental management plans.

4.0 INVOLVEMENT OF OTHER SECTORS, INSTITUTIONS AND NGOS IN ENVIRONMENTAL CLEARANCE AND MONITORING (STAKEHOLDERS PARTICIPATION IN EIA)

The role of stakeholders participation in the EIA process is to assure the quality, comprehensiveness, and effectiveness of the EIA, as well as to ensure that public views are adequately taken into consideration in decision making. Stakeholder participation is relevant in the following stages of EIA - process.

- in determination of the scope of the EIA
- in evaluating the relative significance of impacts
- in providing specialists knowledge about the site
- in proposing mitigation measures
- in ensuring that the EIS is objective, truthful and complete
- and in monitoring any conditions set on the development agreement.

Benefits of stakeholder involvement includes:-
- helps the EIA to address relevant issues of importance to various target groups.
- to harness traditional knowledge which could be overlooked by conventional approaches
- improves information flow between the affected and interested parties and improving that understanding and ownership of a project
- helps identification of important environmental characteristics or mitigation measures
- enables local people to influence project design to respond to their needs and reduce conflict of interest of different agencies
- helps to ensure that the magnitude and significance of impacts has been properly assessed.

The opposite of the above constitute the cost incurred as a result of lack of participation.

In the proposed EIA framework procedure, the formal review mechanism at national level involves the participation of key sectors, and institutions through the cross-sectoral technical review committee (TRC). Members of the current TRC are drawn from sectoral ministries that have direct link to natural resources and environment management and those which are currently the focus for investment development. These are representative from ministries responsible for: environment; lands: water; industries; tourism and natural resources, energy and minerals; agriculture and works. Institutions are NEMC which form the secretariat and IRA representing research institutions. Depending on the nature of the proposed undertaking and circumstances TRC may coopt specialist(s) in relevant disciplines. NGOs, reputable individuals etc. to assist in renewing certain proposals.

Other informal ways of involvement of stakeholders in EIA has been through Public review of EIS deposited at public places for comments. These are then collated by NEMC for TRC considerations or in case of a controversial project to conduct “a Public Hearing” over the project i.e. Rufiji Prawn Project.

At district level, District Environmental Committee involves all district functional/technical officer from planning, agriculture, livestock, water, forestry, wildlife, fisheries, health, community development and education. Their participation enhances not only technical credibility but also encourages co-ordination and inter-agency co-operation in dealing with environmental issues which are cross-sectoral in nature, thus requiring holistic and multi-sectoral approaches.

DED’s office serving as secretariat to DEC like NEMC’s role to TRC shall distribute EISs to public places such as libraries, information centres etc. to enable informal review by interested members of the public. Their communicated views, opinions and comments should be part of the review process. For controversial projects, a panel of experts has to be appointed by the minister responsible for environment or by the District Commissioner and carry out an independent review.

Environmental impact statement of development projects should not be approved by their specific sector ministry, due to vested sectoral ministries' interests. Otherwise this will undermine the objectivity of EIA and principle 17 of the Rio Declaration on Environment and development which endorses universal application of EIA as a “national instrument to be a subject of decision by a competent national authority”. However, the environmental units/desks in sector ministries shall do the following:
Within national framework, prepare sector specific EIA guidelines in collaboration with NEMC,

Issue EIA registration forms, provide information and advices to developers with respect to policy, legal and administrative requirements,

Participate in a review process as an integral part of the TRC,

Incorporating TRC's approval terms and conditions in project licences,

Advice and guide the proponents in preparation of appropriate monitoring programme and environmental management plan.

Ensure general EIA compliance at sectoral level.

5.0 EXPERIENCES WITH CURRENT EIA PRACTICES IN TANZANIA:

5.1. Weaknesses:

There a number of policy, legal and institutional weaknesses that have turned into constraints, against effective implementation of EIA in Tanzania:

- There is no legal framework that imposes mandatory requirements for EIA of development undertakings in the country. Effective implementation of both policy objectives and EIA procedure need to be backed-up by appropriate legislation.

- Unclear institutional arrangement and inadequate co-ordination. Irrespective of the efforts by some sectors to review their sectoral policies, still gaps, overlapping mandates (conflicts) and inadequate accountability exist in relation to natural resource utilisation and environmental conservation. Nevertheless, there are efforts underway to streamline responsibilities among various institutions by Institutional and Legal Framework for Environmental Management Project (ILFEMP).

- Monitoring of project implementation is hampered by lack of legislative provision that provide for issuance of sanctions i.e. stop work orders, fines and restitution of monitoring reveals non-compliance to mitigation measures.

- Inadequate political will and subsequent minimal financial and human resources allocated to environmental conservation initiatives and projects.

- The capacity and expertise to manage the EIA process are extremely limited and are thinly spread across sectors and institutions in the country. Lack of adequate EIA expertise has further led into the preparation of Environmental Impact Statements that are below the required quality in terms of:

  (i) sufficiency and accuracy of information that describe the project activities and baseline information.

  (ii) compliance with the terms of reference. For instance an insufficient involvement of stakeholders, particularly the public

  (iii) comprehensiveness of the EIA studies and presentation of the information in the report.
(iv) Adequacy of the assessment of potential impacts and evaluation of their significance, mitigation and monitoring.

5.2. Strengths:

It is important to note that there has been some achievements in various issues that account to significant contribution towards the EIA processes in the country. viz.

- The national environmental policy recognise and reiterates the importance of EIA as one of the priority policy instruments in attaining sustainable development.

- Changes in attitude towards integration of environmental concerns. Initially many stakeholders perceived EIA as a bureaucratic measure against development and hence a constraint to economic advancement. But, the majority are gradually recognising the need and its role in realising sustainable economic development.

- Sectors or/and institutions dealing with mariculture, roads, hydroelectric power generation etc. are currently working hard in establishing their sectoral EIA guidelines within the proposed national EIA framework.

- Establishment of Environmental Units (EUs) and environmental desk officers in some of the sector ministries.

- A proposal to have an independent District Environmental Standing Committees, instead of environmental issues to be dealt the Economic Services Standing Committees of districts.

- On the part of the Council, the following have been done:

  (i) development and submission to the government the draft framework for instituting EIA in Tanzania.

  (ii) preparation of environmental standards for waste water, effluents and air emissions.

  (iii) preparation of the guidelines for environmental monitoring and reporting by industrial developers.

  (iv) supporting the efforts to provide local training for various groups like that of the Institute of Resource Assessment of the University of Dar es Salaam (IRA/UDSM).

  (v) arranged seminars and awareness raising workshops on EIA and related issues at various levels of decision makers including members of parliament, district actors etc.

  (vi) by the assistance from the Technical Review Committee (TRC) the Council undertakes review of various Environmental Impact Statements (EISs) and Scoping Reports in EIA.
6.0 NECESSARY EIA CONSIDERATIONS FOR ELECTRIC POWER PROJECTS:

The sources and uses of energy and their associated impacts on the environment vary widely. Some sources are mainly used for electricity generation, while others are also used for several non-electric purposes like irrigation, water supply etc. Moreover, it is common to distinguish between small power plants and major ones based on machine installation and power production, but environmental impacts caused by both tend to be of the same type and nature.

Despite of the newly introduced technology of producing electricity from natural gas, only hydropower and thermal power plants are common in Tanzania. Hereunder are important aspects to be considered during planning for the assessment of both hydropower and thermal power generation.

6.1. Environmental Aspects of Hydropower Generation:

- Hydropower projects usually lead into alteration of hydrological conditions in a watercourse and its associated watershed changes in the total water budget and flow patterns.
- Construction of dams is essentially the change of riverine system into lucustrine system. Bearing in mind that a watercourse is an ecological system, changes within one component may create a series of spread-effects. For example alteration in water quality is likely to have impacts to both flora and fauna.
- Construction of dams, tunnels, roads, power stations, transformer stations, transmission lines etc. will entail extensive shifting of materials such as rocks, gravels, sand, soils etc. Issues like landscape, land use patterns, historical sites, local population’s style of life, as well as access and utilisation of natural resources are of great importance.
- The emergence of various activities e.g. industries and other commercial activities, subsequent to completion of the hydropower plant, may cause further environmental changes.
- Local population lives are normally closely tied to their resource base, and it is consequently difficult to resettle people without letting them suffer a series of drawbacks. It is also difficult to predict all indirect environmental impacts in the new settlements.
- Others include flood and health risks; eutrophication and groundwater level. If unchecked are likely to cause adverse impacts to local populations living in the project area or even those dwelling close to the core area.

6.2. Environmental Aspects of Thermal Power Generation:

- Air pollution and its further consequences due to emissions that contain CO, CO₂, No, SO, particulate matter etc.
- Water and soil pollution due to oil spill together with its secondary and tertiary effects to various ecosystems.
- Life safety and risks to people living close to the project area (power plant).
- Others aspects may remain common as those mentioned above for the hydropower projects.
7.0 CONCLUSION:

While there is still a need for improvement to areas that require more clarity, co-ordination, strengthening and enforcement, the Environmental Assessment in Tanzania is gradually gaining a recognition in decision-making process. Some of the sectors and institutions such as water, industrial licensing board, TANESCO, road sector etc. positively and significantly contribute to the EIA procedure. However an overall progress will only be made through full co-operation of all sectors, institutions, local authorities and the rest of the public.

As discussed in this paper, environmental clearance for development project enables the integration of environmental concerns in sustainable development imperatives before implementation of project. The monitoring part is relevant for tackling the compliance to terms and conditions of approval issued during project implementation and within the projects’ life span. As proposed in the national framework for the two to work effectively, legal backing, clear institutional framework and capacity building among others are important pre-requisites.
ENVIRONMENTAL MANAGEMENT PROGRAMS IN TANESCO

1.0 Introduction

Tanzania Electric Supply Company Limited (TANESCO) is a wholly owned government parastatal organisation under the Ministry of Energy and Minerals. The company is responsible for generation, transmission, distribution and sale of electricity in Tanzania and is so far the country’s sole supplier of electricity.

The company owns and operates both grid and isolated systems covering the entire country (Figure 1). The grid system derives its power from both hydro and thermal power plants, hydro making up for about 70% of the total grid power generation. Isolated centres use mainly thermal power sources. TANESCO continues to carry out further developments to cater for new load centres and growing demands for electricity and also for power supply quality improvement.

Due to the nature of its operations and development activities, there are always impacts on and from the environment which have to be addressed in the appropriate manner. Such considerations are also reflected in TANESCO’s mission statement which reads thus: “To generate, transmit, distribute and supply electricity in the most safe, reliable, cost effective and environmentally friendly manner.”

This mission statement forms the background to TANESCO’s previous and present day environmental standing.

2.0 Linkages between the Environment and TANESCO activities

The broad consideration of TANESCO activities as may be associated with environmental considerations is based on the entire project cycle, i.e. initiation, design, implementation, operation and decommissioning, and include hydropower systems, thermal power systems, transmission lines, distribution systems and associated infrastructures (buildings, roads, auxiliary support systems, etc.). The linkages that exist between these and the environment is briefly described below.

2.1 Hydropower systems

Hydropower projects involve construction of dams, waterways, powerhouses, access roads, temporary establishments and creation of reservoirs. During construction the project area is defined and it has to be free from any other use either temporarily or for good. Resettlement or relocation of people may be involved; furthermore, hazards from effluents and emissions from construction activities may occur. Other problems include waste disposal, sediment transport, and pressure on local population and their resources by immigrants coming to work on projects.
However, a project may bring benefits such as improvement of communication and health facilities, job creation and promotion of local economy.

During operation phase, conditions change; there are fewer people and less activity, hence reduction in income and services to local population. Impoundment lead to disappearance of all submerged features and leads to development of new aquatic and terrestrial environment. New concerns at this juncture become apparent; these include the nature of the new ecosystems, the performance of the hydro-system in connection with altered hydrologic conditions in the catchment and water quality changes (if any). Also concerns about safety of structures become of great importance.

Decommissioning of hydro may come after 60 years or so of operation. Thorough environmental studies have to be carried out then, if the involved plant is supported by a large reservoir. After many years in existence, reservoirs become associated with unique ecosystems, besides the human beings whose livelihood, in one way or another also become attached to them.

2.2 Thermal Power Systems

Thermal power plants are of many types; most common ones are, oil fired, coal fired, gas fired, geo-thermal and nuclear power plants. The plants of concern in Tanzania are the oil, coal and gas fired types. The negative effects of these are associated with the type, quality and quantity of their emissions and effluents. Waste materials from these plants are also of environmental concern.

During construction, impacts of these plants are similar to those of hydropower plants, although the extent of the effects is normally over a small area. This might involve relocation of people, limited access road constructions, employment opportunities and some population increases.

Thermal power plants produce emissions namely gases and particulate material. Gases include oxides of carbon (CO₂), sulphur (SQ), and nitrogen (NO), and carbon dust (particulate material). These emissions are responsible for global warming (resulting into melting of ice caps & inundation of coastal areas), acid rain, general air pollution and have negative effects on human health and other living organisms (e.g. Drying of trees and respiratory organs diseases). Thermal power plants produce effluents such as waste oils and water which if not properly disposed, lead to impairment of soils and receiving waters. Besides effluents, these plants emit noise. Noise levels exceeding certain limits are known to be detrimental to human health and the living environment in general. Other environmental aspects of concern relate to by-products from these plants such as waste mutton cloth, coal ash (from coal fired plants), hot water from cooling system, etc., which impair the environment if not properly handled and disposed.

Decommissioning of a thermal power plant has varying degree of complexity depending on the type of plant and on whether there has been serious environmental damage during the operation life of the plant. The need for Environmental Impact Assessment (EIA) before decommissioning depends much on the final state of the environment around it.

2.3 Transmission line systems

These systems include the transmission lines and related substations. Transmission lines are given a right of way and substations receive permanent land allocation. Furthermore, construction of
lines include also access roads which are used during construction phase and later for maintenance during operation. Therefore the impacts of the construction phase is similar to other projects as it also involves re-allocation of land, immigrants in search of employment and the like.

During operation, problems such as interference with aircraft and bird routes, disruption of sensitive ecological areas due to easy access and effects of electromagnetic fields to human beings may occur. Maintenance activities on substations may involve use and disposal of hazardous fluids and materials (eg. insulation materials containing PCB's). Decommissioning of Transmission line systems has to be carefully planned and supervised, and where necessary some EIA has to be done before decommissioning.

2.4 Distribution systems and infra-structures
Distribution systems include power supply lines of 33 kV voltages and below, and related substations. These are normally located in developed areas and they too, have a right of way and particular land has to be confiscated for substation establishment. Thus, problems typical of construction projects do arise, but with severity varying depending on land use and settlement pattern in the concerned area. As distribution systems are built where there is human settlement and/or activity, related operation activities have to take due consideration of this fact. Safety, pollution and security aspects are but some of the aspects to be continuously addressed. These considerations can be extended to decommissioning where applicable.

Infra-structures involve offices, workshops, garages, company residential buildings and service facilities. Construction aspects are similar to any construction project, as acquisition of land, immigration, etc., are involved. Use of infra-structures result into production of wastes, pollutants and behaviour that may lead to both direct and indirect damage to the general environment. Here we may cite examples of waste paper and sewage which is not properly disposed or over staffed offices which may impair the general health of workers.

We may generally conclude that, the entire business system has to be maintained at an acceptable degree of environmental compatibility, starting with generation through transmission, distribution, sales and services. This is what our mission says.

3.0 TANESCO Environmental Programmes
Since the electric power development interventions started in the 1930's there was no such thing as Environmental Impact Assessment. What existed was the environmental due diligence specifications built up in traditional civil engineering construction contracts. In these contracts, safety, health, land degradation, water quality and aesthetic (natural scenery) aspects had always been addressed. However, there wasn't enough ecological and socio-economic considerations. Recognition of this shortfall has over the years lead to integration of environmental considerations in specific, which has evolved to present day Environment Impact Assessment approach. This, is today, a universal requirement which has earned respect, recognition and acceptance from TANESCO.

3.1 Background to Environmental Management in TANESCO
Until the early 1970's TANESCO did not carry out formal EIA for its projects. When the Great
Ruaha Power Project (Kidatu and Mtera) started in the early 1970's there was already a requirement by donors and funding agencies, notably the World Bank to carry out social and environmental impact studies for the projects they were financing. Since then, environmental impact assessment has been and continues to be carried out on all our major projects.

Environmental Impact Assessment is now a universal requirement for all types of development interventions. Many Nations and International Organisations have environmental policies, guidelines and, needed legal and institutional frameworks. In addition, many conventions on environment have so far been passed and signed, reflecting global concerns. Tanzania has signed many of these conventions. Many reputable companies and firms also have internal environmental organisation to ensure compliance with National and International environmental requirements.

Tanzania has an environmental policy, but doesn’t have the required legal and institutional framework to harmonise environmental concerns. However, the Government has allocated environmental matters to be handled by the Vice President’s Office under which the Directorate of Environment is placed. An advisory environment body, the National Environment Management Council (NEMC) is also established under the Vice President.

Lack of Tanzania specific environmental guidelines has compelled TANESCO to adopt guidelines from donor agencies in the process of establishing its development interventions. Major projects which TANESCO has carried out and have involved EIAs are:
- the Great Ruaha Power Project (phase I: Kidatu Power Station, phase II: Mtera dam & extension of Kidatu power station. Phase III: Mtera power station).- 1970 - 1986
- Pangani Falls Redevelopment Project: - 1990 - 1995
- Ubungo Gas Power Plant :- 1993 - 1995
- Lower Kihansi Hydropower Project: - 1989 - to date
- Various feasibility studies for hydropower projects: Mandera (Pangani river), Rumakali (Rumakali river), Ruhudji (Ruhudji river), Lower Nakatuta (Ruvuma river).- 1994 - 1998

Environmental studies had always been contracted to competent Consultants. However, to each project counter part staff from TANESCO get attached as part of the Technology transfer arrangement. In this way TANESCO has been able to develop personnel who are capable of managing environmental activities, including EIAs.

To serve as an example, our own experts were fully responsible for carrying out EIA for the Mandera project. Today, all environmental issues related to TANESCO activities are organised from within the Company using own experts. The responsibilities taken by our experts range from conducting EIAs, making EIA reviews, coordinating environmental programs and advising the company on matters pertaining to environment.

Increasingly, environmental awareness is penetrating through the ranks of TANESCO. The current development is that the TANESCO Board of Directors has recently approved establishment of an Environmental Unit in TANESCO. As we progress TANESCO will under this arrangement be more competitive given the environmental compliance conditions placed on all aspects of business.
3.2 Environmental Organization in TANESCO
As already mentioned in section (3.1) above, the Board of Directors has recently approved establishment of an Environmental Unit in TANESCO. The unit will be headed by a Chief Environment Engineer/Officer who will be assisted by experts as shown in the organization chart, figure 2. Formally and until now the environment is placed under the Field Studies Unit (FSU) in the department of Research & Development, as shown in figure 3.

FSU has been responsible for environment as describe in (3.1). Some of the important environmental programmes TANESCO has owned are presented in section (3.3).

One of the notable works which have been done by this unit is the proposal for development of the TANESCO Environment Management System (EMS). This proposal has been submitted to various donors to solicit funding. The EMS in essence is a system which includes organisational structure, planning of activities, responsibilities, practices, procedures, processes and resources allocation for developing, implementing, achieving, reviewing and maintaining the environmental policy (ref: ISO 14004).

3.3 Environment Management Programmes
There has been and there still is and will continue to be, environment management programmes in TANESCO as long as the company continues with business. Some of the important programmes that TANESCO has had include:

- **Follow up studies of the Mtera Reservoir**
  Following TANESCO’s environmental concerns, environmental studies were carried out for Mtera during the pre-investment studies in 1975-78. Further studies were carried out during reservoir impoundment 1980-84, and a continuous monitoring programme carried through 1998. The study addressed itself to ecological and social aspects, mainly, and hydrological issues to a limited extent. The latest studies are regarded as an environmental audit of the post impoundment evaluation. Table 1, matrix gives more details about this programme

- **Environmental Monitoring Programme for the Pangani Falls Redevelopment Project (PFRP)**
  This program was designed by TANESCO using its FSU experts and is being implemented by the same unit. During implementation of the Pangani Falls project, impacts for which measures were taken included:

  - reduced water flow into Nyumba ya Mungu reservoir due to poor water use management in the catchment, poor local infra-structures aggravating the state of poverty and health related problems, endangered plant - the *Saintpaulia tongwesis* (African Violet) and white *colobus* monkeys found in the forest area to be desiccated, the water hyacinth existing in the Pangani river and concern for water pollution.

  Mitigation measures taken under the PFRP which from which the monitoring program derive include: a program for upgrading of local infra-structures (rehabilitation of schools, roads and providing water supply and health facilities), transplant of the *Saintpaulia tongwesis*, location of possible refuge for the *colobus* monkeys downstream of the tailrace area; as for the hyacinth, weevils were introduced for biological control and, a boat and floating boom provided for mechanical removal of the weeds. Recommendation to
monitor the water quality was also made.

The matrix in table 1 show some salient features of the PFRP monitoring program.

- Ubungo Gas Power Plant
In 1994 two ABB combustion turbines (CT's) of 20 MW were erected at Ubungo. Another two CT's of total capacity 75 MW were erected at the end of 1995 under the emergency power program (EPP). All these CT's were accommodated in the old power station area (1963). Environment and health impact assessment for ABB - CT's (1994) was carried out by Stockholm Energy AB, followed by an update for the EPP in 1995 by Agra Earth.

The study included a survey on the state of environment of the existing plant, i.e., the quality of emissions, liquid discharges/leakages and disposal, storage and handling of hazardous materials, health and safety practice (awareness and preparedness, guiding standards and regulations).

One of the important findings was that Tanzania did not have defined acceptable standards in connection with pollutants from industries. Therefore based on standards from elsewhere, the pollution levels from the EPP, CT's were acceptable. EPP uses light diesel fuel which has less sulphur content if compared with that used by the existing old machines; the new machines were also less noisy, with levels of about 68 dB at 100 m.

As the machines age up and standards get well in place, periodical monitoring of all environmental aspects of Ubungo power plant will be done. A program for this plant will be drawn as environmental organisation in TANESCO firms up.

- Lower Kihansi Hydropower Project Environmental Programmes
There are in total five programs designed to address environmental issues during project implementation and later on in the operation phase. The sixth program for upgrading of local infra-structures is under consideration and will take off as soon as funding has been secured.

The ongoing programmes are: the Preparation of the Catchment Management Plan (CMP) - phase II, the MUAJAKI Public Health Project, the Long Term Environmental Monitoring Project, the Socio-economic Study Project (SEMA-ki) and the Malaria Vector Study. All these programs have been initiated after implementation work for the LKHP had started. The programs are financed separate from the main project and are being carried out under separate contractual arrangements by both independent consultants and the main consultant NORPLAN, taking part as well. TANESCO is playing a coordinating role. As these programs are presented in detail in another paper, some aspects of these programs will only be quoted for illustrative purpose in this paper.

- Development of EMS in TANESCO

General
There are widespread and deep concerns, both nationally and internationally, calling for full incorporation of environmental protection in decision making processes for economic activities. The National environmental policy (NEP) requires every developer to achieve sustainable development that maximizes the long term welfare of both the present and future generations.
In order to comply with relevant legal and regulatory requirements, TANESCO is considering to establish its own environmental management system (EMS). This will ensure that environment is given appropriate consideration in all company development activities and decision making processes.

Objectives
The main objectives in the process of establishing the EMS, will be:

- to develop an appropriate corporate environmental policy, objectives and targets
- to develop a system that will ensure that there is full integration of environmental considerations in all TANESCO's work and decision making processes.
- to establish a system that will ensure continual improvement of the environmental management in TANESCO.
- to demonstrate to the public that TANESCO is protecting the environment in carrying out its activities.

Technical and Financial requirements
Developing an EMS needs technical and financial inputs. Technical inputs include hiring services of experienced environmental management experts, training internal experts and awareness raising. Both local and foreign experts are needed to develop the EMS, in collaboration with TANESCO experts. It is estimated that this work will take about three (3) years to accomplish and will cost about US$ 400,000. This sum of money cover costs for foreign consultant/expert and local experts, transport, training both abroad and in the country, and materials and awareness raising activities. Local component of these costs is estimated to be 15 to 20% of the total.

TANESCO has been struggling to get foreign financial assistance for the EMS development, but all has been in vain. If it has to be developed using own resources it will take too long to accomplish due to recurrence of unfavourable financial situation.

4.0 Internalisation of Environmental Costs in Project Analysis

In project economic and financial analysis environmental costs form part of the overall project costs. Some of the items which may be placed under environmental costs include the following:

i. Hydropower
   - Compensation for lost property
   - Costs for relocating facilities and people (roads, railways, settlements, etc.)
   - Adopting design to suit environmental requirements, eg. accommodating a road on top of a dam, providing regulation facilities to cater for ecosystem, etc.
   - Environmental management costs during and after construction (include mitigation and monitoring costs)
   - Socio-economic costs

ii. Thermal power
   - Costs of plant increase disproportionately as emission standards become more stringent
   - Cost of waste disposal and treatment facilities
   - Compensation for lost property
   - Environmental management costs during and after construction (include mitigation and monitoring costs)
iii. Transmission line system
   • Compensation for lost property
   • Choice of route to suit environmental requirements
   • Environmental management costs during and after construction (include mitigation and monitoring costs)

The cost of any of the above items accounts for the total cost of a project and contribute to the quality of economic and financial indicators which determine the viability of a project. Therefore, any disproportionate rise in the cost of any of these items could by itself render a project unviable. Hence evaluation of mitigation measures has to be carefully done so as to make logical and unbiased judgement regarding what should be done and what shouldn’t. Proceeding with a project or abandoning it on environmental grounds, can result into serious social and economic consequences, whose impacts have great bearing on the progress of the society and the nation at large.

5.0 Environmental Benefit/Cost analysis considerations

Environmental costs and environmental benefits can be enormous depending on how project impacts are identified and analysed. Impact evaluation is itself a complex issue, as there are numerous factors which may be considered and are subject to human judgement. Therefore for a particular impact to be either negative or positive, choice of evaluation perspective, matters very much. For example if we consider the amenity perspectives, we have things such as aesthetic, intrinsic and intangible values. These cannot be quantified and are subject to being exaggerated or treated lightly depending on the evaluator (attitude, knowledge, method of evaluation, etc.). The other perspectives are the social ones. With this regard, evaluation of impacts may be influenced either at individual and community level, or at national and international levels. Negative attitude towards development and love of birthplace, at individual/community level may disqualify development intervention even if intended to remove inherent inhospitable conditions.

At national level, drive for economic development may over-ride community interests (some or all) or treat them with less regard. At international level much influence come from developed nations which usually provide technical and financial support to projects. The attitude of developed nations is for conservation and protection of natural resources. Financing of some projects may be discouraged or withheld because of protection and conservation considerations by the donors. Such attitudes will clearly not be favoured by nations struggling to meet their development objectives, given the fact that industrialised countries have grossly disregarded same aspects during the industrialisation process. Other perspectives do exist, eg. Geographical, temporal, comparative, etc. These have to be carefully evaluated.

In order to exemplify the costs or benefits which an evaluation can result into, some cases connected with the Mtera reservoir and the Kihansi project are given below:

Mtera reservoir
i. The creation of Mtera dam has created a physical obstacle to upstream migration of fish in the Great Ruaha river, but further downstream there was already built the Kidatu dam which prevent upstream migration of fish
ii. Loss of terrestrial habitats for wildlife due to impoundment at Mtera; but the reservoir has
created a new, rare, aquatic habitat important to a variety of organisms and has in fact increased the biodiversity of the region.

iii. In the Mtera case again there was loss of cultivated and fallow land of approximately 9 km², but land of similar quality is still available around the reservoir. Water was the limiting factor for survival, not land. Potential also exists for foreshore agriculture or small scale irrigation of the near-shore area.

Kihansi Project

iv. In order to sustain the natural bio-diversity of the Kihansi gorge, a proper release to the natural channel has been determined to be 7 cumecs. This is 43% of the average flow (16.3 cumecs) and 28% of the turbine design flow (24.9 cumecs). This amount of release represents a cost of US$ 27.83 million per annum. Other releases considered are as shown in the table below:

| Expected annual costs (US$ million) of bypass flows (release to natural channel) |
|----------------------------------|----------------|----------------|
| Bypass - m³/s | Cost using LRMC | Cost using peak/base |
| 1               | 3.87            | 3.48            |
| 2               | 7.796           | 7.01            |
| 3.5             | 13.79           | 12.44           |
| 7               | 27.83           | 25.96           |

Estimated revenue from Kihansi without bypass flow is: US$ 48.2 million per annum

The above costs were arrived at by calculating the amount of energy that would have been generated by the bypass discharge, which then has to be generated from an alternative source or simply be compensated by carrying out equivalent load shedding. The price per energy unit is then applied to get the total cost. Both long run marginal cost (LRMC) and peak/base costs are applied and results compared. Costs range from 7.2 to 57.7 % of the projected revenue from the project. Other charges in respect of environment and use of water are not included yet!

The consultant recommends a bypass of 1.5 cumecs, corresponding to a cost of about US$ 5 to 6 million. There is no indication of the effect of such recommendation on the project viability indicators, namely the Net Present Values (NPV's), the economic internal rate of return (EIRR) and the Financial internal rate of return (FIRR).

If recommended bypass flow and other environmental costs turn project viability indicators to unacceptable levels, then it could be concluded that the primary objective of the Kihansi project has changed from that of meeting national energy requirements to that of supporting the environment at Kihansi and associated aspects.
5.0 Concluding remarks

1. Lack of legal and institutional framework, and approved National EIA guidelines is costly to the nation. Use of external guidelines denies Tanzania a chance to properly exert her development desires.

2. TANESCO already has environmental organization within, but needs support to develop and strengthen it. Supporting TANESCO to develop its EMS, will set pace for other institutions to follow suit.

3. EIA should be regarded as a planning tool, and never be used to hinder positive development and progress.
<table>
<thead>
<tr>
<th>PROJECT/ PROGRAM</th>
<th>IMPORTANT FEATURES</th>
<th>MITIGATION ASPECTS</th>
<th>MONITORING ASPECTS</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mtera reservoir follow up study</td>
<td>reservoir area 660 sq.km</td>
<td>relocated 100 people &amp; a major road</td>
<td>concentration of wildlife near the reservoir</td>
<td>Irrigation activities upstream of Mtera had increased beyond expectation</td>
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<td></td>
<td>reservoir volume 3800 mil. CM., 16% is dead storage</td>
<td>provided basic services to relocated people</td>
<td>water borne diseases - bilharzia, malaria &amp; river blindness</td>
<td>water quality is changing indicating ingress of pollutants</td>
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<td></td>
<td>catchment area 68000 sq.km.</td>
<td>fishing allowed in reservoir</td>
<td>hydrology</td>
<td>no evidence of high sediment accumulation</td>
</tr>
<tr>
<td></td>
<td>hydropower supported is 280 MW, at 2 power stations</td>
<td>provided sufficient dead storage to accommodate sediments</td>
<td>reservoir related ecological aspects</td>
<td>biodiversity has tremendously increased</td>
</tr>
<tr>
<td></td>
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<td>fishing, off shore grazing and farming support over 4000 families</td>
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<td>diseases not more serious than before</td>
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<td>weeds invading reservoir shores</td>
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<tr>
<td>PROJECT/PROGRAM</td>
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<tr>
<td>Pangani Falls Redevelopment Project</td>
<td>- pond of 0.8 MCM&lt;br&gt;- daily peak regulation&lt;br&gt;- 66 MW power plant&lt;br&gt;- upstream of the main reservoir of Nyumba ya Mungu extensive irrigated agriculture take place</td>
<td>- raised &amp; strengthened existing road bridge to maintain existing communication network&lt;br&gt;- transplanted endangered plant&lt;br&gt;- upgrading of local infrastructures&lt;br&gt;- environmental training to TANESCO &amp; others assisted to establish pangani basin water office to do water management functions</td>
<td>- Functioning of the basin office&lt;br&gt;- development of transplanted plant&lt;br&gt;- new refuge for endangered white colobus monkeys which lived in a forest in the desiccated area&lt;br&gt;- water hyacinth in the new pond and further upstream&lt;br&gt;- Hyrological monitoring</td>
<td>Recent monitoring work by TANESCO revealed the following:&lt;br&gt;- Basin water office has gained respect &amp; recognition among water users, but needs to be further strengthened&lt;br&gt;- endangered plant doing very well&lt;br&gt;- hyacinth is increasingly becoming difficult to handle; need much more effort&lt;br&gt;- self supporting initiatives from local community to sustain benefits from the project are lacking</td>
</tr>
<tr>
<td>PROJECT/PROGRAM</td>
<td>IMPORTANT FEATURES</td>
<td>MITIGATION ASPECTS</td>
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<tr>
<td>Lower Kihansi Project: long term environmental program</td>
<td>♦ pond with storage about 1 CM spectacular water fall downstream with wide spray spray result into micro climate favouring certain ecosystem in the Kihansi gorge reserve forest around the gorge and further out Kihansi river has stable minimum flow of about 7 cumecs Kihansi designed to produce 180 MW with later extension to 300 MW</td>
<td>Mitigations came after project start. Now Proposals are: ♦ simulate gorge spray through bypass flow to maintain micro-climate, believed to support unique ecosystem in the gorge ♦ institute project area management to control use of natural resources near the hydro-system ♦ using nearby gorge as control</td>
<td>♦ performance of ecosystem, especially the rare toad found in the gorge &amp; its surroundings with recommended bypass flow ♦ Success of area management plan</td>
<td>No investigation so far carried out to find transplant area for the toad; nor attempt done to find out if such a toad exist elsewhere.</td>
</tr>
</tbody>
</table>
THE NATIONAL GRID SYSTEM

LEGEND

POWER STATIONS

EXISTING UNDER CONSTRUCTION

- HYDRO
- THERMAL DIESEL
- THERMAL COAL
- THERMAL GAS
- SUBSTATION

TRANSMISSION LINES

EXISTING UNDER CONSTRUCTION KV

- 110
- 220
- 320
- 400

FIGURE 1

EXISTING GENERATION AND TRANSMISSION IN MAJOR LOAD CENTERS

PREPARED BY
DISTRIBUTION & COMMERCIAL SERVICES DEPT.

