



Cahora Bassa Dam by Ryan Hoover, courtesy of International Rivers

Comprehensive Options Assessment for Sustainable Development of Infrastructure

Training Manual

May 2011



Authors:

Tinashe Nhete
Dr Thomas Chiramba

Name of Reviewers

Pr. Eng. Andrew Tanner
Dr Kenneth Odera
Dr Matthew McCartney
Dr Rangarirai Taruvinga
Tim Jones
Elizabeth Khaka
Grace Musarurwa
Silas Mogoï
Aaron Griffiths

Disclaimer

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the United Nations Environment Programme concerning the legal status of any country, territory, city or area or of its authorities, or concerning delimitation of its frontiers or boundaries. Moreover, the views expressed do not necessarily represent the decision or the stated policy of the United Nations Environment Programme, nor does citing of trade names or commercial processes constitute endorsement.

Reproduction

This publication may be reproduced in whole or in part and in any form for educational or non-profit purposes without special permission from the copyright holders, provided acknowledgement of the source is made. UNEP would appreciate receiving a copy of any publication that uses this publication as a source. No use of this publication may be made for resale or for any other commercial purpose whatsoever without prior permission in writing from the United Nations Environment Programme.

Comprehensive Options Assessment for sustainable development of infrastructure

- ISBN: 978-92-807-3442-9
- Job Number: DEW/1490/NA



Copyright © 2011, United Nations Environment Programme

United Nations
Environment Programme
PO Box 30552,
Nairobi
Kenya

Practical Action
Southern Africa
4 Ludlow Road
Newlands, Harare
Zimbabwe

InWEnt
Internationale
Weiterbildung
und Entwicklung GmbH
Tulpenfeld 5
53113 Bonn
Germany

SADC Water Division
Directorate of Infrastructure
and Services
Southern African
Development Community
Private Bag 0095
Gaborone
Botswana

East African Community
PO Box 1096
Arusha
Tanzania

Cover Photo: Cahora Bassa Dam in Mozambique: Photo by Ryan Hoover,
courtesy of International Rivers



UNEP promotes environmentally sound practices globally and in its own activities. This publication is printed on paper from sustainable forests including recycled fibre. The paper is chlorine free, and the inks vegetable-based. Our distribution policy aims to reduce UNEP's carbon footprint.

Foreword

Comprehensive Options Assessment (COA) can play a critical role towards sustainable development by ensuring that societal needs are met by the most appropriate solutions with minimum impact to the environment. Thus environmental impacts are considered and addressed early as the development measures are selected. As such COA is gaining importance in development planning and complements strategic environmental impact assessment. It is particularly relevant in the planning and development of infrastructure.

Decisions on infrastructure development have typically been taken with little participation of stakeholders or transparency. In the recent past, however, there has been a growing emphasis to consider environmental and social factors on an equal footing with the more traditional technical, economic and financial factors. This manual highlights the need for a structured, participatory and transparent process of assessing development options including infrastructure to meet specific societal needs that capture the views and inputs of all key stakeholders.

The UNEP Dams and Development Project (DDP) process noted that the application of the COA is hindered by the limited understanding of the concept in terms of scope and the related processes on the part of the managers to initiate and oversee its execution on the one hand and stakeholders who are involved in its implementation on the other. The manual is intended to articulate the processes and scope of COA and help trainers and participants involved in building capacities for its broader application.

As Africa is poised to undertake many infrastructure projects, strong interest to build capacity on COA and other approaches for sustainable development has been expressed by African Ministers Council on Water (AMCOW). Based on the very positive experiences in the pilot training using the manual in the Southern African Development Community (SADC) and East African Community (EAC) sub-regions, the President of AMCOW requested that training using the manual and other complementary ones such as the Environmental Management Plans (EMP) be rolled out across Africa.

We thank SADC, Botswana in particular and EAC, Tanzania for arranging pilot training workshops, without which the manual would not have been finalized. UNEP is also highly indebted to INWENT, Germany for providing didactic expertise that improved the draft manual and ultimately Practical Action Southern Africa for assisting UNEP to produce the manual over the period 2010 and 2011

Since the manual has now been completed, development partners and other well-wishers are invited to support the process of rolling it out in Africa and beyond. We hope that these efforts will ultimately result in sustainable development of infrastructure to meet the needs of all, particularly the vulnerable and disadvantaged as set out in the global targets- the MDGs.

Ibrahim Thiaw

Director, Division of Environmental Policy Implementation (DEPI)
United Nations Environmental Programme (UNEP)



Contents

Table Of Contents

LIST OF FIGURES

INTRODUCTION

MODULE 1: BASIC INTRODUCTION

Session 1.1: Background

MODULE 2: COMPREHENSIVE OPTIONS ASSESMENT STAGES

Session 2.1: Overview

Session 2.2: Needs assessment and objective setting

Session 2.3: Setting criteria and performance measures

Session 2.4: Identification of options

Session 2.5: Screening and ranking of options

Session 2.6: Assessing and ranking alternative plans

MODULE 3: MANAGING THE PROCESS OF COMPREHENSIVE OPTIONS ASSESMENT

Session 3.1: Managing the process of Comprehensive Options Assessment

CASE STUDY: BERG WATER PROJECT, SOUTH AFRICA

BIBLIOGRAPHY AND FURTHER RESOURCES

ENDNOTES



Photo by Ryan Hoover, courtesy of International Rivers

INTRODUCTION



Kariba dam wall: Courtesy of Wikimedia Commons

Origins

This training manual and the two others that accompany it have their origins in the African Ministerial Conference on Hydropower and Sustainable Development that was held in Johannesburg, South Africa, in March 2006. Attended by energy and water ministers from across the continent, the conference explored developing 'a holistic and integrated development strategy to meet Africa's growing demand for water and energy through sustainable hydropower, while maintaining assets.

Subsequently, a regional East and Southern African seminar entitled 'Major Water Infrastructure Development in Africa: Balancing Economic, Environmental and Social Aspects for Sustainable Outcomes' was held in Mbabane, Swaziland, in July 2007 to advance this agenda. Capacity Building International (InWEnt, now part of GIZ) and its partners supported the seminar.

From the group work, two recommendations stood out: that there is a need for specific and targeted training modules; and that capacity building initiatives should address all levels in the hierarchy of policy-makers, decision-makers and professionals.

This is one of a series of training manuals that address the priority topics covered by UNEP's Dams and Development Project (DDP).

“... capacity building needs to be enhanced by learning from good practice in the region as well as internationally from reference material such as the UNEP-DDP Compendium and adapting these lessons to local conditions.”

Purpose Of This Manual

In infrastructure development internationally, there is a growing emphasis on considering environmental and social factors on an equal footing with the more traditional technical, economic and financial factors. This manual advocates a structured, participatory and transparent process of assessing options to meet needs for infrastructure that captures the views and inputs of all key stakeholders.

Accordingly, the purpose of this training manual is to present Comprehensive Options Assessment (COA) in a format that will promote training for sector leaders and managers. It draws from the body of work related to COA that has flowed from the World Commission on Dams (WCD), the DDP and other contemporary frameworks for assessment of policy, programme and project options.

Introduction

Purpose Of This Manual

The training programme has as its core a number of these key sources (especially WCD, 2000; UNEP, 2007; ESMAP & BNWPP, 2003). The value added by this manual comes from:

- structuring the material into logical training modules and sessions;
- providing training aids;
- broadening the focus and examples beyond dams to cover other types of infrastructure;
- adding some material, mainly for adding context to the training; and
- providing focused additional reading lists of readily available material for the trainee that wishes to pursue a topic.

Target audience

Development planning is generally driven along sectoral lines and led by central government technocrats. Energy planning is usually led by the responsible ministry, as is planning for water, roads, housing and other infrastructural services. This training manual primarily targets government officials who must manage and guide sector policy, strategy and operations. It is not an advanced technical manual that provides skills in the detail of preparing or implementing projects. It is rather a guiding framework that highlights key issues, considerations and principles in the evolving concept of COA without being prescriptive.

Within these parameters, the manual is intended to cater for three groups of trainees:

- Policy-makers will typically be politicians at the national, provincial or local level concerned with the broad direction and performance of their sector. They are driven by the needs of the population. They provide direction to the decision-makers and professionals. Most have an interest and informed understanding of the sector. They do not need to have technical knowledge but must fully understand the local, national and international dimensions and importance of COA and how it can help them. Their prime need from the course is awareness of the historical development of the topic, the international trends and practices that influence the selection of options, and the internationally accepted principles that should guide policy.
- Decision-makers will typically head a ministry or department or be in the top management of a regulatory body or other semi-autonomous public body (such as River Basin Authority, Sector Regulator). They provide policy-makers with information and recommendations and they guide and supervise the professionals who implement policy. The decision-makers may have technical skills but their function is mainly the management of human and financial resources. Their prime need from the course is a thorough understanding of the principles that underpin practice in the topic and sufficient knowledge of the topic of COA itself to make informed decisions and guide others.
- Professionals (or 'administrators') will typically be in the operational or middle management of a ministry or department. They will have extensive experience in one of the disciplines important in their sector. They originate development proposals and define, procure and manage the services of consultants commissioned to undertake the detailed technical work. Professionals prepare the multi-criteria decision frameworks for decision-makers and policy-makers. Their prime need from the course is detailed knowledge of international best practice and sufficient skills in COA to be able to guide the work of consultants and to determine its quality.

Introduction

These categories are indicative rather than absolute. The following example illustrates the roles of each category in the project cycle of a large-scale infrastructure project:

- The **policy-makers** express the priorities of government (ideally based on the needs of the people) and develop these into policy, implementation programmes, specific projects and budgetary provisions. Ultimately, a large-scale infrastructure project may be selected to meet these needs.
- The **decision-makers** assist with these tasks by managing financial and human resources and interpreting technical information into policy and strategy. They decide on the steps needed for implementation and prepare plans. As far as COA is concerned, they decide on responsibilities and budgets, and may have regulatory responsibilities in the final recommendations or decisions about selected options.
- The **professionals** do the calculations, provide technical solutions, procure consultants and manage the quantity and quality of the consultants' work. They specify the extent and complexity of the options that will be assessed.

Training objectives

The training and learning objectives of the three categories are:

On completing the training programme, policy-makers will:

- have learned about the history and context of COA;
- have learned about the issues and their international importance;
- be able to place policy proposals in the broader context;
- be able to relate community needs and aspirations to the technical process of COA;
- be able to guide the policy tradeoffs that must inevitably be made.

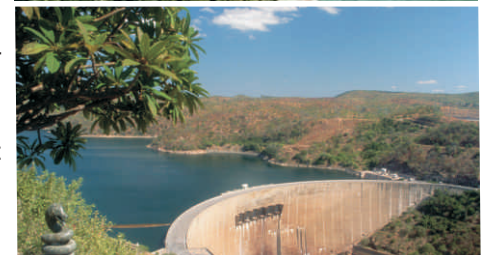
On completing the training programme, decision-makers will:

- have learned about the history and context of COA;
- have learned about important principles and criteria that underlie decisions in the field;
- have learned about the relationship of COA to other issues in the relevant sector and of inter-sectoral linkages;
- be able to take more informed decisions at a high level based on a greater understanding of the issues.

On completing the training programme, professionals will:

- have learned about the history and context of COA;
- have learned about the important principles and practices that underlie decisions in COA;
- have learned about international case studies on COA;
- be able to formulate alternatives, oversee their appraisal, and understand the consequences of trade-offs that must be made by the decision-makers and policy-makers;
- be able to take new initiatives in COA and effectively direct the operational work of other professionals.

Ultimately, full professional skill and competency in a COA comes with in-depth study of the topic and experiential learning. The purpose of a training manual is to provide readily available material and a learning structure that can be completed in a relatively short time.



Photos Courtesy of Wikimedia Commons

Introduction

Structure

The training material has been structured into three modules that reflect the main subdivisions of the topic and sessions that reflect a smaller division that can be dealt with in a 15-minute to 2-hour period. The sessions are based on an item of content rather than the volume of material that should be dealt with in a fixed time.

The proposals for the duration of each session are based on the following:

- professional groups: over four-and-a-half days at 6 hours per day, excluding preparation time;
- decision-maker groups: over two days;
- policy-maker groups: over half a day.

Fewer or shorter periods can be accommodated by reducing exercises or discussion periods or by leaving out or shortening the modules that recap traditional areas such as financial and economic appraisal. It remains for the trainer to structure the sessions around the available days and break periods and the needs of the trainees.

Because the manual is targeted at the three groups described above, the material for some of the sessions is provided in three parts with increasing detail. In several instances, it is suggested that the decision-making group follow the content of the professionals. It was assumed that policy-makers would mainly require the international dimension especially the applicable normative frameworks and the principles of a topic but not the detail. On the other hand, professionals would need access to the detail. Decision-makers would need part of each with some focus on procedural matters.

How to use this manual

This training manual has been prepared principally with the professionals in mind who must administer COA for large-scale infrastructure. It therefore focuses on the principles, content and core elements of COA rather than the 'how to'.

Training forms part of wider experiential learning. The manual's content presents ideas and concepts on COA, and the training materials allow the trainees to experiment with these ideas and concepts through discussions and exercises. The trainees then take this back to their work situations to cement their learning, and the learning process is completed as they move on to a phase of reflection.

The manual is directed at the trainer, but it can be beneficially distributed to trainees. The trainer should adjust the proposed exposure times, discussion topics and exercises to suit the particular circumstances of the trainees and to provide regional, national or local context. The trainer should also select or add items that can connect the training to the particular country, region or project.

The manual provides the following information for each session:

- The **purpose** is a short narrative to explain the relevance in the broader topic.
- The **learning objectives** are to focus the trainer and the trainee as they work through the material.
- The **preparatory reading** is optional and generally for the professionals and is intended to provide insights to help them absorb the detailed material by adding richness and broader context prior to the training session.
- The **guideline on timing** is to be used at the discretion of the trainer and should be adapted according to the prior knowledge or interests of the trainees and the total time available for the training.
- The **discussion topics** are suggested with the key elements of the session content in mind. The discussions could be in groups or with all trainees.
It is assumed that the trainer has sufficient background in the topic to guide or lead the discussions where necessary.
- The **exercises** are provided to increase learning of the more detailed content and may be undertaken by individual trainees or during the training

Module 1: Basic Introduction

MODULE 1:

BASIC INTRODUCTION

Objective

The objectives of this module are to:

- present the historical context and practices in options assessment in the development of infrastructure;
- illustrate that partial application of the process of options assessment has led to highly subjective and contested outcomes;
- introduce the concept and principles of the process of Comprehensive Options Assessment (COA).

Context

This module will deal with the history and approaches to options assessment in relation to large-scale infrastructure. It will

- provide the trainee with an overview of different levels and perspectives of options assessment;
- highlight the emergence of demand-side options in an area dominated by the supply side;
- introduce and distinguish between the assessment of project options and within-project options;
- introduce how COA has been embedded into normative frameworks and how it relates to the other strategic priorities for large-scale infrastructure such as Environmental Management Plans;
- introduce the different tools applied in contemporary cases.

As a whole, the module highlights that COA is a process that is iterative in nature. With technological advances what was once technically impossible has become highly feasible, broadening the range of options and highlighting the need for an iterative approach.

Learning outcome

On completion of this module, the trainee will understand the general range of options available and the delicate balance of different factors needed to reach optimal options for large-scale infrastructure.

Session 1.1: Background

Purpose of session

The purpose of this session is to:

- introduce the large-scale infrastructure conundrum;
- review the World Commission on Dams and its follow-up – the UNEP Dams and Development Project;
- introduce COA as a balanced process for identifying and selecting acceptable projects for meeting agreed objectives in the context of large-scale infrastructure.

Learning objectives

As a result of this session, trainees will:

- appreciate the context of options assessment;
- have obtained insight into the historical perspectives on options assessment in large-scale infrastructure;
- appreciate the dynamic and iterative nature of options assessment.

Module 1: Basic Introduction

ESTIMATED TIME REQUIRED FOR SESSION (MINUTES)

MODULE 1		Professional	Decision-maker	Policy-maker
Session 1.1	Preparation	30		
	Contact Time	45	35	10
	Exercises	30		
	Discussion	15	15	

Decision-makers should follow the full text for professionals, emphasising key lessons and principles, with less attention to detailed cases.

Preparatory reading

- UNEP, 2007: Foreword.
- Practical Action, 2006: Executive summary.
- ESMAP-BNWPP, 2003.

Discussion topic 1

The WCD and DDP ended when they had achieved their mandate. Is there an argument for having a similar process for other large-scale infrastructure such as roads and mining development?

Discussion topic 2

Consider the fundamental shifts in thinking that the Human Development Report 2000 (UNDP, 2000) called for (see), and discuss the extent to which the WCD's approach and core values align with these.

Box 1

Human rights and development

The UNDP Human Development Report 2000 focuses on human rights as the fundamental framework within which human development must be pursued. It contends that societies are on the threshold of a significant advance in the recognition of, and respect for, human rights. But this will require six fundamental shifts from the thinking that dominated the twentieth century:

- From state-centred approaches to pluralist, multi-actor approaches – with accountability not only for the state but also for the media, corporations, schools, families, communities and individuals.
 - From national to international and global accountabilities – and from the international obligations of states to the responsibilities of global actors.
 - From the focus on civil and political rights to a broader concern with all rights – giving as much attention to economic, social and cultural rights.
 - From a punitive to a positive ethos in international pressure and assistance – from reliance on naming and shaming to positive support.
 - From a focus on multiparty elections to the participation of all through inclusive models of democracy.
- From poverty eradication as a development goal to poverty eradication as social justice, fulfilling the rights and accountabilities of all actors.

Module 1: Basic Introduction

Discussion topic 3

In the contemporary context of your country how realistic and applicable is the principle that environmental and social factors have the same significance and importance in decision-making as do the technical, financial and economic factors?

Exercise 1

List the factors that are used for decision-making on large-scale infrastructure projects in your country.

Exercise 2

List large-scale infrastructure projects in your country that are controversial or have under-performed technically, economically, environmentally or socially.