INDIAN OCEAN

AFRICA
ORGANIZATION CHART FOR DCPR SHOWING ENVIRONMENT PLACE

FIGURE 2

Director Corporate Planning & Research

Manager Corporate Planning

Manager Research & Development

Chief Engineer
Field Studies Unit

Chief Environment Engineer/
Officer

Senior Environmental Engineer/
Officer: Monitoring & Audit

Environmental Experts (2)

Senior Environmental Engineer/ Officer
Environmental Impact Assessment

Environmental Experts (2)
NOTE: 1. All FSU staff participate in Environmental Work and Programmes
Session 2

Plans and Work
for Developing of a New
Licensing System
THE ROLE OF ENVIRONMENTAL GUIDELINES FOR ENVIRONMENTAL MANAGEMENT IN TANZANIA


Prepared by

Dr. M.A.K. Ngoile
Director General - NEMC
ABSTRACT

Environmental guidelines are among the many tools that are essential for environmental management. They provide technical guidance on benchmarks for minimum standards, clarify reporting requirements and provide information to those involved in environmental management on their respective roles and obligations. They assist in preparation of terms of references, simplify screening of projects, scoping of key issues of concern and clarify methodological approaches. Furthermore, guidelines provide information on conducting environmental investigations and inspection and in the evaluation of environmental reports and necessary monitoring aspects after issuance environmental clearance. So guidelines, simplify decision making process to ensure integration of environmental concerns into the planning, designing & implementation processes and are perceived as promoting best practices.

In this paper, environmental guidelines relevant for integration of EIA as a tool for promoting sustainable development are discussed. Emphasis has been given on the proposed draft framework EIA guidelines for Tanzania at national level. Sectoral environmental impact assessment guidelines have been highlighted for sectors that have initiated such efforts.

Donor environmental guidelines also have been mentioned and recommended for use where national guidelines are lacking. For comparison purposes a case of Ghanian environmental guidelines are also discussed.

The paper furthermore attempts to highlight factors constraining the influence of guidelines and concludes that if guidelines are to make a real difference, and fulfill their potential role, then, they must be clear, focused and tailored to meet the needs of intended users. It is anticipated that in the long term when "environment" and impact assessment" is introduced into practice through mainstream education and professional training, many guidelines will become redundant and considered as useful materials for learning and training.
1.0 INTRODUCTION

Tanzania is one of the least developed country in the world aspiring to improve her economic development which is dependent on the exploitation of the available natural resources of the environment. The challenge for the government of the day is how issues of environmental sustainability can be integrated or mainstreamed into the core of national development policy planning and implementation. Environmental issues cannot be viewed in isolation. They need to be addressed together with the process of development, taking into consideration the crucial importance of maintaining the proper balance between economic development, population growth, the rational use of natural resources and environmental protection and conservation.

In order to achieve sustainable development goals and objectives that focus on rational and efficient exploitation of natural resources for present and future generations, environmental management tools (EMTs) have to be employed. Among these EMTs are: the environment policy, legislation, economic instruments, environmental education and awareness, Environmental Monitoring and Auditing, Environmental Standards and Environmental Impact Assessment (EIA).

This paper will focus on environmental guidelines of relevance to environmental impact assessment - a process that systematically examines the environmental & social consequences of proposed projects, policies, plans & programmes and that gives an account of the implications before a decision is made. EIAs can modify and improve design, hence promotes better planning, ensures efficient resource use, enhances social aspects, identify measures for monitoring and managing impact. EIA also serves time and money in the long run, ensure long term sustainability, transparency and accountability and leads to rational decisions regarding environment and development.

2.0 THE ROLE OF ENVIRONMENTAL GUIDELINES

2.1 Definition

The term "guidelines" appear to have many different meaning. A broad definition of the term encompass "all documents compiled specifically to provide guidance on the implementation of different aspects of environmental impact assessment processes". In Environmental Impact Assessment nomenclature, guidelines are supposed to provide key stakeholders (be they are decision makers, EIA consultant and practitioners, project proponents, project reviewers, and the general public) with check list or guidance on their expected obligations in fulfilling the EIA process and practice requirements.
In a legal sense, guidelines are non-binding. Despite the profusion of guidelines available, recent works have shown that few are implemented or followed. The reasons are many, but generally among them are the insufficiency levels of human and financial resources and nature of the Guidance - many are too general or too mechanistic, to be of relevance to deal with real tasks and problems. Guidelines do provide important mechanisms to ensure that procedures for EIAs are understood by government & development agencies, private sector and project proponents and the general public that key issues of concern are addressed. They are meant to help development officers to integrate environmental concerns of various types of development projects (ie assist in the assessment of projects in relation to their environmental effects). They are a rich source of environmental criteria and information and technical guidance for those involved in EIA process.

2.2 Categories of Guidelines

2.2.1 National Guidelines

National guidelines provide information on implementing national EIA frameworks. They do provide information on the basic questions of who does what, to whom, how and when. Such guidelines complement and supplement the "bare" legal requirement & provide guidance on the initiation of development activities, their design and appraisal, authorisation and subsequent implementation & management. They are designed to ensure that all participants in the EIA process understand their roles, and laws or regulation are interpreted correctly and consistently.

2.2.2 Sectoral Guidelines

Sectoral guidelines provides detailed guidance on the specific assessment of different categories of projects, such as irrigation, power generation, mining etc. Sectoral specific guidelines provide information on environmental issues of sectoral concern and how these can be internalized when undertaking development projects in respective sectors.

Most sectoral guidelines attempts to provide detailed checklist on major activities which typically take place in all phases of development project; major issues of environmental concern associated with the sector; typical impacts associated with sectoral developments, type of analysis and tools in assessing the magnitude and significance of environmental impacts which may be applied and finally management steps to mitigate the impacts.

2.2.3 Donor Guideline

These provide guidance to development aid agencies and recipient countries to assess the environmental impact of development assistance projects, which because of their nature, size and location could significantly affect the environment. These guidelines normally indicate how environmental aspects are integrated into decision making process of the host country, aid agency and other institution involved in project design and implementation, and also provide environmental standards on which to gauge environmental performance in project planning and
implementation. They also establish "best practices" procedures for agency staff to follow in project planning, implementation and appraisal. The most commonly used guidelines are the World Health organization (WHO) World Banks, OECD's development assistance, United nations and bilateral agencies.

2.3 Roles of environmental Guidelines

Environmental guidelines serve a number of functions as far as integration of environmental concerns in development planning and design is concerned. Some of the roles and purposes of environmental guidelines are provided below:

- Provide information to those involved in EIA process on their respective roles and obligations. As one of the "toolkits" for impact assessment, guidelines serve government agencies, development officers, consultants who carries out environmental studies, and the general public on their expected tasks and obligations.

- Provide technical guidance on benchmarks for minimum standards to follow, particularly to those consultants conducting EIA studies on methodologies for impact identification, prediction and analysis and to those assessing the adequacy of the EISs for decision making.

- Assist in preparation of Terms of References. Guidelines improve formulation of terms of Reference through providing a generic array of significant issues that need to be examined. TOR should be informative, systematic and unambiguous to guide EIA consultants and facilitate subsequent evaluation of the EIA report.

- Clarify reporting requirements by the proponents as required (ie initially a project brief to provide sufficient information to allow determination of the need for an EIA study and later when a report of environmental study is being prepared for submission to a reviewing agency). There are standards requirements for preparation of EIA reports, which are to be evaluated using a standard, comprehensive evaluation procedure.

- Encourage transparency in impact assessment process and evaluation of EIA reports. Through stakeholder analysis, the relevant affected and interested groups will be involved and participate in the various stages of process starting from screening, scoping, impact assessment and evaluation of reports.

- Environmental guidelines simplify decision making by promoting information flow between impact assessment stakeholders.

- They improve awareness of all concerned by interpreting existing regulations and rules for practical implementation. Guidelines are flexible and try to cover or fill the gaps in those regulations. In this way, they help to enhance more positive approaches to impact assessment practice.
• They are considered a useful training resource material in the way they are informative and structured for easy assimilation and understanding.

3.0 PROPOSED FRAMEWORK EIA GUIDELINES FOR TANZANIA

3.1 National framework EIA guidelines

The framework EIA procedure and guidelines are prepared to facilitate the institutionalization and formalization of EIA as a tool for achieving the goals and objectives of sustainable development, and specifically to integrate environmental concerns into development planning, decision making and implementation processes. They provide technical guidance to those responsible for conducting EIA studies and those responsible for managing the EIA process and determining the quality of impact statements for decision making.

Developed in a participatory process, the draft guidelines are presented in five (5) volumes. The first volume outlines the procedural framework, focusing on who does what, when and how. Volume two provides guidelines on screening and scoping, and in volume three report writing requirements are elaborated. Reviewing of environmental statements and monitoring guidelines are in the forth volume and the last volume contains a checklist of environmental characteristics to elaborate on issues that need to be looked at or considered by environmental planners or analysts.

3.1.1 A procedural guide

The framework procedure highlights the need for and objectives of EIA i.e promoting goals of sustainable development; integrating environmental and economic & technical issues/concerns early in planning and designing stages; predicting consequences and developing mitigation measures, develop and compare various alternatives to determine the optimum mix of environment and economic costs and benefits and providing an avenue for stakeholder participation & involvement in an open transparent and participatory process.

The procedure sets out a recommended steps, purposes and responsibilities for issues, such as registration, screening, scoping and terms of references, preliminary/comprehensive assessment of impacts, review, public hearing, environmental clearance, monitoring and auditing and decomissioning.

The final section of the procedure provides for important considerations which includes EIA fees, penalties, time frame, public notices, appeals, technical review committee, reports and environmental units.

The procedural guide also includes important appendices such as registration forms (for preliminary EIA & full EIA), screening decision, scoping notice, EIA notice, principles for parties in EIA process, contents of EIS, list of projects requiring mandatory EIA, list of small-scale activities and enterprises that may have environmental effect, environmental sensitive areas and ecosystems and a glossary.
3.1.2 Screening and Scoping Guidelines

Part 1 of volume two provides guidance on screening process. This is a process of determining whether or not an individual proposal requires an environmental impact assessment and the level of assessment that should occur.

The guidelines provides for why screening, when, who does screening and how is it being done. Approaches to screening involves one or a combination of the following:-

i. Decision makers discretion - on a case - by - case basis, following criteria related to:
- information about the proposal and its potential impacts;
- the level of confidence in predicted impact;
- character of receiving environment and its resilience to change;
- existing planning, environmental management and decision making frameworks and degree of public interest

ii. Initial Environmental Examination (evaluation). This is an examination or evaluation that make use of readily available information. The IEE entails description of the proposal and examination of any alternative that might improve the environmental outcomes; identifying and address the concerns of the local community; identifying & assessing the potential environmental effects; mitigating adverse effects and enhance potential benefits and preparation of environmental monitoring and management plans

iii. Project lists with/without thresholds. The project list establish a set of specific criteria that determines which project should undergo EIA based on criterias such as key project parameters i.e type, size, location, technology mode of production process; character of receiving environment; importance & scale of impacts, land use consideration and degree of public concern and

iv. Exclusion lists - a list of projects which are exempted from EIA.

The screening guidelines have provided a list of projects that require mandatory - full EIA and those which may have environmental effects. Also provided is a list of environmental sensitive areas (ESA) and ecosystems in which any activity that is likely to be situated in such ESA’s should be subjected to EIA.

Part two of the guidelines provides information on scoping. This is an interactive and participatory process which entails determination of the extent of and approach to an impact assessment; and identify the main issues of concern that are relevant for decision making. The scoping guidelines set out responsibilities and tasks, discusses roles of different bodies and methodologies for public participation’s, suggest the content of scoping report and cover the contents of a generic terms of references for an EIA.
The importance of scoping process cannot be over emphasized. It suffices to reiterate that scoping determines the boundary of the EIA study, provides an opportunity for stakeholders to exchange information and express their views and concerns regarding the proposal, identifies important issues of concern. Thus focus the study on relevant issues for decision making, evaluates them, organises & present them to assist analysis and establish the terms of reference. In general it facilitates an efficient assessment process that saves time and financial resources.

3.1.3 Report writing Guidelines

These provide a report format as well as aspects which should be covered in preliminary or comprehensive EIA report, according to the terms of references. These include inter alia:-

- a non-technical summary
- a description of proposed activity & the need for it
- a description of the surroundings of a project and baseline conditions of the environment against which future impacts, can be assessed.
- A consideration of alternatives including zero alternative
- An analysis of site selection
- A description of potential positive and negative impacts from an environmental, social, economic and cultural perspectives for different phases of development
- An analysis of the importance of potential negative impacts
- The proposed measures to mitigate potential negative impacts
- A monitoring plan for tracking environmental impacts and mitigation measure
- Contingency plan for residual and unpredicted impacts.
- A description of how public consultation was undertaken
- Any other information considered necessary to assess the proposed activity i.e all technical information including maps graphs etc.

The guidelines prescribes the format and organization of the report including cover page, executive non-technical summary, contents page, introduction, terms of reference, approach to the study assumptions and limitations, administrative, legal & police, requirements, proposed actions, affected environment, assessment, proposed mitigation measures, incomplete or unavailable information, conclusions definition of technical terms, list of prepares references and appendices. The contents of each of the items are also provided.

As the EIA reports are designed to assist the project proponent to plan, design & implement in a way that minimizes negative effects and maximize the benefits; the decision-makers to decide whether or not a proposal should be approved and if so, the terms and conditions of approval, and the public to understand the proposal and its impacts on the community and environment; then the reports should be clearly presented for easy understanding by lay persons. Where possible a non-technical summary be translated into a local language.
3.1.4 Review and Monitoring Guidelines

Volume 4 of the environmental guidelines provides guidance on reviewing/evaluating the adequacy of EIA reports for decision making and monitoring requirements.

Part one of the guidelines covers the review process. The draft guidelines provides for why is reviewing of impact statement necessary, when it is be done, who does the review and the criteria to follow when reviewing reports.

Reviewing impact statements in the EIA process can:-

- determine whether the EIA report is an adequate assessment of the environmental effects and of sufficient relevance & quality for decision making
- collect and collates the range of stakeholder opinion about acceptability of the proposal and the quality of the EIA process that was used;
- ensure that EIA report and process complies with the TOR and
- determines whether the proposal complies with existing plans, policies & standards.

The review guidelines sets out four major areas of focus as important criteria for consideration. There are:-

- Description of the development, local environment and baseline conditions
- Identification and evaluation of key impacts. This entails the identification of impacts and methodologies used, prediction of impacts magnitude and assessment of impact importance/significance.
- Alternatives and mitigation’s including commitment to identified mitigation resources.
- Communication of the results and stakeholder involvement. The focus is on presentation, balance, non-technical summary, gaps and uncertainties. On stakeholder involvement the focus is whether key issues of concerns from various stakeholder groups are taken on board and integrated.

The review guidelines furthermore provides detailed aspects for consideration under each of the above criteria's.

Part two of this guideline document provides guidance on Monitoring. It emphasis the objectives for monitoring, responsibility for monitoring, when should it be done, parameters to monitor frequency and a monitoring programme including financial obligations.

Monitoring ensures that anticipated impacts are maintained within levels predicted; conditions of approvals are adhered to; mitigation measures are effectively applied and benefits expected from
EIA are achieved. Through monitoring verification of past predictions and effectiveness of mitigation’s can be done and also assists in the review of effectiveness of the environmental management.

3.1.5 General Checklist of Environmental Characteristics

These guidelines provide checklists of identified environmental characteristics which may potentially be affected by development actions, or which could place significant constraints on a proposed development. The checklist endeavors to include major characteristics and linkages that should be considered by environmental planners or analysts, when describing the proposed undertaking with its implications on the environmental, socio-economic and cultural context in the efforts to integrate development and environmental management.

The checklist provides guidance on the following parameters

- Physical description of the site and its surrounding
- Ecological characteristics of the site and its surrounding
- Current and potential land uses & landscape characteristics
- Socio-economic & cultural aspects of affected public including services and facilities
- Levels of present and future environmental pollution
- Risks, hazard, health & safety issues
- Policy considerations, awareness and publicity
- Cumulative and synergistic effects and
- Enhancement of positive characteristics.

The checklist might not be exhaustive, but it intended for use as a guide.

3.1.6 Environmental Standards

These provide guidance to decision maker and EIA practitioners on the minimum acceptable levels to which a proposed project should adhere. They also provide a quantifiable measures for use in the review and monitoring processes. Many countries do not have their own standards and preparing them requires time financial as well as human resources.

Tanzania has few official national standards for environmental quality. Temporary air and domestic water supply standards and effluent standards do exist. In absence of these, internationally recognized standards such as the Word Health Organization, World Bank, European Union etc can be used. WHO specified air quality guidelines based on the lowest level at which a pollutant was shown to produce adverse health effects, or the level at which no observed health effect was demonstrated, plus a margin of protection to safeguard sensitive groups within the population.
3.2 Sectoral EIA guidelines initiatives

There has been some notable initiatives to incorporate EIA at sub-national level. Several sectors are in the process of reviewing their policies that appreciate the need of EIA. However, they lack legal provisions. These include:

Tanzania National Parks (TANAPA)

TANAPA’s policy 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 by TANAPA, as well as other government agencies and private sector proponents. EIA is also being extended to cover General management Plans currently being prepared for each national park.

Department of Wildlife

Department of Wildlife policy requires all 'significant' development proposals with Tanzania's protected areas (which includes game controlled areas, reserves and forest reserves) to be subjected to EIA (Department of Wildlife, 1996). Ngorongoro Conservation Area authority has a similar policy.

World Banks EIA guidelines are categories projects in categories A through C with projects in third categories being requiring for details on how to conduct scoping, preparing terms of references, conducting EIA studies, suggest contents of EIA document, the review approach and the necessary supervision and expert evaluation.

Tanzania Electric Supply Company (TANESCO)

TANESCO have made EIA mandatory for all generation projects and for the construction of transmission lines.

Mining Sector and Marine Park Reserve

In these Acts EIA is a legal process and any proponent who violate it is subject to charges and penalties supported by legislation.

Other sectors

A number of sectoral policies, such as those for construction industry, tourism, land and energy, advocate the use of EIA in project planning. For example, the proposed National Land Policy requires EIA studies to be done prior to project approval. These policies however lack clear procedural guidelines and legislation, except for mining, sector and marine park reserve. Some sectors which are in the process of preparing guidelines include; Mariculture, and Road sector.
3.3 Donor EIA Guidelines

Multilateral and bilateral donor agencies have produced various guidelines that aim at integrating development and environment imperatives in the execution of assisted development programmes in recipient countries. One such guidelines are the OECD's guidelines on Environment and Aid, which outlines among others, guidelines on good practices for EIA, its integration into decision making and implementation process, project requiring mandatory EIA, coverage of impact assessment, riming, responsibility and procedural arrangements, including external and internal review, decision making process, monitoring and auditing.

4.0 ENVIRONMENTAL GUIDELINES IN GHANA

Ghana is among the first African countries that is advance in implementation of EIA. EIA was refereed in 1985 by the Ghanaian Investment Code first as a policy instrument. The Environmental Protection Council introduced the EIA process for industrial developments. A Government Administrative Directive made EIA a legal requirement in 1989, and in 1994 the Environmental Protection agency was formed with mandates among others, implementation of EIA process.

(i) Environmental Impact Assessment: procedures.

Following an introduction on the need for environmental management, the EIA process procedure in Ghana is described. Section 3 sets out the EIA procedures (registration, screening, scoping, ToR, EIS review, public hearing, and environmental permitting and validity of provisional environmental permit). Other sections deal with fees, environmental management plans and annual environmental reports, penalties, determination of an application, appeal, Technical Review Committee and public notices.

(ii) Environmental Assessment in Ghana: A Guide.

This guide was prepared to assist the headquarters and regional offices of the Environmental Protection A agency in administering EIA procedures. It provides the context of EIA within the broader fields of environmental planning and environmental management. It covers introduction, EIA procedures and project registration, screening, scoping and consultation, the management of EIA, EIS review, monitoring, environmental audit, environmental management plans, environmental reports and environmental management system etc.

(iii) Ghana Mining and Environmental guidelines

The document is presented in three parts: general guidelines for exploration, mining, mineral processing and decommissioning; detailed guidelines for the preparation of an EIA for a new mining project; and detailed guidelines for the preparation of an Environmental Action Plan for existing mines. The guidelines address mineral exploration by requiring liaison, controlling access and activities and specifying abandonment process.
Lessons for learning from the Ghanaian case

i. In addition to advising role supervisory and enforcement roles are necessary.

ii. An effective institutional framework for environmental management at national and local levels is a prerequisite.

iii. EIA guidelines and frameworks need to be supported by legislation.

iv. Adequate capacity building at all levels to improve human expertise and awareness.

v. Representation of environmental officers at district and lower levels.

vi. Political will, support and commitment to environmental issues and concerns.

5.0 FACTORS CONSTRAINING THE INFLUENCE OF GUIDELINES

A recent study on performance review and critical analysis of environmental guidelines (OECD 1994) found that few guidelines were actually implemented in practice because of: lack of human and financial resource; their general, non-specific and (often) mechanistic nature; and their lack of relevance to the main tasks and problems facing guideline users.

Notwithstanding the utility of guidelines as "tools" available for impact assessment practitioners and process managers, guidelines are defined by a number of different considerations including the policies and priorities of agencies concerned. Furthermore, the use of guidelines vary from country to country, from organization to organization, amongst institutions at different stages of development in impact assessment practice, and according to specific social, economic, ecological and political context.

Some of the factors constraining the influence of guidelines:

- Limited expertise in EIA – national capacity in terms of expertise to support implementation and management of environmental assessment is limited. This impedes development of sectoral guidelines & legislation.
- Lack of time and financial resources.
- Lack legal status and hence frequently avoided and vulnerable to political influences.
- Inadequate awareness of their content amongst potential user groups.
- They are often too "technical" providing directions to those responsible for undertaking the assessment and fails to provide the same guidance to those responsible for managing the assessment process.
- Limited compliance to existing stipulated guidelines.
- Dependency on trained staff for implementation.
- They over-emphasize negative impacts and pay insufficient attention to optimizing the positive aspects development.
- They fail to convey the best (or leading-edge) practice due to:
  - Failure to highlight the importance of initiating impact assessment early in the planning process.
  - Some fail to guide formulation of terms of reference; do not mention the need for
- assessing alternative project options;
- Some do not address health impacts adequately;
- majority do not make reference to the need for addressing residual impacts; and others
  make no reference on the need for environmental management and monitoring plans.

• They fail to provide guidance of value to impact assessment in the 'real world' due to lack of
  attention to stakeholder involvement.

• On the quality of guidelines, most do not seem to be keeping pace with changing ideas on best
  practice due to their mechanistic and rigid approaches. As such they limit innovation and
  stifle" the adoption of more appropriate and context - relevant approaches (tendency to be
  seen as static documents).

• There are also gaps in the guidelines as relates to different EIA stakeholders; specific contexts
  and even specific aspects of environmental assessment as follows:-

i. Different EIA stakeholders
   - for policy makers & process managers
   - for local staff untrained in EIA
   - for the general public (lack of user guide)

ii. Specific contexts e.g
   - conflicts & post - conflicts context
   - transboundary impacts & cumulative impacts- small
   - scale/community projects
   - environmental projects assumed not to required EIAs e.g.
     establishment of protected areas, sewage and sanitation project etc.

iii Specific aspects of environmental assessment
   - strategic environmental assessment
   - codes and ethics of impact assessment practice and professional ethics, and code of
     practice
   - links with international agreements and conventions

• Lack of use of local language
• Absence of national environmental standards and reliance on international standards
• Lack of capacity and representation at district level. Very few people are knowledgeable
  about the EIA process and practice at not only national level, but also at district level and
  lower levels of environmental governance.
6.0 CONCLUSION

Guidelines have been prepared for different aims and purposes and as such they differ markedly in their content. Some seek to guide impact assessment practices for various target groups i.e. decision makers, environmental planners, EIS reviewers, EIA practitioners, private developers and the general public while others seek to set out institutional procedures and regulations.

Whereas the purpose of these guidelines are clear, recent research on guidelines utility and effectiveness has indicated that majority are used only occasionally by policy makers, advisers and consultants. It is therefore recommended that, in addition to preparing these guidelines as a response to addressing real or perceived deficiencies in impact assessment process, other approaches need to be adopted to complement the production of existing guidelines. These include:-

- staff training at various levels, from national to local levels.
- performance review
- institution re-organization and
- improved communication

Under the current state of affairs in Tanzania, which emphasize central & local government reforms, trade liberalization, privatization and mushrooming of socio-economic enterprises among others, particularly imperative and necessary. Effective planning and environmental management is emphasis. EIA has proved in many counters to be an appropriate and effective tool in achieving sustainable development. For EIA to be implementable and effective, clear guidelines support by strong legislation should be in place. And therefore, effort to curb environmental abuse initiated by various government departments should be appreciated and supported. Sectors are advised and encouraged to formulate sectoral specific EIA context of national framework guidelines so as to integrate environmental concerns, their respective sectoral development. Our goal is sustainable development let us join hands through collaboration and coordination to ensure that this goal is achieved. Rest assured of the National Environment Management Councils’ interest, support and commitment towards the process of institutionalization and normalization of EIA as one of the effective tool for environmental management and governance.
References


REGULATORY FRAMEWORK FOR THE REFORMED SECTOR
By: Eng. B.J. Mrindoko

1. STATUS OF THE POWER SECTOR - DONE

2. THE ELECTRICITY ORDINANCE - DONE

3. POWER SECTOR VISION

...provision of adequate, safe, reliable, efficient and cost effective and environmentally compatible electricity services on a sustainable basis...

4. POWER POLICY STATEMENT

➢ INCREASE SECTOR EFFICIENCY

➢ ACCELERATE ELECTRIFICATION TO ENCOURAGE FUEL SWITCH

➢ ENSURE LONG TERM ECONOMIC VIABILITY AND SUSTAINABILITY OF THE SECTOR

➢ REDUCE PUBLIC SECTOR EXPENDITURE BY TRANSFERRING TO PRIVATE SECTOR THE BUSINESS RISKS INHERENT IN INVESTMENTS IN THE POWER SECTOR.
5. **STRATEGIES**

- REVIEW THE ELECTRICITY ORDINANCE
- RESTRUCTURING AND UNBUNDLING THE INDUSTRY
- INTRODUCE COMPETITION WHERE POSSIBLE
- PROVIDE A REGULATORY FRAMEWORK TO REGULATE THE SECTOR
- GOT TO PROVIDE AN ENABLING ENVIRONMENT FOR PRIVATE SECTOR PARTICIPATION

6. **INSTITUTIONAL FRAMEWORK**

GOT TO SEPARATE POLICY FORMULATION FROM REGULATORY AND OPERATIONAL FUNCTIONS

7. **ENVISAGED POWER SECTOR STRUCTURE**

- SEPARATION (UNBUNDLING) OF THE DIFFERENT SEGMENTS
- TRANSMISSION AND DISTRIBUTION ARE NATURAL MONOPOLIES.
8. RURAL ELECTRIFICATION - DONE

9. ELECTRICITY TARIFFS WILL BE DETERMINED ON COMMERCIAL PRINCIPLES

10. FISCAL INCENTIVES

➢ IN ORDER TO MAINTAIN COMPETITIVENESS IN THE REGION CONSIDERATION SHALL BE MADE FOR SPECIAL CONCESSIONS OVER AND ABOVE THOSE UNDER THE INVESTMENT ACT OF 1992
Session 3

Water Resources Management

in

Tanzania and Norway
Ministry of Water

River Basin Management and Smallholder Irrigation Improvement Project

Interventions by the River Basin Management Project
By Washington Mutayoba

Conference on Licensing Procedures for Electric Power Development and Environmental Management in Tanzania
Iringa 4 – 7 October, 1999

Dar es Salaam, October 1, 1999
RIVER BASIN MANAGEMENT

By W. N. Mutayoba  
Project Coordinator  
River Basin Management Project  
Ministry of Water  
P.O. Box 35066, Dar es Salaam

Background

Tanzania faces a water stress situation in many parts of the country, as water demands exceed available resources. Today water scarcity is perceived at many places in the country, attracting interests and discussions on issues related to its use, availability quality and adequacy. Water issues vary from place to place depending on the supplies and the demands on it. Some of the critical water management issues are the diversity and nature of the activities as well as the water use alternatives. The high variability in rainfall and river flows and occurrences of droughts and floods, pollution of water sources, lack of adequate coordination among various sectors and, lack of adequate infrastructures and tools needed for planning and decision making and lack of a framework for effective stakeholder participation aggravates the difficult situation.

Uncoordinated planning for water use, inadequate policies and legislative framework, and poor operational infrastructure of data gathering networks and capability, together with increasing demands from growing populations, inefficient water use and frequent occurrences of droughts, water pollution, have all resulted in water shortages. Furthermore, extensive dry season irrigation dries up the rivers and disturbs wildlife. As a result of all the water uses, there are conflicts among users and sectors. The various human activities are also impacting negatively on the environment.

The government through the Ministry of Water undertook, in 1994/95, a rapid water resources assessment (RWRA), which was a quick identification of water resource availability, use and the priority issues to be addressed in river basins. This was prompted by the seemingly water scarcity in many parts of the country, evidenced by serious water use water conflicts. In this assessment it was identified that demand for water is exceeding the available resources in some Basins and that conflicts were serious growing from local into national and even international issues. There are serious water user conflicts particularly in Pangani and Rufiji Basins. Also the assessment noted the very efficient water use in irrigation systems and deterioration of water resources due to municipal and industrial pollution. These problems in water management arose mainly because of lack of comprehensive and integrated planning and management. It was recommended that there was a need of improving water resources management in the country starting with the priority Pangani and Rufiji Basins.

A major recommendation from RWRA was; a comprehensive water resources management strategy was deemed necessary to foster sustainable water resources development and management nationally and particularly in Pangani and Rufiji Basins.
The Project

The RBM project was conceived out of a water stress situation in parts of the country, as water demands exceed available resources. The situation is particularly critical in Pangani and Rufiji Basins where expanding water use is threatening existing investments and the environment and is the cause for serious water use conflicts among the water users and sub-sectors. Largely this is a result of an inadequate water allocation system, wasteful use of the resource, and lack of adequate management action. The project aims at strengthening the capacity of the Government to manage its water resources in a comprehensive and integrating manner. This will be achieved through implementing clear policy options which directs to sustainable levels of water use, while satisfying a wide range of needs including, irrigation, hydropower, industrial and water to maintain the natural ecosystems, without infringing on the rights of every citizen to adequate water for drinking and sanitation.

Primary Objective of the RBM component of the Project
to strengthen the government’s capacity to manage its water resources in an integrated and comprehensive manner that ensures equitable, efficient and sustainable use of the resource.

Specific Objectives
to develop a comprehensive and dynamic water policy, that will guide water use and development. The policy should lead to a harmonized water management legislation and institutional framework.

to put in place a mechanism for participatory planning and systematic involvement of stakeholders in decision making at all levels.

to improve water resources monitoring infrastructure.

to improve analytical understanding of hydrological phenomena and their interaction with other natural resources.

Scope of Work
The scope of work includes:-

Strengthening national water resources management through improving the legal and regulatory framework and broadening participation in river basin management.

Carrying out a review of the institutional framework and legislation for water management, focusing on water rights, water charges, protection of water against pollution and broadening participation in the institutional framework.

Carrying out a review of the functions and organization of WRD, in order to restructure its activities in the light of the increased awareness of water-related issues and increase in responsibility and volume of activities, and strengthening of WRD's capacity to monitor
water availability and use, through: (i) the acquisition of specialized equipment and vehicles, (ii) construction and rehabilitation of office facilities in Dar es Salaam and the Rufiji River Basin; (iii) provision of training and technical advisory services to improve monitoring capabilities.

Strengthening regulatory functions in the water sector through: (a) the acquisition of equipment and vehicles; (b) provision of training and technical advisory services to offices of Principal Water Officer, and the Basin Water Officers in the Pangani and Rufiji Basins, respectively; and (c) rehabilitation of the offices of the Principal Water Officer in Dar es Salaam.

Carrying out studies on: (a) features of Pangani and Rufiji river basins which are of importance to basin hydrology and environment; (b) issues related to natural resources management in the Great Ruaha sub-basin; (c) regulation of water use, and assessing the environmental impact of large scale farming enterprises engaged in irrigation in both river basins; and (d) two other river basins.

Strengthening the national water quality network to enable it to carry out effluent monitoring of ambient conditions; and groundwater monitoring through: (a) replacement and upgrading of equipment and facilities in MoW's regional laboratories serving the Pangani and Rufiji River Basins; and (b) improvement of facilities at MoW's Central Laboratory.

Project implementation was designed to be carried out in three broad programs as follows:

A  **Strengthening National Water Resources Management**

(i)  Strengthening Offices of the Director of Water Resources and Principal Water Officer.
(ii) Conducting Special Studies.
(iii) Participatory Basin Management.
(iv) Capacity Building in Social Assessment for Water Resources.

B:  **Strengthening Basin Management**

(i)  Strengthening the Pangani and Rufiji Basin Water Offices
(ii) Water Use and Water Right Surveys
(iii) Rehabilitation and Improvement of Hydrometeorological Network
(iv) Establishment of Groundwater Monitoring Network
(v) Water Quality and Environmental Pollution Monitoring
(vi) Construction and Rehabilitation of Office Buildings
(vii) Operation and Maintenance of Stations, Information Gathering and Management
(viii) Water Resources Information Management Systems
(ix) Information Dissemination
C. Training
The training program is intended to build capacity at all levels of Water Resources Management. It will involve:
(i) Courses related to project management, supervision, monitoring and evaluation.
(ii) Water resources management courses
(iii) Water resources database management
(iv) Instruments maintenance and repair course.
(v) Water quality and environment management.
(vi) Environment Impact Assessment.
(vii) Capacity building for stakeholder participation.
(viii) Stakeholder training.