Exercise 3

Provide an example from your country of a large-scale infrastructure project that has over-performed. How and why did it do so? Whose interest has the project catered to? How can project performance be measured?

Additional reading

- WCD, 2000: Summary.
- UNEP, 2007: Part 1, Introduction.

Introduction

Comprehensive Options Assessment (COA) is an iterative process through which the choices available for meeting a particular need or range of needs and objectives are appraised and the optimal options are selected within specific constraints (such as the trade-offs, risks and the safeguards to be observed).

The history of options assessment for large-scale infrastructure has been dominated by a focus on:

- supply-side options with very little regard to demand-side management;
- a narrow focus on technical, financial and economic factors;
- often superficial assessment of environmental and social factors;
- very limited public disclosure or participation by the affected communities in selection of options that affect them;
- controversy and social conflict over unfulfilled promises or disenfranchised local communities affected by the projects.

The World Commission on Dams (WCD) broke new ground by suggesting a new framework for the incorporation and consideration of environmental and social factors with the same weighting as technical, financial and economic factors.

The WCD also identified COA as one of the strategic priorities for the new framework for decision making in large dams.

The UNEP Dams and Development Project (UNEP-DDP) disseminated the WCD report (WCD, 2000) and facilitated a review of its recommendations at national and local levels through inclusive multi-stakeholder dialogues.

This training manual arises from a recommendation of a seminar entitled 'Major Water Infrastructure Development in Africa: Balancing economic, environmental and social aspects for sustainable outcomes' which was held in 2007 pursuant to decisions at the 2006 African Ministerial Conference on Hydropower and Sustainable Development.

Module 1: Basic Introduction

This Training Manual draws extensively on material from the WCD Report (WCD, 2000), the UNEP-DDP: A Compendium of Relevant Practices for Improved Decision-Making on Dams and their Alternatives (UNEP, 2007) and the supporting paper on Identification of Options (Practical Action, 2006), as well as a UNDP-World Bank sourcebook on stakeholder involvement in options assessment (ESMAP & BNWPP, 2003).

Historical context

As a development choice, large-scale infrastructure projects have historically often become a focal point for political interests, dominant and centralized government agencies, international financing agencies, banks and the construction industry. Involvement from civil society varies with the degree of debate and open political discourse in a country. There has been a generalized failure to recognize affected people and empower them to participate in the decision-making process. A first step for any COA is to understand whose interest are being served by the project as it stands, and whether broader interests can be incorporated into the project to satisfy development needs.

Once a large infrastructure project has passed preliminary technical and economic feasibility tests and attracts interest from government or external financing agencies and political interests, the momentum behind the project often prevails over further assessments. In any event project planning and appraisal for large-scale infrastructure has been confined primarily to technical parameters and the narrow application of economic cost-benefit analyses. Historically, social and environmental impacts were left outside the assessment framework and impact assessments in project selection remained marginal into the 1990s.

Conflicts over large infrastructure projects (mainly dams, major transport projects, energy infrastructure and pipelines) have heightened in the last two decades. This results from dissatisfaction with the social and environmental impacts of such large scale projects and their failure to achieve targets for costs and benefits. It also stems from the failure of project proponents and financing agencies to fulfil commitments made, observe statutory regulations and abide by internal guidelines.

In some cases, the opportunity for corruption provided by large-scale

infrastructure projects further distorts decision-making, planning and implementation. While substantial improvements in policies, legal requirements and assessment guidelines have occurred, it is often 'business as usual' when it comes to planning and decision-making. Furthermore, past conflicts remain largely unresolved for a number of reasons, including poor experience with appeals, dispute resolution and recourse mechanisms.

Decision-making and the political economy of large-scale infrastructure projects

Large infrastructure projects unfold from decisions taken at the beginning of the planning process through to the final approval of a project and financial closure. At each stage different actors are involved, including government agencies, public or private utilities, interested parties from the region, financing agencies, consulting and construction companies and equipment suppliers. Affected people and NGOs are increasingly involved as well. Each of these groups promotes its own self-interest, whether these be profits, political power, property rights or livelihoods. COA manages the interplay of these forces and the various stakeholders' actions, interests and roles with a view to ensuring that decisions are balanced and represent the overall good.

Planning processes are usually controlled by sectoral or regional single-purpose government agencies or public utilities and the decision to build is taken as the outcome of a fairly limited set of political interactions at levels commensurate with the size and importance of the project. In the case of East and Southern Africa, the selection of alternatives for meeting water, food and energy needs is frequently constrained by access to international finance and the availability of international expertise in certain technologies rather than others. Recently, restructuring and reform of the energy and water sectors in many countries in the region has changed the role of government in decision-making and planning, with private investors and corporations taking both financing and ownership roles in these projects. Bilateral and multilateral development financing agencies have helped finance studies needed for large-scale infrastructure investment and lent money for the construction. They have identified development goals through strategic sectoral planning documents, provided resources and technological capacity to conduct feasibility studies, and created institutional frameworks to plan and implement the projects.

Module 1: Basic Introduction

Role of industry and bilateral funding

Governments are ultimately responsible for taking the decision or granting the authority to build. However, governments are naturally influenced by political promises and imperatives, international expertise and financing opportunities. Once a government is politically committed and construction has begun, the nature of large construction projects makes it extremely hard to change course, even if there are cost overruns, unforeseen negative impacts, or if the benefits are less than expected. International corporations, funding agencies and donors work within increasingly strict frameworks designed to minimize and mitigate any adverse consequences of large infrastructure projects. This has been an important trend in driving improvement in environmental assessment, including COA. National governments also have to consider their responsibilities under Multilateral Environmental Agreements and other treaties.

For industrialized countries with expertise in specific sectors and in related equipment, bilateral overseas aid has often become a vehicle for supporting local industry by exporting this expertise through aid programmes tied to the purchase of services or equipment from the donor country. The case of NordicAid in Tanzania is detailed in .

Box 2

Nordic aid influence in the Pangani Falls redevelopment project, Tanzania

A 1985 Canadian study provided Tanzania with a national energy development plan that led to the decision to redevelop the old Pangani Dam, raising its installed capacity from 17 MWs to 66 MWs. The Finnish International Development Agency (FINNIDA) funded the \$2.5 million feasibility study in 1989-90, which was carried out by Finnish and Norwegian consultancy firms. Given the close relationship between the Finnish firm and FINNIDA, the firm not only wrote the terms of reference for the feasibility study but later was also given contracts to procure supplies and supervise construction (jointly with its Norwegian partner). In the event, the feasibility study confirmed that the dam was the best option to meet sector needs and the EIA concluded that no adverse effects existed that would prejudice the project. As the Finnish, Swedish (SIDA) and Norwegian (NORAD) aid donors planned to finance the project, SIDA hired a Swedish firm which reviewed and confirmed the results of the feasibility study. The three Nordic donors subsequently approved grants to Tanzania to cover the costs of the project. While the aid was not 'tied', no competitive bidding was undertaken for contracts; rather, checks were made to ensure that prices offered by selected firms were competitive. A Norwegian firm supplied the turbines, a Swedish firm the generators and control equipment and a number of Finnish firms were involved in the civil works and transmission lines, including the parent company of the consultancy firm that undertook the feasibility study.

Source: WCD, 2000: 174

Planning and evaluation

Project planning and evaluation for large infrastructure projects has generally been confined to technical parameters and the narrow application of economic cost-benefit analyses. Decisions of this nature have typically been taken with little participation or transparency.

In particular, those to be negatively affected by the infrastructure project were (and are) rarely involved in this process. The primary concern with planning processes is that once a proposed project has survived preliminary technical and economic feasibility tests and attracted interest from financing agencies and political interests, the momentum behind the project and the need to meet the expectations raised often prevail over further assessments.

Module 1: Basic Introduction



Planning and evaluation

Project planning and evaluation for large infrastructure projects has generally been confined to technical parameters and the narrow application of economic cost–benefit analyses. Decisions of this nature have typically been taken with little participation or transparency.

In particular, those to be negatively affected by the infrastructure project were (and are) rarely involved in this process. The primary concern with planning processes is that once a proposed project has survived preliminary technical and economic feasibility tests and attracted interest from financing agencies and political interests, the momentum behind the project and the need to meet the expectations raised often prevail over further assessments.

Environmental and social concerns are often ignored and the role of impact assessments in assessing options remains marginal except to ratify the prior position. Once operations have been initiated there is a generalized lack of effort to monitor, assess and respond to operational concerns and changing values surrounding dams. The political economy of large infrastructure and the dominant power of a small number of actors often drive these planning and evaluation processes. In some cases, such as Norway, Quebec, Brazil or Nepal, a high-level political choice made in favour of hydropower has driven subsequent choice of technology (large dams) and project development.

In addition, governments have frequently committed themselves unquestioningly to large infrastructure projects, whose merits have not been subjected to public scrutiny, without hearing alternative views on the choice of development objectives for a village, region or country. This is partially driven by the perception of developmental progress created by high visibility physical projects – and political mileage to be gained from this.

The lack of a transparent and participatory process has prevented affected people from playing an active role in debating the project and its alternatives. As a result they are unable to assist project planners to provide a development response that meets their needs and allows them to add to the benefits to be derived from the project. This has tended to magnify the perceived and real negative

impacts of such projects and led to active opposition to projects and considerable uncertainty for project proponents.

The outcome is often not only poor performance of the social and environmental components of projects but also delays, cost overruns and poor financial and economic performance.

Options assessment

The range, scale and type of options considered in development plans in the past were limited by the planning and decision-making approaches of the day. Many sectoral planning studies from which projects emerged were narrow technical and economic studies aimed at least-cost supply solutions for providing a single service such as irrigation water or electric power. When large-scale infrastructure projects were contrasted with alternatives, they were typically only compared to other large-scale projects or, in the case of hydropower, with alternative large-scale thermal power generation options (see). In developing countries the pressure on development aid agencies to move large amounts of capital – a considerable portion of it as tied aid – argued for large-scale solutions. Administrative efficiency is a related factor leading to a preference for financing large projects. This relates mainly to donor programmes that have preference for a few large projects that can be managed by a few or leaner administrative structure as opposed to many small projects that require a large administrative set up to track and manage.

Module 1: Basic Introduction

There is a good example of COA in the IEA Report *Hydropower and the Environment: Present Context and Guidelines for Future Action* (IEA, 2000: 83), which presents a table summarizing life cycle analyses (LCA) for alternatives to hydropower based on the energy service provided by each option.

Projections of demand

The needs for basic and essential services such as power, food and water are typically identified through sectoral demand forecasts and have frequently been overstated. Failure to adequately account for the rate of development of new supply and the effect of policy reform, when it is outside the limits of the planning exercise, may also lead to what effectively amounts to overstated demand. Projections for demand (and hence prices) for crops and other agricultural products that are widely traded can be subject to market boom-and-bust cycles when a series of independent decisions in different countries or provinces leads to over-production relative to demand.

In many circumstances this has militated against a gradual approach of adopting smaller, non-structural options and has pushed decision-makers into adopting large-scale projects because they seem to be the only adequate response to the large gap between existing supply and forecast demand.

A further complication is the long lead time of large-scale infrastructure projects, which may take decades from the initial development of an idea to the commissioning of a structure. Changes in market conditions during construction have left proponents stranded with costs or projects that are not financially or economically viable.

Of principal concern is that the agencies that are responsible for building supply infrastructure are frequently also charged with undertaking demand forecasts, leading to a potential conflict of interest.

Available options

There is generally a wide range of alternatives available for fulfilling basic water, food and energy needs, although the actual number available will depend on local circumstances. The number of alternatives has, however, not always been so large. For instance, alternatives to hydropower prior to the 1950s included conventional fossil fuel and biomass generation options. Nuclear power arrived in the 1960s and recently the range and scale of renewable electricity supply options has dramatically expanded. Alternatives for municipal and industrial water supply have tended to be site-specific and depend on whether there are groundwater aquifers, natural lakes and rivers to draw from. On the other hand, many of the irrigation water supply and flood management options that are being considered today have been available for a long time. The principal change here is a more receptive policy context and the increasing cost of developing new water supplies.

Demand-side management options (DSM) are a relatively recent phenomenon. Efficiency and conservation became concepts in policy and planning in the 1970s and 1980s, but serious attention to demand management programmes has tended to depend on a perception of crisis. The oil price shocks in the mid 2000s focused attention on biofuels as alternatives as well as DSM in the electricity sector in many countries. Water scarcity and the threat of water shortages is a driving force for more efficient water use in many countries, but the response has not been universally translated into concrete action to foster water-efficient practices.

Obstacles to consideration of options

The options considered in a given context have often been predetermined by political considerations or intellectual barriers. Political economy obstacles include efforts made by groups – primarily those with economic control and political influence – to protect their own interests and to impede similar efforts by other stakeholders. In practice, these barriers have been immensely varied and wide-ranging. They include actions such as withholding information that other stakeholders and decision-makers need to make informed decisions. In some cases there have been overt and even violent measures to protect favoured options

Module 1: Basic Introduction

With few exceptions, an inclusive institutional and policy structure capable of dealing with a spectrum of options has been slow to emerge in developing countries. Small-scale infrastructure alternatives have often not received integrated planning support, impeding their ability to emerge as competitive solutions. Those promoting non-structural alternatives have rarely offered an adequate political counterbalance to the interests promoting large-scale infrastructure. The fact that actors back particular options has often obstructed proper consideration of other viable alternatives.

As a result, smaller-scale options continue to be viewed as secondary to large projects. China provides an example of a country that has mixed both small- and large-scale. It has the world's largest programme for the development of small-scale rural and appropriate technology, while at the same time it has built half the world's large dams.

Whether failure to adequately assess all the options implicitly leads to the selection of large-scale infrastructure projects over other equally attractive or even superior options is difficult to say. Certainly, the options currently available reflect not only continued technological development over the last 50 years but also more recent efforts to find locally appropriate, small-scale solutions that have benign social and environmental impacts, and the recognition that human rights are a legitimate and fundamental part of the development equation.

Parameters for project appraisal

Cost-benefit analysis (CBA) emerged between the 1950s and 1970s as the dominant economic tool supporting decision making on large-scale projects. Initially it was limited to a number of parameters, most of them internal and relatively easy to assign values to. Efforts in the last two decades to expand the scope of CBA to cover social and environmental issues have rarely led to comprehensive social and environmental valuation, and have usually been limited to incorporating the costs of resettlement and environmental mitigation.

Review of multilateral bank appraisals and the performance of CBA more generally leads to the following conclusions on the adequacy of CBA as applied to the appraisal of large-scale infrastructure projects:

- Projections of project costs are systematically understated.
- Social and environmental impacts are not valued explicitly or are only indirectly accounted for through mitigation or resettlement budgets.
- They have difficulty predicting growth in demand and final design capacity (hydropower, irrigation and other benefits).
- They have difficulty predicting market conditions and end-user behaviour over time.
- The employed social discount rates that are too high.
- Sensitivity and risk analysis is inadequate.

A number of the weaknesses of CBA may lead to overstatement of the net project benefits. Moreover, influences from the wider political economy also filter through into the process of undertaking CBA. In some cases, early political or institutional commitment to a project became overriding factors, leading subsequent economic analyses to justify a decision that had in fact already been taken.

Module 1: Basic Introduction

Decisions to build large infrastructure made solely on the basis of such an analysis are questionable given the failure to assess all the options and external impacts, particularly social and environmental costs. An alternative approach to a decision-support system based on CBA is to use a method that recognizes that projects often have multiple objectives, not simply economic welfare maximization. Experience to date with these multi-criteria approaches suggest that they allow disaggregated information on social and environmental impacts to enter directly into the decision analysis. Such decision-support systems appear particularly appropriate and useful in the case of large-scale infrastructure when implemented within a participatory, transparent multi-stakeholder approach.

Addressing social and environmental impacts

Social and environmental issues have historically been among the least addressed concerns in large scale project decision-making. Current thinking and contemporary approaches now focus mainly on these because they are two of the key issues that determine whether a project proves to be effective or widely accepted by the public. The environmental risks associated with large infrastructure projects have not generally been incorporated as key factors in the decision-making process. The enforcement of existing regulations is often weak, initial assessment is not comprehensive and it has frequently been incorrectly assumed that impacts could be effectively mitigated. Impact monitoring and assessments of the effectiveness of environmental mitigation measures have generally been absent.

With growing political awareness of greenhouse gas emissions in the global warming debate, a new phenomenon is emerging with large-scale projects justified on the basis of environmental benefits. Large-scale biofuels plantations and infrastructure have emerged across Africa. An example is the development of more than 40,000 hectares of sugar cane for ethanol production in Chisumbanje Estates in Zimbabwe.

National legal frameworks and policy provisions

There were few policy, legal and regulatory frameworks governing large infrastructure development before the 1970s, particularly for social and environmental issues. However many countries revised their policy and regulatory frameworks in the 1980s and 1990s to give more emphasis to environmental and social concerns, public participation, efficiency and cost-recovery. There is now a broad body of international and national regulation applicable to large infrastructure, referring to both the public and private sectors. Existing regulations in most countries tend to focus on project appraisal and implementation with insufficient focus on options assessment planning in the early stages of the decision-making process where fundamental choices are made. Few require the regular assessments and performance evaluation that could inform future decision-making. Nor do they often provide recourse for those who may have been harmed by a particular project. In many cases it has only been strong concerted civil society movements that have generated sufficient momentum to ensure that constructive negotiations occur, and projects are not imposed on affected communities without consultation.

Corruption

Corruption is a worldwide phenomenon that affects both poor and rich countries. It may take many forms, from inducements to certain contractors during bidding, through to manipulating water allocations, offsetting farmer repayments, or manipulating domestic electricity connections locally. At whatever level, vested interests can distort the decision-making process, undermining development outcomes. Decision-makers may be inclined to favour large infrastructure as they provide opportunities for personal enrichment not afforded by smaller or more diffuse alternatives. The consequences frequently directly affect the poor or the environment. Allegations of corruption have tainted many large infrastructure projects in the past and present but have seldom resulted in prosecutions.