Current Status of the Project
The various programs are at different levels of implementation, a few of them have been delayed a bit because of unforeseen problems in the procurement processes.

Integrated Water Resources Issues in River Basin Management.

All water in the country is vested in United Republic of Tanzania making water a common use resource. Water touches on the lives, social and economic well being of the all the people in country. Currently water resources management is governed by the Water Utilization (Control and Regulation) Act (WUA), No. 42 of 19974 and its Amendment Act No. 10 of 1981 and Written Laws (Miscellaneous)Act No. 17 of 1989 and General (Regulations) Amendment . According to this Act the country is divided into river basins, namely the Pangani Basin, Wami Ruvu Basin, Rufiji Basin, Southern Coast (including the Ruvuma river) Basin, Lake Nyasa Basin, Internal Drainage Basin to Lakes Eyasi and Natron, Lake Rukwa Basin, Lake Tanganyika Basin, and Lake Victoria Basin.

In Tanzania the major water uses are:
(i) water for urban water use (both households and other users dependent on the same supply system), rural water supply and sanitation (both urban and rural);
(ii) water for food security or irrigation and drainage;
(iii) water use for ecosystem/environment;
(iv) water for other uses such as hydropower, industry, and navigation etc.

The first priority use of fresh water is to meet basic human and ecosystem water needs in which case these needs must be identified before allocating the resource for some other use; all other uses may be subject to economic evaluation. This is the first principle for water resources management in Tanzania. Other principles are;

- Water is an economic good, its economic value should be given due attention when apportioning scarce water resources among competing uses, without infringing on the basic rights to water services for all people at affordable prices
Water planning and decision-making should be democratic, and must ensure the interests of all affected parties and that there is participation of all key stakeholders.

**Water Resources Management Issues and Challenges**

Water Resources development in the country is mainly through sectoral, regional or district interests. This makes it rather difficult to clearly understand the resources available in the hydrological unit. Having realized this deficiency the Government has adopted a River Basin as a planning unit. Analysis, evaluation and management are to be made at the Basin level. In pursuing this strategy the Government has established Basin Water Offices in the Pangani (1991) and the Rufiji (1993), when the need arose, as a first step. Each of these offices has a Basin Water Board and a Water Officer, who implements water allocation, water rights administration and control of pollution; through application of this law. The two functioning Boards have each ten members. The WUA does provide for integrated water resources management. In consolidating this important step and to ensure equitable, efficient and sustainable development, of water resources, both in the short and the long-term, the Government is committed to adopting a comprehensive approach to river basin management and implement Integrated Planning and Management in a river basin.

Water in natural state is an integral part of ecosystem, a natural resource and social and economic good, whose quantity and quality determine how it may be used. Tanzania is endowed with abundant water resources including rivers, aquifers, springs and lakes. Unfortunately, this resource is unevenly distributed in time and space. The major lakes; Victoria, Tanganyika and Nyasa are trans-boundary water bodies situated at the peripheries of the country.

**The main issues and challenges are:**

**Environmental Issues**
(a) Water availability – high variability in rainfall and river flows
(b) Establishing Land-Water-Environmental Linkages
(c) Catchment Protection and Management
(d) Conservation and Management of Wetlands and Ecosystems
(e) Maintenance of minimum flows of key rivers
(f) Pollution of Water Resources
(g) Soil erosion and sedimentation
(h) Inter basin water transfers

**Socio-economic issues**
(a) Rising demands on limited supplies
(b) Large numbers of unlicensed uses
(c) Inefficient water uses, misuse of water supplies
   - Leakages from domestic water supplies
   - Low irrigation efficiencies
(d) Operation and management of large hydropower or multipurpose reservoirs
Institutional Issues

(a) Water Use Conflicts, and Sectoral Conflicting Interests
(b) Inadequate incentive for conservation
(c) Coordination, development cooperation in the utilization and management of internationally shared water resources
(d) Inadequate hydro-meteorological, groundwater and water quality monitoring network and information management system and tools needed for sound planning and decision making.
(e) Stakeholder participation in basin management.
(f) Lack of cross-sectoral coordination
(g) Establishing mechanism for integrated water resources planning, and decision making support system

Integrated Water Resources Management

According to the Global Water Partnership (GWP) IWRM is a process which aims to ensure the coordinated development and management of water, land and related resources to optimize economic and social welfare without compromising sustainability of vital environmental systems. When this process acts on a river basin, IWRM may be called River Basin Management. It is the linking mechanism for the various sectors and the environment.

Activities in the IWRM includes; the evaluation of the quantity and quality of available water resources under alternative land uses; the allocation of raw and other re allocatable water to competing uses and users; the development of water supply and demand management strategies and mechanisms to increase welfare derived from scarce resources of water, land and capital in a sustainable manner.

For the above to take place successfully it requires; (i) a framework of policies, legislation and regulations; (ii) an institutional framework covering all levels included within river basins or sub basins or catchments; (iii) management strategies for planning and prioritization to provide the required information and tools to guide rational allocation of the resource and management decisions. For Tanzania these strategies include: Cost recovery; Capacity building; institutional reform; Training; Stakeholder participation; Water resources management at various levels; Strong River Basin Boards, other include financing mechanisms including Government funding for information management and large schemes; Private sector participation; access to credit, etc.

ESTABLISHMENT OF HYDROPOWER PROJECTS ON RIVER BASINS- KEY ISSUES TO BE CONSIDERED.

River Basin Management is a holistic, integrated approach to the management of land and water in a Basin with the objective to save water and identify its optimal use.
Other factors to be considered include:
(a) Cross sectoral coordination
(b) Operation of hydropower reservoirs while maintaining minimum flows, for the environment, ecosystem flora and fauna.
(c) Consideration of other riparian rights, in the management of hydropower reservoirs,
(d) Optimal operation of reservoirs in the hydrosystems that avoids undue spilling and wastage.
(e) Dam safety consideration-regular monitoring and reporting,
(f) Monitoring and recording of inflows and outflows of the hydrosystems, and understanding of the water balances of reservoirs,
(g) Preferably develop sites where there is minimum potential conflict with other users,
(h) Consider multi-objective, and integrated planning of hydropower and other uses.

It is believed that such an approach will permit a more responsive and effective allocation system and sustainable use of the resource.
Water resources management and water user associations in Norway.

Audun Bjørkenes, Managing Director
Arendal Water System Management Association
(Arendals Vasdrags Brugseierforening - AVB)

Summary.
Water Management Associations (WMA) in Norway have been established in basins with more than one power company operating. The main objective of a WMA is, on behalf of its members, to construct, maintain and operate reservoirs in order to optimise the water resources available. The WMA is financed by the owners (the power companies), according to fixed shares reflecting the normal production. The WMA is operating the reservoirs according to concessions given by the Government, and reports regularly to the authority. Water abstraction to consumers, industry or irrigation is not a conflicting area. Environmental protection, fishing, pollution and recreation are the main obstacle for new projects, and must be taken care of by WMA through remedial measures and compensations to land owners.

1. Background.
In Norway, 99,5 % of the electricity consumption depends on hydropower, very small share is produced by gas or oil, or other sources. This is due to the fact that Norway mostly is a country with high mountains, heavy rainfall and many natural lakes which easily can be used as reservoirs, especially in the mountains.

Heavy rainfall throughout the growing season means that there is hardly any lack of water for irrigation, and neither for public or industrial use. In pratctice this is not a conflicting area in Norway. The main conflict is between the power industry (construction of reservoirs) and all aspects of environmental protection, including erosion, pollution, fishing and appearing view of the landscape and river.

During the last 100 years construction of dams, power stations and regulation of rivers have been established to meet the need for electricity, both for public and industrial use. Especially during the years from 1950 to 1975 the need for electricity increased considerably, and new hydro projects were constructed. Up to 1995 hydropower met the increased demand, but during the last years the production (assuming normal rainfall) can not meet the need for power, and Norway now has to import from other countries (mainly power generated by gas, oil and coal produced in Denmark, Germany and other countries in northern Europe).

Due to unstable political situation combined with strong and active local, environmental protection groups new projects have almost been stopped. Increased consumption must be met by alternative energy sources, increasing import and optimal use of available water.

Postal adr. Visiting adr. Phone: 37 00 57 00
Postboks 121 Langbryggen 21 Fax : 37 00 57 10
4801 Arendal, Norway 4800 Arendal, Norway E-mail: audun.bjorkenes@avb.aa.no
Water Management Associations in Norway - Audun Bjørkenes.
Optimal use of water must be based upon the economic value for different users, but keeping in mind basic public needs and environmental protection. This is a challenge for Norwegian authorities, power companies and WMA’s.

2. Water Management Associations (WMA).

River system with one power company.
The main group of power companies are owned by national or local authorities, in addition to a few number of private companies.
The Water Regulation Act dating back to 1917 (WRA-1917) gives the owner of the power company the legal right (concession) to construct regulating dams and watercourse diversions, and regulate the river discharge.

This is the fact in rivers with only one company operating. The company is responsible to the authority and public to fulfil the conditions concerning regulations, environmental protection, minimum discharge, water level in reservoirs, etc.

River system with more than one power company.
In a river system where more than one company is operating, the legal rights are granted to a company or an association owned by the power companies in common, according to the WRA. This company is usually called a Water Management Association (WMA), in Norwegian called Vasdrags Brugseierforening (Water user Association). The WMA is responsible for the construction, maintenance and operation of the reservoirs and watercourse diversions, and to meet the conditions and the obligations connected to the regulations on behalf of the power companies.

In Norway totally 11 WMA’s are operating, mainly in the south-eastern part of the country.

Fig 1.
Water Management Associations in the southern part of Norway. AVB is marked with dark colour.
In the western and northern part of Norway, and areas not marked, a single power company is the owner of all constructions and power plants in the basin.

In Sweden similar WMA’s are operating in the major river systems, but for practical reasons they have established centralised units, operating most of the river systems from one head-office. We expect during the coming years that centralised operating
companies (WMA’s) will be established in Norway, each covering regions with 2 or 3 river systems.

From other countries we know the concept of WMA’s both in Tanzania and Mozambique. Personally I have been involved in the establishment of Pangani Basin Water Office (PBWO) from 1991 to 1993, and the reviewing of ARA-Sul in southern part of Mozambique in 1998. In many other countries throughout the world we can find similar organisations. Compared to the WMA’s in Norway, duties, responsibilities and financial frames can differ, but the basic principle of water management for multipurpose use of water is more or less the same.

3. Main duties for WMA’s in Norway.

The main objectives of the Water Management Associations in Norway are, on behalf of its members, to develop hydroelectric power production by means of river regulation, to operate reservoirs, and to optimise the utilisation of water resources available.

The main focus for the WMA’s is quantitative hydrology, water quality and protection of fishing interests are taken in hand by other institutions and by remedial actions of the WMA’s, imposed by the authority. At present there is no conflict concerning amount of water abstractions by other users (public water consumption, irrigation or industrial use).

In addition the WMA represents its members in dealing with authorities and public in matters of common interest, which may range from construction and maintenance of dams to implementation of remedial measures and recompensing land owners for damage and inconveniences in connection with the regulation schemes.


Arendal Water System Management Association (in Norwegian - Arendals Vasdrags Brugseierforening – AVB) is an organisation (association) responsible for the overall water management in Arendal catchment area, southern part of Norway, established according to the Watercourse Regulation Act of 1917. AVB was established in 1908 (before the WRA), and is a co-operative of 5 power company owners along the river.

Regulation licences for nearly all 17 reservoirs and a number of watercourse diversions in the basin are granted (concessioned) to AVB. Total storage volume is 1350 million m3. The catchment area is 4000 km2, and the annual mean discharge is 110 m3/s (around 3500 mill.m3/year). The annual production in 19 power plants is 2250 GWh (550 MW), 2-3 % of Norway's total energy production. The power plants are owned by 5 power companies. A map of the basin showing the reservoirs, some tunnels and the power plants is presented in fig 2.
At present there are 5 permanent employees in AVB, 4 of whom working in the main office in Arendal. Maintenance and operating personnel working on dams, gauging stations and other installations are either hired from the owners (power companies) or
from private companies and contractors within the basin (representing 10-15 full-time working persons). AVB is responsible for training of all personnel.

The board of directors are elected by the power companies, and the chairman is normally the director of the biggest power company within the basin. AVB is financed by the owners (power companies), and costs are shared depending on type and place of activity. There is no other financial sources than the owners. AVB is responsible for financing projects, data collection, remedial actions and compensations imposed by the authorities during the licensing of water rights.

AVB is responsible first of all to the owners, but must also fill the obligations towards the public and authority.
4.1. Main activities.

I order to compare the Norwegian WMA’s with similar associations in Tanzania (Water Office) and other countries, a brief presentation will be given below of the main tasks, duties and activities in AVB, which is a typical WMA in Norway. There are two main tasks: construction and maintenance and operational hydrology.

4.2. Construction and maintenance.

Construction and maintenance of dams, valves, watercourse diversions etc is a condition for the operation of the water system.

4.2.1. Planning constructions - financing.

Constructions includes dams, valves, canals, roads, sills, bridges, - all constructions needed for storing and releasing water in order to operate power stations downstream in an efficient and optimal way. (Power plants and transmission lines are the responsibility of the power companies.)

The initial plans (feasibility studies) are carried out by AVB in close corporation with Consulting companies. Detailed project plans are carried out by Consultant. AVB has no capacity to do this work.

Nearly all dams etc in the basin are owned both formally and in practice by AVB. The owners of AVB are the power companies, and financially all power companies downstream each of the dams have a share of the dam. The share is calculated by the formula:

\[ \Delta Q_{\text{reg}} \times H \]

where \( \Delta Q_{\text{reg}} \) is the increase in regulated flow caused by the reservoir, and \( H \) is the head for each of the power stations downstream the dam. (This calculation is indicated as one possible method of how to share rights and obligations among the members, according to the WRA, 1917.)

In practice each of the power stations downstream have a share which compares (more or less) to the normal power production. All costs for planning, construction and future maintenance of the dams are shared among the “owners” (the owners of AVB) according to this fixed percentage. As an example, costs for each group of dams in AVB are shared among the users according to the table below.

<table>
<thead>
<tr>
<th>Groups of reservoirs</th>
<th>AAK</th>
<th>AF</th>
<th>AE</th>
<th>VKE</th>
<th>SK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nisser-Vråv.</td>
<td>59,2</td>
<td>32,9</td>
<td>7,9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fyres.</td>
<td>63,0</td>
<td>29,9</td>
<td>7,1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nelaug.</td>
<td>29,6</td>
<td>56,8</td>
<td>13,6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nesvatn.</td>
<td>80,6</td>
<td>15,7</td>
<td>3,7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Torsdals.</td>
<td>44,4</td>
<td>8,0</td>
<td>1,9</td>
<td>45,7</td>
<td></td>
</tr>
<tr>
<td>Fjone.</td>
<td>19,0</td>
<td>9,8</td>
<td>2,4</td>
<td>68,8</td>
<td></td>
</tr>
<tr>
<td>Finndøla.</td>
<td>53,8</td>
<td>8,8</td>
<td>2,1</td>
<td>35,3</td>
<td></td>
</tr>
<tr>
<td>Gjuvå.</td>
<td>100,0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skafså.</td>
<td>8,3</td>
<td>4,6</td>
<td>1,1</td>
<td>86,0</td>
<td></td>
</tr>
<tr>
<td>Common and administr.</td>
<td>48,0</td>
<td>17,5</td>
<td>4,2</td>
<td>16,0</td>
<td>14,3</td>
</tr>
</tbody>
</table>
4.2.2. Controlling procedures and maintenance program.
A controlling program for every construction in the basin has been established. This program is according to demands set by the authorities (NVE - Norwegian Water Resources an Energy Directorate), and is included in the InternalControllingSystem (ICS) - the Dam Safety Program. Normally there is no people permanently employed or resident at the dam. Nearly all dams are operated automatically from the nearest power plant or operated by personal coming from the nearest plant.

Each dam is inspected every week, with a main inspection twice a year with qualified personnel from AVB. Every 5th year this main inspection should be done by the Licensed Supervisor Engineer in AVB together with qualified personnel from other WMA's, power companies or personnel with high and long experience. After 10-15 years each dam should be inspected and revised by a Consultant, and the final report should be controlled by the authorities (NVE).

In addition there is a demand for high flow calculations to ensure the dams capacity and stability and a demand to carry out flow simulations downstream, caused by a possible dambreak.

The inspection program is the basis for the planning of maintenance. Within each WMA there is a qualified and approved person (Licensed Supervisor Engineer) with a special task to control maintenance and report divergences from the fixed quality of the dam.

4.2.3. Security plans, disaster planning.
All power companies including the WMA's are obliged to create and exercise security plans according to regulations from authorities (NVE). The dam safety program (in order to prevent dambreak or accidents at the dam) and operating procedures will be revised regularly by NVE. In order to improve both this program and personnel involved, the program shall be exercised regularly, at lest every 3rd year.

4.2.4. The purpose of a dam safety program.
The main objectives for the dam safety program is to:

- assure the public and the society that the dams and valves are secure, and will not create any risk or threat.
- at any time have constructions which can be operated, in order to release the exact amount of water for hydro-production.

A continues program for rehabilitation and maintenance is carried out. Priorities for this program are presented to the owners of AVB every year. There will always be discussions about the priority program, but the understanding of being in advance has been accepted: for most cases regular maintenance before accidents happens is cheaper than repairing after an accident or breakdown.
Around 30% of the annual costs for AVB are used for the dam safety program, for the operation of the dams, controlling, rehabilitation and maintenance.

4.3. Water management - operation of the river system.
The purpose of AVB is to operate the dams, valves, tunnels, etc in order to optimise the hydro-production within the basin and adapt the production to the actual demand. No other competitive water users exists within the basin. Some irrigation schemes have been constructed and public water supply is mostly from the main river. Rafting of timber was up to 1970 a main user of the river, but has ceased out. Other conflicting areas (users) are environmental issues and use of the river for recreation. Environmental conflicts comprise both pollution to the river and appearing changes caused by reservoir regulations and low flow.

The holistic approach to water management is based on the principle that all need of water should be covered, and in case of choosing between different users the economic value of water should be used as a guideline for decision makers. The priority of using water is, however, not the responsibility of AVB or any other WMA. This is a political choice, and legislation of water rights will be presented later.

AVB has been given the right (concession) to construct and operate the reservoirs within special conditions and to report regularly about the operations.

The operational water management program / procedure includes:

4.3.1. Collection and use of meteorological forecasts.
Twice every day meteorological forecasts are collected automatically from The Norwegian Meteorological Institute (DNMI). An example is given below in fig. 3.

Fig. 3. Meteogram - meteorological forecast 5 days, presenting temperature, pressure, wind, clouds and rainfall. Forecasts like this must be ordered from DNMI, and costs around 70 000 NOK per year (9-10 000 US$).
The meteorological forecasts are of vital importance to make plans for reservoir operation and planning of hydro-production. Forecasts from DNMI can be given up to 10 days ahead, but normally forecasts with a range of more than 3-4 days are not reliable.

4.3.2. Installation of equipment, operation and collection of basic data from the basin.

Even if some observations still are collected and reported manually, most data of water level, discharge, rainfall and temperature are collected from automatically operated equipment in the basin. The number of automatic stations is growing. All data are automatically collected to the main computer at the office, and in principle the data up to 7 a.m. are prepared for the daily use within 8 a.m. (normal start of the day at the office). The quality of data are controlled by the officer in charge, and data are not stored permanently before the data are accepted by him. In AVB 3 qualified persons are on this special duty every 3rd week, including weekend, evenings and nights.

Discharge measurements are carried out regularly to ensure reliable data. Most of the discharge data however, are calculated by using power production, head and eventually adding release of water passing through the intake dam.

In AVB data are collected every day from:
- 19 reservoirs and intake dams (water level)
- 42 discharge stations or power station
- 16 rainfall and temperature stations

4.3.3. Calibration program for discharge measurements.

In order to ensure correct data measurements are carried out regularly to control the rating curve. Normally this is done by AVB personnel or by personnel from NVE.

4.3.4. Data control and data storage.

Based upon experiences manually observed data mostly are correct, but the last figure depends on the observer. Some personnel prefer the last figures 0, 2, 4 etc., and other prefer 0 and 5.

Automatic equipment's makes (in principle) observations every 10 sec. Mean water level is calculated every hour and is reported.

First, graphic presentation detects possible wrong data. However, the most important controlling procedure is to (automatically) calculate the inflow to every sub-basin and to compare both trend and amount of inflow (divided by basin area) from all the basins (all together 18 sub-basins are calculated daily).

No data are accepted before the manual and automatic controlling program proves the data to be reliable.
4.3.5. Reporting of data.

Data about water level, discharge, rainfall, temperature are reported from AVB to the power companies and power stations every day, normally not later than 9 a.m. Every week the main data are reported to the authority (NVE). Reports are distributed by fax, but e-mail seems to be the most convenient distribution medium. In addition all companies and most of the power stations have an easy access and can be connected to the main computer at AVB, and can receive updated data as often as needed. An example of the daily report from AVB is given in fig. 4 (next page).

4.3.6. Hydrological forecasting models.

Computer based hydrological models have been used in AVB since 1978. At the moment physically based mathematical models (HBV-model) are calibrated for 2 basins. Input to the model is rainfall and temperature, and daily computation of inflow is compared to observed inflow. The goal for the calibration is to minimise the difference between observed and calculated inflow. At least 4-5 years of observations are necessary to do the calibration. The model is, as soon as it is updated used for forecasting, with a range of up to 10 days (normally 5 days). This model is the basis for the day to day planning of the hydropower production in the basin.

The HBV-model (originally developed in Sweden, but further developed in Norway) is now operating all over the world. Even in climatic regions quit different from Norway (e.g. as in Tanzania) the model has proved to give very good results. The necessary input data exists in Tanzania, but my experience is that the main problem is to collect updated and reliable data in real time.

In addition several other short- and long time hydrological models are in use. Of vital importance in Norway is to make forecasts of the snowmelting volume, based on either measurements or other information's throughout the winter time.

4.3.7. River simulation models.

The inflow forecasts (normally for 5 days) are used to make plans for the operation of the reservoirs and to make forecast for hydro-production. The simulation programs are very simple, using fixed time lags and are programmed in EXCEL. Input data are automatically collected from the daily reports and HBV-model (forecasting of inflow). These forecasts are distributed as daily reports to the power companies, normally within 9 a.m. (se fig. 5).

Long time planning models have a range of up to 2 years. Inflow is based on statistical data, corrected for the first 2-3 weeks by the HBV-model.

In Tanzania as in Norway long time simulation programs have been used to make consequence analysis about the operation of reservoirs, based on statistical inflow data for a period of 20-30 years. The first model was established in Pangani river for the operation of NyM in 1992.
**Flood prob.****Water level and reservoir storage**

<table>
<thead>
<tr>
<th>Location</th>
<th>W.L. 7 a.m.</th>
<th>% Last day</th>
<th>mm</th>
<th>% of norm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hovden</td>
<td>394</td>
<td>24%</td>
<td>186</td>
<td>114%</td>
</tr>
<tr>
<td>Torsdalen</td>
<td>362</td>
<td>30%</td>
<td>160</td>
<td>103%</td>
</tr>
<tr>
<td>Dysen</td>
<td>336</td>
<td>65%</td>
<td>130</td>
<td>81%</td>
</tr>
<tr>
<td>Vatna</td>
<td>346</td>
<td>68%</td>
<td>120</td>
<td>77%</td>
</tr>
<tr>
<td>Ystad</td>
<td>356</td>
<td>69%</td>
<td>120</td>
<td>76%</td>
</tr>
<tr>
<td>Nygård</td>
<td>376</td>
<td>70%</td>
<td>120</td>
<td>74%</td>
</tr>
<tr>
<td>Askeland</td>
<td>376</td>
<td>70%</td>
<td>120</td>
<td>74%</td>
</tr>
<tr>
<td>Øysas</td>
<td>386</td>
<td>70%</td>
<td>120</td>
<td>74%</td>
</tr>
</tbody>
</table>

**Discharge and Inflow**

<table>
<thead>
<tr>
<th>Location</th>
<th>Discharge, m³/s</th>
<th>Last 7 days</th>
<th>Nonn</th>
<th>% of norm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hovden</td>
<td>2.5</td>
<td>125</td>
<td>80%</td>
<td>80%</td>
</tr>
<tr>
<td>Torsdalen</td>
<td>4.0</td>
<td>125</td>
<td>80%</td>
<td>80%</td>
</tr>
<tr>
<td>Dysen</td>
<td>3.5</td>
<td>125</td>
<td>80%</td>
<td>80%</td>
</tr>
<tr>
<td>Vatna</td>
<td>3.2</td>
<td>125</td>
<td>80%</td>
<td>80%</td>
</tr>
<tr>
<td>Ystad</td>
<td>3.2</td>
<td>125</td>
<td>80%</td>
<td>80%</td>
</tr>
<tr>
<td>Nygård</td>
<td>3.2</td>
<td>125</td>
<td>80%</td>
<td>80%</td>
</tr>
<tr>
<td>Askeland</td>
<td>3.2</td>
<td>125</td>
<td>80%</td>
<td>80%</td>
</tr>
<tr>
<td>Øysas</td>
<td>3.2</td>
<td>125</td>
<td>80%</td>
<td>80%</td>
</tr>
</tbody>
</table>

**Rainfall**

<table>
<thead>
<tr>
<th>Location</th>
<th>Last 7 days</th>
<th>In 1999</th>
<th>mm</th>
<th>% av norm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hovden</td>
<td>25.4</td>
<td>11.3</td>
<td>921</td>
<td>94%</td>
</tr>
<tr>
<td>Torsdalen</td>
<td>26.9</td>
<td>12.9</td>
<td>914</td>
<td>93%</td>
</tr>
<tr>
<td>Dysen</td>
<td>24.6</td>
<td>13.0</td>
<td>906</td>
<td>92%</td>
</tr>
<tr>
<td>Vatna</td>
<td>19.0</td>
<td>13.0</td>
<td>897</td>
<td>89%</td>
</tr>
<tr>
<td>Ystad</td>
<td>15.9</td>
<td>13.0</td>
<td>887</td>
<td>88%</td>
</tr>
<tr>
<td>Nygård</td>
<td>11.2</td>
<td>12.0</td>
<td>877</td>
<td>86%</td>
</tr>
<tr>
<td>Askeland</td>
<td>11.2</td>
<td>12.0</td>
<td>877</td>
<td>86%</td>
</tr>
<tr>
<td>Øysas</td>
<td>11.2</td>
<td>12.0</td>
<td>877</td>
<td>86%</td>
</tr>
</tbody>
</table>

**Temperature**

<table>
<thead>
<tr>
<th>Location</th>
<th>Last 7 days</th>
<th>In 1999</th>
<th>mm</th>
<th>% av norm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hovden</td>
<td>11.7</td>
<td>12.0</td>
<td>761</td>
<td>75%</td>
</tr>
<tr>
<td>Torsdalen</td>
<td>12.2</td>
<td>12.0</td>
<td>751</td>
<td>75%</td>
</tr>
<tr>
<td>Dysen</td>
<td>11.9</td>
<td>12.0</td>
<td>741</td>
<td>74%</td>
</tr>
<tr>
<td>Vatna</td>
<td>11.9</td>
<td>12.0</td>
<td>741</td>
<td>74%</td>
</tr>
<tr>
<td>Ystad</td>
<td>11.9</td>
<td>12.0</td>
<td>741</td>
<td>74%</td>
</tr>
<tr>
<td>Nygård</td>
<td>11.9</td>
<td>12.0</td>
<td>741</td>
<td>74%</td>
</tr>
<tr>
<td>Askeland</td>
<td>11.9</td>
<td>12.0</td>
<td>741</td>
<td>74%</td>
</tr>
<tr>
<td>Øysas</td>
<td>11.9</td>
<td>12.0</td>
<td>741</td>
<td>74%</td>
</tr>
</tbody>
</table>

**Discharge to HRWL**

<table>
<thead>
<tr>
<th>Location</th>
<th>Discharge, m³/s</th>
<th>Last day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hovden</td>
<td>3.2</td>
<td>125</td>
</tr>
<tr>
<td>Torsdalen</td>
<td>4.0</td>
<td>125</td>
</tr>
<tr>
<td>Dysen</td>
<td>3.5</td>
<td>125</td>
</tr>
<tr>
<td>Vatna</td>
<td>3.2</td>
<td>125</td>
</tr>
<tr>
<td>Ystad</td>
<td>3.2</td>
<td>125</td>
</tr>
<tr>
<td>Nygård</td>
<td>3.2</td>
<td>125</td>
</tr>
<tr>
<td>Askeland</td>
<td>3.2</td>
<td>125</td>
</tr>
<tr>
<td>Øysas</td>
<td>3.2</td>
<td>125</td>
</tr>
</tbody>
</table>

**Summary of Water Reservoir Storage**

- **Total Reservoir Storage:**
  - 1999 and 1975-98, m³/m³
  - (25, 50 and 75% curve)

**Graphs and Diagrams:**

- Inflow and discharge, Total RYGENE power plant.
- Observed Inflow, Normal Inflow, Virtual Inflow.
- Rainfall, Temperature, Discharge, Inflow, Residual Storage.
Fig 5.
Prediction of inflow, discharge and power production in lower part of Arendal river.

DNMI = Forecast, rainfall and temp.

Inflow forecast 5 days = 338 % of normal

ALT.2 = 11 mm rainfall

ALT.3 = 32 mm rainfall

m3/s Proposed release, m3/s

JØRUNDL FYRESV NISER BØYLEF

23.09 7.4 13.8 13.0 254.1
24.09 22 24 15 250
25.09 22 25 20 208
26.09 22 25 25 200
27.09 22 30 25 150
28.09 22 30 25 150

m3/s Discharge forecast.

GJØV DYNJ HØGEF NIDELV BØYLEF RYGENE

24.09 47 43 40 111 250 335
25.09 43 40 40 99 208 293
26.09 35 35 40 89 200 240
27.09 31 34 40 82 150 209
28.09 39 34 40 93 150 194

Mean PRODUCTION FORECAST based upon DNMI-weather.

MW

RYGENE HØGEF AMLI AE AF SUM Loss of production, MW

AAK AF AE SUM

24.09 59 65 25 24 75 246 143 75 15 233
25.09 59 63 24 24 75 246 95 50 9 154
26.09 59 59 24 24 75 238 70 46 7 122
27.09 59 58 18 18 75 232 23 15 0 36
28.09 59 65 23 23 75 245 19 16 0 35
Middel 59 62 22 24 75 242 70 40 6 116

HØGEF = Sum av Dynjafoss, Berlifoss, Nisserdam, Tjønnefoss og Hegelfoss

AMLI = Sum av Gjøv og Nidelv

On duty: Audun Bjørkenes, TLF: AVB 37 00 57 01, Priv 37 03 37 64, Mob.tlf 905 66 143
4.3.8. Registration of groundwater, snow, etc.
Upon requests or demands from the authority, or by the initiative of AVB some other observations are collected from the basin. Snow measurements are carried out 2 or 3 times every winter. Measurements of groundwater level is carried out regularly, but results are not used by AVB (groundwater level can easily be calculated by hydrological models with very good results, compared to observed level). Water quality, and registration of fish (as well as fish stocking) in the reservoirs are done on request by the authorities.

4.3.9. Planning of production.
Every day production plans are presented for 5 days ahead, and once every week for a range of up to 2 years. Included in these plans are time and duration for maintenance of dams, valves, power plants and constructions in the river system.

![Fig. 6 Areas observed and possible flooded in the southern part of the basin.](image)

4.3.10. Forecasts for the public.
Forecasts and plans are presented to give the owners of AVB the best input to operate the production system in the best way (to optimise production at the time of highest prices for electricity, and minimise the spill of water). Flood warnings are also distributed to the public (in newspapers, local radio, fax and phone direct to contact people), and maps showing the flooded area have been constructed, example in fig. 6. Flood pillars showing the level for high floods the last 100 year have been raised some places along the river.

5. Financing and administration.
The activities within AVB (like all other WMA’s in Norway) are financed by the owners, the power companies having power plants in the basin. As pointed out, each of the companies contribute with a certain fixed percentage according where and what type of activity. This percentage reflects briefly the share of production
for each of the power plants. As pointed out in 4.2.1 there is no other financial source.

The annual budget is to be settled some months before the start of the year, and necessary amount of money will be collected to cover the expenses for 2-3 months ahead.

The table below shows the costs for each of the main activity (example from budget for 1999).

<table>
<thead>
<tr>
<th>Main activities:</th>
<th>mill. NOK (mill US$)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation and maintenance of reservoirs, dams, valves, etc</td>
<td>1,714 (0,23)</td>
<td>21,6</td>
</tr>
<tr>
<td>Maintenance of rivers, incl. environmental protection</td>
<td>0,580 (0,08)</td>
<td>7,3</td>
</tr>
<tr>
<td>Tax and insurance (personnel responsibility, constructions)</td>
<td>1,352 (0,18)</td>
<td>17,1</td>
</tr>
<tr>
<td>Salary, wages, personal costs and social expenditures</td>
<td>2,296 (0,31)</td>
<td>29,0</td>
</tr>
<tr>
<td>Hydrology program and equipment's, computer models</td>
<td>0,730 (0,01)</td>
<td>9,2</td>
</tr>
<tr>
<td>Contingencies and office equipment's</td>
<td>1,256 (0,17)</td>
<td>15,8</td>
</tr>
<tr>
<td>Sum</td>
<td>7,928 (1,06)</td>
<td></td>
</tr>
</tbody>
</table>

In addition new constructions can amount to 1-50 mill NOK (0,1 - 6,7 mill US$) pr. year.

Execution of all activities within the fields above are the responsibility of AVB, but most of the practical field work (measurements, constructions and studies) are carried out by personnel from the power companies, private contractors or consultants.

6. Conclusions.
Comparison between Norwegian and Tanzanian WMA's.

Norway: Norwegian WMA's (as AVB) are owned and financed by all power companies within the basin. The legal rights and obligations for the Norwegian WMA's are given by the Government (based upon and according to the acts), and guidelines and demands for the operation are regulated by NVE.