Module 1: Basic Introduction

The Organization for Economic Cooperation and Development (OECD) countries and the major international financing agencies have recognized the pervasive extent of corrupt practice and its negative consequences. Through the 1990s they have moved to assist countries in tackling corruption by making bribery payments illegal in their country of origin, barring contractors convicted of bribery from future contracts and tightening up due diligence on bribery opportunities. As of August 2010, the 33 OECD member countries and 5 non-member countries – Argentina, Brazil, Bulgaria, Estonia, and South Africa – have adopted the OECD Convention on Combating Bribery of Foreign Public Officials in International Business Transactions (1997). Its principal objective is to eliminate bribes to foreign officials, with each country taking responsibility for the activities of its companies and what happens in its own territories.

The international NGO Transparency International has also been active in promoting workable and transparent 'integrity pacts' for large infrastructure tenders. These have met with growing acceptance and success in Latin America.

Multilateral and bilateral financing agencies

Overseas development financing agencies have played an important role in funding and securing large infrastructure projects. They have adopted a broad set of policies, criteria and guidelines since the 1980s in responses to lessons from experience and public criticism. For example, the World Bank has adopted ten Environmental and Social Safeguard Policies relating to environmental issues such as forestry, pest control and environmental assessments and social issues such as indigenous peoples, cultural property and resettlement. The result of these developments is that on paper the World Bank has a comprehensive set of policies dealing with large infrastructure projects. More recently the International Finance Corporation (IFC) and the Inter-American, Asian and African Development Banks have adopted similar guidelines.

Despite these changes, these policies are more concerned with project planning, design and financial management than with options assessment or with the operational phase of a large project, which is often left to national governments.

Even then, the main focus has been on comparing the project proposals with the project outcome. Weak treatment of social and environmental impacts at the appraisal stage leads to weak assessments of outcomes at the evaluation stage.

Focusing on the planning cycle for large infrastructure reveals a series of limitations, risks and failures in the manner in which these facilities have been planned:

Box 3

Limitations of historical approaches to options assessment

- Planning processes for large dams were historically neither inclusive nor open. While actual change in practice remains slow, there is increasing recognition of the importance of inclusive processes.
- While the number of options has increased over time, options assessment was typically limited in scope due to political and economic interests driving large infrastructure projects, lack of familiarity with other options, the perceived need to quickly proceed with large-scale projects to meet large projections in demand and the relative ease of developing new supply relative to undertaking policy or institutional reform.
- Project planning and evaluation for large scale projects was confined primarily to technical parameters and the narrow application of economic cost–benefit analyses. Many sectoral studies aimed at finding least-cost supply solutions for providing a single service.
- Even where opportunities for the participation of affected people and environmental and social impact assessments have been provided, they often occur late in the process, are limited in scope, and even in the 2000s their influence in project selection remains marginal.

Module 1: Basic Introduction

Table WCD case studies: options assessment

Project (country and year completed)	Alternatives considered in preliminary planning	Comparison with alternatives at appraisal	Criteria and parameters used for selection
Aslantas (Turkey, 1984)	Existing run of river source for irrigation was considered insufficient to support wider agriculture development. Alternative dam locations in the basin considered.	The hydropower component was compared with a thermal alternative	Least-cost analysis for power supply
Grand Coulee (USA, 1940s)	The agreed objective was regional development through irrigated agriculture. Alternatives considered over a 15-year period related to gravity and pumped systems for the delivery of water. The 1932 Butler Report recommended the pumped option financed predominantly by hydropower revenues from the dam.		Economic analysis
Glomma and Laagen Basin	Government policy for hydropower established in early 1990s. Oil and gas discovered in early 1980s, but hydropower policy remained in place until recently.	Alternative hydropower sites considered.	Least cost and environmental and social ranking of sites in the 1980s protection and development plans
Kariba (Zimbabwe and Zambia, 1966)	Kafue Gorge in North Rhodesia considered as an alternative but rejected after protracted debate with Southern Rhodesia.	A set of thermal power alternatives	Least-cost analysis for power and influence of Southern Rhodesia's political interest.
Orange River (South Africa)	Reservoir storage was seen as the only way to achieve more reliable water supply for year round irrigation. Hydropower was a secondary benefit therefore thermal alternatives were not considered. Subsequent studies led to raising the Vander Kloof dam to increase output.		Political
Pak Mun (Thailand, 1994)	Thermal alternatives located elsewhere considered. A higher dam option was rejected due to resettlement and environmental concerns. The revised project approved by the cabinet included irrigation benefits.	Alternative thermal power (gas turbine)	Least-cost analysis and power system studies
Tarbela (Pakistan, 1974)	Additional storage was considered the only option for replacing water of the eastern rivers allocated to India.	A number of alternative dams sites including Kalabagh and Garlala	Economic comparison of the sites combined with government preference for larger storage and power potential of Tarbela
Tucuruí (Brazil, 1984)	Tucuruí responded to objectives for development of the mining-metallurgical sector and to supply power to urban areas in the Amazon region. There was no explicit options assessment.		

Source: WCD, 2000: 178

Module 2: Comprehensive Options Assessment Stages

MODULE 2:

Comprehensive Options Assessment Stages

Objective

The objective of this module is to outline the elements of a comprehensive options assessment (COA) framework for large-scale infrastructure with a particular emphasis on how environmental and social considerations can be integrated in the assessment and decision-making process. The module draws primarily from the WCD report (WCD, 2000) but has broadened the concepts, cases and draws elements of relevant practice from a cross-section of sources and does not limit itself to dams.

The primary goal of this training manual is to equip government and other officials to manage the COA process rather than to become practitioners. Accordingly this module focuses on the definition, purpose and process of each element rather than on detailed technical matters.

Context

Options normally emerge in response to demand or supply. The choices available to a society at any given time also depend on factors such as natural resource endowments, technological capability, institutional capacity, finance, market conditions, cultural preferences, awareness and education. These can act either as barriers or as enabling conditions, depending on whether they impede or promote the consideration and adoption of a particular option. Creating conditions for certain options to emerge as competitive responses to demand and supply requires support. Policies, institutions and regulatory measures can either help or hinder innovation, modernization, maintenance, continuation and the sustainability of different options.

COA is one of the preferred processes through which decisions are reached on courses of action to fulfil certain needs. This could be done through private companies, public utilities, government departments and more lately public-private partnerships (PPPs). Ideally the process should give equal consideration to all important factors. Traditionally these factors are technical, economic, financial and political. In recent years the social and environmental factors have emerged as critical factors worthy of consideration with equal weighting with the traditional factors outlined earlier.

The COA process ultimately aims to ensure that the optimal solution for meeting for a set of defined needs is selected. This entails a balance of short- and long-term benefits and effects of each option. Options are assessed at different levels and usually in an iterative manner.

This module introduces these elements largely from a management perspective, so it largely omits the technical detail of tools and methodologies.

Learning outcome

On completion of this module, the trainee will understand the core elements of the process of COA and, together with the training in other modules of this manual, will know the kinds of issues that need to be addressed and the types of questions to ask experts brought in to advise on proposed options.

Module 2: Comprehensive Options Assessment Stages

Session 2.1: Overview

Purpose of session

The purpose of this session is to introduce the constitution of the COA so that the specific elements that make up the other sessions in this module can be studied in context and integrated.

Learning objectives

As a result of this session, trainees will understand the broad nature and content of a COA

ESTIMATED TIME REQUIRED FOR SESSION (MINUTES)

MODULE 1		Professional	Decision-maker	Policy-maker
Session 1.1	Preparation	30		
	Contact Time	60	20	20
	Exercises	20		
	Discussion	40	15	

Policy-makers should focus mainly on the introduction and definition. Professionals and decision-makers should review all the content of this module, but the latter in less technical detail.

Preparatory reading

- WCD, 2000: Chapter 8 – Strategic Priorities: Comprehensive Options Assessment, pages 221-224
- UNEP-DDP, 2004: pages 19-32

Discussion topic 1

What would be the most effective institutional arrangement for COA to be implemented in your country's water sector?

Discussion topic 2

Many people now advocate environmental and social factors being accorded the same weight and status as technical, financial and political considerations in options assessment. Do you think this is practical and correct? Introduction

An options assessment is part of a decision-making process that works towards identifying the most appropriate options to satisfy defined needs. These processes are conducted at policy, strategic planning and project levels.

According to the WCD, effective COAs:

- Are driven by a needs assessment that reflects local, sub-national and national goals and is influenced by international commitments.
- Are transparent – they are built on explicit assumptions and result in documented decisions.
- Include the full range of alternatives relevant to the articulated need, such as demand-side and supply-side measures; structural and non-structural alternatives; and conventional and non-conventional options.
- Are participatory and involve, among others, project-affected groups at local levels and representatives of interest groups at the strategic planning and policy levels.
- Recognize and address limitations of knowledge base and available resources.
- Are iterative processes with time-bound outcomes designed to meet both short- and long-term needs.
- Consider environmental and social factors together with technical, political, economic and financial factors (WCD, 2000).

Module 2: Comprehensive Options Assessment Stages

Definition

An options assessment is part of a decision-making process to identify the most appropriate options to satisfy defined needs. These processes are conducted at policy, strategic planning and project levels.

At policy and strategic planning levels, options assessment is a government-led decision-making process. At the project level, the project proponent is responsible for conducting the options assessment and government provides the enabling environment.

COAs provide an instrument for more inclusive consideration of all alternatives earlier in the planning cycle. They require an enabling planning environment, particularly at policy and strategic planning levels.

To be implemented COAs successfully, there is a need to build the capacity of decision-makers and professionals in the relevant sectors, increase information on alternatives, and enhance inter-sectoral cooperation, participatory processes, and ranking and screening tools. In effect COA is a framework for guiding interdependent and mutually reinforcing appraisal tools for each of the key factors of technical, economic, financial, environmental and socio-political considerations that may eventually lead to a choice of one or a mix of different scale infrastructure projects.

The implications for funding and budgets are: that COAs increase up-front costs in order to reduce longer term costs associated with delays and conflict; that small-scale, dispersed options require access to micro-credit for implementation; and that public resources will need to be devoted to options assessments at planning levels within and across each sector.

The COA process will also need to be formalized in legal and regulatory frameworks.

Decision-makers would benefit from performing COAs because:

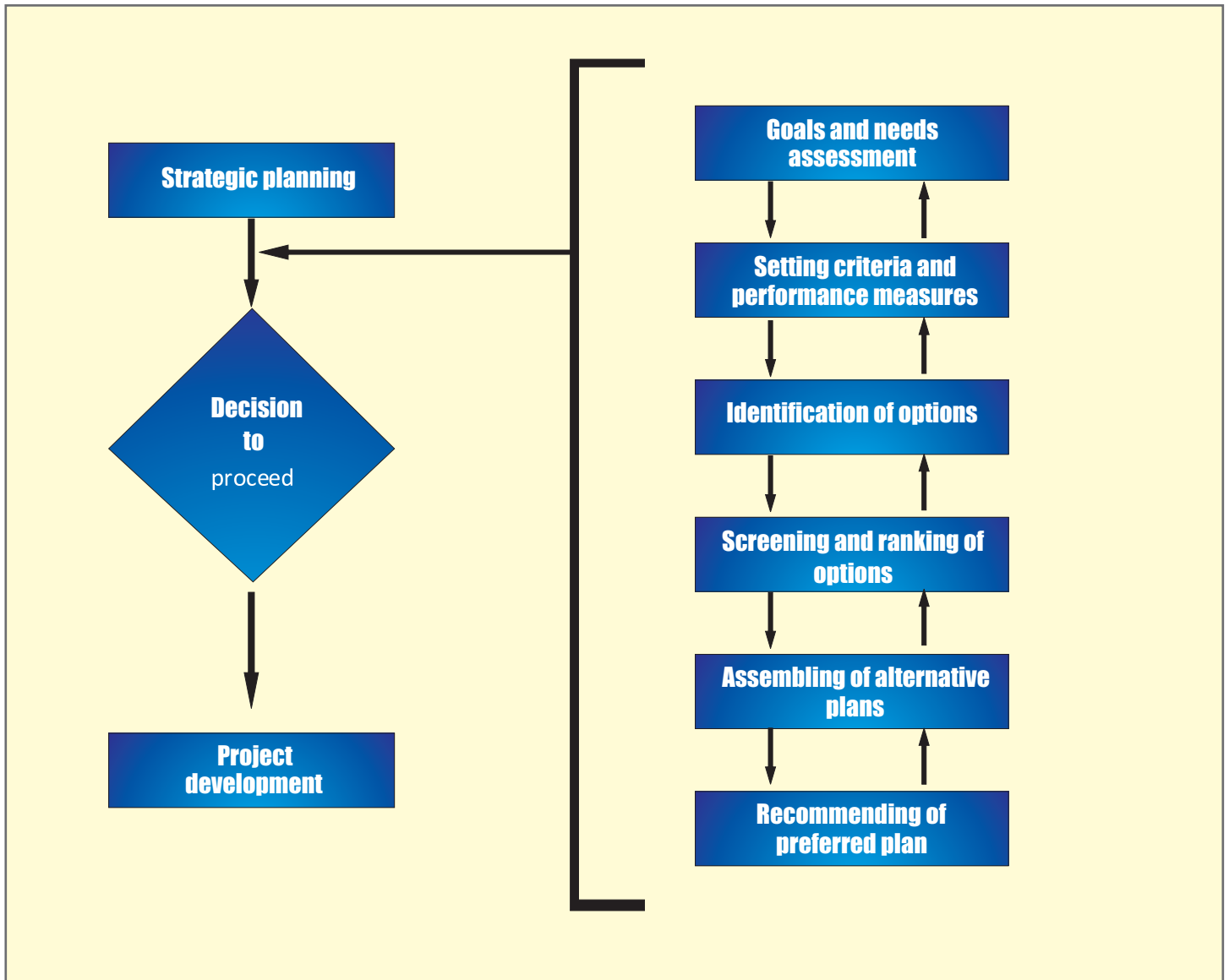
- they improve development outcomes and help ensure that these outcomes are responsive to needs defined through a multi-stakeholder process;
- they can achieve wider legitimacy for selected options and reduce controversy; and
- they can create a sense of ownership and 'buy-in' by the stakeholders.

Steps in comprehensive options assessment

Six generic steps for undertaking a comprehensive options assessment are shown in below, applicable to any large-scale infrastructure. The outcome is typically the recommendation of a preferred plan. Appropriate sensitivity analysis or scenario analysis would also be provided to clearly show the range of circumstances where the recommendations are valid. Alternative plan(s) for significantly different scenarios could also be proposed. The same steps may be used in a less extensive way to assess alternatives during the development and operational phases of a large-scale infrastructure projects. The steps are elaborated further later in this module and in a strategic exercise.

Module 2: Comprehensive Options Assessment Stages

Figure Typical steps in an options assessment process



Source: Adapted from ESMAP & BNWPP, 2003: 86.

Module 2: Comprehensive Options Assessment Stages

To assess options effectively, the planning processes must be dynamic and flexible. In practice there are iterations between the steps in figure above, either because the results of one step affect decisions taken earlier, or because information becomes available leading to new understanding of the choices and trade-offs.

The process of assessing options is very much a learning exercise for everyone involved, and it may be necessary to modify or improve criteria, revisit the importance of different criteria, or incorporate additional options. The important point is that all adjustments made within the process need to be transparent so that the assessment is carried out in a fair manner.

Needs assessment (session 2.2)

Needs assessment is generally the responsibility of the government, delegated to sector ministries, local authorities, river basin organizations and national and regional utilities. Assessing the need (or demand) for services in different sectors and these needs' relationship to wider development goals is an essential step in options assessment. The development goals and needs should be clearly set out through an open and participatory process that includes all relevant stakeholders.

Generally, a study team would update or prepare a needs assessment, which should then be reviewed by a multi-stakeholder advisory group to ensure that stakeholders can have some input. The needs assessment should not only consist of demand forecasts, but should also assess the required levels of access of different beneficiary groups to services, and in many cases the levels of service reliability.

Needs are not defined simply in terms of growing demand, but also in terms of a society's development objectives. Consequently, the wider socioeconomic and cross-sectoral impacts of these services should also be considered, such as education, agricultural production, health, and equity.

Depending on the scope of the exercise, the needs assessment phase may also identify priority short-term needs. This may lead to a decision to identify fast track options to address those needs while options to respond to longer-term needs continue to be evaluated.

Criteria and performance measures (see session 2.3)

In this step, criteria are defined to structure the screening and ranking of options and evaluating alternative plans. Options for meeting the identified needs should be assessed on their social and environmental effects as well as on their technical and economic viability. The criteria should:

- be linked to the needs and objectives of the interest groups identified in the preceding step;
- include social and environmental criteria as well as technical and economic criteria;
- include criteria that reflect national and regional development objectives and policies;
- include criteria that look at impacts of options over their life cycle.

For each option, the social and environmental costs should include both mitigation costs and any residual, unmitigated costs.

Identification of options (see session 2.4)

A wide range of options for meeting needs is usually available. Factors such as affordability, resource availability and the scale of requirements define the possible options that need to be assessed.

- Some principles of relevant practice to follow when identifying options for a particular set of needs include:
 - involving stakeholders in identifying the option;
 - including options at all scales of intervention;
 - including options from different timeframes and properly recognizing lead times;
 - including supply-side efficiency options;
 - including demand-side management options;
 - including policy interventions and institutional arrangements;
 - addressing remaining social concerns from past projects.

Module 2: Comprehensive Options Assessment Stages

Screening and ranking of options (see session 2.5)

This phase typically consists of two steps: the rapid exclusion of unfavourable options (screening); and the valuing of the remaining options (ranking). The options are assessed against the set criteria to identify options that contribute significantly to the needs and objectives.

Where there are many options, there may be an initial stage where they are screened against coarse criteria and reduced to a more manageable number. This screening may include grouping similar options, as well as eliminating options that perform poorly against the screening criteria. For example, options that contradict provisions in national legislation can be excluded at this stage.

Assembling alternative plans (see session 2.6)

Once the options have been screened, they are bundled into alternative development plans using a combination of quantitative and qualitative analysis. Each alternative development plan consists of a group of options that would meet the specified needs (in one or more scenarios). Once again there are several iterations leading to the emergence of the alternative plans.

Recommending a preferred plan

After several iterations it is important that the process manager ensure there is a definite recommended preferred plan to meet the identified needs and set objectives. The recommendation is usually a detailed report on the factors considered and the key assumption under which the selection will hold. The recommendation should include a full and detailed justification of the particular choice selected as well explicitly highlighting any trade-offs associated with the choice (e.g. negative social and/or environmental impacts). This will be the 'trigger point' for a decision to proceed to the project development phase.

Session 2.2: Needs assessment and objective setting

Purpose of session

The purpose of this session is to introduce goals and needs assessment as the source from which all subsequent decisions in COA will flow.

Learning objectives

As a result of this session, trainees will:

- understand the multi-sectoral needs and goals that large-scale infrastructure is expected to address;
- understand the importance of addressing in strategic planning the environmental and social goals and needs upstream of individual project considerations.

ESTIMATED TIME REQUIRED FOR SESSION (MINUTES)

MODULE 2		Professional	Decision-maker	Policy-maker
Session 2.2	Preparation	30		
	Contact Time	14	20	20
	Exercises	15		
	Discussion	20	15	

Module 2: Comprehensive Options Assessment Stages

- Preparatory reading
- WCD, 2000: Chapter 8 – Strategic Priorities: Comprehensive Options Assessment, pages 221-224
- UNEP-DDP 2004 Pages 19-30
- Longo and Markandya, 2005.
- Sheng, 2004.
- Dalal-Clayton and Sadler, 1999.
- ESMAP & BNWPP, 2003.

Discussion topic 1

Does it matter which institution promotes the COA (e.g. central government water directorate, local water body, international NGO, private sector consulting firm, bilateral agency, political party)? What kind of biases could appear in each case? How does one minimize such biases?

Discussion topic 2

Why is it important to know whose needs are being served by a particular proposal? In what way can specific interests determine the outcome of a project?

Introduction

COA occurs upstream in the planning process before the individual project assessment or appraisal; in other words, at the strategic planning level. Strategic plans are typically formulated either as sector plans or as river basin plans that incorporate multiple sectors.

In this session we look at the first step in the COA process: goals and needs assessment.

Goals and needs assessment

Assessing the need (or demand) for water and energy services in different sectors, and the relationship of these needs to wider development goals is an essential step in options assessment. The development goals and needs should be clearly set out and agreed by all stakeholders before proceeding to the identification of the options.

Generally, the assessment team would update or prepare the needs assessment, which is then reviewed by the stakeholder group, thus ensuring that stakeholders have some input into this important phase of the assessment. The needs assessment should not only consist of demand forecasts, but also include required levels of access of different beneficiary groups to basic services, and in many cases the levels of service reliability. Needs are not defined simply in terms of growing demand, but also in terms of a society's development objectives.

Consequently, the wider socioeconomic impacts of these services should also be included, such as on agricultural production, health and equity. Sometimes an existing needs assessment (or demand forecast) can simply be reviewed and endorsed by the stakeholder group/forum. In other situations, a new element may have to be added to an existing needs assessment. This would apply, for instance, when a particular beneficiary group has been omitted, or if the beneficiaries were not sufficiently differentiated and have different levels of need or priorities.

Surveys are generally used to obtain raw data on the demands for various services. In rural settings, a community's development needs can be assessed relatively quickly using a Participatory Rapid Appraisal (PRA). PRA uses a variety of participatory techniques (such as visualization) that solicit views and information from focal groups. NGOs, because of their closeness to communities, are often engaged to facilitate PRA exercises. Outcomes of PRA exercises are qualitative statements of the development needs and priorities of local communities. PRAs can, for example, reveal whether the present level of irrigation, drinking water, or power service provision hampers a community's socioeconomic development and whether communities are actively in favour of improving such services. A new variant of PRAs called Community Based Planning (CBP) has been proven effective in identifying community needs in food security, urban development and rural energy planning. Practical Action has successfully piloted this approach in Zimbabwe, Malawi, Mozambique and Zambia.

Module 2: Comprehensive Options Assessment Stages

Service-oriented demand forecasts – such as power demand forecasts or projections of municipal water demand – vary from simple projections of past trends to data-intensive, disaggregated modelling exercises. Simple trend-based forecasts are not very robust or reliable for longer timeframes. Modelling can improve the accuracy of forecasts and produce scenarios by incorporating assumptions about behavioural responses to changes in price, climate (e.g. water or electricity demand's dependence on temperature), or technology (e.g. leak detection techniques or energy efficient household appliances).

For example, the Southern African Power Pool load forecasting models have proven very accurate. The power pool accurately projected demand and capacity deficits on the grid to avert a power deficit in 2007.

The drawback is that such models are data intensive and that databases must be constantly updated. Irrigation water usage forecasts rely strongly on assumptions about future cropping patterns, commodity prices, and on assumptions about conveyance efficiencies of irrigation systems.

Modelling forecasts prepared by water or power agencies can be very detailed and their outcomes depend strongly on key assumptions and parameters used in the computations. Such assumptions may include overly optimistic forecasts of economic growth, exaggerating the predicted requirement for water and energy services. These forecasts need to be checked carefully since the size of the projected demand is important when deciding the extent to which demand management can meet these forecasts.

Technical assessment

At the level of needs assessment the key technical considerations include an assessment of levels of access to appropriate and modern technologies for facilitating basic services and needs. The need to reduce drudgery in basic production features highly in the Southern and East Africa region. The state and level of utilization of existing assets is another critical technical consideration.

Environmental assessment

At the strategic planning level many countries have already spelt out their environment objectives and goals. These are further guided and determined by global and regional targets. For example, South Africa has ratified the UN Framework Convention on Climate Change, signed the Kyoto Protocol, adopted a National Climate Change Response Strategy, issued electricity regulations for energy efficiency, issued pending regulatory standards for ambient air quality and emissions of specified air pollutants from coal-fired power plants, co-drafted and signed the Copenhagen Accord and confirmed ambitious emission reduction targets of 34 per cent by 2020 and 42 per cent by 2025.

Strategic Environmental Assessment (SEA) is gaining acceptance as a tool to be applied before projects are selected to ensure congruency between environmental, development and project policy objectives. The UN Economic Commission for Europe describes SEA as follows:

'The purpose of SEA, broadly stated, is to ensure that environmental considerations inform and are integrated into strategic decision-making in support of environmentally sound and sustainable development. In particular, the SEA process assists authorities responsible for plans and programmes, as well as decision-makers, to take into account:

- Key environmental trends, potentials and constraints that may affect or may be affected by the plan or programme
- Environmental objectives and indicators that are relevant to the plan or programme
- Likely significant environmental effects of proposed options and the implementation of the plan or programme
- Measures to avoid, reduce or mitigate adverse effects and to enhance positive effects
- Views and information from relevant authorities, the public and – as and when relevant – potentially affected States.

SEA has evolved largely as an extension of project-level environmental impact assessment (EIA) principles, process and procedure.'

SEAs are used to define and align broad development policies, programmes with environmental sustainability objectives. The power sector in Zambia has benefitted from an SEA as the box below illustrates. The case illustrates how strategic assessments and stakeholder involvement informed supply-side power sector rehabilitation initiatives. SEA helped to broaden the options available as well as the overall development effectiveness of the

Module 2: Comprehensive Options Assessment Stages

Box 4

Strategic environment assessment in the power sector rehabilitation in Zambia

The Government of the Republic of Zambia requested World Bank assistance in restructuring the power sector, with rehabilitation of the supply system being a priority. As an initial step in defining the programme, a sector environmental scoping exercise was completed in 1995. This produced an action plan and reconnaissance-level terms of reference for incorporating environment and social considerations in the rehabilitation activities and power sector management more generally.

Broad national goals and needs were identified:

- To improve the reliability of power supply – seen as essential to stimulating investment in the country's economic development.
- To improve the efficiency and management of the existing power supply system – which could help avoid a short-term power deficit while new supply options with much longer lead times were pursued.
- To improve public sector efficiency in the short-term and encourage private investment over the longer-term.
- To improve and extend distribution networks was regarded as a high social priority.

Following this sector environmental scoping assessment study (a SEA-type exercise), a package of technical efficiency, social rehabilitation, environment restoration and dam safety measures were incorporated in the sector-wide rehabilitation project. The use of SEA early in the process broadened the range of options thereby improving the overall development performance of existing power infrastructure and reducing detrimental community impacts.

Source: Sector Environment Scoping and Reconnaissance Study (1995) and the Project Appraisal of the Power Sector Rehabilitation Project for Zambia (1997).

Social assessment

Social factors relate to the effects on populations, health, communities, deprived and vulnerable groups, and access to leisure and cultural amenities.

Social assessment is a specific form of social analysis. It focuses in a systematic manner on equity and social sustainability and aims to improve social development outcomes. It uses five entry points (or dimensions of enquiry) for the study of equity and social sustainability: social diversity and gender; institutions, rules, and behaviour; stakeholders; participation; and social risks.

Social assessment is an 'upstream' planning approach undertaken to incorporate stakeholders' views into project design and to establish a participatory process for implementation and monitoring. It helps identify different beneficiary groups and groups of potentially affected people and links their social development needs and equity concerns to the sector needs assessments.

At the first stage of needs assessment it is important to:

- Consider the needs of vulnerable, at-risk groups and/or ethnic minorities and/or indigenous peoples.
- Focus on poverty reduction and always seek to improve the position of the worst off members in society.
- Recognize and preserve the existence of social diversity.
- Maintain community integrity and viability.
- Stimulate a range of activities in the community and encourage diversity in economic, cultural and social activity.

Module 2: Comprehensive Options Assessment Stages

It is important to note that although distinct in their purpose, social and environmental assessments are usually undertaken in one process. The SEA for power sector rehabilitation in Zambia considered the needs of at risk Gwembe-Tonga people who had been adversely affected by their displacement during the development of the Kariba Dam in the 1950s. Social assessments therefore should consider historical as well as current and potential future impacts. illustrates how the SEA approach helped to highlight and eventually address some of the development needs of the Gwembe-Tonga

Box 5

Power sector environment assessment scoping and reconnaissance study – Zambia

One of the macro goals and identified need was the 'improvement and extension of distribution networks was regarded as a high social priority'. Full environmental assessments were recommended for power facilities where rehabilitation involved more complex social and environment management issues and tradeoffs. Here one recommendation was to assist the Gwembe-Tonga people. Forty years earlier an estimated 57,000 of their people (35,000 on the north bank of the Zambezi, now Zambia) who previously lived along the shores of the river had been forced to resettle when the Kariba dam and reservoir was established (between Northern and Southern Rhodesia during colonial times) without adequate support for livelihood restoration. They remained in a state of deep poverty.

Source: Sector Environment Scoping and Reconnaissance Study (1995) and the Project Appraisal of the Power Sector Rehabilitation Project for Zambia (1997).

Both social and environmental assessments are covered in greater detail in the Environmental Management Plans Manual which is part of the Training Manual Series on Large-scale infrastructure in East and Southern Africa (Hollingworth, 2008).

Economic assessment

Macro-economic policies and targets help define the economic imperatives of infrastructure projects. National poverty reduction strategy papers, country assistance strategies, and national, regional development strategies provide high level guidance usually which cascades down into different policy sectors. Similarly, the Millennium Development Goals (MDGs) and their associated targets have been translated into their local derivatives and give an alternative and contemporary framework for setting economic goals.

In needs assessment it is important to assess and understand the economic policies and trends guiding the country or region because it is these that will lead current and future demand for infrastructure services.

In the case of Uganda illustrated in Box 6, economic liberalization stimulated growth and demand for electricity.

Module 2: Comprehensive Options Assessment Stages

Box 6

Case study: Bujagali hydropower project – Uganda

During the 1990s, the Government of Uganda successfully introduced economic liberalization policies that resulted in macroeconomic growth of close to 7 percent annually with comparable growth in electricity demand. While overall economic growth was impressive, investments in power and other infrastructure did not keep pace. According to a private investment survey in 1998, inadequate and unreliable grid power supply was rapidly emerging as the main impediment to private investment (domestic and international) in the economy and sustained economic growth.

The government's power development strategy was formalized in the 1999 Electricity Act. The policy aimed to improve power services in the short-term and position for future power development by restructuring and commercializing power sector institutions, mobilizing private sector expertise, and encouraging foreign and domestic private investment in the electricity industry. The Bujagali Hydropower Project was identified as an option to plug the power deficit brought about by the economic growth.

Source: ESMAP & BNWPP, 2003.

Financial assessment

Financing continues to be a very significant factor in determining the objectives a government prioritizes. Sources and types of financing guide the setting of goals. The changing role of government in large infrastructure from a provider and financier to an enabler and regulator has made leveraging private sector financing more important.

Key factors to note

The following are important when identifying and defining needs and objectives for a planning exercise:

- Identify and rank the needs of different groups from the outset, including the needs of those groups upstream and downstream of proposed infrastructure whose livelihoods depend on environmental services.
- Account for broadly defined development needs, including those associated with the Millennium Development Goals. Often countries have explicitly stated their long-term objectives in their country development framework, or five-year plan. This should include macroeconomic needs such as reducing imports (food or fossil fuel), macroeconomic stability, and foreign exchange balances, and socioeconomic objectives such as poverty reduction.
- Account explicitly for immediate needs and ensure they are not compromised by the duration of the planning exercise. That is, the needs of some groups may be urgent enough that they must be met without undue delay. It is possible to fast-track some priority options to meet those needs, provided this is acceptable to all stakeholders. For example, in the case of the Berg River Project in South Africa, before a new dam was approved a series of water restrictions aimed at high-volume users and other demand management and wastewater recycling measures were introduced to address water shortages and ensure poorer areas were serviced.
- Account for development effectiveness. For example, when meeting the need for water services for irrigation, also consider options that enhance access to other inputs such as seed, fertilizer, labour, and credit.

Module 2: Comprehensive Options Assessment Stages

- Include the needs of other sectors in the assessment. This is especially important where multi-function options such as dams are considered, given their broad systemic impacts and the scale of the investment.
- Account for changes in development needs over time. This is especially important when considering assets with long lifetimes. This would, for example, encourage the identification of options that provide flexibility.

Stakeholder participation

Defining needs and objectives with input from stakeholders is an important first step in meaningfully involving stakeholders and establishing development partnerships among governments, communities, and the private sector. Discussing development needs and objectives also provides space for a constructive dialogue on options early in the planning process and lays the foundation for some of the difficult decisions on priorities to be made later on.

Session 2.3: Setting criteria and performance measures

Intended outcome

A clear set of criteria and performance measures to be attained by the range of proposed plans or options. A well defined set of criteria and performance measures focuses the subsequent steps in the process of comprehensive options assessment

Purpose of session

The purpose of this session is to introduce concept of criteria and performance standards in meeting identified needs.

Learning objectives

As a result of this session, trainees will understand the importance of setting the criteria and performance that options to be identified have to meet to qualify for consideration in the process of COA.

ESTIMATED TIME REQUIRED FOR SESSION (MINUTES)

MODULE 2		Professional	Decision-maker	Policy-maker
Session 2.3	Preparation	30		
	Contact Time	60	20	20
	Exercises	20		
	Discussion	40	15	

Preparatory reading

- WCD, 2000: Chapter 8 – Strategic Priorities: Comprehensive Options Assessment, pages 221-224.
- UNEP-DDP 2004: pages 19-30.
- Kaplinsky and Morris, 2010.
- Foster, 2008.
- Yepes, Pierce and Foster, 2009.

Module 2: Comprehensive Options Assessment Stages

Discussion topic 1

Develop social and environmental criteria and performance goals for a specific project of your interest.

Discussion topic 2

Prepare sectoral (water, transport, energy) criteria and performance goals.

Introduction

Having identified and agreed on the goals and needs to be pursued and addressed over a set time period, it is important to set the criteria and performance measures against which the range of assembled options will be validated. In this session we address the setting of these criteria and performance measures. The measures defined will be used to structure the screening and ranking of options and to evaluate alternative plans. This step is vital if environmental and social factors are to be as significant as technical, financial and political factors.

The criteria should:

- be linked to the needs and objectives of the interest groups identified in the preceding step;
- include social and environmental criteria as well as technical and economic criteria;
- include criteria that reflect national and regional development objectives and policies;
- include criteria that look at impacts of options over their life cycle;
- for each option, the social and environmental costs should include both mitigation costs and any residual, unmitigated costs.

There are different types of criteria and no single classification is best for all circumstances. Criteria can:

- exclude projects – for example, no projects that significantly change flows in protected areas should be considered; nor should any options that cannot deliver services in a certain timeframe;
- relate to performance criteria – that is, provide a certain amount of drought security or electrical supply at peak demand;
- relate to development objectives – that is, provide an opportunity for regional development, provide a certain minimum portion of benefits to poor people or provide local food security.

There also may be a hierarchy of criteria. In Nepal's Medium Hydropower Screening and Ranking Project there were two categories of criteria, 'environmental-social' and 'technical-economic', which represented the two axes of a preference matrix. Various combinations of criteria were incorporated at the successive levels of screening (i.e. coarse and fine).

All criteria should be explicit and, to the extent possible, quantitative. Below illustrates how environmental costs were internalized in the National Power Plan in Pakistan. Once these criteria were internalized, separate criteria were then used to evaluate and select options to develop alternative generation expansion plans for different scenarios.

Module 2: Comprehensive Options Assessment Stages

Box 7

Internalization of environmental costs in the Pakistan power sector

When coal, gas, and oil-fired thermal generation options were considered in the Pakistan National Power Plan (1992-94), each option needed to conform to Pakistan's national regulations on air emissions (CO₂, SO₂, NO, etc.) for both single-point emissions and incremental additions to the airshed. The assessment was made using emission models, which predicted the concentrations of emissions for different technologies and levels of mitigation, taking into account topography and climate conditions. Similarly, the cooling systems for thermal plant (once-through cooling) were designed so that large volumes of water abstracted from rivers and link canals from irrigation districts were within temperature limits when discharged back into the source. Both atmospheric and riverine emissions were monetarized and expressed as costs for each of these thermal options, through increased operating costs and capital costs (including larger cooling systems, more expensive low-sulphur oil and coal inputs, and scrubbers) that were required to meet national standards.