AVB is responsible both to the authority and to the owners for the operation of the reservoirs, in order to give maximum hydro production and to minimise the environmental consequences.

The water user fee (to be paid by the members or owners of AVB) covers the expenses for the construction, operation and maintenance. In addition the WMA's and the power companies have to pay different types of taxes to the authority and the public.

Tanzania: Tanzanian WMA's (as PBWO) covers parts of the duties which in Norway is within the responsibility of NVE. For example, granting of water rights
are delegated to PBWO (but abstractions to irrigation schemes must be decided by higher levels - PWO or MAJI). The WMA's are financed partly by the Government (through MAJI) and partly by the main water users (both TANESCO and irrigation schemes).

**Mozambique**: In Mozambique the WMA in the southern part of the country (ARA-Sul) is operating more or less like PBWO in Tanzania.

The table below has been prepared in order to compare some of the main activities and functions of WMA's in Norway, Tanzania and Mozambique. The table is not necessarily correct, and should be further elaborated during the meeting in Irringa.

<table>
<thead>
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**Comments to the conclusions.**
- From my experience (both in Norway, Tanzania and Mozambique) the responsibility and authority of WMA's in Tanzania (like PBWO) in relation to different water users and the environment is stronger and more direct, compared to the WMA's in Norway (like AVB).
- The financing of the WMA's in Norway is more secure and predictable than in Tanzania and Mozambique. To my opinion the main obstacle for the WMA's in Tanzania (and Mozambique) is the financing.
- The functioning of the WMA's in Tanzania comprises a great number of different water users, and the WMA is totally responsible for water management within the basin.
• In Norway hydropower is dominating. Other interests, like environmental issues, recreation, fishing and alternative use of water are only considered in connection with demands and obligations connected to the concession.

• There seems to be no obstacle concerning need for qualified personnel within hydrology or environmental protection in Tanzania. However, as the number of WMA's increase there will of course be a problem. Qualified and clever personnel will also be attractive to private companies, which may offer higher and better personnel benefits.

• Twinning arrangements between WMA's in different countries (as Norway, Tanzania and Mozambique) is highly recommended, and can give valuable input to all parts.

• The Norwegian concept of water management can easily be modified and applied in countries with legislation different from that of Norway. However, in Norway the WMA's have no experience with the main problem in African countries: the allocation of water from a limited resource.

• The WMA's in Tanzania and Mozambique seems to have a formal and practical function covering both the functions of the Norwegian WMA's and NVE.
Session 4

Experiences
from
other Countries
Zambian Environmental Management Programs as relates to the Electric Power Development in Zambia

By

Elenestina M. Mwelwa,


Environmental Scientist - Environment and Social Affairs Unit, ZESCO
1.0 Background

The paper reviews the general environmental management programs in Zambia with specific reference to the application of these programs to electric power development which is the core business of ZESCO. The existing Environmental Impact Assessment Regulations are discussed and the implications on the operations of ZESCO. A highlight is made on ZESCO’s response to the general developmental trend of environmental management.

The Government of Zambia adopted the National Conservation Strategy in 1985 which led to the establishment of environmental legislation and an institutional framework to facilitate sustainable environmental management. The legislative responsibility for environmental management in Zambia is vested in the Environmental Council of Zambia (ECZ) through the Environmental Protection and Pollution Control Act (No. 12 of 1990) (EPPC).

The Environmental Protection and Pollution Control Act is assisted by other legislation that relate to management of natural resources namely: Forestry Act, Fisheries Act, National Parks and Wildlife Act, Lands Act, Water Act, National Heritage Conservation Act, Natural Resources Act, Local Government Act and Museum Act. Therefore to harmonise all legislation that deals with sustainable management of our natural resources, the Government of Zambia through the Ministry of environment spearheaded the development of a National Environmental Policy which was referred to as the National Environmental Action Plan (NEAP). In this document, issues of environmental management were addressed for all sectors related to the use and development of natural resources.

The Environmental regulation which relate closely to the electric power development is the Statutory Instrument No 28 of 1997 - The Environmental Impact Assessment Regulations. Under this regulation, the Environmental Council of Zambia is given the mandate to ensure that any major development projects that are likely to have impacts on the environment are subjected to environmental impact Assessments.

In the wake of Zambia’s development of Environmental legislation and the demands of international financial institutions for sound Environmental Management Plans for all existing and proposed projects, it became necessary for ZESCO to develop and establish internal technical competence to effectively manage the environment. This then led to the Establishment of the Environment and Social Affairs Unit which spearheaded the Development of ZESCO’s Environmental Management System which will facilitate sustainable environmental management for both existing and proposed electric energy projects.

2.0 Environmental legislation and regulations

The adoption of the National Conservation Strategy in 1985 led to the establishment of environmental legislation and an institutional framework to facilitate sustainable environmental management for Zambia. The Environmental Protection and Pollution Control Act (EPPC)(No. 12 of 1990) which is the principal Environmental Act is “An Act to provide the protection of the environment and the control of pollution, to establish the
environmental Council and to prescribe the functions and powers of the Council, and to provide for matters connected with or incidental to the foregoing."

The EPPC Act then led to the establishment of the Environmental Council of Zambia (ECZ) with the core legislative responsibility of ensuring sustainable environmental management in Zambia. In addition, the Ministry of Environment and Natural Resources was established to facilitate Government coordination of Environmental Management and environmental policy implementation in Zambia.

Under the EPPC Act, the following regulations have been developed:

- STATUTORY INSTRUMENT No. 71 OF 1993 - The Waste Management (Licensing of Transporters of Wastes and Waste Disposal Sites) Regulations
- STATUTORY INSTRUMENT No.72 OF 1993 - The Water Pollution Control (Effluent and Waste Water) Regulations
- STATUTORY INSTRUMENT No. 20 OF 1994 - The Pesticides And Toxic substances Regulations
- STATUTORY INSTRUMENT NO. 141 OF 1996 - The Air Pollution Control (Licencing and Emissions Standards) Regulations
- STATUTORY INSTRUMENT No. 28 OF 1997 - The Environmental impact Assessment Regulations.

2.1 National Environmental Policy

The National Conservation Strategy (NCS), adopted by the Government of Zambia in 1985, was the main policy document on the environment. The NCS was developed to manage natural resources and the environment in the context of a centrally planned and controlled economy. A decision was made by Government to update the NCS through the National Environmental Action Plan (NEAP) process in 1992 in view of a liberalised economy. The NEAP provides an overview of Zambia's environmental problems, existing legislation and institutions, and strategy options for improving environmental quality.

The NEAP is founded on three fundamental principles:

1. The right of citizens to a clean and healthy environment.
2. Local community and private sector participation in natural resources management.
3. Obligatory Environmental Impact Assessments (EIAs) of major development projects in all sectors.

The overall objective of the NEAP is to integrate environmental concerns into the social and economic development planning process of the country. The main thrust of the NEAP therefore was to identify environmental problems and issues, analyse their causes and recommend actions required to resolve those issues. In the NEAP, this has been done for the major sectors. Some recommendations, inevitably, cut across several sectors. From the recommended actions, an Implementation Strategy is drawn for each sector and proposes the Action, a Priority Ranking, a Time Frame for its implementation.
and finally the Responsible Agency for the implementation of the recommendation. These proposed actions therefore form a basis for a detailed environmental action plan to facilitate the implementation of the NEAP through the Environmental Investment Programme (EIP).

Issues analysed in the NEAP include:

- Review of Institutions and Legal Reforms
- Review of Economic Policies and the Environment
- Review of Agricultural Policy
- Review of the Water Sector
- Review of the Forest Sector
- Review of the Wildlife Sector
- Review of Fisheries Sector
- Review of the Tourism Sector
- The Mining Sector
- Review of the Industrial Sector
- Population and Environment
- Review of the Energy Sector
  - Hydropower Environmental Issues
  - Action Plan for Fossil Fuels
  - Action Plan for Renewable Sources of Energy
- Review of Environmental Education
- Environmental Issues of Human Settlements

2.2 The Environmental Impact Assessment Regulations

The Environmental regulation which relate closely to the electric power development is the Statutory Instrument No. 28 of 1997 - The Environmental Impact Assessment Regulations. Under this regulation, the Environmental Council of Zambia is given the mandate to:

- identify projects or types of projects, plans and policies for which environmental impact assessment are necessary and to undertake or request others to undertake such assessment for consideration by the council;
- monitor trends in the use of natural resources and their impact on the environment;
- request information on the quantity, quality and management methods of natural resources and environmental conditions from any individual or organisation anywhere in Zambia; and
- to consider and advise the government, on all major development projects at an initial stage and on the effects on any sociological or economic development on environment.

Figure 1 gives the EIA procedure as outlined in the EIA regulation.
Figure 1. EIA Procedure as outlined in the Zambian EIA regulations
With the above outlined environmental management legislative requirements, it became mandatory that for any major developmental or rehabilitation works to be undertaken, ZESCO was required to undertake environmental impact assessments to ensure that any negative environmental impacts that would arise as a result of the planned developments are adequately managed and mitigated.

3.0 ZESCO's Response to Environmental Management

3.1 Establishment of the Environment and Social Affairs Unit

ZESCO's main business is to generate and distribute electricity throughout Zambia and export excess power to some neighboring countries for both commercial and domestic purposes. More than 90% of electricity generated by ZESCO is through hydro schemes composed of both big and small generating plants together having a capacity of approximately 1600 MW. The transmission network, which forms the National Grid (NG), stretches to most parts of the country for more than 5000 Km. The transmission network pass through a highly diversified land use pattern ranging from settlements to biodiversity rich protected areas.

In the wake of Zambia's development of environmental legislation and the demands of international financial institutions for sound Environmental Management for all existing and proposed projects, it became necessary for ZESCO to develop and establish internal technical competence to effectively manage the environment. The main driving force to the establishment of the Environmental Unit was the approval of the Major Power Rehabilitation Project which was proposed for the purpose of rehabilitating ZESCO's infrastructure. The implementation of this project, it was envisaged, would have environmental impacts requiring mitigation plans.

3.1.1 Mandate of the Environment and Social Affairs Unit

The ESU is charged with the main responsibility of ensuring environmental protection and conservation for the areas of ZESCO's operations. This important role requires comprehensive baseline data on which decisions on environmental management can be based. The main functions include:

- Ensuring that ZESCO operates in accordance with Zambian environmental regulations;
- Liaison with all appropriate regulators including but not limited to those responsible for water resources management, environment, land management and community affairs;
- Development of baseline environmental and socio-economic data for all existing and proposed hydro power projects;
- Assessment of problems and mitigation requirements for existing projects to ensure operations meet environmental regulations;
- Screening of proposed sites and projects to determine the issues and constraints for their development;
- Advising and training of the engineering and other ZESCO departments on environmental and social issues;
- Conducting and facilitating environmental public awareness meetings on the operations and projects being undertaken by ZESCO;
- Managing programmes and consultants for environment and socio-economic aspects of power generation, transmission and distribution;
- Managing land acquisition and resettlement programmes; and
- Spearheading the establishment of ZESCO's Environmental Management System.

3.1.2 Staffing

To be able to carry out ESU's mandate it was seen necessary to have a multidisciplinary team of the following staff:

- Environmental Manager
- Environmental Scientist
- Hydrologist
- Soil Scientist
- Social Scientist (2)
- Information Specialist

3.2 Establishment of ZESCO's Environmental Management System (EMS)

In addition to the establishment of ZESCO's Environment and Social Affairs Unit, an Environmental Management System (EMS) after ISO 14001 was developed to manage environmental issues and ensure that all operations are managed in a way that minimizes adverse impacts on the physical environment. The main role of the EMS is to come up with a systematic process of setting up environmental goals and objectives and outline implementation plans and targets.

The International Organization for Standardization (ISO)- the body that defines and enforces the ISO 14001 environmental standard under which ZESCO intends to be certified, describes an environmental management system as:

"that part of the overall management system which includes organizational structure, planning, activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining the environmental policy."

Refer to figure 2 for the elements of ZESCO's EMS, figure 3 outlining ZESCO's environmental policy, Table 2 for a summary of environmental objectives and short term activities and figure 4 for the EMS Structure.
The ISO14001 Cycle - Environmental Management Systems

ZESCO’s Environmental Policy
Mission & Vision statement

Environmental Planning
ZESCO:
- Objectives
- Short Term Actions

Directorates and Sub-Units:
- Targets
- Environmental management program

Checking and corrective action
- Monitoring and measurement
- Nonconformance and corrective actions
- Records
- Environmental Management System Audit

Implementation and operation
- Structure and responsibility
- Training, awareness and competence
- Communication
- Environmental Management System documentation
- Document control
- Operational control
- Emergency preparedness and response

External factors
- Legal requirements
- Banks, funding sources
- Customers & stakeholders
- Public Opinion
- etc.

Management’s
Regular Evaluation
and Review

Figure 2. Elements of ZESCO’s EMS
ZESCO's ambition is to satisfy customers' demand for efficient, safe and environmentally friendly supply of electric energy.

The natural resources on which our operations depend shall be harnessed with utmost possible care.

In our effort to achieve environmental excellence in our operations, we shall continuously train and motivate all employees to perform their duties in an environmentally responsible manner.

Facing our responsibility to enhance environmental protection, we shall take the interest of future generations into consideration when carrying out our development projects.

In openness and with commitment to environmental issues related to power development, we shall endeavor to create and enjoy the confidence of our customers and other stakeholders in our actions and operations.

R.C. Mwansa
MANAGING DIRECTOR

DATE ____________________________

Figure 3: ZESCO's Environmental Policy
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<th>OBJECTIVES</th>
<th>SHORT TERM ACTIVITIES</th>
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<tr>
<td><strong>OBJECTIVE A</strong>: Initiate and supervise comprehensive Environmental Impact Assessments on any proposed development (generation, transmission, distribution and supply of electric energy) and ensure that the mitigation plans are implemented.</td>
<td>- Develop instruction manuals for Environmental Impact Assessments</td>
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<td><strong>OBJECTIVE B</strong>: Monitor corporate activities and operations and initiate comprehensive waste management plans.</td>
<td>- Develop and implement waste management guidelines and plans</td>
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| **OBJECTIVE C**: Initiate and Implement environmental awareness programs to train and motivate all employees to perform their duties in an environmentally responsible manner. | - Develop resource use guidelines  
- Develop environmental awareness manuals  
- Develop EMS manuals |
| **OBJECTIVE D**: Acknowledge, investigate and mitigate stakeholders' complaints related to environmental issues | - Develop mitigation guidelines for environmentally related stakeholder complaints  
- Integrate a mechanism for receiving environmentally related complaints within the existing customer services. |
Figure 4. ZESCO's EMS Structure

ECOs are appointed from existing staff
4.0 Conclusion

With the growing global environmental awareness and the need for sustainable development, the energy sector has no choice but to respond in a way that will facilitate adherence to laid down environmental legal requirements in all activities. This move for a company like ZESCO does not only ensure good relations with environmental organisations, but it does maintain good Corporate image.

ZESCO, by developing its own internal competence to deal with environmental issues, has made a lot of saving in terms of consultancy fees which would have been spent hiring external consultants to undertake activities as required by the environmental regulations.

The development of ZESCO's Environmental Management System is envisaged to enhance environmental performance in all activities through the well structured and systematic procedure for dealing with environmental issues.
5.0 References


ABSTRACT

Environmental Management Programs as relates to the Electric Power Development in Zambia

By

Elenestina M. Mwelwa (Mrs)
Environmental Scientist
ZESCO

The Paper seeks to review the general environmental management program in Zambia with specific reference to the application of these programs to electric power development which is the core business of ZESCO. The existing Environmental Impact Assessment Regulations are discussed and the implications on the operations of ZESCO. A highlight is made on ZESCO’s response to the general developmental trend of environmental management by setting up the Environment and Social Affairs Unit and the development of ZESCO’s Environmental Management System.

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ENVIRONMENT IMPACT ASSESSMENT
AND ENVIRONMENTAL MANAGEMENT
IN THE NATIONAL ENVIRONMENT
MANAGEMENT AUTHORITY, UGANDA

A paper presented at the Conference on Licensing Procedures
for Electric Power Development and Environment Management
in Tanzania

3-8 October 1999
Iringa, Tanzania

Charles Sebukeera
Director for Information and Monitoring
National Environment Management Authority (NEMA)
P.O. Box 22255
Kampala, Uganda
Tel: 256-41-251065
Fax: 256-41-257521
E-M: neic@starcom.co.ug
http://www.uganda.co.ug/nema
INTRODUCTION

Effective environmental management programs in this, or any country requires a well coordinated framework law and a strong institutional structure.

The Government of Uganda (GOU) pursued this commitment by approving a National Environment Management Policy in November 1994 which outlined the policy objectives regarding the management of the environment.

This was further strengthened by the passing by parliament, of the National Environment Statute 1995 which put in place an institutional framework which established NEMA.

THE NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA)

NEMA is the principal agency responsible for the management of the environment in Uganda and coordinates, monitors and supervises all activities in the field of environment. Specific functions of the Authority are:

♦ Coordinate the implementation of government policy and the decisions of the policy committee;
♦ Ensure the integration of environmental concerns in overall national planning through coordination with the relevant ministries, departments and agencies of government;
♦ Liaise with the private sector, intergovernmental organizations, non-governmental agencies and government agencies of other states on issues relating to environment;
♦ Propose environmental policies and strategies to the policy committee;
♦ Initiate legislative proposals, standards and guidelines on the environment in accordance with the national environment statute, 1995;
♦ Review and approve environmental impact assessments and environmental impact statements submitted in accordance with statute or any other law;
♦ Promote public awareness through formal and non-formal education about environmental issues;
♦ Undertake such studies and submit reports and recommendations with respect to the environment as the government or the policy committee may consider necessary;
♦ Ensure observance of proper safeguards in the planning and execution of all development projects, including those already existence that have or are likely to have significant impact on the environment;
♦ Undertake research and disseminate information about the environment;
♦ Prepare and disseminate a state of the environment report once in every two years; and
♦ Mobilize, expedite and monitor resources for environmental management.
INSTITUTIONAL SET UP OF NEMA

NEMA's institutional set up, as indicated in the diagram, is tailored to ensure coordination and effective monitoring and control.

The key centers of authority are:

(i) **Policy Committee on Environment**
This is the supreme body of NEMA and is composed of 10 ministers relevant to environment under the chairmanship of the Prime Minister. The committee has the responsibility of reviewing major environmental policies and legislation before submission to cabinet and parliament. Other duties and responsibilities include:
- providing policy guidelines, formulating and coordinating environmental policies;
- liaising with cabinet on issues affecting the environment;
- identifying obstacles to the implementation of environmental policies and programs and ensuring implementation of those policies and programs;

(ii) **The Board of Directors**
The Board was established to fulfill the operational, financial and personnel oversight functions of the authority. It is granted direct responsibility for ensuring the effective and efficient accomplishment of objectives of the authority. Membership on the Board has representation from Government Ministries, Research Institution, NGO and the Private Sector. The total membership is nine. The Executive Director of NEMA is ex-officio member of the Board.
(iii) **Technical Committees**

These are appointed by the Board on the recommendations of the Executive Director to give advice on the technical matters relating to the environment. Initial four permanent Technical committees were established by law, namely:

- a technical committee on soil conservation;
- a technical committee on the licensing of pollution;
- a technical committee on biodiversity conservation; and
- a technical committee on environmental impact assessment.

(iv) **NEMA Secretariat**

The day to day activities of the authority are carried out by the Secretariat technical staff with their support staff. The secretariat is headed by the Executive Director and a Deputy. The two are the Chief Executives of NEMA and are responsible for the day to day operations of the Authority. Under the Executive Director, there are four divisions each headed by a Director. These are:

- Policy, Planning and Legal Division;
- Information and Monitoring Division;
- Education, Awareness and Training Division;
- Administration and Finance Division.

Policy, Planning and Legal Division is to ensure that environmental concern are integrated into the planning process, policy and law at relevant levels of activities that affect the environment.

The Division of Information and Monitoring is to ensure adequate surveillance and control of the environment and those areas of interest to it, collect and analyze data and disseminate information on the state of the environment, evaluate their overall impact on the system, inform the concerned parties and institute control measures.

Education, Awareness and Training Division focuses on promoting the development of adequate environmental knowledge, skills and awareness to ensure sustainable utilization of the country’s environment and natural resources. Logistical support to the Authority is ensured by the Administration and Finance Division.

**Linkages with Line Ministries**

While NEMA is responsible for monitoring, planning and coordination of environmental matters, implementation is the responsibility of relevant line ministries. Environment liaison units have been established in each line ministry and charged with the responsibility of integrating environmental concerns into the sectoral plans, and implement environmental activities within the mandate of the Ministry such as reviewing Environment Impact Statements. The heads of the liaison units report to the Director for Policy, Planning and Legal Division.

**Linkages with the Districts**

Development of strong links between the resource users and the authority is very crucial for effective implementation of the NEAP. NEMA therefore has focused programs aimed at:

- building local government environmental planning capacity to enable them to sustainably manage their own environment and natural resources;
- assisting local government to develop their own environmental action plans, policies and bye-laws;
GENERAL POLICY FOR ENVIRONMENT IMPACT ASSESSMENT

It is the policy and legal requirement of the Government of Uganda that Environmental Impact Assessment (EIA) be conducted for proposed activities that are likely to, or will have significant impacts on the environment so that any adverse environmental impacts can be foreseen, eliminated or minimized or mitigated, while the positive impacts are maximized.

EIA is a tool for protecting the environment and its use ensures that environmental impacts are considered during conception, design and implementation of development policies, projects and activities, at the same time that their financial, technical and institutional aspects are considered.

As provided in Section 20 (1) of the National Environment Statute, 1995, developers of projects that are likely to cause significant impact to the environment, are required to submit their project briefs to the appropriate sectoral Lead Agencies and to the Authority, so that the level of EIA required shall be determined and the developer advised accordingly.

The level of EIA required varies on a project-by-project basis, depending on the nature, scale and possible effects of the project, and the characteristics of the site where the project is to be located. The assessment is conducted by experts approved by the Authority.

It is also the policy of government that the EIA process be inter-disciplinary, fully transparent so that all stakeholders have access, and that the process serves to provide a balance between environmental, economic, social and cultural values for sustainable development in the country.

The Policy therefore, through the use and application of EIA, seeks to integrate environmental concerns in all development policies, projects, activities and planning at national, district and local levels, with full public participation.

"Environmental Impact Assessment" is defined in the National Environment Statute as a systematic examination conducted to determine whether or not a project will have any adverse impacts on the environment.

The key policy objectives include among others:

- enhancing the quality of life of all people in Uganda and promote long-term sustainable socio-economic development through sound environmental and natural resource management and use;
- integrating environmental concerns in all development policies, planning and activities at national, district and local levels, with full participation of the people;

According to the Environment Policy, the guiding principles for EIA include:

- Public and private sector development options should be environmentally sound and sustainable, and any environmental consequences should be recognized early enough and taken into account in project design;
- EIAs should consider not only biophysical/environmental impacts, but should also address the social, economic, and cultural conditions;
- Environmental Impact statements should be required in order to determine the "environmental threshold" of a particular activity,
• EIA should be conducted within the context of existing laws, policies and regulations.
• The EIA process should give opportunity for public involvement and consultation.

ENVIRONMENTAL IMPACT STUDY (EISTUDY)

An EIS study is a major and detailed assessment, conducted for any project which clearly will have significant impacts whose mitigation measures cannot readily be prescribed unless in-depth analysis of the project and its possible alternatives is conducted.

Development of EIA Procedures for Uganda

In order to supervise and oversee the implementation of the EIA process in Uganda, NEMA has developed guidelines on the procedures to be followed in conducting EIA in Uganda. The Guidelines are intended for use by different user groups, including:
- the general public,
- developers,
- EIA practitioners,
- Lead Agency staff who will be involved in the review of environmental impact statements,
- NEMA which co-ordinates and oversees the implementation of the guidelines, and also reviews and approves EIAs conducted in accordance with provisions of the National Environment Statute, 1995.

MAIN ELEMENTS OF THE EIA PROCESS

Public and Stakeholder Involvement and Participation at all Stages

The central policy of the EIA process is the full opportunity for public involvement and participation. People, including individuals, or groups of local communities who may be directly affected by a proposed project will clearly be a focus for public involvement. Those directly affected may include project beneficiaries, those likely to be adversely affected, or other stakeholders with interest or are likely to benefit or to be affected by the proposal in one way or the other. These may include government agencies, local authorities, NGOs etc.

The level of public participation and involvement required for a particular proposed project often depends on its social and political context, as well as the magnitude of its anticipated impacts.

The Statute provides for public input into EIA through the rights to participate, information and the general right to bring actions to prevent or discontinue an activity or project deleterious to the environment. It also empowers local environmental committees to take action to redress local environmental concerns.

The EIA Regulations create a duty on the Developer to take all measures necessary to seek the views of the people in the communities which may be affected by the project during the process of conducting the study.

In seeking the views of the people the Developer shall:
• publicize the intended project, its anticipated effects and benefits through the mass media in a language understood by the affected communities;
• hold meetings with the affected communities to explain the project and its effects;

Failure to show evidence that the Developer did not consult the people most affected by the development may lead to the project not being approved.

Lead Agency Involvement
Lead Agencies play an important role in ensuring that the implementation of sectoral development activities is carried out in a manner that does not adversely affect the environment. The Lead Agency responsibilities in the EIA process include, among others, screening, review functions and approving the environmental aspects of the projects. (Lead Agencies include ministries, departments, parastatal agencies, the local government system or public officers in which or whom any law vests functions of control or management of any segment of the environment).

EIA Approval and Implementation
After considering the EIA report the Authority, in consultation with the Lead Agency, decides, and give reasons, whether:

• a conditional or unconditional approval for project shall be granted, or
• a further assessment of environmental impact shall be required.

Where the both the Authority and the Lead Agency are satisfied that the environmental assessment conducted on the project does not disclose possible significant impact on the environment, the environmental aspects of the project may be approved.

Monitoring
An important element of the Ugandan EIA procedure is the requirement for monitoring. All developers whose projects have been subjected to the EIA shall ensure that mitigation measures and actions as approved in the EIA are adopted and implemented. The developers are required to undertake to conduct self monitoring, self record-keeping and self reporting, and the information gathered through monitoring shall be stored and made available during inspection.

• In self-monitoring, enterprises measure emission, discharge, or performance parameter that provide information on the nature of the pollutant discharges or the operation of control technologies.
• Self-record keeping means that enterprises are responsible for maintaining their own records of certain regulated activities (e.g., shipment of hazardous waste).
• Self-reporting requires that enterprises provide the enforcement program with self-monitoring or -record keeping data periodically and/or upon request.

The developer shall also take all reasonable measures to mitigate any undesirable environmental impacts not contemplated in the EIA, and shall accordingly report on those measures to the Lead Agency and to the Authority.

The responsible Lead Agencies, in consultation with the Authority, are required to monitor compliance implementation of development activities and projects to ensure that the design criteria, mitigation measures, and monitoring requirements are implemented.

Ensuring compliance is important:
• To protect and conserve environmental resources and public health
• To build and strengthen the credibility of environmental management efforts and the legal system that supports it. NEMA, Lead agencies and district authorities must be taken seriously. Credibility means that society perceives NEMA’s environmental management programs and the institutions that implement them as strong and effective.
• To ensure fairness for those who willingly comply with environmental requirements.
• To reduce costs and liability - through reduced costs to public health and medical treatment and long term costs of restoring the degraded environment.
• To prevent short-term economic competitions among the regulated community or between facilities that might undermine longer-term economic and environmental goals for a sustainable future.

Enforcement
Enforcement by NEMA and Lead Agencies (including the Districts) can be done through:
• Inspections to determine the compliance status of the regulated community and to detect violations.
• Negotiations with individuals or facility managers who are out of compliance to develop mutually agreeable schedules and approaches for achieving compliance.
• Legal action, where necessary, to compel compliance and to impose some consequence for violating the law or posing a threat to public health or environmental quality e.g. compensation of victims of degradation, performance bonds, environmental audits, restoration orders and EIA requirements.
• Compliance promotion (e.g. educational programs, technical assistance, subsidies, incentives, etc) to encourage voluntary compliance.

Promoting Environmental Compliance
Compliance promotion is any activity that encourages voluntary compliance with environmental requirements. There are six approaches to compliance promotion:

1) Providing education, awareness and technical assistance to the regulated community.

2) Building public support: Public support creates a social ethic of compliance. The public serves as watch dogs that alert enforcement officials to non-compliance. The presence of public support ensures that funding and political support will be effective. Public support is critically necessary in:
   a) strengthening technical government officials where there is limited or no political will to stop violations.
   b) improving decisions making;
   c) strengthening the role of civil society;

3) Publicizing Success Stories: NEMA provides an incentive for the regulated community to comply by publicizing information about enterprises that have been particularly successful in achieving compliance. Positive publicity about a firm’s success can enhance its reputation and public image. Such publicity helps create a positive social climate that encourages compliance. It also builds confidence in NEMA’s compliance and enforcement efforts.

4) Creative Financing Arrangements: One barrier to compliance is cost. Facility managers may want to comply but may not be able to afford the cost of fulfilling the
requirements. Creating financing arrangements may help solve this problem.

5) **Providing Economic Incentives**: Benefits of incentives can be applied to the facility generally or to an individual based on his or her performance. Incentives may include fees, waiving taxes, tax incentives, subsidies for complying facilities (to help defray the cost of compliance); bonuses for achieving better results; etc.

6) **Building environmental management capacity within the regulated community**: One specific approach of doing this is developing a Corporate Environmental Plan or Policy. Through this the facility may develop a formal environmental compliance plan or policy, including environmental management goals; educational and training programs for employees; developing monitoring, record keeping, internal and external reporting systems; etc.

The Environmental Corporate Plan is then implemented through a Self Monitoring Strategy. This is performed by specialized trained employees who periodically assesses the firms compliance status and recommends changes if necessary.

The concept of environmental monitoring is important because industry is finding it good business to run their operations in an environmentally sound manner.

**CHALLENGES OF INTEGRATING ENVIRONMENT ISSUES INTO DISTRICT DEVELOPMENT ACTIVITIES THROUGH THE EIA PROCESS**

**Capacity Building in Environmental Impact Assessment in Uganda**
In Uganda, there is still low level of information, experience and expertise in administering the EIA process by key stakeholders including decision makers, administrators, local authorities, developers and local communities.

In addition, there is currently a lack of institutional capacity and skills to effectively fulfil these responsibilities. The procedure set out in the guidelines requires all projects to be screened on an individual basis to determine whether an EIA is required. The large number of projects submitted also contribute to inefficiencies and delays in the process.

Local expertise in Uganda to carry out EIAs is limited. The multi-disciplinary and specialist skills required to carry out EIAs need to be passed on to the Ugandan consultants.

Quality control in the EIA process is also of concern. There is need to enhance and maintain quality as well as reliability/quality control to the data used in EIAs.

**Important Considerations include:**
- Actual integration of environmental concerns into the development planning process at various levels through EIA.
- EIA Review and Evaluation: Assessing the adequacy of the EIA reports, taking account of the points of view of stakeholders and assessing the acceptability of development proposals in terms of existing plans, policies, and standards.
- Decision-making: To decide whether or not the proposal can proceed and under what conditions.
- Monitoring and managing impacts associated with development projects: the relevant agencies should have the capacity to monitor and ensure compliance and
implementation of mitigation measures identified in EIAs.

- Public involvement: The relevant agencies should also ensure public involvement and consultation as a key component of the EIA process.
- Creating and developing capacity within lead agencies, district offices/branches of lead agencies and other stakeholders. The high demand on the EIA review function makes it necessary that capacity for EIA review be developed and strengthened among the Lead Agencies, at the district level and private sector in EIA.
- Assessing strategic and social impacts of government policies and planning initiatives at both national and district levels.
- It is important to note that at the district level, administrative structures are new and evolving. This provides a timely opportunity to influence economic development planning which takes into consideration environmental matters (including EIAs).
- At the district level therefore, there is need to strengthen the capacity of administration staff to understand the value of EIA and the components of the process. The application of EIA will assist in the decision-making process and development planning at the district level.

Other Pertinent Considerations

- **Securing commitment from district and local authorities at policy level** - this can be demonstrated through the development of relevant policies.
- **Problem of inadequate technical capacity of district personnel** - NEMA provides technical back-stopping.
- **Streamlining conflicting lines of communication and reporting** within the district (especially by line departments) and between the district and NEMA.
- **Unfavourable institutional procedures** such as excessive bureaucracies in districts resulting in delays and bottlenecks.
- **Taking advantage of existing laws and regulations**.

CONCLUSION

It is often best to have EIA done as an integral part of the development planning process. The planners or developers at all levels have to bear in mind that some environmental damage and loss may be unavoidable. The EIA process attempts to work out a "reasonable compromise" against the other claimed or desired benefits that will accrue from the implementation of the project within a particular environmental setting.

It is important to remember that the purpose of environmental assessment is to enable decisions to be made in a way which optimizes sustainable use of resources and **NOT necessarily** to stop a project.
LEGAL FRAMEWORK FOR ELECTRICITY AND WATER RESOURCES IN NORWAY
BY ESPEN LIER, NVE

1. INTRODUCTION

This paper is prepared for a presentation to be given at the conference on Licensing Procedures for Electric Power Development and Environmental Management in Tanzania, to take place in Iringa 4.-7. October. Due to limited time, the presentation on this issue can only give an introduction of the main principles and elements involved. However, a report going into further detail on the Norwegian water resources and energy legislation will be available at the conference.

2. BACKGROUND

All legal and institutional framework has to be considered in relation to the conditions in the current country. Thus, the geographical and other factual conditions firstly will be briefly described.

Norway is a 2500 km long and narrow country covering an area of 323 000 km² located far north, with a population of 4.5 million. The topography is characterised by a mountain range of a high of 1000-2000 m above sea level along a large part of the length. Most of its precipitation is generated from the weather conditions in the Atlantic. Due to geographical variations, the annually precipitation varies from less than 300 mm to more than 4000 mm in different areas. In general, fresh water resources are plentiful in relation to demand from different user interests.