Alternative plans identified the cumulative air shed impact of the thermal options. Hydro options also estimated the cumulative basin impacts, including impacts on ecological processes and services, combined flood storage and mitigations, impacts on sediment and nutrient cycles, biodiversity impacts, and resettlement

Source: WAPDA, 1994.

Stakeholders should contribute to setting these criteria, usually through the multi-stakeholder advisory group that was established during the needs assessment stage. In situations where there are a large number of options, a first pass at screening may employ a small set of criteria, often designed to eliminate obviously infeasible options. For the coarse and fine ranking, criteria are developed that respond to needs and objectives. Between coarse and fine ranking, there may be progressively greater detail in the criteria.

The role of the Study Team is to design quantitative criteria with a logical structure that reflects the views of the Advisory Group. Even when well-formulated criteria have been defined, it is still likely they will need to be modified as the assessment proceeds and the Advisory Group learns more about the implications of their choices. Nevertheless, it is worth making an initial effort to make the criteria as comprehensive and structured as possible. It is a sign of a healthy process if the criteria need modification because of the evolving understanding of the Advisory Group and the Study Team; it is a sign of inefficiency if they need modification because they were not properly thought through at the beginning. When a strategic options exercise is under intense public and media scrutiny, changing criteria mid-stream may be interpreted as a form of manipulation. It is therefore important to record clearly what changes are made to the criteria and who sought those changes.

Developing logically structured and detailed criteria requires considerable effort. The objectives of the different groups represented on the stakeholder group are revealed at this stage of the exercise, so the time-consuming work of understanding what each group is really seeking (often poorly understood by themselves as well as by others) commences at this time. Obviously, the time required to develop these criteria depends on the diversity of views and the complexity of options to be assessed, and it depends whether this is the first exercise of its nature or an update of a previous exercise where criteria can be carried over and updated. However, if it is the first time a participatory sector or basin-level options exercise is undertaken, it may take two months or more to develop the criteria. In such cases, criteria development for a subsequent stage (e.g. fine ranking) may occur in parallel with other steps such as assembling the options inventory or screening.

Module 2: Comprehensive Options Assessment Stages

Environmental criteria

National laws, thresholds and guidelines provide a useful starting point for setting environmental criteria and performance objectives. These usually define the norms, standards and thresholds involved. The criteria will usually be multidimensional covering several potential environmental risks.

In the case of South Africa, the Atmospheric Pollution Prevention Act (No. 45 of 1965) provided the legal basis of policies for air pollution prevention in South Africa and for the establishment of a National Air Pollution Advisory Committee. The National Environmental Management Air Quality Act (No. 39 of 2004) mandated that norms, standards, mechanisms, systems and procedures be issued to improve air quality. It established the national framework within which these standards will be created, giving the Minister of Environmental Affairs and Tourism or the members of the Executive Council of a province the authority to issue standards, enforce regulations and other measures, implement penalties for non-compliance and establish funding arrangements. Under this Act, the Minister of Environmental Affairs and Tourism drafted Regulations Relating to Listed Activities and Minimum Emission Standards in which the emission limit values for emissions of air pollutants from combustion plants and industrial processes were proposed.

Table 2 Proposed emission standards for coal-fired plants in South Africa

Pollutant	Emission limit value ⁶ , mg per cubic metre	
	New Plant	Existing Plant
Particulate Matter	20	75
So ₂	400	4000
NO _x (as No ₂)	500	800

Source: International Energy Agency Website

EIA and SEA

Strategic Environmental Assessment (SEA – also see session 2.2) is regarded as a process rather than a single activity or output (such as the production of a report). It is also defined as an analytical and participatory approach for mainstreaming and up-streaming environmental and social considerations in policies, plans and programmes to influencing decision-making and implementation processes at the strategic level. It is different to an Environmental Impact Assessment in several regards.

Module 2: Comprehensive Options Assessment Stages

Table 3 Differences between EIA and SEA

EIA	SEA
Is usually reactive to a development proposal	Is proactive and informs development proposals
Assesses the effect of a project on the environment	Assesses the effect of a policy, plan or programme on environment, or the effect of the environment on development needs and opportunities
Has a well defined beginning and end	Is a continuing process aimed at providing information at the right time
Assesses direct impacts and benefits	Assesses cumulative impacts and identifies implication and issues for sustainable development
Focuses on the mitigation of impacts	Focuses on maintaining a chosen level of environmental quality
Has a narrow perspective and high level of detail	Has a wide perspective and a low level of detail to provide a vision and overall framework
Focuses on project specific impacts	Creates a framework against which impacts and benefits can be measured
Focuses mainly on quantitative data	Is generally more qualitative and flexible

Source: Dalal-Clayton and Sadler, 1999: 3.

Environmental performance measures will include a wide range of indicators given the many possible impacts of large-scale infrastructure. Each of the environmental factors has its own relative weight.

Social criteria

Common social criteria include minimizing population displacement and reducing negative impacts on the health, social fabric, institutions and cultural heritage of affected communities. Performance measures might include a specified increase in access to basic services such as health or education.

Box 8 shows an illustrative list of potential social and environmental issues that could be addressed in the social and environmental assessment documentation.

Module 2: Comprehensive Options Assessment Stages

Box 8

Potential social and environmental issues

- a) Assessment of the baseline social and environmental conditions
- b) Consideration of feasible environmentally and socially preferable alternatives
- c) Requirements under host country laws and regulations, applicable international treaties and agreements
- d) Protection of human rights and community health, safety and security (including risks, impacts and management of project's use of security personnel)
- e) Protection of cultural property and heritage
- f) Protection and conservation of biodiversity, including endangered species and sensitive ecosystems in modified, natural and critical habitats, and identification of legally protected areas
- g) Sustainable management and use of renewable natural resources (including sustainable resource management through appropriate independent certification systems)
- h) Use and management of dangerous substances
- i) Major hazards assessment and management
- j) Labour issues (including the four core labour standards), and occupational health and safety
- k) Fire prevention and life safety
- l) Socio-economic impacts
- m) Land acquisition and involuntary resettlement
- n) Impacts on affected communities, and disadvantaged or vulnerable groups
- o) Impacts on indigenous peoples, and their unique cultural systems and values
- p) Cumulative impacts of existing projects, the proposed project, and anticipated future projects
- q) Consultation and participation of affected parties in the design, review and implementation of the project
- r) Efficient production, delivery and use of energy
- s) Pollution prevention and waste minimisation, pollution controls (liquid effluents and air emissions) and solid and chemical waste management

Note: The above list is for illustrative purposes only. All the issues listed may not be relevant to every project.

Source: Equator Principles, 2006: 7.

Technical criteria

Technical criteria and performance measures define such parameters as the minimum capacity operation regime for a generation plant.

From a supply-side perspective, project objectives are usually defined in terms of market and system requirements such as meeting demand forecasts (e.g. kilowatts and kilowatt-hours required) for a given time horizon, increasing access (e.g. percentage of population with access to clean water or using electricity), and meeting system operational needs (e.g. base load, peak-load or cyclical operation).

A COA, however, recognizes that infrastructure is not demanded for its own sake but to provide essential services to enhance economic productivity and quality of life. As such, the definition of goals and needs must involve all stakeholders rather than the traditional list of governments, project promoters, technical experts and financiers.

In the assessment of power development options for the Nile Basin countries under the Nile Equatorial Lakes Subsidiary Action Program, the Project Steering Committee with stakeholder participation developed a set of criteria and performance measures which were then used to determine the range of feasible options. Four screening criteria, which were suggested by the stakeholders and approved by the Project Steering Committee, were applied. One of the criteria was that the size of project had to be greater than 10MW for Rwanda, Burundi and Eastern DRC and greater than 30MW for the East African Community countries. The application of the technical capacity criteria resulted in the elimination of 30MW in options deemed too small.

Module 2: Comprehensive Options Assessment Stages

Economic criteria

Economic criteria focus on increasing national or regional welfare. Most common measures relate to the number of jobs created, support to downstream industries, import content or substitution, projected tax revenue, unit cost of service and effects on macroeconomic measures such as inflation.

As the unit cost of energy can affect inflation, it may be decided to put a cap on the unit cost of energy as screening criteria. Alternatively a set subsidy level can be determined and any further plans would need to determine their viability against the set constraint.

In the NELSAP case, the economic criteria were set as unit cost below a specified threshold value. Options with a unit energy cost above this value would not be considered. Application of this criteria resulted in 922MW in potential projects being eliminated.

Financial criteria

The most common financial criteria and performance measures include the asset total budget, the internal rate of return, the payback period and the breakeven period. These measures are determined by the source of funds to be used. Grant funding is usually focused on a reasonable breakeven period and the ability of the selected plan to meet its operating and maintenance costs without further subsidy. Private capital, on the other hand, has more demands in terms of the return on investment and the shortest possible payback period.

Box 8

Assessment of power development options in the Nile Equatorial Lakes Region

In the assessment of power development options in the Nile Equatorial Lakes Region, four screening criteria were applied, suggested by the stakeholders and approved by the project steering committee. These criteria were:

- The availability of data (pre-feasibility level or better)
- Tolerable socio-economic or environmental risks after mitigation
- Unit cost below a specified threshold value
- Size of project: 10 MW for Rwanda, Burundi and Eastern DRC and 30 MW for the East African Community countries.

The application of these criteria resulted in the elimination of 2,489 MW for the following reasons:

- Lack of data: 520 MW
- Unacceptably high environmental and social impacts even after mitigation measures: 1017 MW
- Excessive unit cost of firm energy: 922 MW
- Options too small: 30 MW.

Source: UNEP, 2007

Source: Equator Principles, 2006: 7.

Stakeholder participation

Stakeholder involvement is critical in determining the range of criteria and performance measures. A transparent process through which stakeholders can push for the inclusion of aspects that are important to them can harness the legitimacy of the eventual outcomes. The exclusion of certain options will be less controversial if these criteria and measures have been agreed through a participatory process. The detailed principles and tools for the process of stakeholder participation are covered in Training Manual 1: Environmental Management Plans.

Module 2: Comprehensive Options Assessment Stages

Session 2.4: Identification of options

Purpose of session

The session covers the identification of options that meet the identified needs and satisfying the set criteria and performance measures. The session covers the importance of demand-side and supply options as well as conventional and non-conventional options.

Learning objectives

As a result of this session, trainees will:

- understand the process of identifying options to meet the set goals and assessed needs;
- understand the need to broaden options beyond traditional supply-side interventions.

ESTIMATED TIME REQUIRED FOR SESSION (MINUTES)

MODULE 2		Professional	Decision-maker	Policy-maker
Session 2.4	Preparation	30		
	Contact Time	60	20	20
	Exercises	20		
	Discussion	40	15	

Preparatory reading

- WCD, 2000: Chapter 8 – Strategic Priorities: Comprehensive Options Assessment, pages 221-224.
- UNEP-DDP, 2004: pages 19-32.
- ESMAP & BNWPP, 2003.
- UNEP, 2007: pages 19-30.
- Longo and Markandya, 2005.
- IHA, 2010.
- IEA, 2000.

Discussion Topic 1

Political and financial considerations determine which options are assessed in Southern and East Africa for large-scale infrastructure. Do you agree, and why?

Discussion topic 2

What is more feasible: requiring proposed projects to meet broader objectives or identifying projects to meet assessed needs?

Module 2: Comprehensive Options Assessment Stages

Introduction

The construction of dams accelerated globally from 1950 until the turn of the twenty-first century, but disputes over their social benefits necessitated some review. The World Commission on Dams (WCD) was the first comprehensive assessment of dam development and it has become a useful reference point for current thinking on water, food, hydropower and many other issues.

The WCD acknowledged that dams have made an important and significant contribution to human development, and that the benefits derived from them have been considerable, but it concluded that dams have not performed as expected in the following areas:

- **Power:** more than half the hydropower dams reviewed generated less power than projected.
- **Water supply:** 70 percent did not reach targets.
- **Irrigation:** almost half have underperformed.
- **Flood control:** dams have increased human vulnerability to floods.

Some of the shortcomings arose from planning processes where appraisals of large dams were confined primarily to technical parameters and narrowly applied economic cost-benefit analyses and which did not consider non-dam alternatives. The decision to build large infrastructure should emerge from a comprehensive and participatory assessment of the full range of policy, institutional, and technical options which starts upstream in the planning process.

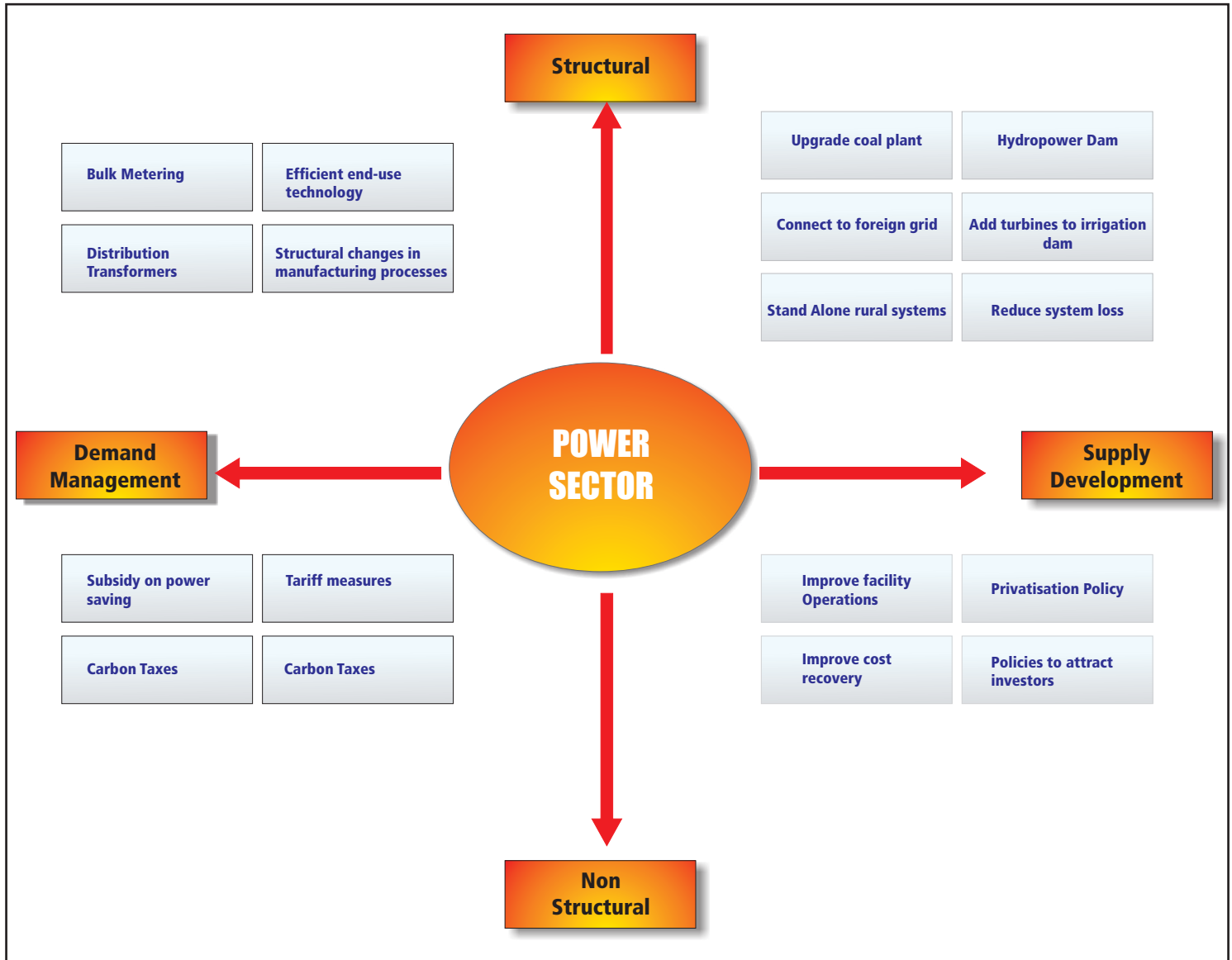
Identification of options

Identifying options includes collating and validating the full menu of possible alternatives to meet the stated goals, objectives and expressed needs.

These options include: technological, policy and institutional responses, such as demand-side and supply-side measures; structural and non-structural alternatives; and conventional and non-conventional options. Options may be categorized further based on whether they contribute to demand-side management, supply-side efficiency, alternative supply options (including rehabilitating and upgrading existing facilities), and conventional supply options.

Module 2: Comprehensive Options Assessment Stages

Figure Range of options available for meeting the needs



Module 2: Comprehensive Options Assessment Stages

A wide range of options for meeting basic needs exists. Some principles of good practice to follow when developing options for a particular project include the following:

1. Involve stakeholders in identifying the options. Involving a stakeholder group reduced the scope for conflict and controversy over the exclusion of infeasible options or the fast-tracking of options that meet immediate needs. provides an interesting example in which an NGO considerably broadened the set of options under consideration from outside the formal decision making process.
2. Include options at all scales of intervention. Depending on the type of exercise, options may include initiatives at the household or community level, as well as larger infrastructure developments. It may mean using options identified in earlier basin and community level planning work.
3. Include options for different timeframes and properly recognize lead times. To meet both immediate and future needs, the options inventory should include options that have shorter and longer timeframes. This requires realistic assessments of how long it will take to implement supply-side measures or for the effects of demand side measures to occur (such as market penetration and adoption or response to tariff changes).
4. Include supply-side efficiency options. Improving the management of existing systems to enhance their effectiveness and sustainability has been the focus of many World Bank projects in recent years. Better management of existing assets can significantly reduce the need for new infrastructure, improving the quality of and access to services at far less cost.
5. Include demand-side management options. Requirements for new supply infrastructure can be significantly reduced by reducing demand through pricing reforms, improving source-efficiency, transmission-efficiency and end-user efficiency, or adopting educational programmes. Where a country has low levels of access to water and energy services, the benefits from demand management will be limited, although they can still play a role alongside new supply development.
6. Include policy interventions and institutional arrangements. Better focused policy and more efficient institutional arrangements can help facilitate the development of new supply options, increase supply efficiencies, or better manage demand. These policy and institutional options can include cost recovery programs, new tariff structures, privatization, decentralization, and management transfer.
7. Address remaining social concerns from past projects. Social and environmental problems from past projects can influence public attitudes toward new infrastructure. The WCD global review showed that, in many cases, promises of compensation and shared benefits from dams had not been kept. Addressing legacy issues may be a sensible option where it will enhance the stakeholders' acceptance of new developments.