Totally, 4000 watercourses and 450 000 lakes are registered. A large number of lakes are located on the mountain plateau without human settlements, favourable for damming, and with outlet to watercourses containing high and steep waterfalls. Thus, the conditions for development of relatively inexpensive hydropower are favourable.

The development of hydropower started about 100 years ago. Power-intensive industries initiated power generation for their own consumption. Municipalities and counties took the responsibility for domestic supply, while the state were responsible for bulk supply to both the industries and domestic consumption, and for development and operation of the national grid. Almost 100 % of the power produced in Norway are hydroelectric power.

100 years of development has resulted in about 800 reservoirs, 600 power plants exceeding 1 MW, a total capacity of 28 000 MW, and an annually production of 113 TWh in a normal year of precipitation. The remaining potential appropriate for development is estimated to 25 TWh. There are about 140 generation companies, 50 regional transmission grid operators, 200 distributors and one national grid operator also responsible for the co-ordination of total power system. There are several vertically integrated utilities.
The generation is owned with 55% by municipalities and counties, 30% by the state and 15% by private. Distribution is to a major extent owned by municipalities, while the national grid is owned and operated by a state-owned utility.

The Norwegian grid is interconnected with the grids in Sweden, Finland and Russia, of which the connection to Sweden has the far largest capacity. There also exist three sub-sea cables to Denmark, while such cables to Germany and Holland are under planning. This will provide for increased power exchange between the hydro-based Norwegian system and thermal generation on the continent to possible mutual benefits for all the systems involved. In addition, Norway will be less dependent on its own generation capacity to meet an increasing domestic demand for power.

An electricity market was introduced in Norway in 1991, which means that all, even the smallest, consumers can choose from which supplier they want to purchase power. Power is traded either at the power exchange NorPool, which is common with Sweden and Finland, or by bilateral contracts. Network operations, which are natural monopolies not suitable exposing to competition, are strictly regulated, particularly in respect of profit regulation, principles for calculation of network services and responsibilities of metering and settlement.

The consumption has been increasing gradually during the 1990's. 120 TWh was consumed in 1998, which exceeds the mean annually production in the Norwegian system by 7 TWh. In addition, extensive reinforcements of the transmission system are required in conjunction with the planned sub-sea cables.

The main challenge in connection with the further development of the Norwegian power sector is undoubtedly to balance environmental considerations against the desired level of welfare in an appropriate way, if possible.

3. POLICY AND STRATEGY

3.1 Introduction: In Norway, the preparation of policy papers is the responsibility of the Government, while parliament decides what policies to be implemented. Parliament has several possible instruments suitable for implementation of its policies in the power sector, such as;

- legislation, including licensing
- national policy guidelines and instructions
- allocation of funds
- taxation
- hydropower master plans
- protection plans
- individual decisions
The policy of the Norwegian power sector is quite fragmentary. It is neither very firm at the moment due to the political situation. The Government has recently prepared a White Paper. However, Parliament has not discussed this yet, thus, its response is still uncertain. The following description of the policy and strategy will therefore be based partly on existing principles and partly on principles laid down in the mentioned White Paper. The latter will to a large extent reflect political trends even if they are not approved by Parliament yet.

3.2 General political objectives:
There exists some overall political objectives for the power sector, such as;

- Optimal use of resources, i.e. natural resources, capital and labour.
- A sustainable development and use of the current resources.
- The totality of the energy policy shall be based on the environmental policy.
- Environmental considerations shall not affect the level of welfare unacceptably.
- National control over the natural resources, including water.

3.3 More specific policy related to hydropower resources:

- Major public ownership to hydropower generation to be retained.
- Hydropower shall still contribute considerably to new generation capacity.

3.4 More specific policy related to the power sector in general:

- Development of new generation capacity dependent on market prices for power.
- Monopoly control shall enforce improved efficiency of network services.
- The price for energy shall reflect environmental costs.
- Obliged to comply with the Climate Convention and the Kyoto Protocol.
- Development of new gas fuelled capacity dependent on improved technology.
- Development of new capacity to a larger extent to be based on new renewable sources.
- Import to meet increased consumption is OK.
- Trend of increase of consumption shall be reduced.
3.5 Strategy to obtain political objectives:

- Plans for protection of 341 watercourses against hydropower development implemented.
- Licensing based on Hydropower Master Plan.
- Taxation of both generation and consumption.
- Allocation of funds for promotion of new renewable resources.
- Parliament reduced major hydropower project applied for.
- Conditions imposed to gas fuelled generation applied for unacceptable for investors.
- Introduction of an electricity market and monopoly control of network services.

4. LEGAL FRAMEWORK

4.1 Introduction:
As mentioned, almost 100 per-cent of the power produced in Norway is hydroelectric power. Thus, water and electricity legislation is strongly interlinked. Licensing is a fundamental element in this legislation. The interests of affected private parties are taken into account in conjunction with enforcing the current law. However, the major attention is given to public interests.

There is no specific environmental act in Norway. Provisions on Environmental Impact Assessments (EIA) are included in the Planning and Building Act, while issues on pollution are regulated by a separate Pollution Control Act.

4.2 Water related legislation:

4.2.1 Act on Acquisition of Waterfalls:
This act regulates different aspects of ownership of waterfalls. The main purpose is to have national control over these resources. The main instruments to obtain this purpose are as follows:

- Acquisition of waterfalls subject to licensing.
- Limited duration of licences for private investors.
- First refusal for the state/counties when waterfalls are transferred.
- Reversion to the state without compensation on expiry of licence.

4.2.2 Watercourse Regulation Act:
The application of this act is regulation of watercourses, i.e. developments, which involve storage of water in reservoirs. The main purpose is to obtain optimal use of resources by balancing the benefits and the adverse effects of projects applied for. The act also provides for establishment of water users' associations in connection with share of water between more generators. Further, it makes licensees subject to provision of some benefits to local communities. The main elements of the act are as follows:
- Regulation of watercourses subject to licensing.
- Royalties to local communities and the state.
- Fund for local business development.
- Yield of compulsory power to municipalities/counties.
- Establishment and participation in water users’ associations.

4.2.3 Watercourses Act:
This act applies to all projects affecting watercourses not insignificantly, except from projects dealt with under the Act on Regulation of Watercourses. This means that run-of-the river-projects, sometimes parts of projects involving storage of water, mini and micro power projects, and projects on water supply, flood protection, extraction of gravel etc. are handled under this act. All projects involving not insignificant impacts on public interests are subject to licensing.

4.3 Energy Act:
The Energy Act applies to all operations from generation to the electricity is received by the end-users. That is construction, ownership and operation of generation, transformers, transmission, distribution and district heating facilities. In addition, electricity sale, emergency preparedness and rationing are dealt with.

The purpose of the act is to ensure that the current operations are carried out rationally.

All the mentioned operations are subject to licensing. Since a free electricity market is introduced in Norway, power prices are determined in this market without interference from the authorities. However, network services are natural monopolies, and strictly regulated. Unbundling of such monopoly services, as a minimum by keeping separate accounts, is a prerequisite for carrying out this monopoly control.

The monopoly control contains the following elements:

- profit regulation (income cap = total tariff revenues)
- principles for tariff calculation (distribution of costs between different users)
- technical and financial reporting
- measurement of efficiency (benchmarking)
- metering and settlement

4.4 Planning and Building Act:
This act contains common provisions on EIAs applying to all sectors. In addition, there are specific provisions applying only to the power sector, i.e. to development of generation plants and transmission lines.

The purpose of EIAs is to elucidate effects of current projects and ensure such effects to be taken into account during the planning and decision phases.

Projects, which may have a significant impact on environment, natural resources or the community, require a duty to carry out an EIA. This duty lies with the developer. The developer is obliged to send the competent authority a notification, including a proposal for a study programme. The competent authority determines the programme based on a public consultation and its own considerations. Later, the same authority approves the studies, which shall accompany the application for a licence.
EIAs are mandatory for hydropower installations generating more than 40 GWh, or developments which, will increase the power generated from a watercourse by at least 9000 natural horse powers (about 7 MW). The same duties apply to power lines, underground and submarine cables carrying a voltage of 132 kV or more and 20 km or more in length. Under certain circumstances, projects involving investments exceeding NOK 50 mill (about USD 7 mill) are subject to carrying out EIAs even if they do not meet the requirements mentioned above.

Both development of generation plants and transmission lines require preparation of Municipal Development Plans to include the current projects, which is within the responsibility of the local authorities. This issue is also regulated by the Planning and Building Act. The Government is empowered to overrule the local authorities if they are considered not to take general public interests into account to a satisfactory extent.

4.5 Pollution Control Act:
Hydropower development involving diversion of water, which accordingly reduce the watercourse ability as a recipient of pollution, requires a permission given by the competent authorities pursuant to the Pollution Control Act. The latter is also the case for emission of air pollutants and cooling water from thermal power plants.

5. INSTITUTIONAL FRAMEWORK

5.1 Introduction:
Several sectoral authorities are involved in the public consultation during the current licensing procedures. However, the share of responsibilities between the different authorities involved is clearly set out. The relevant institutions have are vested with the following responsibilities:

5.2 Municipalities:
Preparation of Municipal Development Plans to include generation plants and transmission lines. May be overrules by Government.

5.3 The Norwegian Water Resources and Energy Directorate (NVE):
- Granting of all licences pursuant to the Energy Act, except from imports and exports.
- Granting of licences pursuant to the Watercourses Act, except from run-of-the river-projects exceeding annually production of 40 GWh.
- Carrying out licensing procedures pursuant to the Watercourse Regulation Act and the Act on Acquisition of Waterfalls, and giving recommendations on such to the Ministry.

5.4 The Ministry of Petroleum and Energy
- Granting of licences for imports and exports pursuant to the Energy Act.
- Granting of licences for run-of-the-river-projects exceeding an annually production of 40 GWh.
5.5 The Government:
- Granting of licences pursuant to the Watercourse Regulation Act and the Act on Acquisition of Waterfalls.

5.6 Parliament:
- Approval of licences for hydropower projects exceeding 20,000 natural horsepowers (about 15 MW) before the licences are granted by the Government.

5.7 NVE, the Ministry and the courts:
NVE has the role as the Regulator for the electricity supply industry and for parts of the water sector. It is organised as a directorate under the ministry of Petroleum and Energy. The share of responsibilities is described above.

During the day-to-day work, NVE acts independently from the Ministry. However, all individual decisions made by NVE affecting private parties may be appealed to the Ministry. In addition, the Ministry is empowered to instruct NVE, or to decide to take over cases of great principle importance within NVE's responsibilities. The latter mentioned options do rarely take place. Even though, there is no doubt that NVE is under political control, in principle. Thus, NVE can not be regarded as a completely independent regulator.

All individual decisions may, after being appealed once within the civil service, be brought to court for judicial review.

6. NORWAY AND INTERNATIONAL CONVENTIONS ETC.

Norway shares watercourses with its neighbour countries Sweden and Russia. In most of the cases, reservoirs are located in Norway, while utilisation of these reservoirs for power generation also takes place in the current neighbour country. Bilateral conventions regulate this share of watercourses.

Norway has signed the Climate Convention and the Kyoto Protocol. The contents of these agreements have been taken into account in connection with determination of conditions attached to licences for power plants fuelled with gas recently, which made the intended developer to put the current projects on ice.

The Norwegian provisions on EIAs are in compliance with the EU-Directive in this field.

The provisions on ownership to hydropower generation are more favourable for public-owned Norwegian companies than for both all private and for foreign public-owned companies. It is claimed that the discrimination against foreign public-owned companies is not in compliance with the current EU-rules. However, the issue is not brought to the relevant courts, and it seems doubtful if the Norwegian provisions constitute any breach of the current rules.

7. WHAT TANZANIA MAY BORROW FROM NORWAY

7.1 Introduction:
All legislation should be considered in relation to the specific national conditions, and be tailored accordingly. However, several circumstances are the same, or almost the same,
around the world. In addition, international players like multinational investors, the World Bank, IMF etc. have some common requirements independent of location. Thus, it could be appropriate to borrow parts of other countries legal and institutional framework, or at least some principles to be adjusted according to specific national interests.

7.2 What not to borrow:
Firstly, it should be appropriate to mention some elements, which may not be recommendable for Tanzania to borrow from Norway:

- The fragmentary structure of water legislation.
- Introduction of electricity market at this stage.
- The time-consumption of licensing.
- Long-lasting compulsory yield of power arrangements.

7.3 What to borrow:
Then, what may be recommendable for Tanzania to borrow from Norway:

- National control over major water resources.
- The main contents of licensing procedures, including EIA-provisions.
- A clear-cut share of responsibilities between involved participants, public and private.
- Provision of benefits to affected local communities.
ENVIRONMENTAL IMPACT ASSESSMENTS AND LICENSING PROCEDURES.

A SHORT REVIEW OF NORWEGIAN PROCEDURES AND EXPERIENCE.

By Mr. Rune Flatby, Adviser,
Norwegian Water Resources and Energy Directorate (NVE)

The rivers and waterfalls in Norway have always been important for transport, recreation and energy supply. For centuries the rivers have been used for floating of timber and power for grain mills and sawmills. The development of hydropower for electricity production started at the beginning of this century. Today, about 99.8% of the Norwegian electricity supply is produced by hydropower.

Hydropower is one of Norway's main natural resources and has been important for developing power intensive industries, such as the chemical and smelting industries. The first concession laws were established at the beginning of this century to secure national control over the water resources and to avoid waterfalls and water rights from being bought by foreigners.

HYDROPOWER IN NORWAY

![HYDROPOWER IN NORWAY](image)

ANNUAL GENERATION CAPACITY

After the Second World War (1945), the demand for electricity grew rapidly along with a rapid technological development. This led to a rapid development of new hydro power plants.

In the 1960s there was growing public concern about the environment. Hydropower developers experienced a number of conflicts with environmental interests and other user groups. Before 1960, applications for new plants consisted mainly of a technical plan, but the growing public environmental concern led to a demand for environmental impact assessments and mitigation measures, such as seasonal restrictions on regulations and minimum water supply to the rivers.

At the end of the 1960s the concession laws were changed so that the applicant had to send a notification to NVE at an early stage of the planning. Interested parties were invited to comment on the plan and on which environmental impact assessments should be included in the application. At the same time nature conservation was included in the legislation and set as terms of licenses.

Protection Plans

Because of the conflicts between hydropower development on the one hand and environmental interests and other user interests on the other, the Government in the 1960s initiated the first

Licensing procedures in Norway, Rune Flatby, 28. Sept. 1999
Protection Plan for watercourses. Since then 4 Protection Plans have been approved and 341 river systems have been protected from hydropower development. The Protection Plans have been prepared by the Ministry of Petroleum and Energy and approved by the parliament. The plans are a result of co-operation between the relevant authorities and user interests.

**Master Plan**

In addition to the Protection Plans, early in the 1980s the government decided to draw up a Master Plan for the remaining hydropower resources. The main goal of the Master Plan was to come up with a priority grouping of hydropower projects for subsequent consideration for licensing. The plan includes a mapping of possible hydropower projects at a pre-feasibility level and a study of each project’s conflicts with environmental and other user interests.

Conflicts with the following user interests were investigated/evaluated:

- Nature conservation
- Outdoor recreation
- Wildlife and fish
- Water supply and pollution
- Preservation of ancient monuments
- Agriculture and forestry
- Reindeer husbandry
- Protection against flooding and erosion
- Transport
- Ice and water temperature
- Climate
- Regional economy

With the Ministry of Environment as the responsible party, the Master Plan was carried out in cooperation between NVE, power utilities and relevant sector authorities like the Directorate for Nature Management, the county governors and municipalities involved.

For each user interest the projects are rated from small conflicts to very serious conflicts. The conflicts with different interests are combined to form one conflict class. The project is then fitted into a predefined matrix with conflict classes ranging from C1-C8 along the X-axis and project economy ranging from E1 - E6 along the Y-axis.

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**Category I**

**Category II**

C = conflict class  
E = project economy  
1-16 = priority groups : 1-5 = Category I 5-16 = Category II

Licensing procedures in Norway, Rune Flatby, 28. Sept.1999
Each project is placed into a priority group, ranging from 1-16. Depending on the priority group the projects are placed in one of the following two categories:

**Category I.** Priority groups 1-5. Projects with moderate conflicts that may be considered for licensing.

**Category II.** Priority groups 6-16. Projects with major conflicts that can not be applied for at present. Depending on energy demand and supply in the future the projects may be re-evaluated and considered for licensing at a later date.

Some projects with plans developed before the Master Plan and with moderate conflicts are defined as "outside the Master Plan" and may be considered for licensing, similar to category I. This was done to secure the possibility to develop new projects during the work with the Master Plan.

The approval of a project in the Master Plan does not mean an advance commitment to grant a licence. The projects may be changed, reduced and even rejected during the licensing process. As a result of the Master Plan conflicts regarding new hydropower projects have been reduced, but not entirely eliminated.

![Diagram of HYDROPOWER RESOURCES IN NORWAY](image)

**LEGISLATION.**

The main acts regulating hydropower development in Norway are:

- **The Acquisition Act (1917)** - licenses to acquire water falls and shares in power utilities
- **The Water Courses Act (1940)** - licenses regarding all kind of measures in the river systems, e.g. power plants
- **The Water Courses Regulation Act (1917)** - licenses to establish reservoirs and to transfer water between river systems

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Licensing procedures in Norway, Rune Flatby, 28. Sept.1999
The Planning and Building Act (1985) and its provisions concerning impact assessments - Handling procedures, Notifications and Impact Assessments

A typical case involves:

- handling procedures, notification and impact assessments according to the Planning and Building Act
- license to acquire waterfalls
- license to build reservoirs
- license to build and run the power plant

In addition the procedures include co-ordination with the Pollution Control Act (1981) and the Cultural Heritage Act (1978).

The impact assessments may contain one or more areas within the following main fields: environment, natural resources and social conditions.

Environmental impact assessments were formally introduced as a condition for the processing of applications under the Water Courses Act and the Water Courses Regulation Act in 1969. Since 1990 environmental impact assessments for hydropower projects have been carried out according to provisions in the Planning and Building Act, which is a general law governing all land use and construction, such as all forms of electricity production, road building, airports etc.

**LICENSING PROCEDURES**

Only projects in Master Plan Category I or projects outside the Master Plan will be received for licensing. Projects in Master Plan Category II or in protected rivers will be rejected without a hearing. The Norwegian Water Resources and Energy Directorate is responsible for the licensing procedures and the handling of notifications and applications. Depending on the project's size, the government or parliament grants licenses.

The licensing procedures are dependent on the size of the project:

All applications for hydropower projects bigger than 40 GWh or reservoirs bigger than 10 mill.m³ is handled in accordance with the procedures in the Planning and Building Act (PBA), including an early notification and environmental impact assessments (EIA). The procedures start at point 1 below.

Applications for projects smaller than 40 GWh and investment bigger than 50 mill.nkr (7 mill. $) must follow the regulations in the PBA regarding an early notification and EIA if the environmental impacts exceed limits stated in the Planning and Building Act.

For all other projects the handling procedures is more simple, there is no need for a notification and the program for impact assessments is decided by NVE without a hearing process. The impact assessments must be according to the rules in the Water Courses Act or The Water Courses Regulation Act, depending on whether or not the project includes reservoirs. The procedures start at point 3 below.

Licensing procedures in Norway, Rune Flatby, 28. Sept.1999
The guidelines according to the Planning and Building Act set up a framework for the impact assessments, but different projects have different sizes and impacts. Therefore it is important to concentrate on crucial impacts and to adjust the program so that the impact assessments focus on relevant issues. The impact assessments must concentrate on which impacts are of importance in the decision making process and for the evaluation of mitigating measures. The procedures are as follows, see also the flowchart in Appendix I:

1. A notification is worked out by the constructor and sent to NVE. The notification includes a description of the technical plan, alternatives, environmental impacts and the constructor's proposed program for impact assessments needed. It is based on existing knowledge about the environmental impacts. The notification is sent by NVE to the relevant authorities and NGOs and published in local newspapers. NVE will arrange a public meeting in the affected area to inform about the project and the handling procedures. All comments on the notification must be received within 6 weeks. The intention is to elicit comments on the impact assessment program and what should be taken into consideration during the planning.

2. NVE decide, in co-operation with the Ministry of Environment, on a program for the impact assessments, based on the information in the notification, the comments received and NVE's own evaluation. The issues included in the program must be relevant for the decision-making.

3. The applicant is responsible for preparing the impact assessments and to present them to NVE. I would like to emphasise the importance of co-ordination between the impact assessments and the development of the technical plan. One of the major goals of the impact assessment process is to adjust the technical plan so as to avoid or minimise the negative environmental impacts.

4. The Application and the impact assessment are sent to the relevant authorities and NGOs and published in local newspapers with a time limit of 12 weeks for comments. A public meeting should take place in the project area with a presentation of the plan, conclusions of the impact assessments and the handling procedures. The applicant is given the opportunity to comment on the statements received.

5. Based on the comments received and NVE's own evaluation, NVE decides if the impact assessments have been developed in accordance with the program stated in point 2 (see above), and that the case in question is sufficiently prepared.

6. NVE make their final evaluation of the project based on the application, the impact assessments and the comments received. The evaluation consists of a discussion of all the costs and benefits of the project, including environmental issues. A licenses is recommended only if the total benefits are considered bigger than the cost.

7. NVE's evaluation and conclusions are sent in a form of a recommendation to the Ministry of Petroleum and Energy who are responsible for preparing the case for the Government after a short hearing with affected municipalities an the ministries involved. Large projects are presented to the parliament.

Hydropower projects smaller than 40 GWh are not handled in accordance with the procedures in the Planning and Building Act. There is no need for a notification and the program for impact assessments is decided by NVE according to the rules in the Water Courses Act or The Water Courses Regulation Act, depending on whether or not the project includes reservoirs.

Licensing procedures in Norway, Rune Flatby, 28. Sept.1999
TERMS OF LICENSE AND RULES OF OPERATION

The legislation establishes conditions for the licenses. Based on experience and co-operation with the relevant authorities, NVE have developed a set of standard terms of license, which covers:

- Time limitation for licenses.
  - Publicly owned utilities: licenses without time limitation.
  - Private companies: reversion right to the government after 60 years.
- Rules for revision every 30 years of the terms of license
- Construction deadlines. The construction must start within 5 years after the license is granted.
- License fees and funds to encourage local industry
- Compulsory delivery of power to the municipality at a cost decided by the government to secure local power supply
- Nature conservation. Authority to require mitigating measures regarding:
  - landscape
  - biotope adjustments to maintain biological diversity
  - weirs
  - fish stocking
  - pollution
- Preservation of ancient monuments
- Hydrological measurements
- Approval of detailed plans regarding landscape and safety
- Monitoring of long-term environmental effects
- Punishment for operation in conflict with the rules of operation

All measures are financed by the licensee.

The rules of operation establish limitations regarding the use of the reservoirs, such as highest and lowest regulated level, and may include seasonal restrictions on regulation levels and minimum water supply to the rivers. In addition the rules of operation include rules for regulation of the reservoirs during floods. Sometimes the first 5 years of operation is used as an experimental period to optimise the rules of operation.

Experiences with the Norwegian procedures

The procedures are complex and involve different authorities and the public. It is a challenge for the responsible and involved authorities to make the procedures work efficiently and to focus the environmental impact assessments on the important issues. Crucial information may be drowned in pages with unimportant details. Because hydropower is such a complex business, I believe the key to make an efficient process is to define clearly the role of the different parties involved!
Co-operation between the impact assessments and the development of the technical plan is important in order to avoid or minimise the environmental impacts.

In short, some of the experiences can be summed up as followed:

Benefits:
- public participation in the decision making process.
- good at identifying environmental impacts, resulting in appropriate mitigation measures
- local economical benefits, due to founds and annual fees.

Drawbacks:
- high costs because of comprehensive impact assessments.
- time consuming; three hearings and many authorities involved. The total licensing process, including impact assessments may take from 2 - 7 years.

It is important to be aware of the fact that user interests and attitudes regarding use of river courses and hydropower development are changing over time. Therefore, it is important to have regulations that ensure the possibility of reconsidering the terms of the licenses and the rules of operation after a fixed time period, e.g. 30 years.
LICENCING PROCEDURES
- THE PLANNING AND BUILDING ACT
- THE WATER COURSES REGULATION ACT

THE APPLICANT | RESPONSIBLE AUTHORITY | RELATED AUTHORITIES | PUBLIC
--- | --- | --- | ---
NOTIFICATION | DEALING WITH NOTIFICATION | HEARING | HEARING

---
APPLICATION | E.I.A. PROGRAMME DETERMINED | DISCUSSION WITH MIN. ENVIR.

---
E.I.A | DEALING WITH APPLICATION | HEARING | HEARING

---
E.I.A APPROVED | OVERALL EVALUATION | NVE'S RECOM. TO MINISTRY

---
DEALING BY MINISTRY | HEARING

---
CONCESSION GRANTED | PARLIAMENT

---
APPLICATION | DEALING WITH APPLICATION | HEARING | HEARING

---
E.I.A | DISCUSSION WITH MIN. ENVIR.

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PUBLIC MEETING

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PUBLIC MEETING
This presentation deals with NVE's environmental work in connection to hydropower development. An important tool for the environmental work is conditions set in the license. This aspect is covered by Mr Rune Flateby in his presentation of the Norwegian licensing procedures. I will instead mention the Protection Plan for River Systems which is another tool for environmental management in Norway. I will also talk about environmentally advisable design principles and mitigation measures used in Norway. At the end I will give some comments to the aspects of how to combine the need for development with environmental protection.

BACKGROUND

The environmental work in NVE started in the early 60's. At that time there was a growing conflict level between hydropower developers and the public with an increasing environmental attention. New hydropower projects more often resulted in massive debates and angry demonstrations. NVE needed to develop its own competence on environmental issues and in 1963, a Nature Conservation Office was established within NVE.

Later in the 60's there was a change in the licensing process and the applicant from now on was obliged to send an early notification to NVE at the beginning of the process. Interested parties were invited to comment on the plan and a framework for the EIA was established. At the same time aspects related to nature conservation was included in the legal framework and set as general terms of licence.

The terms of licence stated that:
- All plans must be approved by NVE
- NVE shall supervise construction work and later maintenance
- The result of landscape design shall be the best possible
- Any damages to the nature shall be repaired
- Construction of weirs or other kind of mitigation measures can be imposed

And a very important principle: THE DEVELOPER MUST COVER THE COST!

THE NORWEGIAN PROTECTION PLAN FOR WATERCOURSES

Norway has a remarkable nature where the amounts of watercourses play a vital role. The rivers and waterfalls have been the basis for Norwegian prosperity through hydropower development, and about 1100 watercourses are being utilised for power production. To protect parts of this unique watercourse nature, the Parliament decided that a number of watercourses should be protected against hydropower development.

The Norwegian hydropower development started for more than hundred years ago, together with the industrialisation of the country. At that time, people were not concerned about nature conservation and...
environment. As the development grew faster in the 60's and 70's and the hydropower projects became bigger, people became more aware of the environmental aspects. Handling the projects according to the ordinary licensing procedure proved to be insufficient for taking care of all the different environmental interest. As most of the hydropower projects turned out to be very profitable, it was difficult to say no to projects seen separately. The Parliament decided it was necessary with a systematic evaluation of the watercourses that were not yet developed, and to assess the need and suitability for protection.

The long-lasting work started in 1960, and the first Protection Plan passed the Parliament 13 years later after a long period of investigation and collection of baseline data. The second plan came in 1980 and the third one in 1986. The work was concluded in 1993 as the fourth Protection Plan was passed by the Parliament. In addition to be the final protection plan, the fourth plan was also co-ordinated with the Masterplan for Hydropower Development.

The protection is based on a variety of environmental criteria.

- Nature conservation
- Scientific values
- Outdoor recreation values
- Landscape and aesthetic values
- Wildlife
- Fish
- Cultural relicts
- Water quality
- Reindeer husbandry
- Agriculture

The value of the general impression of the watercourse is to be attached with the same importance as any of the separated protection criteria.

In addition, the Parliament emphasised:

- Variation regarding the protection values
- Diversity in size
- Equally allocation throughout the country
- Priority given to watercourses close to population centres
- Acceptable economic consequences in relation to the objective to fulfil the country's electricity needs

Protection of a watercourse means that it will not be given new licenses for hydropower development in the watercourse. Even though the protection is primarily against hydropower development, the watercourses are also to be protected against other kind of encroachments that may disturb the environment. This may be road building, removal of gravel, canalisation, etc.

Since it is impossible to separate between the watercourse and the surrounding nature when it comes to making a total evaluation of the protection values, the whole watershed is in principle protected. The main attention is however, given to the water system, the riverine areas, and other areas that are proved important for the river environment.

Today, 341 watercourses are protected which are about 20% of the total hydropower potential. The total area of the protected watersheds is about 100,000 km², or approximately 30% of the country.
After working with the Protection Plan, we started to develop a Master Plan for Hydropower development, which put all remaining hydropower projects into priority categories. The first category contains projects with minor conflicts and these are the only projects open for licensing considerations.

By developing the Protection Plan and the Master Plan, the conflict potential regarding hydropower projects has been considerably reduced, although not eliminated.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

What kind of environmental impacts do we talk about concerning hydropower development? A more or less "typical" Norwegian hydropower landscape often consist of high mountains, steep slopes, scarce vegetation, and hence extremely visual vulnerability.

The reservoir are often located in the mountain areas where there are no people living, hence resettlement of people are almost non-existing in Norwegian hydropower schemes. Negative socio-economic impacts are more often linked to fishing and husbandry, but all in all these may be regarded as small compared to socio-economic impacts from hydropower development in densely populated development countries. In Norway, hydropower development has often resulted in extensive economic growth in the small local communities. Actually, in the golden days of hydropower development the term "Hydropower Municipality" became equal to a small, wealthy municipality with all its welfare benefits covered.

However, even though the socio-economic conflicts tend to be minor, the physical impacts can be severe. The elements of a typical hydropower scheme may be listed as follows:

- reservoirs, often inundating large areas
- the dam as a large, dominating construction in the landscape
- quarries are necessary to obtain rock material for the dam and access roads
- rock tips with excess tunnel disposal
- access roads
- different rig areas
- the river bed upstream and downstream the outlet channel, affected by the regulation
- the regulation zone in the reservoir, also affected by the regulation
- transmission lines for construction power and lines transferring power from the new plant
- transformers/switchyards, often very visible in the landscape
- the hydropower station itself, in Norway often situated underground

To achieve an acceptable environmental result, it is importance to emphasise the Baseline surveys:

- What is the character of the landscape?
- Is there any special landscape features present?
- How do the different ecosystems function?
- Is there any conservation interests present?
- Are there any endangered species in the area?
- Will any cultural relicts be disturbed?
- Do people use the area for outdoor recreation?
- What kind of economic activities are present (fishing, husbandry, tourism)

These are just examples of issues that should be investigated. Hydrological, geological and the full range of socio-economic issues are of course just as important.

Anne Kronen Helgestad: Environmental Aspects of Hydropower Development in Norway - 29.09.99 -
When a scheme is approved, detailed design and locations of the different elements are essential for a successful result. Terrain adjustments, selections of building materials and route adjustments of roads and transmission lines are examples on common problems. It's highly advisable to use Landscape Architects for these tasks. Then there are the mitigation measures, which of course are crucial. Just as important as the extent and contents of the mitigation measures though, is the decision on responsibility and financing, management and monitoring.

I will now discuss some of the items more in detail:

**DOWNSTREAM RIVER**

**Compensation flows**
One of the most serious environmental effects of hydropower development, is the reduction in flow or change in the annual discharge regime. This can have negative visual effects as well as produce severe damage to fisheries and to aquatic life in general.

In the old days, many hydropower schemes were designed with no compensation flow at all. Today, this has changed. Now, the principle is that one should always design for a proper minimum flow and lot of attention is given to this issue, taking into account both environmental, technical/operational and environmental interests. Sometimes the first 5 years of operation are used as an test period to optimise the rule of operation for multipurpose use.

**Weirs**
To give a river with reduced water flow a more appealing look, we can also build weirs. A weir is a sort of a barrier across the river, which controls the flow of water. Without the weir, rivers with reduced water flow would appear dry. This also, of course, improves the conditions for the fish.

The weirs can be built of wood, concrete or moraine material. In low discharge rivers, they are usually built as a single straight line, while they are given a V-shape in high discharge rivers. The V-shape concentrates the flow and creates a pool below the weir, providing suitable conditions for fish to jump the weir, opportunities for spawning and survival when the winter flows are low.

**Substrate improvement**
In channelled rivers where sand and other fine materials dominate the bottom, artificial areas of rocks and stones have been placed in the river. Such areas or "islands" provide improved conditions for fish by creating a greater diversity in substratum, flow conditions and water depth, as well as providing cover.

**River restoration**
At present, there is a growing international focus on river restoration techniques. In Norway, NVE has started to look into these issues. River restoration is defined as "planned improvement of physiological and ecological conditions related to waterways and streams". In Norway, the concept is used to characterise a holistic plan for amendments to streams that, environmentally speaking, are rather heavily degraded from technical encroachments. River restoration asks for contemplation of partly opposing goals and interests. Specific goals should be described for each particular project. To keep up a high level of erosion protection and flood control will usually be considered as vital, but also an aesthetically pleasing appearance, ecological conditions as well as accessibility and multipurpose use should be given due consideration.

In river restoration we combine well proven techniques developed during our work with the hydropower projects, and new techniques specially developed for the new knowledge of ecological
concepts. The design of the banks and slopes of such rivers play a vital part in the improvement. By analysing on a principal basis how the river profile can be improved through moving, lowering, or smoothening it out, or by adding cover or using geotextile armouring to modify the original slope, the different goals and interests can be clarified.

The riverbed itself can be furnished with various types of weirs, cobble ripples, pools etc. Providing the riverbed with boulder clusters, small islands and spawning grounds are other applicable techniques.