Box 10

Wloclawek and Nieszawa dam and options assessment in Poland

In the assessment of power development options in the Nile Equatorial Lakes Region, four screening criteria were applied, suggested by the stakeholders and approved by the project steering committee. These criteria were:

- The availability of data (pre-feasibility level or better)
- Tolerable socio-economic or environmental risks after mitigation
- Unit cost below a specified threshold value
- Size of project: 10 MW for Rwanda, Burundi and Eastern DRC and 30 MW for the East African Community countries.

The application of these criteria resulted in the elimination of 2,489 MW for the following reasons:

- Lack of data: 520 MW
- Unacceptably high environmental and social impacts even after mitigation measures: 1017 MW
- Excessive unit cost of firm energy: 922 MW
- Options too small: 30 MW.

Source: UNEP, 2007

Source: Equator Principles, 2006: 7.

Module 2: Comprehensive Options Assessment Stages

for the development of a sector or river basin for some of the following reasons:

- The need to ensure that decisions are sound and reflect the interests of all their citizens. Good governance and transparent and participatory decision-making require that stakeholders are consulted and empowered to participate in decisions that affect them.
- The magnitude of the basic needs development challenges means traditional supply strategies alone can no longer meet the demands of growing populations in many developing countries and regions. New supply options are needed along with options that contribute to better managing existing assets. Reductions in service demand are also needed.
- There is a greater range of technical options now than a few decades ago – options that may perform similar functions to, replace, or work in combination with large infrastructure.
- Recent trends in financing of development initiatives have seen shifts towards different forms of funding that include public-private partnerships. This has imposed greater rigour on financial returns and necessitated finding the most efficient investment options.
- More emphasis is being placed on poverty alleviation in the global development agenda, making governments more accountable to their citizens' rights and interests.
- Greater concern over the social and environmental impacts of large-scale infrastructure and their alternatives has entailed greater rigour in the assessment of options to meet developmental needs of communities and countries.
Taken together, these trends have broadened the objectives of decision-making from narrowly defined technical and economic objectives to meeting complex human development needs and environmental sustainability.

Policy level options (policy review and development, reform of the legal and regulatory framework)

The policy framework and sector strategy of a country has increasingly become the focus of the debate over large projects with the need for a comprehensive policy and regulatory framework that creates 'a level playing field' as the means to enable the full breadth of options to be fairly considered and assessed without being constrained by policy distortions or subsidies. However, due to other national and geopolitical and social considerations such as environmental sustainability, deliberate policy measures may be introduced to influence (promote or discourage) the adoption certain options in meeting basic needs. These could be in the form of environmental taxes, green electricity quotas.

To this end, policy-makers have to choose the instruments or policy options that enable a country to meet its broad strategic and development objectives. Such policy instruments and options contribute significantly in shaping the landscape in which options will be identified, adopted and implemented. As an example policy makers may require that they internalize the externalities in the electricity production. For this they have to find a solution that gives the best outcome in terms of efficiency, cost minimization, impact on the job market, security of supply, equity of the instrument, technological innovation, certainty of the level of the internalization, and feasibility. The choice of the instrument will require some trade-offs among these criteria.

The government is the key player and takes the lead and responsibility for identification of options at the policy level. Depending on the governance system, the process of identifying policy options is consultative with different stakeholders such as major end users, investors, industry/sector associations as well as consumer groups.

Module 2: Comprehensive Options Assessment Stages

Strategic/sectoral level options (master plans, basin plans, poverty reduction strategies, sector strategies, pre-feasibility)

Different methods and techniques are used in different sectors to assemble options into a plan. In power sector planning exercises, system optimization and simulation models are typically used to prepare least-cost generation expansion plans for different scenarios. For example, a generation optimization model would show how the highest ranked generation options fit together (that is, which power generation options are selected, in what order, and in what timeframe) under different load forecast scenarios. The system models take into account the unique characteristics of each generation option, such as their suitability for base load, mid-range, and peak power generation, and ancillary benefits such as reactive power generation. In more complex planning exercises, a family of different expansion sequences can be produced for each scenario. In the irrigation sector, farm household models help construct alternative farm configurations that provide the required livelihood to the farming community. Plans can differ in the degree of dependence on irrigation, in the degree of specialization, and in the degree of support activities being undertaken, such as credit for farm modernization and input supply. Different farm household models may require different amounts of irrigation water supply and hence correspond with different infrastructure options.

Options for the management of water resources for various uses can also be performed at the river basin level. This approach is premised on the concept of Integrated Water Resources Management and seeks to understand the competing uses and users of finite water resources across sectors and the cross-linkages between them.

Identifying options at the strategic/sectoral planning level is usually a government-led process. Sector stakeholders need to be consulted to include local environmental insights and projections of impacts, especially for the basin level.

- Large-scale commercially oriented projects receive more attention and detailed investigation than small-scale decentralized options. This disparity leads to information asymmetry when comparing the two: much more is known about the large-scale options. This bias is evident in the NELSAP, in which projects with a capacity below 10MW were immediately screened out.
- The description of each option is the source of most controversies. Differences among stakeholders are common when dealing with such parameters as the extent of displacement of people, the discount rate, the unit cost of energy or water supplied, the total project budget and the amount of energy or water availed. The development of guidelines and clear processes for validating each of these is essential in identifying and screening options.
- Policies and the regulatory frameworks in each context play a key role in shaping which options get identified and promoted. Levies, taxes, credits, preferential tariffs, targeted grants are all used by governments to promote the identification and selection of some type of options over others. Today they are often used to promote environmentally-friendly options for meeting water and energy needs.
- The technical and human resource capacity available in a country or region goes a long way to determining the options identified. Different natural resource endowments and different historical practices in meeting water and energy needs lead to different levels of skills related to different options.

Module 2: Comprehensive Options Assessment Stages

Session 2.5: Screening and ranking of options

Purpose of session

The purpose of this session is to introduce the concept and principles of screening and ranking of options.

Learning objectives

As a result of this session, trainees will:

- understand how to screen options using multi-criteria analysis to eliminate unfeasible options against agreed performance thresholds;
- understand the iterative nature of the screening and ranking process.

ESTIMATED TIME REQUIRED FOR SESSION (MINUTES)

MODULE 2		Professional	Decision-maker	Policy-maker
Session 2.5	Preparation	30		
	Contact Time	60	20	20
	Exercises	20		
	Discussion	40	15	

Preparatory reading

- WCD, 2000: Chapter 8 – Strategic Priorities: Comprehensive Options Assessment, pages 221–224.
- ESMAP & BNWPP, 2003: pages 101–103.
- UNEP, 2007: pages 19–30.
- Emerton, 2008.
- Goodland, Mercier and Muntemba, 1995.

Introduction

This phase typically consists of two steps: (1) the rapid exclusion of options (screening); and (2) the valuing (using either an ordinal or cardinal index) of the remaining options (ranking). The options are assessed against the criteria to identify the ones that contribute most to the needs and objectives set for the exercise.

When there are many options, there may be an initial stage where they are screened against 'coarse' criteria and reduced to a more manageable number. This may include grouping similar options and eliminating options that perform poorly against the screening criteria.

For example, options that contradict provisions in national legislation can be excluded at this stage. In the Nepal Medium Hydropower Screening and Ranking Project, compliance with the Laws on Conservation Areas required eliminating potential hydropower sites from the project inventory if they were located in protected parks, conservation areas, and buffer zones. In irrigation development, options that would extract water from trans-boundary rivers beyond quantities agreed in international treaties can be eliminated early on.

The reasons for excluding an option from strategic planning should be recorded. Some excluded options may still be candidates for a later cycle of strategic planning – for example, if they were excluded because of a lack of current information. Screening can help focus efforts toward meeting immediate needs if all options that do not contribute directly to alleviating the immediate need are excluded.

Module 2: Comprehensive Options Assessment Stages

The remaining options are then ranked, usually with a multi-criterion method such as 'rating-and-weighting'. The elements of rating-and-weighting are as follows:

Weighting of criteria

All rating-and-weighting approaches rest on the concept of 'weights' to be associated with each criterion as an indication of their relative importance in assessing the overall attractiveness of options. Stakeholders typically assign these weights after considerable negotiations. These weights are necessarily exploratory, since they represent multi-faceted measures of importance. They are normally adjusted through iteration to test the sensitivity of the screening or ranking process to these weights.

In the case of the Nepal Medium Hydropower Screening and Ranking exercise, the screening criteria were formulated by a study team in consultation with stakeholders and Nepal Electricity Authority (NEA). These criteria were published and stakeholder comment was invited. The study team did not engage local communities at the screening stage. This was a deliberate strategy so as not to create unfulfilled expectations or anxieties in the communities around the 138 sites included in the exercise, which could lead to speculation on land and changes in price. The screening criteria reflected:

- congruence with regional development policies;
- construction road transmissions access;
- hydrology and cost;
- watershed conditions;
- World Bank and national safeguard policies on social and environmental aspects;
- indices such as persons resettled and land take/MW, biodiversity impacts;
- current level of study.

After debating the screening criteria results, the steering group authorized 44 sites to proceed to coarse ranking. The list of these 44 sites was published in national and regional newspapers and the screening report was sent directly to key stakeholders, inviting comments in a fixed timeframe.

The tables below shows the course ranking criteria that were set for 'technical/economic' as well as 'environmental/social' factors. The weightings were suggested by the study team and adopted through stakeholder consultation.

Options inventory	Screening	Coarse ranking	Fine ranking
Expand the initial inventory of 60 sites to 138 sites.	Eliminated 94 sites from the 138 to base ranking on 44 sites.	Coarse-ranked 44 sites and selected 22 for fine ranking.	Fine-ranked 22 sites and selected 7 projects to proceed to full feasibility/EIA study.
Stakeholder defined criteria and adding sites proposed by stakeholders	Multi-criteria screening Stakeholder reviewed criteria and results.	Multi-criteria analysis framework. Stakeholders involved in developing criteria and criteria weights, project scoring method, and reviewing ranking results presented in a series of preference matrix for all scales of options.	

Module 2: Comprehensive Options Assessment Stages

Options inventory	Screening	Coarse ranking	Fine ranking
<p>Screening and ranking team to add options and where stakeholders identified new options:</p> <ul style="list-style-type: none"> • Project scale 10-50 MW, 50-100 MW, and 100-300 MW • Regional diversity and spread across basins in the country • Mix of run-of-river, peaking, and storage options 	<p>Criteria reflected:</p> <ul style="list-style-type: none"> • Congruence with regional development policies. • Construction road transmission access • Hydrology and cost. • Watershed conditions • Bank/national safeguard policies on social and environment aspects • Indices (e.g. persons resettled and land take/MW, biodiversity impact) • Current level of study 	<p>Techno-economic criteria:</p> <ul style="list-style-type: none"> • Standardized design parameters • Levelized power cost • Power system fit <p>Environmental-social criteria:</p> <ul style="list-style-type: none"> • Based on rapid appraisals • Biography and social impact sub-criterion • Consultations with affected communities. 	<p>Techno-economic criteria:</p> <ul style="list-style-type: none"> • Reconnaissance layout • Levelized power cost • Power system fit • Internalized environment and social management. • Risk analysis <p>Environmental-social criteria:</p> <ul style="list-style-type: none"> • Preliminary EIA- level • 88 impact sub-factors • 22 enhancement sub-factors • Consultation with affected communities

Source: NEA and CIWEC, 1998

Table Coarse ranking composite technical/economic criterion

Criteria	Scoring system		Weighting
Economic Supply Cost (75%)	Discounted cost/Discounted energy (in US¢/kWh), inclusive of civil, E&M, transmission, road access, environmental mitigation and cost contingencies		75%
System Fit for Medium-Term Supply (25%)	Project size	Installed capacity in three size ranges reflecting what is needed in the 'project basket' for system planning	3%
	Firm Energy Contribution	Ratio of firm energy to average energy production from the project	10%
	Flexibility of dispatch	Storage and ability to dispatch at peak or seasonally	7%
	Regional Location	Regional supply-demand balance	5%
			100%

Source: UNEP, 2007; NEA and CIWEC 1998.

Module 2: Comprehensive Options Assessment Stages

Table Coarse ranking composite environmental/social criterion

Module 2: Comprehensive Options Assessment Stages

Scoring and rating of alternatives against each criterion

Each option is evaluated against each criterion. Because rating-and-weighting methods allow non-commensurate criteria to be used, these ratings must be normalized on a standard scale, typically a 1-100 scoring scale. Clearly, there is a considerable degree of judgment required in assigning these ratings. Rather than seeing this as a weakness, this should be seen as an opportunity for the stakeholder groups to engage and discuss the pros and cons of a particular design and to explore the implications of different ratings.

Each option is then assigned an overall score, obtained by multiplying the rating score of each criterion by the corresponding importance weight for that criterion and then summing these weighted ratings for that option. This overall score describes how well the option meets all the criteria. The options can then be arranged in order of their overall scores to give a preference ranking.

The preference ranking is usually highly dependent on the importance of the weights used, the choice of criteria, and the scaling method. Discussion of the preference order of the options and what weights and ratings influenced the results will usually lead to changes in the weightings and ratings and a recalculation of the preference order.

Because of its simplicity and transparency, rating-and-weighting is particularly useful for decision-making in the public domain. Rating-and-weighting approaches make choices and considerations explicit and facilitate discussions among stakeholders. In addition, they can be used at various levels of decision-making. A group of farmers might use the method in order to establish their own preferences for different development options, while a government agency responsible for sub-catchment management might use the method in order for strategic basin management plans.

The rating-and-weighting process promotes transparency and communicates the values held by the different stakeholders. It gives a picture of what different stakeholder groups deem to be important. The use of a wide range of criteria means that divergent views on the importance of one criterion may not strongly affect the overall ranking of the option.

Obviously, assigning single rating values for each option against each criterion cannot fully replicate the complexity and subtlety of human decision-making. In most cases, the stakeholder groups involved in the decision-making will not come to the process with a clear understanding of the consequences of their choices. The decision-making process is necessarily one of exploration and learning, and the models and other methods of determining the rating values should be seen as aids that inform a decision process. Consequently, the development of rating values is an iterative process that evolves as the stakeholders refine their understanding of the consequences of each option.

Models can be used to measure the performance of individual options against criteria. Models can be complex or simple. As an example of complex models, the downstream effects of options that change flow regimes and ecological functioning of the rivers are often assessed using a complex hydrological model. Where ecological effects are expected, the hydrological model can be coupled to one or more ecological models of, for example, wetland response to floods and ensuing changes in physical habitats.

The risks associated with the various options can be included as criteria. If not specifically included in the screening and ranking criteria, it is wise to include a risk analysis as part of the assessment. Standard techniques include:

Module 2: Comprehensive Options Assessment Stages

Qualitative techniques

- A logical framework in which the categories of risk and assumptions about managing these risks are elaborated.
- Risk matrices that show the probability of risk occurrence (as high, medium, low) against the seriousness of the impact, and those impacted.
- Poverty and vulnerability risk analysis that indicates the risk that a particular option poses to poor and vulnerable groups.
- Quantitative techniques
- Probabilistic analysis that indicates the likelihood of certain goals, such as a specific internal rate of return being achieved.
- Spreadsheet-based applications of various kinds.

The ways in which risks affect different groups in society, particularly the poorest and most vulnerable, should be part of the risk analysis. Distribution Analysis shows how the benefits and costs of an option would be shared across stakeholders, especially poor and vulnerable groups. A review of impoverishment risks identified during the stakeholder analysis may also help address poverty related concerns.

Session 2.6: Assessing and ranking alternative plans

Purpose of session

The purpose of this session is to provide context and approaches in combining the identified options into alternative plans for meet the range of needs and objectives identified.

Learning objectives

As a result of this session, trainees will understand the process of combining different project attributes to meet the range of social, environmental and development objectives

ESTIMATED TIME REQUIRED FOR SESSION (MINUTES)

MODULE 2		Professional	Decision-maker	Policy-maker
Session 2.6	Preparation	30		
	Contact Time	60	20	20
	Exercises	20		
	Discussion	40	15	

Preparatory reading

- WCD, 2000: Chapter 8 – Strategic Priorities: Comprehensive Options Assessment, pages 221-224.
- UNEP, 2007: pages 19-30.
- World Bank, 1991.

Module 2: Comprehensive Options Assessment Stages

Assessing and ranking alternative plans

Once the characteristics of the shortlisted options and their ability to meet the needs have been detailed, the study team can bundle these options into alternative development plans using a combination of quantitative and qualitative analysis. Each alternative development plan consists of a group of options that would meet the specified needs (in one or more scenarios). illustrates how different portfolios of options are constructed and combined to form a set of alternative plans, from which the preferred (or recommended) plan is eventually selected.

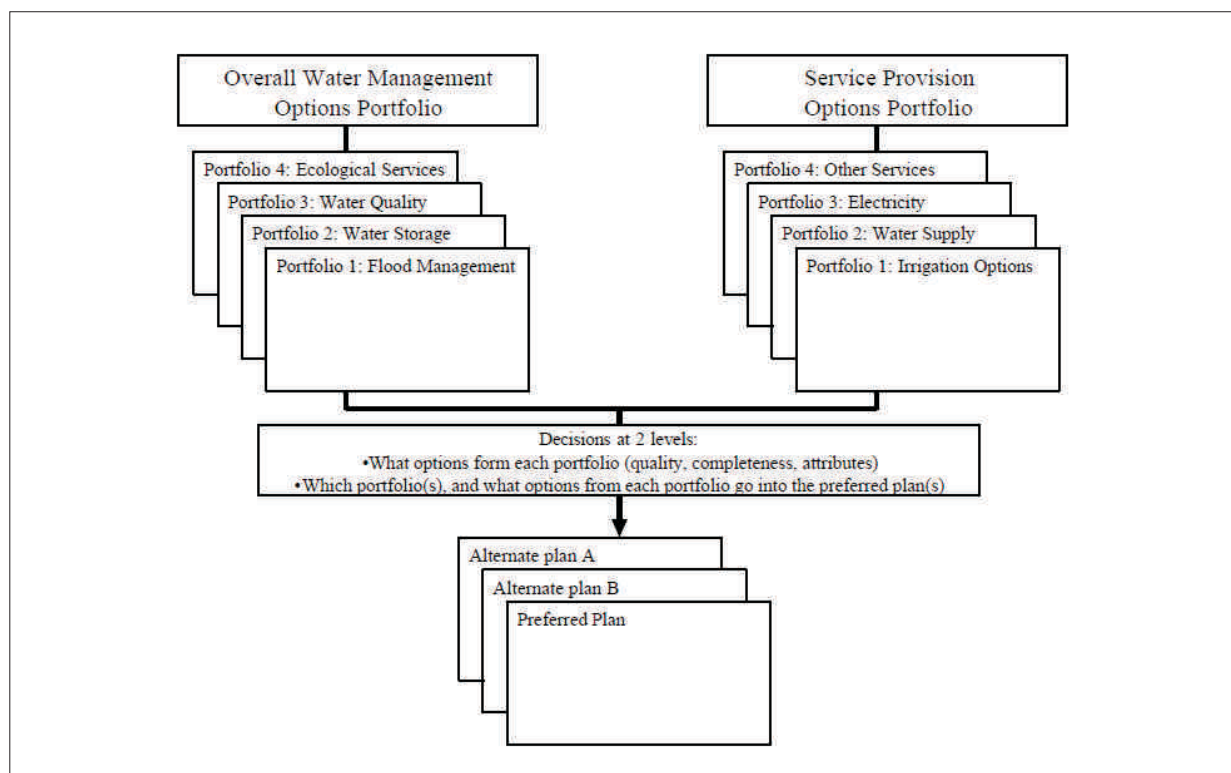
There are different methods and techniques used in each sector to assemble options into a plan. In power sector planning exercises, system optimization and simulation models are typically used to prepare least-cost generation expansion plans for different scenarios. For example, a generation optimization model would show how the 10 highest ranked generation options fit together (that is, which power generation options are selected, in what order, and in what timeframe) under different load forecast scenarios. The system models take into account the unique characteristic of each generation option, such as their suitability for base load, mid-range, and peak power generation, and ancillary benefits such as reactive power generation.

In more complex planning exercises, a family of different expansion sequences can be produced for each scenario. For example, the National Power Plan exercise in Pakistan (1992-94) identified expansion sequences for all-hydro, all-thermal, mixed thermal-hydro, different fuel types (imported and domestic), different generation and transmission supply reliability levels, and different demands. Demand-side management alternatives were assessed outside the model and used to produce the different demand scenarios.

In the irrigation sector, farm household models help construct alternative farm configurations, which provide the required livelihood to the farming community. Plans can differ in the degree of dependence on irrigation, in the degree of specialization, and in the degree of support activities being undertaken, such as credit for farm modernization and input supply. Different farm household models may require different amounts of irrigation water supply and hence correspond with different infrastructure options.

Alternative plans can also be developed qualitatively as a group learning exercise. Coherence between options from different portfolios can be identified. For example, increasing the irrigation water fee may not be an option that ranks highly in a rating-and-weighting analysis, but could be an essential precondition to undertaking a higher ranked option such as rehabilitating of major water infrastructure.

Module 2: Comprehensive Options Assessment Stages



Source: ESMAP & BNWPP, 2003: 105

The Advisory Group, with the assistance of the Study Team, establishes which of the alternative plans it prefers using criteria that may be similar to (or broader than) the criteria applied to assess the individual options. For example, criteria may include the share of benefits and costs between regions, or broader criteria related to national food security, national or regional energy security, and aggregate implications for poverty alleviation and environmental impacts.

Equity is an important consideration in comparing alternative plans. An analysis of equity impacts shows how the various benefits, cost streams, and risks are distributed among the stakeholders as a proportion of the total expected benefits, costs, and risks. This allows redesign of the intervention in order to arrive at a socially acceptable distribution of costs, benefits, and risks. Often, the assessment of such risks is already done in the evaluation of individual options, but is undertaken again in comparing alternative plans at a deeper level of analysis.

shows two examples from Canada that discuss building portfolios and evaluating alternative plans based on these portfolios. They show the contrast between a more comprehensive approach to assessing demand-supply options to build portfolios, and a more generic approach to building and assessing portfolios. The power system in Ontario was nuclear-dominant, but had diversified generation sources. The power system in Quebec, on the other hand, was almost totally hydro, and the provincial utility at the time was seeking to evaluate other renewable options and specifically introduce wind-generation.

Module 2: Comprehensive Options Assessment Stages

Box 11

Building options portfolios and plans: Canadian examples

Over a three-year period starting in the late 1980s, Ontario Hydro undertook a multi-year Demand-Supply Review with an extensive public consultation process. At that time, it relied on nuclear generation for close to 70 percent of supply. The process involved the sequential development of a new load forecast for the Province of Ontario and preparation of a series of portfolios for demand management and supply development. The various options were compared within each portfolio, assembled into a series of portfolio plans and the plans were compared. A demand management plan, an infrastructure rehabilitation and management plan, and plans for each major supply option—including nuclear, hydro, thermal, co-generation, renewables, inter-fuel substitution, and fuel-switching—were developed. Eventually a proposed Demand/Supply plan and three alternative Demand/Supply Plans were prepared and presented to the government.

At each step in the process—options identification, evaluation, and portfolio plan formulation there were extensive public consultations, hearings, and public debate. Ontario Hydro funded submissions from NGOs and civil society based on published criteria.

Hydro Quebec, which relied primarily on hydropower generation, used a different approach to engage the public and stakeholders in strategic-level power options assessment. They assessed a series of generic environmental comparisons of power generation options (wind, solar, hydro, cogeneration, tidal power, conventional thermal) against criteria such as life-cycle greenhouse gas emissions, acid precipitation, land requirements, energy payback, and biodiversity impact. They fed these comparisons into the public debate about options. For the key hydropower portfolio, Hydro Quebec introduced a 'Triple Bottom Line' – community agreement had to be secured, projects had to be economically feasible, and projects had to be environmentally acceptable. When considering options for its hydropower portfolio, Hydro Quebec introduced a practice where community agreement was simultaneously sought on a number of possible sites that had been studied to a very preliminary level. The normal cycle of preparing project studies to confirm environmental and technical feasibility was commenced only for those sites where community acceptance had been reached. This turned around the usual practice, where economic and environmental studies are undertaken before community agreement is sought.

Sources: Ontario Hydro, 1990; Hydro Quebec, 2001.

MODULE 3: Managing The Process Of Comprehensive Options Assessment

Session 3.1: Managing the process of Comprehensive Options Assessment

Purpose of session

The purpose of this session is to present institutional, process and personnel requirements for the effective management of COA.

Learning objectives

As a result of this session, trainees will understand the necessary institutions and processes necessary for effective consultation and participation of stakeholders in COA.

ESTIMATED TIME REQUIRED FOR SESSION (MINUTES)

MODULE 3		Professional	Decision-maker	Policy-maker
Session 3.1	Preparation	30		
	Contact Time	60	20	20
	Exercises	20		
	Discussion	40	15	

Introduction – the benefits and costs of stakeholder involvement

Many governments are cautious when it comes to promoting stakeholder involvement in public decision-making. They may be unwilling to devolve authority, concerned about the time and resources required for stakeholder involvement, and doubtful about the added value of involving stakeholders (ESMAP & BNWPP, 2003: 17).

Involving stakeholders, however, can lead to better development outcomes, make the project more attractive to external financing, and improve its legitimacy and public acceptance. Lower overall costs outweigh the incremental time and cost spent prior to decision making. Investing time and resources up-front in a planning exercise is the best way to manage the social risks that are associated with major infrastructure projects. Assessing a comprehensive range of options upstream in strategic planning helps develop a better and more diverse portfolio of interventions for project planning, including the identification and early clearance of fast-track projects that address immediate needs and the early elimination of poor projects.

The time and cost associated with stakeholder participation in options assessment will vary depending on the circumstances. A conservative assumption would be that an options assessment with full stakeholder participation could be undertaken in about two years at a cost of around US\$2 million. The screening and ranking process for the Medium Hydropower Study Project in Nepal took 14 months to complete (versus the anticipated 3 months), at a cost of US\$1.2 million. The exercise started with an inventory of 138 potential hydropower projects and resulted in the selection of seven sites for full feasibility and environmental impact assessment study (ESMAP & BNWPP, 2003: 29).

MODULE 3: Managing The Process Of Comprehensive Options Assessment

Principles

A joint UNDP-World Bank sourcebook identifies four principles for stakeholder involvement in options assessment (ESMAP & BNWPP, 2003: 12-14):

- Principle 1: Create an enabling environment for stakeholder involvement and options assessment
- Principle 2: Involve all relevant stakeholders
- Principle 3: Assess all options strategically and comprehensively
- Principle 4: Reach a decision

Create an enabling environment for stakeholder involvement and options assessment

The environment can be improved by developing enabling policies and legislation, by reorienting existing systems for planning, and by building capacities—all aimed to ensure that major public decisions are informed by stakeholder involvement and options assessment.

Policies and legislation can be introduced to ensure that stakeholder involvement and options assessment are systematically undertaken in major planning exercises. Governments can formalize roles and responsibilities in public decision-making through policies and legislation. Not only does this make the process of decision-making more efficient, it also legitimizes the involvement of affected parties (ESMAP & BNWPP, 2003: 38).

gives the International Energy Agency's recommendations on the inclusion of options for power generation in national policies and regulations.

Box 12

Building options portfolios and plans: Canadian examples

The International Energy Agency (IEA) produced generic recommendations on how governments might incorporate the assessment of options in national power sector policies and regulatory frameworks.

Nations should develop energy policies that clearly set out objectives regarding the development of power generation options, including hydropower. For example, (a) national energy policies should compare electricity generation options fairly, by 'internalizing' or fully accounting for environmental and social costs; (b) comparison of power generation options should be based on a life-cycle analysis, by assessing impacts based on the services provided by each technology; and (c) the social, environmental, and economic tradeoffs required to establish a national energy policy should be supported by public debates and the result of a consensual approach.

The IEA Working Group's mandate was hydropower and the environment. It went on to recommend that countries should consider strategic environmental assessments (SEAs) as a planning tool at the national energy policy level. At the national or regional policy-making stage, such assessments help integrate environmental and public concerns into energy policy-making and reconcile development, environmental protection, and community rights. One important objective of a strategic environmental assessment for energy policy would be to reduce uncertainties regarding the potential development of hydropower resources, for example by defining river reaches where hydropower would be environmentally or socially unacceptable.

Source: IEA, 2000

MODULE 3: Managing The Process Of Comprehensive Options Assessment

illustrates how South Africa introduced new legislation to both facilitate participatory planning and consider a wide range of options early in the planning process. The new regulatory framework for water service provision in South Africa changed the way the city of Cape Town met urgent demands for water supply in the context of drought and water security. A set of demand management and water recycling options were pursued in parallel to the development of the Skuifraam dam to increase water storage capacity for the city and its surrounding municipalities.

Box 13

Building options portfolios and plans: Canadian examples

South Africa introduced a new National Water Services Act (1997) and National Water Resources Act (1998) that set out the principles for participatory planning and public consultations on water resource management and water services provision activities. The Water Services Act specifically required all municipalities to prepare a Water Services Development Plan (WSDP) using collaborative processes. Each WSDP sets out the way in which the water services authority plans to deliver services in its area of jurisdiction. It must describe and analyse current and future demands, the type of services to be provided to each customer category, the infrastructure requirements, a water balance, organizational and financial arrangements, and an overview of environmental issues. The act requires each Water Authority to take its WSDP plan through a public participation process where the public, other stakeholders, and water services authorities and providers can comment. Each plan provides a process in which stakeholders interact on overall priorities for new supply and demand management initiatives, key aspects of how the facilities are operated, and the quality of the water services delivered.

Source: ESMAP & BNWPP, 2003

Many countries have conducted master planning exercises for their water and power sectors. The framework within which this planning occurs depends on the economic, cultural, and historical aspects of each country. Although there is no single, correct way to undertake these planning studies, there are four principles that lead to more informed decision-making, which is based in the assessment of diverse options and the involvement of stakeholders. They are:

- use structured processes;
- orient processes to meet broad needs and objectives;
- locate options assessments 'upstream' in strategic processes;
- use iterative and integrated processes (ESMAP & BNWPP, 2003: 42).

In the past, planning processes in the water and energy sectors were strongly oriented toward identification and preparation of an investment portfolio that was primarily intended for developing new infrastructure. Thus, planning processes began with a clear, but very limited, idea of the possible outcomes (ESMAP & BNWPP, 2003: 43)

Today, planning processes should be designed to identify all options and establish clearly what needs and objectives are to be addressed by the planning outcomes. The following factors are important when identifying and defining needs and objectives for a planning exercise:

1. Identify and rank the needs of different groups from the outset, including the needs of those groups upstream and downstream of proposed infrastructure whose livelihoods depend on environmental services.

MODULE 3: Managing The Process Of Comprehensive Options Assessment

2. Account explicitly for immediate needs and ensure they are not compromised by the duration of the planning exercise. That is, the needs of some groups may be so urgent they must be met without undue delay. It is possible to fast track some priority options to meet those needs, provided this is acceptable to all stakeholders. For example, in the case of Berg Water Project for the City of Cape Town, a series of water restrictions aimed at high-volume users, and other demand management and wastewater recycling measures were introduced to address water shortages and ensure poorer areas were serviced before approval to proceed with a new dam was given.
3. Account for broadly defined development needs, including those associated with the Millennium Development targets. Often countries have explicitly stated their long-term objectives in their Country Development Framework, or Five-year Plan. This should include macroeconomic needs such as reducing imports (food or fossil fuel), macroeconomic stability, and foreign exchange balances, but also socioeconomic objectives such as poverty reduction.
4. Account for development effectiveness. For example, when meeting the need for water services for irrigation, also consider options that enhance the likelihood of delivery of other inputs such as seed, fertilizer, labour, and credit.
5. Include the needs of other sectors in the assessment. This is especially true where multi-function options such as dams are considered, given their broad and systematic impacts and the scale of the investment.
6. Account for changes in development needs over time. This is especially important when considering assets with long lifetimes. This would, for example, encourage the identification of options that provide flexibility (ESMAP & BNWPP, 2003: 44-45)

The WCD found that in many instances, the decision to build a dam had already been made by the time options assessment took place – perhaps triggered by the need for external financing. Moving options assessment upstream allows the genuine consideration of the full range of options, and brings with it a number of advantages:

- Better decisions are likely to emerge, because the assessment is not constrained by sector-specific orientations.
- Inappropriate options can be eliminated early in the process. This is particularly important for infrastructure projects, because proponents may spend considerable time and resources on site investigation works, baseline data, monitoring, and studies for projects that are clearly inferior to other options. Early options assessment can also result in the need to develop basic information profiles for a wide range of options.
- Governments have more flexibility to address the legitimate interests and concerns of all constituencies. This also helps improve related strategic decisions such as improving the enabling environment, sector financing, and regulatory and institutional reform.
- There is an opportunity to 'fast track' specific projects where there is consensus that there are pressing needs that should be met immediately.
- Upstream assessment makes subsequent decision-making more efficient by avoiding the need to re-open the options debate each time a decision is required for a specific dam.
- If a dam does emerge as a preferred option, then it will be as a result of a legitimate, strategic choice among alternatives. This has great advantages in getting public support, acquiring financing for the dam, and avoiding costly delays (ESMAP & BNWPP, 2003: 46).

How to bring the identification and assessment of options 'upstream' in the planning process depends on the circumstances in each country. A common starting point is to introduce Strategic Environmental Assessments (SEAs) with appropriate stakeholder involvement. SEAs generally provide a broad assessment of priorities and identify the critical issues likely to surface in subsequent steps of the planning procedure. Whereas SEAs generally concentrate on the physical environment and sustainable resource use, Social Assessments have a similar role but assess social issues, particularly issues of equity.

MODULE 3: Managing The Process Of Comprehensive Options Assessment

Involve all relevant stakeholders

The success of COA is largely dependent on the extent to which it galvanizes the different stakeholders to reach concrete decisions through robust, transparent and open processes of participation and communication. To foster stakeholder involvement, information and studies must be made accessible to all stakeholders. Difficult choices may have to be made, which require an atmosphere of trust and openness. Stakeholder involvement requires considerable commitment and may require professional management, but can help resolve conflicts that may arise later in project level decisions. It takes resources and time to foster this degree of effective and meaningful participation. Extra efforts may need to be directed to poor and marginalized stakeholders, who are to be primary beneficiaries in projects. (ESMAP & BNWPP, 2003: 13-14).

The quality and acceptability of decisions reached in a major planning exercise for major infrastructure development depends to a large degree on whether the appropriate stakeholders have been involved in a meaningful manner (ESMAP & BNWPP, 2003: 53).