Establishment of new vegetation is often a difficult and time-consuming process in Norway because of the harsh climate. A lot of attention has therefore been put on this aspect regarding types of plants and planting techniques. To succeed in developing an agreeable cover of trees, shrubs and herbaceous plants, it is recommended to combine different methods. Shrub-like tree species like willows (Salix sp.) with a good rooting system can be introduced in several ways like willow cuttings, stakes and mats. To enhance variety, it can be advantageous to arrange for some conventional plantings of trees too. The setting should then be enriched with a ground cover of moss, sedges and herbaceous plants. The merchandise of grass mixtures in the Norwegian market has improved much in the last years as regards the variety of seeds from meadowland plants.

Wildlife
Converting hydropower development wetlands can be either drained or flooded making them unavailable for waders and other wetland birds. Among the remedial measures tested and evaluated are artificial islands constructed to create delta areas and the building of weirs in arms of reservoirs to maintain a suitable wetland habitat. The maintenance of corridors of woodland and other vegetation along watercourses is very important for biological production in rivers and streams, as well as of strategic importance for birds and animals. Such boundary zones are areas of high biological diversity and have an important function in reducing erosion runoff from agriculture and industry. A wide range of human activities in addition to hydropower however, often threatens them.

LANDSCAPE

Landscaping
Landscaping is largely carried out to make sure that the power plants are built in such a way that they fit into the total landscape as well as possible and that unnecessary scars on the scenery are avoided.

A hydropower development will always change the landscape, but it doesn’t necessarily have to destroy it. As all licences are granted on specific conditions, it is possible to make environmental conditions both to the planning and the construction. Instead of leaving a landscape in ruins, it is possible to create a new landscape with new values. A thorough planning and strict follow-up during construction should result in a changed, although acceptable scenery from a landscape aesthetic point of view. Impacts such as rig areas and the quarries may be hidden under water in the reservoir and rock tips revegetated.

There will also be a need for measures that maintain natural diversity and create a dynamic cultural landscape.

Power plant
While old power plants often were located in the open, modern power plants are now usually located underground and are only visible by their entrance gates and switch yards for transmission lines. This building technique has many advantages, both from the point of view of security and the landscape. However, large amounts of spoil rock are troublesome by-products.
Spoil rock

Efforts are made to incorporate the spoil into other parts of the same power project or to use it in other ways. Great care is taken to find a suitable location, to adapt any rock tips to the surrounding terrain, to cover the surface with a thin layer of soil and if necessary apply fertilisers and seeds or plant trees over the tip.

Left alone, any pile of rock will be covered by vegetation eventually. However, on a human timescale, this goes on painfully slowly in the cold climate of Norway, and much can be gained by using topsoil and fertilisers. In our experience it is very important to establish a plant cover as soon as possible, thus creating a protective surface which prevents runoff, as well as providing a foothold for the plant species native to the area.

Large dams

Large dams are constructions that will endure for very many years. Although they are in themselves large obvious structures that cannot be hidden in the surrounding terrain, one has chosen to let them be seen as they are; a manmade structure. Efforts are, however, made to blend them into the landscape by giving the dam a curved shape. Nevertheless, economic considerations have often had the final word.

Emphasis is given to keeping the area below the dam as free as possible from manmade encroachments or ensuring that the terrain is landscaped in a way that minor encroachment disturbs the general picture as little as possible.

Regulation zones

The regulation zones of hydropower reservoirs are very exposed to erosion and appear ugly when the reservoir levels are lowered. Experiments have been carried out to decide the most suitable plant species and fertilisation procedures for this zone characterised by alternate desiccation and flooding. In large new reservoirs planned to be filled over several years and which have retained considerable amounts of fine-grained material, conditions are more favourable for establishment of vegetation.

Quarries

To build dams it is usually necessary to quarry large amounts of rock, stones and filling materials. Attempts are made to site quarries and sites for extraction of moraine material in areas which will subsequently be covered by reservoirs and thus not visible after regulation.

When this is not possible, extensive efforts are made to develop the plans such that the quarry does not appear to be an obvious scar in the landscape. The sharp contours of the quarry can be smoothed out and the waste material placed at the bottom so that the fissures do not appear as sharp edges, but form a softer profile that fits in with the more natural lines. There are also examples where parts of the quarry have been filled with water, giving a water surface within the total landscape.

Access roads

Constructions of access roads are often necessary in connection with hydropower development as the project areas often may be regarded as wilderness. Some people view this road building as a blessing, while others consider it destroying. Making an area accessible by car will usually affect the biological system. Illegal logging and hunting as well as disturbance of the wildlife in general are known results. A road may also lower the recreational value of the area.

It is possible to put restrictions on the use and thereby conserve more of the nature and make the area more appealing for recreational use. The area will still have lost its image as a "wilderness" though. There are also examples of removal of the road after ending the building activity, like this foil shows.
Because of the problems in connection with access roads, helicopter and temporary cableways, are now frequently in use in Norway to reduce road building. In other countries, with a tropical climate, any road construction will often be exposed to severe erosion. Spreading of disease such as malaria, is also a known adverse effect.

Though access roads often are regarded as temporary elements, for works traffic only, experience tells us differently. The access roads will often become a part of the local infrastructure, and this should be taken into consideration in the planning.

TRANSMISSION LINES
Transmission lines are a necessary part of any power plant. Still, the planning of the alignment route is often far from easy. Transmission lines affect large areas. Considerable visual impacts as well as restriction on land use are well known effects. Conflicts with residential areas, clearing of forest and bird collisions are also common problems. Transmission lines may change the landscape character and lower the aesthetic value of an area, and thereby cause economic impacts. In Norway today, building of any new high voltage transmission line causes loud environmental discussions.

Impacts:
- Occupy valuable land
- Reduced efficiency in agriculture and forestry
- Aesthetic degradation of the local environment
- Fear of radiation and health risks
- Negative impacts for recreational use of the landscape, nature- and cultural conservation
- Danger of bird collisions and electrocutions

Mitigation measures:
- Careful planning of new lines, including evaluation of the actual need
- Clearing and possible elimination of old lines
- Optimal line routing
- Careful clearing of vegetation
- Optimal design and colour on pylons, isolators and lines
- Marking of lines to prevent bird injuries
- Underground cables as an alternative to overhead lines

ENVIRONMENTAL PROTECTION VERSUS ECONOMIC DEVELOPMENT

The main goal for most developing countries is economic development, and usually this includes industrial development and the need for utilisation of natural resources. The question arise if it is possible to achieve economic development through industrialisation and exploitation of natural resources, and at the same time take care of the environment?

There are no easy answers to this very difficult question. It would have been easy to say "yes, we will have both," - both industrial development and protection of the environment. Most often, however, the reality claims that we have to make compromises. In the discussion leading up to these compromises, it is important that we know exactly what we are compromising upon. What is the real cost benefit, both short-term and long-term? Proper data on the economic industrial/economic development aspects are easy to find, but what about the environment? How is it possible to put the right price on clean air, the natural beauty or the habitat of a spider or a frog?

Several different methods for quantifying environmental values have been developed in the later years.
To what extent they succeed in putting the right price on the environment or if they just make it easier to compare different alternatives, I shall not say. Some will say that it is impossible to put a price on long-term effects from damaging the nature. Who can say what price the future generations will put on nature? Do we have the moral right to choose away their future? On the other hand, do we have the right to give priority to the future generations at the cost of the welfare and development of the people of today?

These are tough decisions for the politicians to make. And if they shall be able to make these decisions, they need adequate knowledge of the consequence. What will today’s decisions mean for the future? Is it really possible to choose development over environment?

In the past, we might have said “Yes”. Today, however, we know better. Nature is not a dead object unaffected by our actions. Whatever we do will have impacts. And if our actions are too severe, the environment will fight back. We have started to gain knowledge about these structures, and seen the increased damages from natural disasters like drought, floods, and hurricanes.

In the past, we might have believed that we had a real choice. Today we know that we have not. The developing countries may feel that it is unfair that while the industrial countries could do their development without interference from environmental concern, they will not allow the developing countries to do the same today. The irony is, however, that the developing countries are the one that will suffer most from the environmental damage. They are often vulnerable both due to geographic and climatic reasons, and they have the weakest buffer capacity to handle natural disasters. The developing countries has to face the challenge of development within an setting of environmental consciousness, they can’t afford different.

We have spoken about the need for proper EIAs as if this was necessary out of respect of the environmental authorities, international donors, NGOs and others. However, EIA must be taken serious form all parties. If we don’t get enough knowledge of the status, possible impacts and how to mitigate, the development aspect of any project will be absurd. An industrialised, developed society within a ruined environment is worthless. People need air to breath, water to drink and fresh food to eat.

Environmental concern need to be seen integrated with the development issues at stake. This is necessary to be able to do the correct cost benefit evaluations. Environmental questions should not be a separate sector responsibility, but integrated in the energy sector development policy and management.

I opened this presentation with illustrations of mitigation measures and landscaping of Norwegian hydropower projects. This may appear to be a “nice” environmental angle of attack suited to satisfy the environmentally concerned public. And maybe this was how it started in Norway. By the time, however, we learned the lesson. It is necessary with a holistic environmental angle, and this is what characterises the environmental work in NVE today. What started as a “Nature and landscape department” is today an “Environment Department” dealing with overall planning and integrating of environmental principles related to rivers and energy in all governmental and local community planning. In Norway, environmental concern is no longer a sectoral responsibility, but the base for all other planning activities related to rivers and energy development.
Session 5

Case Study

Lower Kihansi

Hydropower Project
LOWER KIHANSI HYDROPOWER PROJECT

Lower Kihansi Hydropower Project is a part of the Power VI program in Tanzania, where the World Bank has a leading role on the donors side. The project has several donors, - the World Bank, European Investment Bank, KfW, Sida and NORAD, in addition to a reasonable local amount from Tanzania. The Project owner and responsible for the implementation is Tanesco, and the main Consultant is NORPLAN of Norway.

Lower Kihansi Hydropower Project (LKHP) is under construction since 1994, and is scheduled to be completed in year 2001. The generation of electricity will, however, commence at the end of year 1999 or early year 2000.

The total costs are calculated to approx. US$ 260 mill, out of which NORAD contributes with an amount up to NOK 380 mill (approx. US$50 mill.). An amount of NOK 33 mill. is set aside for environmental projects, within the Norwegian grant.

The agreement between the Government of the United Republic of Tanzania and the Government of the Kingdom of Norway regarding assistance to the development of LKHP was signed 24th November 1995. The Norwegian grant will be utilized to supply equipment to the project, like hydraulic steel works, ventilation and ventilation works, and delivery and installation of turbines, generators and cranes.

In addition, funds will be available for financing the Public Health Program for the Project, and further studies of the environmental consequences of the Project and to carry out environmental mitigation measures.

The LKHP is located in the south-western part of Tanzania, some 440 km. from Dar es Salaam. The road distance via Ifakara is around 560 km. from Dar es Salaam.

The project utilizes the water in the Kihansi river from the Central Plateau in the Iringa area down the escarpment to the Kilombero plains, a head of 853.5 metres. This is the highest head utilized for hydro power in Africa. The catchment area is approx. 590 km², and a dam of 25 m. height, length 220 m. is under construction above the Kihansi Falls. The dam (intake pond) will submerge an area of approx. 26 hectares. The live storage of the intake pond is approx. 1.14 mill m³.

The power station is constructed inside the mountain, with head and tailrace tunnels not visible from outside, approx. 3 km. A tailrace channel brings the water back to the river, some 6 km. after the intake pond. This means that approx. 6 km of the river will have a reduced waterflow when the Project is completed.

The power plant will be constructed with an installed capacity of 3x60 MW (180MW), but space is prepared for an increase to 5x60 MW (300 MW), in case of using the project for peaking power.

A road is constructed up the escarpment to the dam site, and this road is connected to the road further to Iringa. In total, approx. 50 km. of roads have been constructed for the project.
Transmission lines, 220 kV, are constructed to Iringa (97 km.) and to Kidatu (178 km), to connect the Project to the Tanzanian grid net. The firm energy delivered from the project is approx. 730 GWh/yr, while the total production will be approx. 930 GWh/yr.

To do proper management of the water resources for the project, effort is made to strengthen the Rufiji Basin Water Office in Iringa.

The Project also includes:
- the MUAJAKI Public Health Project (Norad)
- the preparation of a Catchment Management Plan Project (Norad)
- Long Term Monitoring of the Natural Environment (Kihansi Gorge) Project (Norad)
- Socio-Economic Follow-up project (SEMA-Ki)(Sida)

For Muajaki, the Project Objectives are to avoid increases in:
- rate of transmission of STD,s, including HIV
- malaria morbidity and mortality
- insanitary disposal of human excreta and refuse
- the occurrence of maternal and childhood health problems
- health problems related to substance and alcohol and drug abuse
- traffic and construction-related accidents and health hazards

In addition, the project shall:
- Monitor progress of the various activities described in the contract
- provide recommendations on extension of the objectives into the operational phase of the Lower Kihansi Hydropower Project
- Prevent an increase in the rate of transmission of malaria in the communities immediately surrounding the LKHP dam site

For the Catchment Management Project, the project has reached phase 2, and the Overall Objective is:
- to establish a situation where there is effective management of the Kihansi catchment, based on a well functioning catchment management system.

The Project Objective is:
- to provide the minimum assistance required which together with necessary decision by Tanzanian authorities will make it possible to reach the Overall Objective.

For the Long Term Monitoring of the Natural Environment, the Project Objectives are:
- to describe biodiversity values of the Kihansi Gorge and nearby areas
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• to provide the initial data required for determination of the absolute impact of LKHP long-term operation and presence on the Kihansi Gorge ecosystem.
• to develop recommendations for the mitigation actions associated with LKHP operation
• to evaluate relative changes in the ecosystem of the Kihansi and Udagaji Gorges
• to enhance the ability of the National Environmental Management Council and the Rufijii Basin Water Office to identify criteria for water management projects
• to contribute to the environmental awareness of Tanesco
• to determine the impact of LKHP activities on the presence of malaria vectors and associated human health consequences in the upper project area and the Udzungwa Plateau, and to develop appropriate mitigation recommendations

For the Socio- Economic Follow-Up (SEMA-Ki), the Overall Project Objective is:
• to safeguard the welfare of the people in the communities surrounding the LKHP during the period of construction.

The Specific Objectives are to generate:

• enhanced capacity by local communities, institutions and individuals to manage and adapt to socio-economic changes
• reports on direct and indirect socio-economic impacts of the LKHP
• recommendations for mitigation activities on direct LKHP-related impacts to be implemented by the LKHP management
• mitigation effort proposals related to indirect impacts of the LKHP for donor funding and for implementation by local government, non-government organisations, communities and other agencies.
LOWER KIHANSI HYDROPOWER PROJECT: CASE STUDY: ENVIRONMENT ASPECTS

Prepared & Presented by: Mr D. P. Ngula

ABSTRACT

Lower Kihansi Hydropower Project located in south-eastern Tanzania is expected to be completed during early 2000. The station will utilise the falling water of the Kihansi River of which the total head is 853m to produce initially 180 MW of electric power corresponding to 935 Gwh of average energy annually and ultimately 300 MW. The project implementation cost stands at USD 270 million financed by TANESCO and the Tanzanian government, World Bank/IDA, NORAD, SIDA, KfW and the EIB.

The Kihansi hydropower potential was identified way back in the fifties in Rufiji River Basin studies conducted by FAO. This site was ranked highest among many sites assessed by Norconsult A.S. under the Rufiji Basin Hydropower Masterplan of 1984. A report on full feasibility study was submitted in 1990 by JICA/EPDC. Following detailed design by NORPLAN A.S., Inception Report was submitted in 1992 and Project Definition Report in 1993.

This project ranked high in the Country's power sector least cost expansion development plan. The Government, through its ministry responsible for energy and the relevant parastatals, played a leading role in facilitating the planning and implementation of this project including providing/soliciting funds and granting permits.

Alongside the technical and economic studies there has been environmental studies conducted notably by JICA/EPDC and by M/s EKONO ENERGY for the World Bank whose findings and conclusions were in favour of development of the Lower Kihansi hydropower project.

Following recommendation of the various LKHP participating Donors to have a detailed study to augment the findings of the pre-construction environmental studies, M/s NORPLAN carried detailed EIA from 1993 to 1995. However the EIA was initiated after the decision has been made to proceed with the implementation of the Kihansi Project. This EIA produced a set of mitigation recommendations which TANESCO is putting commendable efforts to implement. These include public health, protection of the Kihansi Catchment, biodiversity issues and social-economic aspects.

Another important concession which has been pursued by TANESCO is water right grant for which the Rufiji Basin Water Officer issued provisional water right in November 1996. Of vital concern here is minimum bypass flow necessary to sustain the ecosystem of the Kihansi Falls. The final grant would be issued after completion of project construction works.

The author is working with the Tanzania Electric Supply Company (TANESCO), P.O. Box 9024 Dar es Salaam, Tanzania; Fax: 255-51-114981; Phone: 255-51-114981.
MAIN PRESENTATION

1. GENERAL

(Location Maps: 2.1-1 & 2.4-1)

The potential for electric power development at Kihansi exists by virtue of the water falling over the Udzungwa Scarp, from an elevation of about 1100 m.a.s.l in the Plateau to an elevation of 300 m.a.s.l in the Kilombero Plains (see Map 2.1-1). The catchment area as measured from the proposed damsite is 620 sq.km (compare: 55,000 sq.km for the Great Ruaha at Mtera and 42,000 sq.km for the Pangani River) located in both Iringa Rural and Mufindi districts (see Map 2.1-6). The river Kihansi has about 10 subcatchments, the largest one being the Ruaha which drains the eastern part of the catchment (see Map 2.1-3). The river is characterized by a very reliable base flow. The majority of the catchment is covered by bushes with scattered cultivation. The forest reserves in the catchment include about 80 sq.km of the Udzungwa scarp Forest reserve. The population in the Catchment stands at 35,000 with an average density of 55 persons per sq.km with the main economic activity being subsistence farming.

The upper catchment is accessed from Iringa by roads. The lower portion of the project area is served by a road connecting the towns of Mlimba and Ifakara, and the Tanzania-Zambia Railroad (TAZARA). Before a road was constructed by the Project, communication between the upper catchment and the Kilombero Plains was by footpaths only.

The area where the Project is located is quite remote and sparsely inhabited with negligible economic activities. There are however villages located in the vicinity of the project area which include Uhafiwa and Ukami in the highland and those between Chita and Mlimba in the Kilombero plains.

2. PRE-CONSTRUCTION PHASE ENVIRONMENTAL STUDIES

The Kihansi hydropower potential was identified way back in the fifties in Rufiji River Basin studies conducted by FAO. This site was ranked highest among many sites assessed by Norconsult A.S. under the Rufiji Basin Hydropower Masterplan of 1984. A report on full feasibility study was submitted in 1990 by JICA/EPDC. Following detailed design by NORPLAN A.S., Inception Report was submitted in 1992 and Project Definition Report in 1993.

This project ranked high in the Country's power sector least cost expansion development plans such as the one of 1985. The Government, through its ministry responsible for energy and the relevant parastatals, played a leading role in facilitating the planning and implementation of this project including providing/soliciting funds and granting permits.

Alongside the technical and economic studies there has been environmental studies conducted, notably the following:
1. Environmental study conducted during 1989-1990 by JICA/EPDC as part of the feasibility study of the Kihansi Hydropower development project.

2. Environmental assessment of the Kihansi hydroelectric project conducted during early 1991 by M/S EKONO ENERGY, a study financed by the World Bank.

Both studies identified some negative impacts for which appropriate mitigation measures were accordingly recommended. In general terms their findings concluded that the project was sound from the environmental viewpoint and recommendations made in favour of development of the Kihansi hydropower project.

The World Bank, in addition to its own environmental assessment of the Kihansi Project which also involved visits to the site by its experts, made a critical review of the above mentioned two studies. The findings and conclusions, based on the World Bank guidelines, were compiled into a report entitled 'environmental assessment, Lower Kihansi Hydroelectric plant, Power VI project-Tanzania' which was submitted by TANESCO to the relevant authorities in the Government. The World Bank environmental assessment was also in favour of developing the Lower Kihansi Site.

During the project's detailed design by NORPLAN A.S. (1991-93) the final layouts of terrestrial structures such as road up the escarpment, switchyard and camps were decided based on geomorphological, architectural and landscaping studies carried by various experts.

3. THE 1993-1995 EIA BY NORPLAN

Following recommendation of the various participating Donors to have a detailed study to augment the findings of the pre-construction environmental studies, NORPLAN AS were commissioned to undertake a detailed EIA of the project.

The EIA activities included a review of project and institutional setting, review of pre-project situation and establishment of baseline conditions, identification of significant project impacts, determination of impact significance, identification of mitigation and compensation possibilities and formulation of recommendations for mitigation measures.

The field activities started in March 1993 were completed in June 1995, and the final report delivered in December 1995. The studies were organised generally along the categories of Terrestrial Ecology and Biodiversity Evaluation, Aquatic Ecology, Medical Entomology, Land Use and Vegetation Cover in the Catchment Project Areas, Socio-Economic and Cultural Aspects, Public Health, and Geology, Hydrology and Water Quality.
The identified major project impacts in the category of human environment were the spread of malaria, population growth ("boom town effect"), sanitation related health problems, increase in sexually transmitted diseases (STD) and overuse of natural resources whereas the major impacts in the natural environment category included erosion from terrestrial construction activities, scour and erosion in the waterways, increased access caused by project roads, tunnel spoils/quarries/borrow pits, garbage disposal and sanitation, the Kihansi gorge and minimum bypass flow and migration barriers for wildlife.

The EIA concluded that the LKHP was located in an environmentally sensitive area, and the issue of minimum bypass flow was probably critical to the biodiversity of the Kihansi gorge. With regard to the human environment the project was relatively favourable compared to other hydropower schemes in developing countries, in the sense that it does not entail resettlement of a large number of people. Furthermore the workforce, although large indeed, is not large when compared to a project where labour intensive construction methods are employed. This meant that the EIA in retrospect did not recommend against the realisation of the project but nevertheless provided several recommendations for mitigation measures to mitigate the above-mentioned impacts from the project.

**The recommended mitigation measures were divided into two groups according to how they could be executed:**

- Mitigation measures which required limited financial resources and therefore could be executed by the proponent (TANESCO) without external assistance
- Mitigation measures which required substantial financial resources and therefore required external assistance.

It was also recommended that matters on public health, protection of the Kihansi Catchment, biodiversity issues and social impacts should have highest priority.

On this background the **LKHP Environmental Program** was formulated by TANESCO with the assistance from NORPLAN in the beginning of 1996. The program was approved by the donors, and after securing NORAD (NOK 34 million) and SIDA (SEK 5.9 million) funding, entered into operation in September 1996 and has been ongoing for about three years.

4. IMPLEMENTATION OF THE RECOMMENDED MITIGATION MEASURES

The LKHP Environmental Program was established as an independent unit within the framework of the Lower Kihansi Hydropower Project organisation. The NORPLAN Project Manager of the LKHP is in charge of overall progress and meeting the project objectives. A Norplan Environmental Co-ordinator is in charge of liaison, monitoring and co-ordination of field operation on a
daily basis with designated focal points in TANESCO. Logistical support is provided by the consultants head office and the local branch office, and four project leaders are in charge of four sub-projects.

4.1 The Projects

4.1.1 **MUAJAKI Public Health Program**: A project based on the principle of community participation and influence. The project covers issues such as occupational health and safety, support and advice to the public and the public health sector regarding, among other things, nutrition, sanitation, Sexually Transmitted Diseases (STD's) and drugs. The project is also assisting in the supply of condoms, antibiotics, anti-malaria programs etc. and is carrying out health monitoring activities.

4.1.2 **Catchment Management Project**: A project for development and implementation of a management system of the Kihansi Catchment in order to protect the hydrological regime of the Kihansi River upon which the project is dependent. In order to achieve this, the local population is also being involved in developing long term sustainable strategies for their use of the local resources.

4.1.3 **Long Term Environmental Monitoring Program**: Project for monitoring and assessing the short and long-term impacts from the construction and operation of the LKHP. The project includes the documentation and description of biodiversity in the project area, comparative studies with other similar habitats and the development of mitigation and management measures. In conjunction with MUAJAKI a Malaria Study is also being carried out to investigate the spread of the malaria vector.

4.1.4 **SEMA-Ki Socio Economic Mitigation and Monitoring Project**: Monitoring and mitigation activities to safeguard the welfare and promote Human Resource Development (HRD) of people in the communities around the LKHP. The project scope has recently been expanded to include a Small Scale Mitigation Program which is designed to help local people to establish economic and business ventures with support from the project in terms of loans, advice and training.

By the year 2002, when the LKHP will be operational, local residents’ living conditions ought to be no worse off, and preferably should be better off, than they were prior to the commencement of engineering activities on-site in 1995. With a view to their longer-term welfare, the mitigation of adverse impacts and the improvements to welfare brought about during the LKHP construction period should be sustainable from locally available resources for another forty years, approximately the working life of the LKHP.
5. CURRENT STATUS OF THE ENVIRONMENTAL PROGRAM

5.1 MUAJAKI: The project has been running quite smoothly, successfully and ahead of schedule.

5.2 CMP: Phase I of CMP successfully completed and CMP final report submitted and circulated to stakeholders. Phase II launched and presently running smoothly.

5.3 LEMP: Project activities according to schedule. New species identified in the gorge in particular a toad believed to have not been found anywhere else.

5.4 SEMA-Kih: Contacts with local communities have been well established and infrastructure improvement needs identified in co-operation with target group. Small-scale mitigation activities being undertaken in co-operation with target population.

6. TECHNICAL FINDINGS AFTER THREE YEARS OF OPERATION

These projects have at present been active for 3 years and over this time have gathered information as to the impacts of the LKHP and possible measures to be implemented during project operation to mitigate negative impacts and develop positive impacts. The critical findings are as follows:

6.1 Biodiversity:

Further studies during the three years have shown the Kihansi Gorge to be an area of special value in terms of its biological characteristics of high biodiversity and the presence of endemic species of limited distribution. A previously unknown species of toad has been found in the Gorge, which is not known to exist elsewhere. Additionally, specimens of three plant species possibly new to science, have also been found. This ecosystem is dependent on the microclimate, which is created by the topography of the Gorge and the large spray created by the Kihansi Falls.

6.2 Public Health Impacts

Malaria: It has been established that a significant increase in the local transmission of malaria in the project area. The highest level of prevalence is currently found in Ukami village, the village closest to the dam site. Malaria is particularly problematic on the Udzungwa plateau where the population, which has had little previous exposure to malaria, has low levels of resistance or 'immunity' to the disease. The new malaria presence in the highland villages will continue to be a
public health problem during the operation phase of LKHP, especially since malaria vector breeding sites seem to have been established. **Sexually transmitted diseases:** A gradual decrease in the prevalence of ‘classical’ STD’s has been recorded. However, the population in the project area has increased by almost 50% during the construction phase and there have been major changes in lifestyle associated with changes in demographic and socio-economic conditions. Under such circumstances, it is possible that without timely and appropriate control activities, the prevalence of sexually transmitted diseases may again begin to increase.

**Other communicable diseases:** Problems related to various other communicable diseases are also associated with the large population increase. Environmental sanitation will be an important issue during the operation phase of the project if large numbers of people settle permanently in the project area. Without appropriate actions in terms of sanitation and water supply, gastrointestinal infections will continue to be a common health problem in the area and the potential for disease epidemics will continue to exist.

**Accidents and injuries:** There have been many motor vehicle accidents during the construction phase of LKHP. Although the traffic density is expected to decrease during the operation phase the new roads constructed for the LKHP will continue to be a source of accidents and injuries.

**Strain on existing health services** An important health issue is the huge growth in population that has been associated with the LKHP. In general terms this places extreme stress on an already overburdened local health services. The current level of government funded health facilities is not adequate for handling the expected population size during the operation phase of LKHP.

### 6.3 Impacts on the Catchment

**Population growth:** The population in the Catchment is growing rapidly both due to natural increase as well as high immigration resulting from better opportunities, higher circulation of money and better accessibility related to the LKHP.

**Farming practices and Erosion:** The combination of current land use practices which are judged to be unsustainable, population growth and lack of agricultural extension services could result in severe degradation of parts of the catchment and its natural resources if left unchecked. Inappropriate land-use practices in these areas will have an important impact on the water flow and sedimentation of the Kihansi River in the future.

**Critical point:** Although it appears that, as yet, the Kihansi Catchment has not reached a critical point in which the water balance is negatively affected by the activities of the population, it is likely that without suitable mitigation measures, the current growth in
population and unsustainable land-use practices this point will eventually be reached. Thus monitoring activities will be important to detect adverse changes in the hydrological regime and mitigation activities will be required, aimed at reducing the likelihood of such negative changes.

6.4 Socio-economic impacts

**Economic benefits:** As was predicted in the EIA the LKHP has been economically beneficial but socially disruptive to the local population. People in the project area are better off financially but their natural resource base has been diminished. Project-related population growth and expansion of the monetary economy have fostered the emergence of micro-enterprises, which are not sustainable post-project. However, skills acquired during exposure to the project will be useful to some.

**Skills:** Local residents have gained insight into the modern economy and some have acquired useful skills through project employment. Marketing produce and services to the workforce has been a source of income, beneficially in the case of rented rooms and harmfully in the case of food. Though the cultivated area has increased slightly, most of the food that has been sold has actually been taken from household consumption rather than being a genuine surplus. Much wood, fish and game meat has been sold locally and more has been transported out the area by truck and train.

**Social indicators:** Social indicators present a mixed picture. Ownership of radios has increased dramatically while school attendance has plummeted. Hygiene awareness has improved but daily life remains hard in terms of longer walks to fields, to collect fuel and water. Social conflict has erupted and caused great distress; but materially signs of progress are abundant. Roads have been improved and many goods, which were never sold locally before, are now available.

7. RECOMMENDATIONS FOR MITIGATION AND MONITORING OPTIONS

On the basis of the experiences and findings of each of the Environment Program components a variety of mitigation and monitoring measures have been identified.

7.1 Measures presented under LEMP

**Survey and marking of LKHP project area boundaries:** To mitigate against encroachment on the project area.

**LKHP Project Area Management Plan:** Already under preparation to
indicate levels of sustainable resource use in the LKHP area in order that the local population can exploit these resources sustainably. **Strengthening regulatory and practical enforcement capability of licencing authorities:** Will provide appropriate institutional procedures for oversight, safety and resource management. **Maintenance of the ecosystem of Kihansi Falls:** Achieved by bypass flow; and/or diversion of flow from Mhalala tributary and/or construction of an artificial sprinkler system. **Ex-Situ maintenance of unique species:** by captive breeding and/or translocation. **Compensatory mitigation:** Compensation to society as a whole and to the local socio-economy for adverse environmental impacts caused by the project. **Continuation of detailed ecological monitoring programme:** Will establish objective evaluation of project impacts on natural environment.

7.2 **Measures discussed under MUAJAKI**

A summary of both mitigation and monitoring measures is given in Table below.

<table>
<thead>
<tr>
<th>POTENTIAL IMPACTS</th>
<th>MONITORING OPTIONS</th>
<th>MITIGATION OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MALARIA</td>
<td>Extension of Malaria Monitoring Project into operation phase</td>
<td>Continued IEC activities</td>
</tr>
<tr>
<td>STD/HIV/AIDS</td>
<td>Repetition(s) of STD/HIV survey in operation phase</td>
<td>Continued IEC activities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Continued operation of STD clinics</td>
</tr>
<tr>
<td>Communicable diseases</td>
<td>Repetition(s) of Household Health Survey in operation phase</td>
<td>Continued IEC activities</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor vehicle accidents</td>
<td>Accident surveillance in operation phase</td>
<td>Construction of speed bumps along Mlimba-Kihansi road</td>
</tr>
<tr>
<td>Lack of preventive and curative health services</td>
<td>Evaluation(s) of availability and quality of health care in operation phase</td>
<td>Support to introduction of cost-sharing</td>
</tr>
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<td></td>
<td></td>
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</tbody>
</table>
7.3 Measures discussed under CMP

General status: The CMP project was completed at the end of 1998 and recommendations for monitoring and mitigation activities are already being implemented under CMP II.

Funding: Phase II of the CMP project is externally funded and will continue to operate until September 2000. In order to be sustainable adequate local funds must be in place before completion of the project.

Practical activities: Phase II project includes practical activities to improve the awareness and skills of the catchment population in agricultural and forestry activities.

Participatory planning: An important aspect of the first phase of the CMP project was to initiate participatory planning in the catchment villages. Each village prepared planning maps as well as written plans. These have been reviewed by the relevant district authorities and have been returned to the villages. The maps have also been digitised and printed out in various formats for the villages to use in their future planning. By formalising the planning process it is hoped that land use practices will improve. Villages have been working carefully with their plans and have been implementing them to varying degrees of success. The planning process, which has already been developing over the CMP project period, should become self-sustaining.

Management: An important part of CMP is the establishment of a management framework which involves all the relevant stakeholders and co-ordinates their efforts. The main stakeholders, TANESCO, RBWO and the District and Village authorities, are involving themselves more closely in the activities in CMP II with the intention of taking over full responsibility towards the end of the project period.

Hydrological monitoring: Hydrological monitoring of the Kihansi Catchment is vital for obtaining an early warning signal of adverse impacts on the regime of the Kihansi River as well as for improving and refining the hydrological studies.

Demography: Monitoring of the population in the catchment will also be important in the future in order to check the increasing pressure on catchment resources. Following improved village planning and management it is hoped that, with both district and village record keeping, an adequate account of demographic changes in the catchment will be maintained.

Vegetation: With the aid of the village maps already produced and improved planning the villages may be in a position to keep a reasonable record of land use and thus vegetation cover in their village. It was also advised following the findings in the CMP report that vegetation monitoring using satellite interpretation should be carried out when the LKHP goes into operation.
7.4 Measures discussed under SEMA-Ki

Continued capacity building: Enhancing the ability of the local population to deal effectively with the changes associated with the operation of Kihansi will be the general aim of the SEMA-Ki mitigation measures. It is proposed that this be done through human resource development by teaching skills, numeracy and literacy. Additionally, institutional strengthening is suggested, particularly for the village councils.

Income generating activities: Promotion of income earning activities will also help the local population to develop their own means of support and development. Small scale enterprises which make use of the skills developed from the construction phase and taking advantage of the greatly improved accessibility.

7.5. Strategies and Economic consequences

For the implementation of the recommended measures, some strategies have been formulated together with their corresponding economic consequences, as per following categories:

Category 1: Minimum bypass flow for biodiversity preservation

Expected annual loss in revenues (income foregone) by releasing various continuous bypass flows are as follows:

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Cost using LRMC of firm energy (6 US cents/kWh)</th>
<th>Cost using peak/off-peak tariffs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 m³/s</td>
<td>3.87</td>
<td>3.48</td>
</tr>
<tr>
<td>1.5 m³/s</td>
<td>5.82</td>
<td>5.24</td>
</tr>
<tr>
<td>2 m³/s</td>
<td>7.79</td>
<td>7.01</td>
</tr>
<tr>
<td>3.5 m³/s</td>
<td>13.79</td>
<td>12.44</td>
</tr>
<tr>
<td>7 m³/s</td>
<td>28.14</td>
<td>25.96</td>
</tr>
</tbody>
</table>

The following are alternative strategies considered:
- Ecosystem maintained by excess flows only (no bypass flow)
- Adaptive management
- Compromise bypass flow

Compromise flow: The cost of a minimum bypass flow of 1-2 m³/s would be in the range of USD 3.5-7.8 Million per year, which is still very high. The
problem with this scenario is that, in terms of ecological impact, it is getting very near to the no-bypass flow scenario. Such a limited bypass flow alone might not be sufficient to sustain the ecosystem, since the flow is not high enough for the generation of a substantial spray. A release of this magnitude must therefore be combined with other measures in order to have any effect. The other measures proposed are:

- A program of artificial spray (installation, testing and operation) to optimise water use efficiency. The program should be linked to the biophysical monitoring program.
- LKHP Project Area Management comprising patrolling and bushfire protection
- Translocation and/or captive breeding programs as a safety net if attempts of in situ preservation of rare species fail.

It is therefore recommended to adapt the **compromise flow** strategy based on a minimum bypass flow of maximum 1.5 m³/s. This minimum bypass flow represents a loss of 12% of the project’s energy potential corresponding to loss of USD 5.5 Million per year. If the irrigation system is out of operation the minimum bypass flow requirement is 3 m³/s, in which case the cost approximately doubles.

In addition to the cost of income foregone comes and investment of approximately 300 000 USD as an investment in the irrigation system and a related annual maintenance cost of 30 000 USD and a yearly cost for project area management of 30 000 USD.

As it is not possible at this stage to predict the impact on the ecosystem, nor to choose correctly the optimum bypass flow it is therefore recommended to undertake a full review after 5 full years of operation to assess the effectiveness of the recommended strategy.

**Category 2:** Catchment Management and Biophysical monitoring

US$ 300,000 annually estimated to be necessary for the following activities:

- Catchment management activities in the Lower Kihansi Catchment
- Long term monitoring of the biophysical environment in the Kihansi Catchment and LKHP project area
- Implementation of a captive breeding/translocation program for rare and vulnerable species of the Kihansi Gorge.

**Category 3: District development fund**

Current activities to mitigate socio-economic and biophysical impacts and compensate the local communities have a total annual budget of USD 3 Million. In addition there is a need to fund, directly or indirectly, the extension of the present LKHP Environmental Program Activities for the
operation period, to the tune of USD 1 Million.

8. **OBSERVATIONS**

- EIA should be done during the very early stages of the project cycle so as to avoid detrimental actions on the main project.
- Prolonged environmental studies are likely to discover environmental problems. The length and details of EIA should have a limit.
- It is vital for a country to have its own procedures/guidelines on environmental issues.
- During the EIA and afterwards, public consultation process is important.
- Enough resources for management, administration and advice are a prerequisite for effectiveness in environmental management.
- Integration of environmental mitigation recommendations in project design is essential.
Richard Minja, Local Project Coordinator
Lower Kihansi Hydropower Project
Catchment Management Plan

A brief
presentation of LKHP-Catchment Management Plan
Administrative boundaries and the Kihansi Catchment

District boundaries
Kihansi Catchment boundaries

1:250000

Iringa District
Mufindi District
Kihansi Catchment Drainage System

Main rivers
Streams
Subcatchments
CASE STUDY
LOWER KIHANSI HYDROPOWER PROJECT / TANESCO

Kihansi Catchment Management Plan (CMP)
- Background: Mitigation measure for 180 MW Lower Kihansi Hydropower Project
- Objective: To ensure economic and ecological sustainability in the KKH catchment area in order to maintain desirable characteristics of the Kihansi flow and sediment load
- $270 Million USD Investment. Annual turnover approx. $23 Million USD over a 40 year period, the capitalized income estimated to reach $970 million USD.

NORPLAN A.5

The Catchment
- 35,000 People in 14 villages, Iringa and Mufindi districts
- Stakeholders: TANESCO, RBWO & Districts
- Area: 588 square Km. 80 Km from Iringa town
- TANESCO - owner and funded by NORAD
- Low district financial base - Av. 0.8 bn Tsh. revenue

NORPLAN A.5

CMP Phase I Activities
- Data collected
  - Socio-economic
  - Farming system
  - Vegetation pattern & Soil characteristics
  - Hydrology
- Data analysis and planning
  - GIS tool and remote sensing data
  - Participatory Rural Appraisal (PRA) in planning

NORPLAN A.5

Phase I Conclusions
- Demography, land use and vegetation cover: There is a clear relationship between changes in population density and changes in land use. If population continues to grow at present rates the current land use will lead to erosion in vegetation patterns. Future population growth will prompt changes in farming system from shifting to permanent systems.
- Vegetation and possible impacts on hydrology: No clear relationship between vegetation cover type and water loss. No significant difference between water loss in cultivated areas and forested areas.

NORPLAN A.5

Phase I Conclusions Cont
- Relationship between land use and erosion: No clear connection between changes in land use and changes in erosion in the catchment. There is higher erosion from "man managed areas". In the first 3-5 years, erosion process in the reservoir may be large enough leading to sedimentation. Land use close to reservoir will probably lead to sedimentation.

NORPLAN A.5

Recommendations From Phase I
- Formation of sustainable organisation system
- Monitoring of hydrology, land use/ vegetation
- Implementation mitigation activities close to reservoir by ex. training, afforestation, agriculture and forestry extension, awareness raising, tree planting, fire control.

NORPLAN A.5
Session 6

Discussion Sessions
Discussions during the sessions

The following issues were commented upon by the speakers and the participants during the discussions after each session. (Because of limited time after the presentations, not all presentations were discussed upon as much as wanted):

1: The existing policy and legal framework regulating the electricity sector, by B. Mrindoko, MEM.

The issue of strategic Environment Impact Assessments (EIA) was raised. It was then clarified that a Hydropower Master Plan (HMP) of Tanzania in the context of the Power Master Plan, was prepared. About 10 potential hydropower projects were studied to pre-feasibility level, and a sequencing of the current projects was carried out. Such a HMP is regarded as a contribution to attract investors to participate in developing hydropower projects. In addition, the authorities consider further studies to be carried out to improve the basis for attracting such investors to Tanzania.

On request, the difference between commercial and social power was explained. Commercial power is electricity supplied in economic viable areas, which means the supply shall be based on commercial terms. Social power is electricity supplied in rural areas not regarded as economic viable due to high costs. Rural Electrification (RE) is given special consideration within in the new Power Policy to be approved by the Government in the near future. The RE-policy is based on a practical approach involving "smart subsidies", which provides for subsidies on investments, while operation and maintenance cost (and a part of the investments cost) should be covered by the consumers. A RE-Fund will be established, and a programme on priority of projects will be carried out. The Government will also coordinate concessionary funding from donors and financial institutions.

Possible improvements on co-ordination of conflicting laws affecting development of hydropower, review of the existing legal and institutional framework and other amendments to suit the directives contained in the new power policy, will be considered in the reform process.

2: The existing policy and legal framework regulating the water sector, by W. Mutavoba, MW.

The policy (in draft) propose two years time limit for stakeholders (usually traditional farmers) for application of water right and proper and secure running of existing water abstractions to make them legal. Contrary to this, the abstraction may be cancelled. The new Water Right (WR) will be approved for the specified time limit (duration is not yet decided). The WR will not be given for unlimited time.

Allocation of WR for rural water consumption will be given free of charge. The amount of water abstracted should meet the need by the customer. Members or consumers will be charged a limited fee for distribution of water or collection of water from the pump or water source.
Private investors may construct and operate water supply systems within the control of the authorities.

3: The existing policy and legal framework regulating the environment, by Mrs. A.F. Tillya, VPO.

There are a lot of legal acts of current interests both in Tanzania and Malawi, and revisions of these are going on in both countries. The information given was very clear and informative, and no special discussion came up.

4: The existing licensing procedures, electricity sub-sector, by T. Bwakea, MEM

Mr Bwakea presented the electricity development in Tanzania in a historical perspective and today's licensing procedures, including the Power Master Plan. The ongoing restructuring of the electricity sector makes need for new licensing procedures, including environmental impact assessments. The procedures should be tailor-made for the conditions in Tanzania, taking international conventions and guidelines into account. The existing laws governing the power sector need to be harmonised and adjusted to the situation of today.

Because of time constraints there was no time for further discussions.

5: Procedures for granting water rights, by J.M.Kobalyenda, presented by W. Mwaluvanda, MW

In conjunction with the ongoing revision of the water statute, it was commented that a participatory approach is important. Further, issues connected to privatisation of existing utilities and private participation in new developments in relation to water rights were raised.

The ownership to all watercourses or waters in Tanzania is vested the state. It was stressed that privatisation of utilities vested water rights will not lead to privatisation of waters. Prospective Independent Power Producers will lease the water rights from the state. A maximum duration for such leases is not regulated by law so far, but is under consideration. However, it seems clear that the current leases will not last forever. What to happen with the water rights, power stations and other installations comprised by an IPP-project on expiration of the water lease and current licences is not regulated by law yet.

After the revised water statute enters into force, the operator of the Pangani power plant will probably get a two years transitional period. After expiration of this period, they have to regularise their operations in accordance with the new statute, and a new licence will be granted for a new period. The duration of this licence is not determined yet. However, 30-40 years was indicated as a likely scenario.

6: Procedures for environmental clearance and monitoring in Tanzania, by Mrs. E. Kerario, NEMC
The question whether the licensing process should be integrated with the EIA or not was raised. It was replied that the EIA process is a part of the licensing procedure, and should take place first since an environmental clearance permit is necessary before issuance of other permits. The environmental permit is first in line.

It was mentioned that the presented procedure could seem a bit confusing from the donor perspective. The donors need clear evaluations and decisions from the authorities. The EIA cannot be considered in isolation, but should be an integrated part in the whole process. A rational way would be to weight all the different aspects (technical, economy and environment) together in one set of considerations. It was replied that the EIA is a component, and the environmental clearance was the requirement no. 1. Any projects that is environmental sound is likely to be economically feasible. Environmental clearance permit is issued by NEMC, while the decision of the project lies within the relevant sectoral ministry. Therefore, after clearing the project from an environmental point of view, other decision lies on the relevant sectoral ministry.

The procedures in Zambia were explained. The economic analysis is made first. If the developer finds it economic feasible, the environmental aspects are looked into. The water rights are the next aspect.

From the Ugandan side, it was commented that their procedures were similar to the Zambian.

7: Environmental management programs in Tanesco, by Mr. K. Luteganya, Tanesco

Comments:

- All kind of developments has impacts on the environment. Environmental rules must not be too strict. EIA is a tool for development.

- The EIA concept it to minimise negative impacts.

- EIA is a planning- and decision making tool, and not to hinder the progress of the project. The aim is not to stop the development, but to facilitate and sustain development.

8: Presentation of the work on environmental guidelines for environmental management in Tanzania, by Dr. M.A.K. Ngoile, presented by Mrs. E. Kerario, NEMC.

The need for an awareness programme and a plan for integration of the different sector’s responsibilities for development of sectoral guidelines were commented upon. It was replied that there are no plans dealing with how the different sectors should act to develop the respective sectoral guidelines. However, NEMC has plans to ensure that all sectors have sectoral EIA guidelines that conform to the Draft National EIA guidelines and procedures. For instance, NEMC participates in the development of Mariculture guidelines and road sector. NEMC plans for year 2000 are to facilitate sector initiatives to develop sectoral specific guidelines. However, Draft National EIA guidelines states that environmental units
should be established within the different ministries to provide sectorial participation in the sector.

The question on how to obtain the necessary capacity was raised. NEMC’s mandate and plans are to ensure that capacity building in environmental matters is attained by all sectors, but capacity building needs funding. For instance, for the last 3-4 years NEMC has received limited funds from the Government, which has hindered the implementation of its various plans, including the capacity building. However, the NEMC has acquired some funding from outside donors, and has plans to undertake capacity building workshop in the near future.

The need and importance of an awareness programme was commented. NEMC underscored the need and importance of awareness and training program in environmental management. NEMC has implemented some awareness and training programmes, and it has plans for the same in the next budget year.

The issue of including EIA into the legal framework was commented. If the EIA has no legal base, it is difficult for the investors to have conclusive sessions. Currently, EIA is undertaken on voluntary basis, although there is an initiative for legal framework to implement environmental management. The draft instructions for the legal framework are based on the Draft EIA guidelines. It is important to have legal backup, and the legislation should be harmonised with the legal framework within Tanzania, and within the cooperation of the East African context, so that investors also know the conditions for their investments in the countries. The World Bank supports this work.

It was proposed to have one clearing mechanism, a one-stop-centre, to facilitate the investors. However, it was commented that experiences from other countries have showed that a one-stop-centre is not practical. One must accept that implementation of hydropower projects claims several permits from different sectors and authorities. NEMC agreed that several sectors would be involved and have a role to play in the licensing procedures. However, the first step is to get an environmental clearance, and then a chain of different licenses.

Regarding EIA and licenses, it was questioned what would happen if an IPP got a license, but so a rejection because of the EIA? The respond was that a license should not be given at all if the environmental consequences are too big.

9: Outlook of a proposed Regulatory framework for Power Sector, by Mr. B.J. Mrindoko, MEM.

A question was raised about how consumers can benefit from private generation if transmission and distribution remain as monopolies.

Firstly, the private generators will, at least in the first phase of private participation, base their operations on Power Purchase Agreements (PPA) where the off-take of the produced power is ensured to a determined price for all the licence period. The Government will either be the off-taker or guarantor for the performance of the power producer. In such a situation private participation will mainly be a way of funding of new generation capacity, and probably not a particularly inexpensive way of funding. Thus, to start with the consumers should not expect inexpensive power as a result from private generation. However, it is important to introduce
competition between investors for the new projects through a least cost solution, even if there is no competitive electricity market yet in place.

Secondly, transmission and distribution (the operation of distribution networks) are natural monopolies because of the cost structure relating to such operations. Thus, it is not profitable to establish competition in these fields. However, an appropriate regulatory framework and a competent Regulator are supposed to ensure that these monopolies do not take unreasonable advantage of the lack of competition.

Then, most of the following comments and questions were related to Rural Electrification.

Some participants expressed that it was not good enough to claim that electricity is too expensive for the people in the rural areas. Even if Tanzania is not like the developed world where rural electrification has been carried out, cost-effective solutions should be adopted.

Further, rural electrification in mainly identified with isolated systems and other sources of power generation than expansion of the grid based hydro.

The response to these comments was that Rural Electrification should have a broader focus than large hydropower projects. Actually, it is a question of rural energy. Electricity must be considered in relation to, and be combined with other energy sources.

The costs of the existing energy consumption in rural areas were mentioned. Charcoal, which is very much used by people in rural areas is often more expensive than electricity. However, it is preferred because it can be bought in small affordable (but expensive) portions.

Further, someone expressed frustration because the conditions of electricity supply in rural areas have not changed much the last 40 years, and that rural areas are exploited by urban areas. Thus, too optimistic political goals in this field were not desired. The politicians were asked to be realistic. (From some political sources, it has been expressed that 40 % of Tanzania shall be electrified within year 2005, yet still 85% of the population in Dar es Salaam use charcoal for cooking).

10: Presentation of the work on river basin management etc, by Mr. W. Mutavoba, MW

For the River basin management it is very important also to include the small holders and their irrigation schemes. About 9000 hectares in 2 basins, Pangani and Rufijii basins, are irrigated now. The principle is that everybody shall pay for the raw water.

The analytical capability in the River basin management, (Basin Water Office) is important, and needs to be strengthened.

An important issue will be how to develop a reasonable system to forecast coming droughts, by installing necessary metres etc. in the basins.

11: Water resources management and Water User associations in Norway, by Mr. A. Bjoerkenes, AVB.
Mr Bjoerkenes suggested co-operation, or twinning, between Norwegian Water User Associations and similar organisations in Tanzania regarding learning and training programmes.

The question on responsibility of water quality was raised. In Norway, the Water User Associations are responsible for water quantity, not the quality, but as a condition for their licenses the association is responsible for financing water quality measurements.

In relation to a question about environmental monitoring it was responded that the Water User Associations must finance environmental monitoring. This is one part of the conditions for their licenses. On the basis of the licenses The Norwegian Directorate of Nature Management and the Norwegian Water Recourses and Energy Directorate may ask for necessary monitoring. The Government decides on the conditions for the licenses based on proposals through the licensing process.

It was commented that data-collection is a costly but a necessary tool for water management.

Regarding co-operation between different organisations it was commented that the Water User Associations work together with different local and central authorities and that there is a tendency that small associations in different river systems join together to operate more efficiently.

12: Environmental Management Systems in Zambia, by Mrs. E. Mwelwa, Zesco

The discussion underlined the following items:

a) Engineers working with hydropower projects and water management are now more aware of possible environmental impacts than previously.

b) In rural areas there seems to be lack of understanding about environmental consequences (mainly the understanding of the conception). Experts seems not to communicate well with the local people. The challenge for authorities is to establish contact and understanding among villagers and stakeholders about environmental impacts.

c) Global warming and greenhouse effects due to effluents from cars, cooking etc were underlined, and should be considered in connection with energy consumption.

d) There is obviously a need for co-ordinating environmental aspects within different acts, in order to harmonise the environmental concern. A pilot project concerning this has been started.

e) Zesco has worked out their own EIA demands, and they also demand all surveys to be made by professionals within each field.

f) Zesco needs to have permission from Ministry of Lands, before any work can commence.
13: Environmental Management in Uganda, by Mr. C. Sebukeera, NEMA.

a) Information was given about the financing of EIA, carried out by NEMA. 2% of the project costs should be allocated for EIA. (This is, however, too much for larger projects).

b) If the applicant has not been informed by NEMA or requested to give additional comments (with TOR) within 140 days from the date of application, it will be considered that the EIA has been accepted, and there is no need for further EIA.

c) Representatives from Tanzania and Uganda (NEMC and NEMA) agreed upon closer relationship and exchange of information in such matters (EIA), on the umbrella of an East African cooperation.

14: Legal framework for energy and water resources in Norway, by Mr. E. Lier

The question concerning who should grant the licenses for a power project, the Ministry or the Government, was raised. It was replied that Government has the possibility to empower the Ministry to carry out certain tasks, while the Government then will be responsible for others. The Ministry could therefore be empowered to grant the licence for certain projects.

The length of the granted licence period for private investors were discussed, and it was mentioned a period of 30 – 40 years to be feasible. After the expiry of the licensing period, the plant should be transferred to the state in good, operational condition. It is not necessary for the state to keep the power plant after the expiry of the licensing period, it can be rented out to others later, on new conditions.

Concerning the privatisation of Tanesco, this is not a legal question, but rather a political matter. Tanzania was advised to look to the system in Uganda, where it is decided that Uganda Electricity Board is responsible for the transmission, while the distribution will be divided into distribution utilities for commercial units, and leased out for a certain period. The generation stations will be leased out for 30 – 40 years to private companies.

It is more costly to construct distribution systems in rural areas than in urban. In Norway, the government introduced two measures to level out the price between rural and urban areas:

a) A levy on electricity consumption to subsidise rural areas.

b) Funding from the Treasury.

   The subsidies were used as investment contribution, not to cover operation and maintenance costs.

The question on how to choose the investor for a project was posed. There are at least two alternatives. One is to allocate a project to an investor to carry out the needed studies and assessments, and then enter into negotiations. Another is to organise a competitive bidding.

How to regulate the profit for the companies was another question. Transmission and distribution are natural monopolies, and therefore, there is a need to regulate the profit and to make the company more efficient.
The generation companies will have to compete with other generation companies, and the profit will have to be set based on negotiations or competition.

**15: Licensing procedures for energy and water resources in Norway, by Mr. R. Flatby**

A question was posed if the EIAs in Norway have to be carried out by people independent from a developer.

In Norway, the Terms of Reference or programme of the EIA and the prepared EIA have to be approved by the competent authorities (NVE). However, there are no requirements about independence between the EIA-executors and the developer. The developer may carry out the assessments himself, or he may select somebody else to do the job.

**16: Electric power and environmental considerations in Norway, by Ms. A.K. Helgestad**

It was commented upon that the presentation only focussed on the negative impact from development of power projects in Norway, and she was asked if there also are some positive impacts.

Firstly, there are of course positive non-physical impacts such as the electricity supply, industry’s contribution to the welfare and development. The positive physical impacts are more limited. However, flood control provided by regulation of watercourses is at least one positive impact. Other positive impacts are value added to the economy, recreation, like increased fishing possibilities (some times), bathing, hydro power stations as tourist places etc.

**GROUP DISCUSSIONS**

The last day was reserved for the group discussions. Mr. T. Bwakea, Commissioner for Electricity gave an introduction to the group discussion, and the topics for the discussions are mentioned beneath. The participants were divided into 6 groups, and they presented their conclusions on overheads. The overheads were prepared to be presented in the proceedings as the final conclusion.

**Topics for Group Discussions.**

**1. Environmental Authorities**
Describe the present situation and present proposals for the future with special emphasise on the role of the Regulator.

a) Which governmental bodies are responsible for environmental issues related to water use and electricity development and how are the responsibilities shared between them?

- Which body has the political authority
- Who carries out the EIA and the Baseline studies
- Which body is responsible for processing the EIA
- The role of the Regulator(s)

b) Environmental Management and Monitoring
- Who is responsible for environmental management and monitoring after the construction period?
- How will environmental management and monitoring be financed?
- Should need for strengthening environmental management capability in the agencies responsible for implementation be included in the mitigation plans?

2. Environmental Impact Assessment

a) Guidelines for EIA procedures

- The status of the existing EIA guidelines
- Proposals for improvement
- Should there be general guidelines or sectoral
- The relationship between national guidelines and the different donor's guidelines

b) Are there specific environmental hazards in Tanzania related to water use and electricity development?

- Protection of the Biodiversity and Tanzania's obligations related to the Rio convention
- Balancing between the need for electricity development and protection of the environment, - who will decide?

c) In the Kihansi project, The EIA recommended different mitigation measures. What is the situation regarding environmental management and mitigation measures so far?

- Any impacts not covered by mitigation measures?
- Mitigation measures: too much or too little?
- Cost/benefit analysis

3. The Regulator and private investors (IPPs)
a. The Regulator

A description of the Regulator’s present powers and recommendation on possible changes, with particular emphasis on:

- Benefits and disadvantages of an independent Regulator versus an advisory Regulator (an advisory Regulator handles the day-to-day work independently, but gives recommendations on important decisions to the Minister instead of making its own decisions).

- Possibilities of appeal of decisions to an institution on a higher level or to the court.

b. IPPs

- To what extent should the plans for a power generation project be developed before private investors are invited for bidding/participation.

- What is an appropriate allocation of risks, in respect of costs relating to both studies and unforeseeable events during construction, for attracting private investors?

- Who shall cover the costs for follow-up studies and later monitoring of IPP-projects?

- What should the duration of a licence granted to an IPP be, and what to happen at expiration of the licence period — reversion to the state or renewal, and on what conditions?

4. Water Management and Use

a) Give an overview of the present situation on Water Management, and problems connected to the present situation.

b) Water Users Association, WUA.

- Should the system of Water Users Association be introduced to Tanzania?
- If introduced, how should it be organised?
- Regulator’s role
- Relations between Regulator, River Basin Offices and WUAs
- Advantages/disadvantages by operating such WUAs
- How should the WUAs be financed.

5. Cooperation between Governmental institutions in electricity development projects.

Describe problems connected to the present situation, and present proposals for the future.
Institutional set-up within the electricity sector
- How are the formal cooperation procedures, and who is responsible to follow up the procedures?
- Establishing of a Regulator, and its powers and functions.

6. Public consultations with local communities.

As a part of a licensing procedure, public consultations in the impact area should be arranged during the process.

- How should these consultations be arranged (meetings, written materials, hand-outs, models etc)?
- At what time during the process should the consultations be arranged?
- Where should the consultations be arranged?
- Who should participate in the consultations?
- How to secure participation from both governmental and private sectors?
- Roles and responsibilities between the Regulator, developer and consultants for the consultations
- Who should finance the consultations?

GROUPS, TOPICS AND PRESENTATIONS:

GROUP ONE

1. Environmental Authorities
Describe the present situation and present proposals for the future with special emphasise on the role of the Regulator.

a) Which governmental bodies are responsible for environmental issues related to water use and electricity development and how are the responsibilities shared between them?

- Which body has the political authority?
- Who carries out the EIA and the Baseline studies?
- Which body is responsible for processing the EIA?
- The role of the Regulator(s)
b) Environmental Management and Monitoring

- Who is responsible for environmental management and monitoring after the construction period?
- How will environmental management and monitoring be financed?
- Should need for strengthening environmental management capability in the agencies responsible for implementation be included in the mitigation plans?

Presentation from Group 1:

1. Present Situation

- National Environmental Program (NEP) in place since Dec. 1997 after Cabinet approval.

- Institutional arrangement in place
  - Ministry responsible for environmental
  - Lead Ministries
  - Advisory bodies
  - NEMC
  - Local Authorities

2. Shortfall

- No legal framework for implementation of NEP
- No clear definition of roles and mandates

3. Recommendations

- Legal Mechanism for the implementation of NEP in form of a Framework Law.
- Legal Mechanism defining roles and mandates of NEMC, DOE

3.1. Government Ministries responsible for environmental issues related to water use and electricity development

- **Ministry of Water**
  - abstraction permits
  - efficient discharge permits - consents
  - water quality monitoring and water quantity monitoring

- **Ministry of Natural Resource and Tourism**
  - catchment management
  - consent for water abstraction in protected areas e.g. in National Parks

- **Regional Administration & Local Government**
  - catchment management
  - water use utility development
  - pollution monitoring and control
water abstraction consent

- Ministry of Industry and Trade
  - Industrialise water licence
  - pollution control
  - water abstraction permits

- Ministry of Health
  - Pollution Control and Monitoring for Public Health

- Ministry of Energy and Minerals (TANESCO)
  - Compliance monitoring
  - Recommends for Water Right

- Ministry of Agriculture and Cooperatives
  - Compliance and monitoring
  - Recommends for Water Right

- Ministry of Land, Housing & Urban Development
  - Issuance of water
  - Issuance of land right

- Vice President Office (DOE & NEMC)
  - Environmental clearance and compliance monitoring

- Ministry of Water has a Political Authority (Minister)

3.2 Responsibilities for EIA and Baseline studies
  - Developer
    - Conduct EIA
    - Baseline studies on the project
  - Government
    - National level baseline information

4. Responsibility for processing EIA

  - VOP
    - NEMC
    - Ministry of Water
    - Local Authorities
    - Public

5. Role of the Regulator(s)

  - NEMC
    - Environment compliance monitoring
  - Lead Agencies
    - Delegates functions to monitor conditionalities of the EIA
Recommendations

1. Current practice has weaknesses, which results in possible delays and conditions. For purpose of harmony it is better to have a **forum** for dealing with major application like river impoundment for electric power development. This could be done under delegated responsibility of a Minister under existing laws.

2. There is need to organise data on baseline information. For example there should be a deliberate policy to have update sectoral database established on natural resource and which is linked to a META database at IRA. This is to guide and ensure an objective of EIA.

Responsibilities:

1. Responsible for Environmental management and monitoring after the construction period:
   - Power developer
   - Ministry of Water
   - NEMC

2. Financing Environmental Monitoring & Management
   - Developer (self monitoring)
   - Government (statutory institution)
   - Donors (on sites of special scientific interest)
   - Established fund (statutory)

3. Strengthening of environmental management capability in the agencies is the responsibility of the Government.

Comments after the presentation:

NEMC was established as an advisory body. Now it is time to determine its future role.

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GROUP TWO

2. Environmental Impact Assessment

a) Guidelines for EIA procedures
   - The status of the existing EIA guidelines
   - Proposals for improvement
- Should there be general guidelines or sectoral?
- The relationship between national guidelines and the different donor's guidelines

b) Are there specific environmental hazards in Tanzania related to water use and electricity development?

- Protection of the Biodiversity and Tanzania’s obligations related to the Rio convention
- Balancing between the need for electricity development and protection of the environment, - who will decide?

c) In the Kihansi project, The EIA recommended different mitigation measures. What is the situation regarding environmental management and mitigation measures so far?

- Any impacts not covered by mitigation measures
- Mitigation measures: too much or too little
- Cost/benefit analysis

Presentation from group 2:

a) Guidelines for EIA procedures:

Status
➢ Draft guidelines have been prepared

Improvements
➢ The draft guidelines are very general. More emphasise should be put on key issues for the different sectors.

➢ The guidelines need legal backing. NEMC should be empowered.

General or Sector specific
➢ In addition to General National Guidelines, each sector should more detailed sector specific guidelines based on the General National Guidelines and made in collaboration with NEMC.

➢ The General National Guidelines should also provide guidelines for strategic EIAs. Strategic EIAs are needed for specific sites to make priority ranking/master plan. A strategic EIA will show which areas suitable for development and which areas will have great environmental impact/cost.

The sector should be responsible for doing the strategic EIA.

National vs Donors’ guidelines
➢ The Tanzania guidelines are based upon principles from other donors/the World Bank’s guidelines.

National guidelines will supersede donors’ guidelines.
b) Specific environmental hazards in Tanzania related to water use and electricity

Rio-convention/agenda 21

- Tanzania has ratified the convention on conservation of the biological diversity. The convention states that EIA procedures are to be followed.

- Specific Hazards
  - Pollution of water, air
  - Diseases, health aspect, safety risks
  - Hydrological changes
  - Changes in sediment transport
  - Resettlements
  - Flooding
  - etc

Who decides?
The competent authority i.e. The Tanzania Government

c) Kihansi project

- Six programmes:
  - Public health - Muajaki
  - Socio-economic issues- Sema- ki
  - Catchment Management Plan - CMP
  - Malaria vector study
  - Long-term monitoring programme- LEMP
  - Upgrading of local infrastructure

- Due to recent findings, protection of the biodiversity in the Gorge is at present not covered by mitigation measures. However, provisions for minimum water release have been installed.

- The minimum water release will be decided in the final grant of water rights.
  - NEMC- environment clearance
  - TANESCO - application- Ministry of Water

- Cost/benefit analysis

  TANESCO (developer) will have to do a financial analysis subject to the different cost associated with the mitigation measures to find out the consequences for the project viability.

Comments after the presentation:

In conjunction with a possible conflict between the Government and NEMC, NEMC will not be allowed to sue the Government. Further, vesting the Government powers to monitor
businesses owned by Government seems to be conflicting. Thus, these businesses have to be divested before such monitoring powers are implemented.

Regarding cost-benefit analysis, the question of how to deal with findings during or after construction, which make the project economic not viable was raised, in particular relating to the Kihansi-toad. Then, it was informed that EIAs for the Kihansi-project were carried out in 1989, 1991 and 1995. In general, complete EIAs should be prepared before the commencement of construction works.

GROUP THREE

3. The Regulator and private investors (IPPs)

a. The Regulator

A description of the Regulator’s present powers and recommendation on possible changes, with particular emphasise on:

- Benefits and disadvantages of an independent Regulator versus an advisory Regulator (an advisory Regulator handles the day-to-day work independently, but gives recommendations on important decisions to the Minister instead of making its own decisions).

- Possibilities of appeal of decisions to an institution on a higher level or to the court.

b. IPPs

- To what extent should the plans for a power generation project be developed before private investors are invited for bidding/participation?

- What is an appropriate allocation of risks, in respect of costs relating to both studies and unforeseeable events during construction, for attracting private investors?

- Who shall cover the costs for follow-up studies and later monitoring of IPP-projects.

- What should the duration of a licence granted to a IPP be, and what to happen at expiration of the licence period – reversion to the state or renewal, and on what conditions?

Presentation from group 3:

1. The Regulator

In Tanzania, the Ministry responsible for Energy is currently the Power Sector Regulator.

Powers of the Regulator under the Electricity Ordinance Cap. 131:
➢ Power to grant licence is provided for in sect. 4(1)
➢ Power to authorise licensee to change electricity tariffs.

Currently there are following steps to change tariffs:

- The utility is empowered to increase tariffs by 5% -semi-annually without authority from the Minister.

- Minister of Energy is empowered to increase tariffs by 10% -semi-annually, to make a total of 15% - semi-annually, in consultation with the Minister for Finance.

- An increase of more than 15% semi-annually is subjected to a Cabinet approval.

The Regulator is also responsible to monitor the activities of the licensees in regard to standards and performance. On other side, the Regulator is the one who arbitrates whenever there is a dispute between TANESCO and consumers (the issue of impartiality is critical).

2. Advantages/Disadvantages of Advisory Regulator vs Independent Regulator

**Advantages**

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<th>Advisory Regulator</th>
<th>Independent Regulator</th>
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<td>1.</td>
<td>It is easy to ensure the implementation of the policy.</td>
<td>There is no political interference on decision making.</td>
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<td>2.</td>
<td>There is stronger link between the policy making and implementation of the same.</td>
<td>There is confidence to the investors.</td>
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<td>3.</td>
<td>Minimise conflict between decision-makers and the Regulator.</td>
<td>There is balance of interests among stakeholders; operators, government and consumers.</td>
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**Disadvantages**

| 1.            | Political interference by the Government                                           | Possibility of creating clashes in decision making between the Regulator and the Government. |
| 2.            | Delays in decision making on important issues like tariffs adjustment etc.          | There is a wider room for the Regulator to be corrupted.     |
3. Possibility of appeal

There is a possibility of an appeal of decision to the appeal institutions such as
- Electricity Appeal Board (sect 17 of Electricity Ordinance)
- Court

B. Independent Power Producers (IPPs)

1. Extent of development of power generation plans before private participation

- A Power Master Plan must be in place
- Have a pre-feasibility study
- Preferably have a complete feasibility study in place

2. Appropriate allocation of risks in respect to costs relating to both studies and unforeseen events during construction

The Government should bear the risks relating to feasibility studies. But for an unforeseen events during construction the investors themselves should meet risks involved.

3. Costs for follow-up studies and monitoring of IPP projects

The costs shall be covered by the Regulator.

4. Duration of a licence to be granted to IPP and renewal conditions after expiration

The duration of a licence granted to the IPP should be long enough for the investor to recoup his investment but shall not be more than the periodical stipulated in the Electricity Ordinance Cap. 131.
After the expiration of the licence period, it should be renewed on negotiable conditions.

Recommendations

1. There is a need to have Independent Regulator in place, urgently.
2. The Government should continue to fund studies for new projects.
3. Electricity Appeal Board should be formed.

Comments after the presentation:
The Regulator in Zambia is to some extent independent. Its exact powers of the Regulator are still unclear. However, the Regulator has issued licences to five utilities recently. It was also mentioned that ZESCO is obliged to keep separate accounts for each of its operations to provide a foundation for effective monitoring and regulation.

Corruption was mentioned as a disadvantage relating to an Independent Regulator (IR) compared with an Advisory Regulator. However, the appointment of the Board of the Regulator is important in relation to corruption. Appointment by Parliament was claimed to be the optimal solution. The importance of appointment on merit was also mentioned. Regulating required qualifications could provide that for by law.

The expression ”Independent Regulator” was questioned, and it was agreed upon that the only adequate solution is independence to some extent, not complete independence. The Regulator must somehow be under political control, which means that it has to carry out its functions within the framework of the present policy.

The relation between the Regulator and the Appeal Board was also discussed. It was agreed that the Appeal Board should be separated from the Regulator. The reasons seem obvious. The Appeal Board is actually supposed to try the Regulators decisions.

GROUP FOUR

4. Water Management and Use

a) Give an overview of the present situation on Water Management, and problems connected to the present situation.

b) Water Users Association, WUA.

- Should the system of Water Users Association be introduced to Tanzania?
- If introduced, how should it be organised?
- Regulator’s role
- Relations between Regulator, River Basin Offices and WUAs
- Advantages/disadvantages by operating such WUAs
- How should the WUAs be financed?

Presentation from group 4:

1. Problems in the Water Management situation are:

- Weakness in the water policy. This is why we need to review the existing policy.
- Weakness in the legislation.
- Inadequate management of watershed areas.
Inter-sectorial linkages are poor.
Insufficient involvement of stakeholders.

2. Water Users Association (WUA)

There is a need to introduce WUA in Tanzania. At the moment we are still thinking on how it should be organised. There is no answer now. However, it is proposed that, the Association be composed of all chairmen of the small Associations.

3. Regulatory Role

A regulator in Tanzania is the Basin Water Officer. His role will be mainly Advising. Secondly he will be an observer during the WUA’s meeting.

4. Relations between Regulator, River Basin Offices and WUAs

WUA members will have the duty to discuss, give comments, proposals etc. but they will not have the powers to make decisions.

The Regulator will be the adviser.

The River Basin Office will deal with all technical issues, as well as handling data to facilitate the advisory role, also will be observing the guidelines given by the Ministry.

5. Advantages/Disadvantages by operating such WUAs

Advantages:
- There is a forum for complete resolutions
- Democracy
- There is information exchange. This is a forum on information exchange on multiple issues e.g. policy, legislation and protection of catchment areas etc.
- Optimise the resources.
- Bringing the stakeholders/villages together.
- Make the functions of the Basin Water Officer easier especially for conflict resolutions.

Disadvantages:
- The Association can lobby to the higher authority.
- It can have a political affiliation in the multiparty system.

6. Procedures for water right grant
Procedures for granting water rights are too lengthy. It is suggested the Water Officer and the Board Chairman can grant specific water rights prior to the approval of Basin Water Board.

7. How to finance the WUAs

The Associations have to finance themselves by fees. However, periodical contributions should be arranged.

Comments after the presentation:

The Basin Water Offices (BWO) are regarded as the Regulator of the water sector in Tanzania. However, the Ministry of Water is superior in relation to these offices. A study on a multi-sector-Regulator-arrangement, i.e. a utility Regulator, is under preparation at present. A report will be issued in two weeks time (end October 1999).

It was agreed that an independent Regulator is important to regulate utilities. However, water rights are different from utilities. These rights are vested to the state. Thus, the Government should be empowered to make final decisions on water rights. The foundation for such powers will be a combination of authority and ownership.

It was observed that Water User’s Associations (WUA) in Norway are different from WUAs in Tanzania, which in addition to large members comprise a number of small-user-members. The need for a forum for discussions, both between different kind of users and between upstream and downstream users, was stressed.

GROUP FIVE

5. Cooperation between Governmental institutions in electricity development projects.

Describe problems connected to the present situation, and present proposals for the future.

- Institutional set-up within the electricity sector
- How are the formal cooperation procedures, and who is responsible to follow up the procedures?
- Establishing of a Regulator, and its powers and functions

Presentation from group 5:

1. Institutional set-up within the electricity sector

Government - MEM
- Policy maker
- Regulator

TANESCO - dominant player in
- generation
- transmission
- distribution
- retailing

IPPs - generation

Functions of the Regulator includes:
- issue licence
- tariffs regulation
- Monitoring of compliance of license terms and conditions
- Arbitration of conflicts

2. Institutions involved in licensing

» Ministry of Energy and Minerals (MEM)
» Donors
» Ministry of Land Human and Urban Development Settlements (MLH&UDS)
» Ministry of Water - Principal Water Officer, Water Basin Office
» Ministry of Local Government
» Ministry of Natural Resource and Tourism (MNRT)
» NEMC
» Ministry of Finance (MF)
» TANESCO (applicant and other power entities)

2. Licensing procedures

» TANESCO - Submit a Master Plan to MEM
» MEM
  - Refer to the Master Plan
  - Review the proposal - technical and economic feasibility, and environmental considerations
  - Financial arrangement through Ministry of Finance
» Permit acquisition
  - Land permit: - MLHDS, MNRT and Local Government
  - Water right (PWO+WBO)
» Letter of intention to stakeholders
» Environmental clearance (NEMC)

3. Water right acquisition
- PWO
- WBO

Provides Provisional Permit then Final Permit

Role of Donors:
- Financing
- Demand of EIA
- Quicken licence acquisition

Problems:
- Poor institutional linkage
- Lack of enforcement- EIA (NEMC)
- High environmental standards - Donors
- Lack of clear, transparent and coordinated procedures

Proposal for the future
- Remove TANESCO monopoly
- There must be Master Plan in place, and feasibility + prefeasibility studies
- Electricity Sector regulator (- Light handed)

GROUP SIX

6. Public consultations with local communities.

As a part of a licensing procedure, public consultations in the impact area should be arranged during the process.

- How should these consultations be arranged (meetings, written materials, handouts, models etc)?
- At what time during the process should the consultations be arranged?
- Where should the consultations be arranged?
- Who should participate in the consultations?
- How to secure participation from both governmental and private sectors?
- Roles and responsibilities between the Regulator, developer and consultants for the consultations
- Who should finance the consultations?

Presentation from Group 6:

INTRODUCTION

ACKNOWLEDGEMENTS

- Resource persons for excellent background papers and presentation
- Workshop chairperson for excellent conduct of the workshop
• All participants for active participation

METHODOLOGY

• Understanding the group assignment concept

• Main observation and recommendations

Main observation

The group observed that it is important to consult the public in the impact area before a license is granted.

Main recommendation

The group generally recommend public participation should be made to:

• Inform the public on the intention of the project and its implications by providing sufficient and unbiased data.

• Get reaction from the affected people.

• Seek community recommendations for enhancing effective licensing.

Based on TOR provided to the group, specific observations and recommendations were:

6.1 How should these consultations be arranged?

Observations:
It is important to have a well-organised way of informing the public.

Recommendation:
Select appropriate channels of consultation, which will maximise involvement of the majority of intended stakeholders on democratic basis and gender equity (Selection of channels should be tailor made based on local conditions).

6.2 At what time during the process should the consultation be arranged?

Observation
As early as possible.

Recommendation
At the time when intention of developing the project is initiated

6.3 Where should the consultation be arranged?

Observation
Consultation could be more effective if held where the impacted community is living.
Recommendations
Consultation should take place where the majority of people are living in the impacted area.

6.4 Who should participate in the consultations?
Observation
It is important for all stakeholders to participate effectively.

Recommendations
Active participation of stakeholders including Govt. Institutions, Local Authorities, Private Investors and Local Community in the impact area.

6.5 How to secure participation from both governmental and private sectors?
Observation
Active participation of governmental and private sectors is necessary for the licensing process.

Recommendations
Early public notification to enhance participation, well planned system for notification and conduct of the consultation which should include:

- Appropriate timing
- Clear statement of goal and objectives of the consultation
- Expected contribution from stakeholders
- Information on benefits of participation
- Provision of incentives

6.6 Roles and responsibilities between the Regulator, Developer and Consultants for the consultations?
Observation
Roles of the relevant parties for the consultation should be well defined.

Recommendations
a. **Regulator**: Should not be involved in the consultation. Independently the regulator should enforce the defined rules and regulations and should not be involved in the policy formulation.
b. **The Government including Local Authorities**
   Should be responsible for arranging consultations.

c. Developer and Consultants. Should be afforded opportunities to participate in the consultation to inform the community on their plans and intentions.

6.7 Who should finance the consultations?
Observation
Availability of fund will enhance successful conduct of consultations.

Recommendations
Government to cover expenses for the consultation and should set aside funds in the govt. budget for project preparation.
Developers to meet their costs of participation.
Words of Closing

by

Mr. B. Mrindoko
Commissioner for Energy
Ministry of Energy and Minerals

and

Mr. Even Sund
Senior Energy Advisor
NORAD

Mr. B. Mrindoko, Commissioner for Energy, made the closing speech. He expressed that the experience from the conference was good, and that the topics discussed during the conference were important for the future decision on the licensing procedure. The laws are to a certain extent existing, but they need to be harmonised and updated to the present situation. There are still many possibilities to improve the coordination of the licensing procedures, and he hoped that the four countries, -Uganda, Zambia, Tanzania and Norway-, could continue to exchange experience within this field in the future. He then thanked the participants for their input to the conference, and thanked NORAD and NVE for their contribution. He asked NORAD and NVE for further assistance within the topics that had been discussed during the conference.

Mr. Even Sund, NORAD, referred to the closing speech of Mr. Mrindoko, and informed that a possible request for further assistance within this field had to be sent through the system from Tanzania to the Norwegian Embassy. This field is an important area for Tanzania officials to make the country able to take care of its energy resources, and to make sure that they are developed in an acceptable manner, both technically, economically and environmentally. In the future, private investors might compete to implement hydro power projects, and the procedures and guidelines are important factors to the investor for appropriate and prompt decision making. NORAD is aware of the importance of proper licensing procedures, and will be willing to consider a request for further support within this field.
Recommendations

Recommendations are divided into three categories, Electricity Sector recommendation, Environmental Management recommendation and Water Sector recommendations.

A. Electricity Sector recommendations

1. Electricity industry is undergoing restructuring, in the process the electricity sector will be privatized and hence be able to attract foreign investment. The following should therefore be reviewed and amended to go in line with these changes:

(a) The existing licensing procedures which are not straight forward, clear and transparent.

(b) The existing legal and regulatory framework governing the electricity sector to provide interacted legal obligation to monitoring measures to protect the environment against electricity projects.

2. The roles and mandates of different stakeholders in the electricity sector should be defined and the need for cross sectional coordination in planning for effective resource allocation and utilization should be emphasized.

3. Independent electricity Regulator or Electrical Appeals Board should be appointed. The responsibility of the Regulator will basically be to issue licenses, monitoring and tariffs control. However, an Appeals Board was recommended to be an immediate solution before the Regulator is in place.

4. The Government to continue bearing risks for preparation of feasibility studies as a step forward in creating good environment for investors in hydropower development. Unforeseeable events should be met by investors.
B. Environmental Management recommendations

1. Currently, in Tanzania there is no legal framework that imposes mandatory requirements for EIA for development projects. Effective implementation of both policing objectives and EIA procedure need to be backed up by appropriate legislation. The legislation should provide for issuance of sanctions for trespassers.

2. Efforts should be made to renew and approve the environmental guidelines and procedures in place. The use of external guidelines denies Tanzania a chance to properly exert her development desires.

3. The existing institutional framework for environmental management in the country should be harmonized. Rules and mandates of institutions dealing with environment should be defined dearly/streamlined. Despite the fact that these efforts are underway, the process should be finalized so as to catch up and be inline with day to day changes in order to achieve sustainable development.

4. The sector specific guidelines should be prepared and environmental units be established by all stakeholders. The specific guidelines should be more detailed and based on the general National Guidelines. The sector specific guidelines should be prepared in collaboration with the electricity sector, NEMC and other stakeholder, in collaborative and participative manner.

5. The Environmental Regulatory Body (NEMC) should be legally empowered to keep up with changes from advisory to regulatory framework.
C. **Water Sector Recommendations**

1. There is a need to establish an institutional framework to facilitate and take decisions for granting of Water Rights to different water users.

2. Water Right granted to electricity projects should be issued for a specific period of time according to the provisions of the Electricity Ordinance. The period can be renewed on negotiations.

3. The existing roles and responsibilities of water right granting bodies should be renewed and redefined clearly.

**General Recommendations**

The existing laws and policies in generation, water use, land use and environment should be harmonized and synchronized.
Annexes

Annex 1: List of Participants

Annex 2: Program for the Conference

### CONFERENCE ON LICENSING PROCEDURES FOR ELECTRIC POWER DEVELOPMENT AND ENVIRONMENTAL MANAGEMENT IN TANZANIA
Iringa, 4-7 Oct. 1999

**LIST OF PARTICIPANTS**

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Institution</th>
<th>Country</th>
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<tbody>
<tr>
<td>B. Mrindoko</td>
<td>CEP</td>
<td>MEM</td>
<td>Tanzania</td>
</tr>
<tr>
<td>T. Bwakea</td>
<td>Ag. ACE</td>
<td>MEM</td>
<td>Tanzania</td>
</tr>
<tr>
<td>R. Mmasi</td>
<td>Ex. Engineer</td>
<td>MEM</td>
<td>Tanzania</td>
</tr>
<tr>
<td>M. Mbwambo</td>
<td>Ex. Engineer</td>
<td>MEM</td>
<td>Tanzania</td>
</tr>
<tr>
<td>D. Ngula</td>
<td>Manager- R&amp;D</td>
<td>TANESCO</td>
<td>Tanzania</td>
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<tr>
<td>K. Luteganya</td>
<td>Chief Engineer</td>
<td>TANESCO</td>
<td>Tanzania</td>
</tr>
<tr>
<td>B. Kihaka</td>
<td>Ass.Site Manager</td>
<td>TANESCO</td>
<td>Tanzania</td>
</tr>
<tr>
<td>Mrs. Tilya</td>
<td>Environment Officer</td>
<td>VPO</td>
<td>Tanzania</td>
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<tr>
<td>M. Kamba</td>
<td>Principal Attorney</td>
<td>AG Chambers</td>
<td>Tanzania</td>
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<tr>
<td>D. Msangi</td>
<td>Senior Economist</td>
<td>MF</td>
<td>Tanzania</td>
</tr>
<tr>
<td>I. Masam*</td>
<td>Forest Officer</td>
<td>MNR&amp;T</td>
<td>Tanzania</td>
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<tr>
<td>B. Kaale</td>
<td>Energy Specialist</td>
<td>TaTEDO</td>
<td>Tanzania</td>
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<tr>
<td>Mrs. B. Kibano</td>
<td>Land Officer</td>
<td>ML&amp;HSD</td>
<td>Tanzania</td>
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<tr>
<td>Mr. J Ngeleja</td>
<td>Environment Officer</td>
<td>NEMC</td>
<td>Tanzania</td>
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<td>Mrs. E. Kerario</td>
<td>Ag. Director - EIA</td>
<td>NEMC</td>
<td>Tanzania</td>
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<td>Ms. J. Maximillian</td>
<td>Environment Officer</td>
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<tr>
<td>Dr. C. Mn’gon’go</td>
<td>Lecture</td>
<td>IRA- University of Dar-es-Salaam</td>
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<tr>
<td>Ms. T. Boya</td>
<td>Accountant</td>
<td>MEM</td>
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<tr>
<td>Y. Kianga</td>
<td>Energy Consultant</td>
<td>CEEST</td>
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<tr>
<td>B. Ruhumbika*</td>
<td>Director</td>
<td>PBWO</td>
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<tr>
<td>Mwaruvanda*</td>
<td>Director</td>
<td>RBWO</td>
<td>Tanzania</td>
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<tr>
<td>W. Mutahyoba</td>
<td>Director</td>
<td>MW</td>
<td>Tanzania</td>
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<tr>
<td>J. Kubena*</td>
<td>Water Officer</td>
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<tr>
<td>C. Sebukeera</td>
<td>Director - Information &amp;</td>
<td>NEMA</td>
<td>Uganda</td>
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<td>Monitoring</td>
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<tr>
<td>Mrs. E. Mwelwa Tembo</td>
<td>Environment Scientist</td>
<td>ZESCO</td>
<td>Zambia</td>
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<tr>
<td>A. Adeler</td>
<td>Executive Engineer</td>
<td>NVE</td>
<td>Norway</td>
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<tr>
<td>Ms. A. Helgestad</td>
<td>Senior Advisor</td>
<td>NVE</td>
<td>Norway</td>
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<tr>
<td>E. Lier</td>
<td>Legal Advisor</td>
<td>NVE</td>
<td>Norway</td>
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<tr>
<td>A. Bjoerkenes</td>
<td>Director</td>
<td>AVB</td>
<td>Norway</td>
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<tr>
<td>R. Flateby</td>
<td>Senior Advisor</td>
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<tr>
<td>E. Sund</td>
<td>Senior Advisor</td>
<td>NORAD</td>
<td>Norway</td>
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Abbreviations and Acronyms:

MEM - Ministry of Energy and Minerals
MW - Ministry of Water
CEP - Commissioner of Energy and Petroleum
DNE - National Directorate of Energy (Mozambique)
NEMA - National Environmental Management Authority (Uganda)
ZESCO - Zambia Electricity Supply Company (Zambia)
NEMC - National Environment Management Council (Tanzania)
NVE - Norwegian Water Resources and Energy Directorate (Norway)
AVB - ARENDALS Water Users Association (Norway)
PWO - Principal Water Officer
VPO - Vice President Office
MF - Ministry of Finance
MNR&T - Ministry of Natural Resource & Tourism
TaTEDO - Tanzania Traditional Energy Development & Environmental Organization
ML&HSD - Ministry of Land & Housing Settlement Development
CEEST - Center for Energy, Environmental Science and Technology
PBWO - Pangani Basin Water Office
RBWO- Rufiji Basin Water Office
Conference on Licensing Procedures for Electric Power Development and Environmental Management in Tanzania
Iringa, 3-8 October, 1999

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<td>Registration</td>
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<td>Introduction Speech</td>
<td>Mr. B. Mrindoko (CEP)</td>
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<td>09.05-09.20</td>
<td>Welcome Speech</td>
<td>RAS</td>
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<td>Note Speech from NORAD</td>
<td>Mr. Sund</td>
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**Session 1: The Present Situation**

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<tr>
<td>09.30-10.00</td>
<td>The existing policy and legal framework regulating the electricity sector</td>
<td>Mr. B. Mrindoko (CEP)</td>
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<td>10.00-10.30</td>
<td>The existing policy and legal framework regulating the water sector</td>
<td>Mr. W. Mutahyoba</td>
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<td>11.00-11.30</td>
<td>The existing policy and legal framework regulating the environment</td>
<td>Mrs. Tillya</td>
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<td>The existing licensing procedures (Electricity)</td>
<td>Mr. T. Bwakea (ACE)</td>
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<td>12.00-12.30</td>
<td>Procedures for granting water rights</td>
<td>Mr. W. Mwaluvanda</td>
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<td>Procedures for environmental clearance and monitoring</td>
<td>Mrs. E. Kerario-Ag.</td>
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<td>Environmental management programs in Tanesco</td>
<td>Mr. K. Luteganya</td>
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**Session 2: Plans and work for developing of a new licensing system**

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<tr>
<td>15.00-15.45</td>
<td>Presentation of the work on environmental guidelines</td>
<td>Mr. J. Ngeleja</td>
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<td>15.45-16.30</td>
<td>Outlook of a proposed Regulatory frame work for Power Sector</td>
<td>CEP</td>
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<td>Presentation of the work on river basin management etc.</td>
<td>Mr. W. Mutahyoba</td>
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<td>08.45-09.45</td>
<td>Water resource management and Water user association in Norway</td>
<td>Mr. A. Bjoerkeves</td>
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<td>Environmental Management System in Zambia</td>
<td>Mrs E. Mwelwa</td>
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<td>Environmental Management in Uganda</td>
<td>Mr. C. Sebukeera</td>
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<td>Legal framework for energy and water resources in Norway</td>
<td>Mr. E. Lier</td>
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<td>Licensing procedures for energy and water resources in Norway</td>
<td>Mr. R. Flatby</td>
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<td>Electric power and environmental considerations in Norway</td>
<td>Ms. A. Helgestad</td>
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<td>Presentation of the case study</td>
<td>Mr. D. Ngula</td>
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<td>Mr. A. Adeler</td>
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<td>Mr. R. Minja</td>
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<tr>
<td>16.00</td>
<td>Returning to Iringa</td>
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<tr>
<td>08.00-09.30</td>
<td>Introduction to the main themes and groups</td>
<td>Mr. T. Bwakea</td>
<td>MEM</td>
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<tr>
<td>Time</td>
<td>Activity</td>
<td>Organizer</td>
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<tr>
<td>09.30-12.30</td>
<td>Discussion in groups</td>
<td>TANESCO</td>
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<td>12.30-13.30</td>
<td>Lunch</td>
<td>NVE</td>
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<td>13.30-15.30</td>
<td>Presentation of recommendations on how Tanzania should proceed the work towards a complete licensing system for the electric power sector</td>
<td>Groups</td>
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<td>15.30-16.00</td>
<td>Coffee/tea</td>
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**Closing session:**

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<tr>
<th>Time</th>
<th>Activity</th>
<th>Organizer</th>
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<tr>
<td>16.00-16.30</td>
<td>Summing up</td>
<td>MEM/NVE</td>
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<tr>
<td>16.30-17.00</td>
<td>Closing speech</td>
<td>MEM</td>
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<tr>
<td>8/10</td>
<td>Departure for Dar-es-Salaam</td>
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**Abbreviations and Acronyms:**

MEM - Ministry of Energy and Minerals  
MW - Ministry of Water  
CEP - Commissioner of Energy and Petroleum  
DNE - National Directorate of Energy (Mozambique)  
NEMA - National Environmental Management Authority (Uganda)  
ZESCO - Zambia Electricity Supply Company (Zambia)  
NEMC - National Environment Management Council (Tanzania)  
NVE - Norwegian Water Resources and Energy Directorate  
ABF - Water Users Association (Norway)  
PWO - Principal Water Officer  
VPO - Vice President Office  
LKHP - Lower Kihansi Hydropower Project
What Makes an Independent Regulator Independent?
Jon Stern
What Makes an Independent Regulator Independent?

Jon Stern

As private capital is increasingly invested in utilities across the globe, the issue of regulation and its interface with different types of government, culture and society has become ever more complex. This article focuses on the design of regulatory systems outside the US and the UK. With references to current practice in many countries, the author argues that formal regulatory independence and accountability is not always a necessary condition for effective regulation (though where feasible and effective it carries potential economic benefits). On the other hand, he also argues that an informal or advisory regulatory system may work better in some situations. In all circumstances, informal accountability and a clear understanding of the "rules of the game" are crucial for effective regulation.

Across the globe, governments are financing new investment in their utilities by the introduction of private capital. Sometimes private capital is being introduced to supplement existing investment resources as when independent power producers (IPPs) negotiate contracts to sell bulk power to the state-owned utility, a process that is now common in Asia and Latin America. In other countries, private capital is brought in not just to supplement investment resources but to take over existing assets - utilities (or some parts of them) are privatised.

This is happening all over the world in telecommunications. Large-scale involvement of private capital and privatisation is also increasingly occurring in electricity and gas and other infrastructure industries around the world. Electricity and gas distribution companies are now being partially or wholly privatised in many countries - for example, electricity distribution in India, electricity and gas in Hungary. A similar development is the use of long-term concession contracts for water and sewage utilities and for railways. Toll-road concessions are being developed in Latin America and Africa.

These developments are creating the need for effective economic regulation and there has been an explosion of interest in how to create this in middle-income, transition and low-income economies. A particular concern is how far the US-UK model, with an independent regulator set up and working within a formal legal framework, is either appropriate or sustainable in these very different contexts.

Indeed, some observers would suggest that the independent regulatory model has not even been transferred properly to the UK. They would argue that UK regulation is a much inferior version of US regulation, imposing much greater risks on the regulated utilities through the lack of an equivalent...
is (a) genuine and (b) sustainable. Thus far, on energy sector regulation, Hungary has clearly not got off to a good start, with the government acting very clumsily at the first regulatory review of electricity prices. In Argentina, the first major test is yet to come with the first post-privatisation five-year regulatory reviews. However, experience to date suggests that, even though the primary law may be well-designed, deficiencies in the subsidiary instruments and regulatory practice may have led to a problematic Argentinian energy regulatory regime. Even in the UK, the question is still raised as to whether the regulatory offices have yet established a genuine independence that will continue into the long term.

It is clear that the trends above demonstrate the need for effective utility regulation. In subsequent sections, I discuss what is needed for utility regulation to be effective. Effective regulation is often taken as synonymous with independent regulation. I will argue below that it may not be. However, it should be clear from the discussion above that the concept of regulatory “independence” involves a number of elements and is far from straightforward. In subsequent sections, I discuss in more detail what effective utility regulation involves and the relationship between effective regulation and the degree of independence of utility regulators.

The Purpose of Regulatory Systems
The economics literature on utility regulation concentrates on the regulation of the natural monopoly elements - for example, energy transmission and distribution grids, telecommunication networks and local loops. The general emphasis is that competitive elements within utility services need not (and should not) be regulated per se. However, economic efficiency within the industry requires “fair” competition between suppliers using the networks, and this typically requires careful regulation of access rights and network use-of-system prices.

The thrust of this perspective is for the “ unbundling” of competitive from natural monopoly services and the potential vertical dis-integration of traditional utilities. This has happened rather more in the UK (electricity, rail and now gas) than in most other countries.

In practice, regulation of utilities as we know it today basically emerged in the US where the main original objective was to protect consumers from being exploited by powerful, vertically-integrated local monopoly service providers. This perspective remains at the heart of US utility regulation. Conversely, in Asia, Latin America, Central and Eastern Europe - and to some extent in the UK - the main purpose of introducing separate utility regulation over the last 10-15 years has been to protect investors from unacceptable risks. These risks are mainly associated with the network elements, but not necessarily directly. For instance, investors in an independent power generator need to be confident that final consumers will pay their electricity bills and pay a price which allows the distribution company and the transmission company to cover their costs; or, as a second-best, that they are protected from the risks to which the distribution and transmission companies may be exposed.

Of course, in the US, protection of consumers has to be carefully balanced with ensuring that utilities can expect to earn a normal (risk-adjusted) rate of return on their assets. Similarly, in privatising countries, risk protection of investors can be (and is) justified on the grounds that it reduces the cost of capital and hence reduces costs and prices to consumers. Nevertheless, providing confidence to new investors - and particularly to foreign investors - is the main purpose of introducing new agencies for utility regulation in “emerging market” economies. In consequence, the critical feature of independence is independence from government intervention. The archetypal US concern of independence from the utilities and the avoidance of regulatory capture by them is important but appears to be secondary in most such economies, at least initially.

The reasons why the protection of new private and foreign investors is critical for the development of regulatory agencies in transitional and developing countries which are introducing private capital to their utilities are set out in Stern (1994) and in an important recent set of papers by Pablo Spiller and associates. Spiller and Levy (1994) set out the key problem as follows:

- utilities are heavily capital intensive and have very long-life assets, many of which are highly specific and non-redeployable;
- many utility services have significant economies of scale and scope; and
- utility services such as energy, water supplies and, perhaps to a lesser extent, telephone services are consumed by a high proportion of the population and consumption of (or at least access to) them is very sensitive politically.

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legal requirements on the regulatory process as well as appeals opportunities for producers and consumers. However, informal accountability is at least as important. By this, I mean the degree to which the regulatory process:

- encourages debate and open discussion;
- involves all relevant parties;
- leads to justification by the regulator of decisions and methodologies; and
- generally leads to a clear understanding of the "rules of the game".

Spiller emphasises the importance of formal accountability, in particular through the operation of effective and incorrupt courts enforcing proper and consistent regulatory practice and procedures. This is clearly necessary, as is a proper legally specified assignment of functions between government, regulatory agency and regulated enterprises. Nevertheless, although necessary for effective regulation, it seems to me that formal arrangements are not sufficient and that informal regulatory accountability - the understandings on the custom and practice of regulation - are at least as important for sustaining effective regulatory governance as the formal legal powers.

The key issue is whether the government and other relevant parties are willing to observe the spirit of the law and the regulatory process as well as the letter. In both Argentina and the Indian state of Orissa, electricity laws have been passed that provide for a strong and independent regulator. For instance, in Orissa, the law includes the following features:

- the state government chooses three Regulatory Commissioners from a short-list prepared by an independent panel;
- the Commissioners have fixed, overlapping terms;
- legal provisions for dismissal of Commissioners are tightly drawn;
- the Commission is accountable for its spending but the law erects hurdles for the government or the legislature if they want to cut its operational budget;
- there is clear legal oversight on the process and procedures used by the Commission but appeal rights against substantive decisions are very tightly drawn;
- the law states clearly that the Commission's price decisions must allow full recovery of all economic costs, unless the state government explicitly agrees to meet any shortfall by a revenue subsidy (although cross-subsidies are allowed under the law).

Nevertheless, in Orissa as in Argentina and many other reforming economies, it is not clear whether the law will be sustained. The licences and other subsidiary instruments may or may not be as well-designed as the primary law. The law and the institutions may not operate in practice as they were expected to. The political and legal culture may not support it sufficiently. In Hungary, there is now the issue of how best to try to (re-)establish the credibility of the Hungarian Energy Office and to ensure that the new Electricity and Gas Laws work in a way that sustains effective regulation.

Clearly, it is very difficult to sustain independent utility regulation when:

- contract and commercial law is under-developed;
- competition policy is absent;
- the legal process is insecure and/or corrupt; and
- there is little or no separation of political powers.

However, the main problem is where political pressures have typically dominated economic and commercial factors. In those circumstances, whatever the relevant law may specify, it is extremely difficult to sustain effective regulation or an independent regulator. Where political economy pressures dominate, as they do on winter energy prices for households in Central and Eastern Europe, an independent regulator following standard economic principles of regulation is likely to be unfeasible. In practice, the risks to political leaders are too great and neither they nor the populace will allow it - whatever the World Bank and other international lending agencies may say.

An absence of agreed legal and administrative procedures for regulation can cause similar problems for private investors in utilities, as has been the case for example in the Philippines. The costs of these uncertainties tend to be passed on to consumers, particularly industrial consumers of utility services.

The importance of the informal accountability of regulatory agencies is demonstrated clearly by UK experience in recent years. The conventional wisdom is that UK regulatory offices had a bias against
compatible with their local economic, political and legal environment. These may well include (eg in Asia) regulatory models of a type that we have not yet observed.

- It enables the embryonic regulatory institutions to build-up expertise, reputation and credibility before they are given full decision-making responsibility. This reduces the gamble for governments.

- It enables utilities, governments, utility customers (industrial and household) to gain experience with the content and process of regulation, either by contract monitoring and enforcement and/or by working with an increasingly effective and (one hopes) influential advisory regulator.

These features also (a) operate to reduce the risks of serious mistakes being made once the full-blown regulatory system goes live; and, (b) enable problems and deficiencies to be resolved early on and without either inflicting serious costs or seriously damaging the credibility of the regulators.

The counter-argument is that the interim regulatory arrangements may either remain long term as a poor second-best or even be unsustainable with a reversion to previous government intervention. There may be cases where this is true and this is a real risk. My guess is that the increasing importance of the role of private investment for utilities should act as an effective force in the direction of explicitness and a first-best solution in the medium to long term.

Conclusion

Decisions on utility service prices, quality and other obligations can probably best be thought of as a multi-period game with many competing players. Each round of the game involves a new solution for prices, quality and capacity. The investments involved are large and represent sunk costs so that regulatory risk is very serious. Regulation with clear rules of the game is the standard way in which this problem can be solved. However, there is no avoiding the problem that the government is both a player and involved in sustaining the process.

Having a regulatory agency with a reputation for behaving fairly is a good way of reconciling these responsibilities. In many cases, this can best be achieved by having a formally independent regulator as in the UK and the US. However, formal legal independence is only a small part of “genuine” accountability and independence, and by no means necessarily the most important part. This is particularly true of reforming economies in Central and Eastern Europe, Latin America, Asia and Africa.

And, finally, what of the UK in this perspective? The formal regulatory independence of the UK regulatory offices looks to be pretty well established. In addition, much has been done to develop and strengthen their wider accountability and to justify their approaches, procedures and decisions. However, their reputation for acting impartially is not yet fully accepted throughout society and they have so far only operated under a government of the same political complexion as that which privatised the regulated industries and established the regulatory offices. The outlook looks good but it is not yet certain whether the current arrangements will become a long-term part of UK constitutional arrangements.

References