To facilitate the meaningful involvement of appropriate stakeholders in planning exercises, five key groups may be involved in options assessment, as outlined below. The titles and functional relationships of these groups will vary according to circumstances and purpose

- The Process Manager is the unit of the government agency or other organisation mandated to carry out an options assessment, normally as part of its planning responsibilities. The Process Manager provides the terms of reference for the exercise and plays a managerial role in all steps of the exercise, including the identification of stakeholders.
- The Advisory Group is the core group of stakeholders interacting with the process manager and/or study team during the exercise. The participants are representatives of interested and affected parties formally invited to participate and represent the interests of their constituencies. Members could include representatives of government departments and agencies, but the overall membership should be a fair reflection of those with a legitimate interest in the outcomes of the decisions, including those often excluded. Depending on the autonomy granted by government, the Advisory Group may review and advise on its own composition to ensure that it is representative of all interests.
- The Study Team is a multi-disciplinary team of professionals engaged by the process manager, either on a full or part-time basis. Staff may be seconded from government agencies or nongovernment organisations, or may include independent consultants. The Study Team would prepare profiles of options, undertake site investigations, surveys, prepare analyses and briefings for the Advisory Group deliberations, and develop and disseminate information packages to wider stakeholder interests and the public, as determined by the Process Manager and/or the Advisory Group.
- The Facilitator is an independent, professional facilitator engaged by the Process Manager to guide interactions among participants of the Advisory Group and possibly the Stakeholder Forum.
- The Stakeholder Forum represents interested and affected parties and acts at key decision moments as a sounding board for the Process Manager and Advisory Group. Depending on the scope and scale of the exercise, it could include government representatives, NGOs, private sector interests, transnational entities, local communities, grassroots advocacy organisations, and specific interest groups who are affected by the decision under consideration (ESMAP & BNWPP, 2003: 55).

BOX 14 provides an example of the structures and mechanisms employed to involve stakeholders in a water project in Southern Africa. It highlights the changes in stakeholder involvement in decision-making in the Lesotho Highlands Project. Although the project had already been selected it shows a practical example of how to 'institutionalize' the participation of affected people in project options assessment.

MODULE 3: Managing The Process Of Comprehensive Options Assessment

Assess all options strategically and comprehensively

All options should be put on the table and should be assessed equally. Options include those proposed by stakeholders; options for new development and for improved management; structural and non-structural options; demand-side and supply-side options; options at different scales; and, depending on circumstances, options aimed at correcting problems from earlier developments.

A level playing field for the assessment comes through a step-wise and at times iterative assessment procedure, wherein criteria for the assessment are agreed upon and options are screened and ranked, assessed individually and jointly, and selected for inclusion in a preferred development plan. Careful records should be kept of the rationale behind the recommendations in order to fully inform the authority making or confirming the decision (ESMAP & BNWPP: 14).

Process Managers should seek to ensure the following:

- That all options deemed relevant to stakeholders are included in the assessment, so that the exercise is enriched with perspectives that otherwise would not have been included.
- That options are evaluated in a fair and transparent manner. The steps in options assessment should address aspects that stakeholders deem important, should be understood by all stakeholders, and should be seen as even-handed.
- That reasons for exclusion (and inclusion) of options should be clearly stated (ESMAP & BNWPP: 86).

Box 14

Structure and mechanisms for involving stakeholders in the Lesotho highlands project

The Lesotho Highlands Water Project (LHWP) is the largest water transfer project in the Southern African region. It is to be developed in five phases over a number of decades, involving a series of dams and tunnels to redirect a portion of the water presently leaving Lesotho in the Senqu/Orange River northward to the Vaal River basin, where it will be utilized for municipal and industrial purposes in the Gauteng Province of South Africa. The scheme was agreed to in a 1988 treaty between the governments. The Lesotho Highlands Development Authority (LHDA) was established shortly afterwards. Phase 1A, which included the Katse Dam, was completed in the mid-1990s. Phase 1B involved construction of the Mohale Dam, tunnels to the Katse Dam, and associated infrastructure to increase water transfers. After strong criticism from local and international NGOs about what were seen as weak mechanisms for community involvement in the Phase 1A development, LHDA changed its approach to community participation. The World Bank also clearly stated that it would not proceed with funding of Phase 1B unless there was satisfactory progress on the social and environmental issues arising from Phase 1A early in Phase 1B. LHDA provided funding for an independent consultancy to assess the capacity of local NGOs; recommend measures for improved NGO involvement; and determine their ability and willingness to have implementation and/or monitoring roles.

To improve the participatory framework, the LHDA established a Community Participation Unit in its headquarters and four field operations teams with community participation officers. Residents of local communities in the Phase 1A and 1B areas elected representatives to liaise with LHDA on various issues, including compensation, conflict resolution, and local development. Local communities in the Phase 1B area were involved through a structured process in the design of resettlement and social impact mitigation strategies, and of EIA/EAP as a whole. The EIA, EAP, and compensation policies were reviewed in public meetings in Maseru and discussed in various pitsos (local meetings) throughout the Highlands. A People's Involvement Program was introduced in Phase 1B and, in consultation with Phase 1A stakeholders, they decided to retroactively apply the procedures for Phase 1B in the Phase 1A communities. LHDA also worked with local NGO partners toward developing a separate fund for NGO capacity building. Local communities were engaged in numerous other aspects of the overall project such as preparation of the Emergency Preparedness Program for dam safety and other dam-induced hazards. With support from consultants starting in 1997, LHDA also adopted a new participatory approach to develop a policy on and monitor environmental flow releases from the dams considering environmental quality indicators. Processes have been established to involve local NGOs and community representatives in monitoring and evaluation, which will be used to adjust operations of the reservoir.

MODULE 3: Managing The Process Of Comprehensive Options Assessment

Workshops on the socioeconomic impacts of the LHWP and on development measures to address these impacts helped to enhance collaboration with national-level and international NGOs. Notwithstanding the improvement in the structure and mechanisms for involving stakeholders, there is still criticism regarding the actual functioning of these mechanisms; for example, local NGOs have been critical of LHDA's previous level of performance on the social aspects of the project.

Sources: LHDA, 2002; Hirji and Ziegler, 1999.

Reach a decision

Efficient assessment processes require clarity about the role of the stakeholders in the options assessment exercise and clarity about the procedures, timeframes, and resources. Ideally, there should be a formal and public response from the decision-making authority to the recommendations of the options assessment exercise. Agreements reached between stakeholders should be confirmed, including methods for ensuring compliance. It is crucial to address compliance of agreements and to monitor whether decisions, once implemented, lead to the desired outcomes. Better planning processes are important, but are not an end in themselves (ESMAP & BNWPP: 14)

Effective assessment processes involving stakeholders require clear terms of reference. It is important to ensure that the Advisory Group and their constituencies are clear about the scope of the exercise, what level of autonomy they will enjoy, what their participation implies in terms of group cohesion, and the expected form and nature of the outputs from the exercise.

provides an example in which clarifying the scope of the screening and ranking of hydropower options in Nepal helped define the options assessment exercise, and where stakeholders recommended further modifications to the scope of the exercise.

Box 15

Establishing clear boundaries for a strategic exercise

The terms of reference for Nepal's Medium Hydropower Screening and Ranking exercise were established in discussions among the Government, IDA, and the Nepal Electricity Authority. The outcome was to focus on medium-scale (10-300 MW) hydropower schemes suitable for domestic grid supply. The exercise explicitly excluded both large storage projects over 300 MW that were primarily for export, and small micro-hydro options for rural and off-grid development. These options were to be addressed in separate development planning exercises. The terms of reference also stated that the assessment was to be conducted as a participatory process employing a multi-criteria framework.

Clarifying the scope of the exercise was important because, at the time, there was an ongoing debate that had become confused about different scales of hydropower development. As a result, it was increasingly difficult to reach decisions that reflected consensus. Nevertheless, there was a consensus view that medium-scale options provided the way forward for grid supply in the medium term, and thus it was important to set aside the debates about other scales of energy production. With this issue resolved, the exercise was able to proceed with all stakeholders willing to engage the process and work toward a well-defined goal.

Source: ESMAP & BNWPP, 2003: 118.

MODULE 3: Managing The Process Of Comprehensive Options Assessment

Outputs need to be clearly defined. This can mean, for instance, specifying whether the options are to meet immediate or long-term needs, and whether they will provide a single plan or alternative plans for different scenarios. It can also mean resolving how information, reports, and submissions will be maintained for the next cycle of planning, as well as setting out the procedures for access to this information by stakeholders. The process manager should address any differences in understanding or expectations about the intended outputs as early as possible. In a larger exercise, the stakeholder analysis can help verify whether expected outputs are understood and underwritten. In a smaller exercise, this can be checked through group discussion. Well defined outputs avoid diversions in the assessment and create the conditions for reaching decisions efficiently.

In some situations, the terms of reference for options exercises are derived from provisions in the regulatory system. For example, the terms of reference for the periodic updates of Master Plans to identify and categorize (a) sites that could be developed with dams and (b) rivers that would be protected from development-is based on a dual planning system defined in legislation.

The authorities and responsibilities of the various actors in the exercise need to be clearly defined. Examples are given in Table 7.

Table 7 Defining authorities and responsibilities and setting clear boundaries for exercises

Process specification and terms of reference	Examples
<p>Legislative and regulatory approval Sector legislation: specific process, subject matter and stakeholder involvement requirements to be followed.</p> <p>Other sector legislation: cross- cutting legislation in other sectors such as that of environmental assessment.</p>	<p>In South Africa, the Water Services Act (1995) required (a) alternatives assessments be undertaken prior to consideration of the Berg River project (Skuifraam Dam); and (b) all municipal water supply authorities to produce a Water Services Development Plan in a collaborative process that indicated future needs, levels of service, and investments</p> <p>In the Nepal case, the time periods for advance public notice of meetings and for review of proposals were adopted from those time periods specified in environmental regulations for EIAs. They were not legally required for strategic exercises, but they provided guidance for the process manager that was acceptable to stakeholders</p>
<p>Sector level practice</p> <ul style="list-style-type: none"> • Reflecting past practice • Based on generic guidelines 	<p>In Pakistan, the National Power Plan exercise (1992-1994) built on the previous experience and practices of the Water and Power Development Authority (Planning Department Power) and sought to broaden and deepen them. New assessments of all demand and supply options were undertaken-such as demand-side management in all sectors; geothermal, oil, gas, and coal development; thermal and hydro siting; and grid and off-grid renewable alternatives. A series of reports (each concerning a family of options) were prepared in a format that could be updated as input to subsequent planning cycles.</p> <p>Guidelines for updating these assessments were also produced, and the task of updating options assessments was written into the annual work plan of the Planning Department (Power).</p> <p>In South Africa, the Department of Water Affairs and Forestry (DWAF) issued a set of generic guidelines for public participation in strategic and project-level planning exercises where DWAF was a partner. These guidelines were aimed at process managers of planning exercises, stakeholders, and the general public.</p>

MODULE 3: Managing The Process Of Comprehensive Options Assessment

Process specification and terms of reference	Examples
<p>Terms of reference for an options exercise</p> <p>Issued by the process manager for the overall exercise. Developed within the sponsor organization.</p>	<p>In many World Bank projects, terms of reference for options assessment exercises that inform project identification and preparation stages of the project cycle may be prepared jointly by the mission team and the sponsoring organization.</p> <p>This is more likely to be the situation when it is the first occasion where rigorous options assessment procedures with broadly based stakeholder participation have been introduced.</p> <p>Otherwise, the responsible ministry or department prepares the terms of reference based on established sector level guidelines taking into account emerging good practice, and reflecting any provisions in regulatory frameworks.</p>

Source: ESMAP & BNWPP, 2003: 119-120.

The type of decision being made, the place of the decision in the project cycle, the role of the government in the exercise, the autonomy of the stakeholder Advisory Group, and the extent to which agreements with and between stakeholders are required all need to be defined. In order to reach a decision efficiently, it is important to identify agreed procedures for settling disputes when establishing the assessment exercise, particularly where negotiation is required for resettlement and compensation for project-affected people.

The process manager can promote the efficiency of the process by providing:

- Sufficient resources for the necessary studies and logistical support where required for participants;
- Sufficient time for assessment given the scale, complexity, and room for controversy of the exercise;
- Timely, equal, and sufficient access to information for all participants in order to expedite interactions and focus on outcomes (ESMAP & BNWPP: 120)

Allowing sufficient time for groups to interact individually and collectively around specific issues is one of the key points to an effective assessment process. Process managers often underestimate the time for strategic exercises involving stakeholders, particularly the first time the approach is used. Time is needed for getting feedback from the Advisory Group, for representatives to consult with their constituencies, and possibly for culturally-specific purposes.

Assigning competent technical assistance to the Advisory Group will make the process of reaching a decision more efficient. This assistance might be provided to the exercise by a Study Team, or it may be specific to certain stakeholder interest groups, such as having NGOs assigned to facilitate local communities' participation or legal counsel made available for certain groups. In addition, professional facilitation can help the group reach a decision efficiently, particularly if there are conflicting views or if some stakeholders are unclear about their objectives.

To foster stakeholder involvement, information and studies must be made accessible to all. Ready access to the best available information also moves the discussions forward by facilitating more informed debate and building confidence. Specialist studies may be required to provide the Advisory Group with information, for instance on the expected future needs or on the likely performance of options. If undertaken authoritatively, these studies help speed up convergence and decision-making. Sometimes direct funding to the Advisory Group may be made available for them to arrange for a specific study, survey, or presentation or to access independent experts.

MODULE 3: Managing The Process Of Comprehensive Options Assessment

While government and industry stakeholders may have greater experience with the development and management of conventional options, public and community participants have a better understanding of local concerns, as well as knowledge of traditional options. The sharing of this information considerably improves the breadth and quality of the information available. Ready and unimpeded access to information also helps dissolve any mistrust stakeholders may hold about the process manager and creates confidence and trust for negotiations.

Information has to be accessible in the terminology, format, and language most appropriate to all stakeholders. It can be shared in a number of ways:

- Visual formats (maps, diagrams) help explain information in a way that is understood by diverse stakeholder groups and promote collective decision making. In some cases Advisory Group members may share the information with their constituencies, although sometimes this is not possible because of confidentiality.
- Study tours, site visits, community-to-community contacts, and other active forms of information sharing are often more effective than written reports.
- Information on the options, the options assessment process, and modes of participation can be made available through sector-based information networks (ESMAP & BNWPP, 2003: 122)

Information that shows the basis for decisions and covers issues that were debated in stakeholder group sessions should be made available. The inputs and results of each Advisory Group meeting should be made public if possible, especially if the issues being considered are controversial. However, intense public scrutiny also places pressure on Advisory Group members. Opinions may be quoted out of context, and it becomes more difficult to openly explore issues in a debate. For complex exercises, or exercises where communication across stakeholders is difficult, it is good practice to formulate a communications plan, which guides the stakeholder interaction throughout the exercise.

Informal and formal agreements at each step in the options assessment exercise are crucial to building confidence, reducing the possibility of having to backtrack and lose time, and ensuring support for the final recommendations. Formalized outcomes from strategic planning exercises also help ensure that the next cycle of planning will be able to build on the achievements of the previous exercise, thus bringing stakeholders to a point of convergence early in the next cycle of planning.

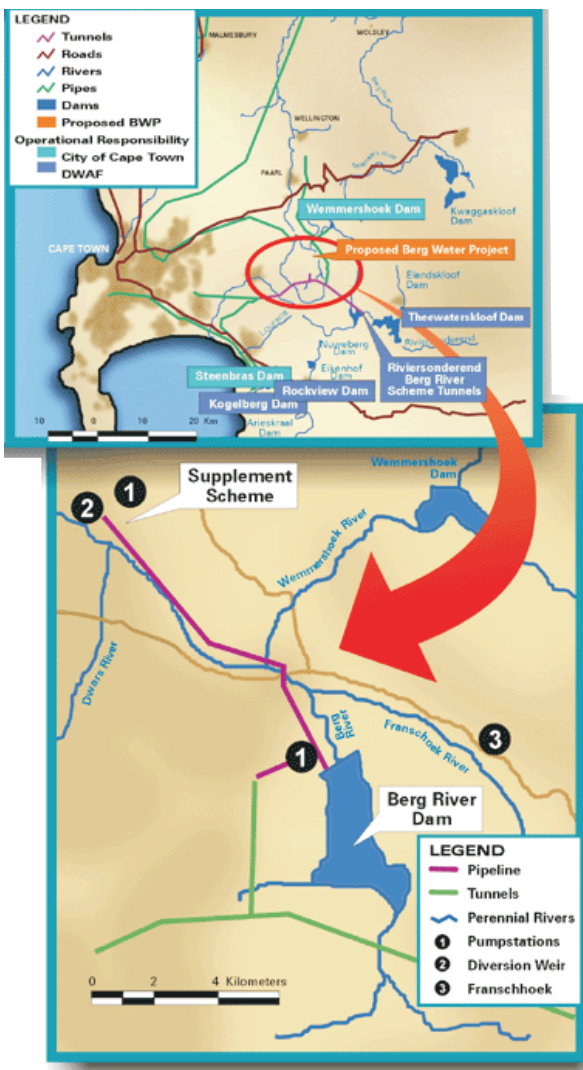
Formalized outcomes are particularly important during the development of dams and during operations, since there is generally a legal basis to the outcomes, where rights, entitlements, benefit sharing, and compliance monitoring may be involved. For example, the decision on the location of structures will have to be reflected in the land tenure records, as well as in contract and tender documents. Dams development once had a poor track record in formalizing outcomes, especially relating to social and environment provisions.

Governments and other stakeholders need to be satisfied that once informed decisions are made, all parties will comply with the commitments. This is especially important for within-project environmental mitigation and social topics such as entitlements, resettlement, compensation, employment, and community development measures. Permanent compliance mechanisms need to be agreed upon because of the long-term nature of the project impacts (ESMAP & BNWPP, 2003: 123).

Case Studies

CASE STUDY: BERG WATER PROJECT, SOUTH AFRICA

South Africa is categorized by the UN as a water-stressed country. The Western Cape is particularly dry and droughts are common. Low summer rainfall requires storage to supply Cape Town with water during the dry summer months. The water system for Cape Town and surrounding municipalities is supplied from five large storage dams forming the Western Cape Water System (WCWS) plus a number of smaller dams, augmented by groundwater from two aquifers. The WCWS also supplies approximately 30 per cent of its water to the agricultural (irrigation) sector, as well as to other urban/industrial users in the lower Berg River. Water is also transferred from rivers located in the adjacent Breede Water Management Area (WMA) through a river tunnel system into the Berg WMA where Cape Town is the dominant consumer.



Total annual yield that can be realized with the existing supply and inter-basin transfer arrangements in average rainfall conditions is about 364 million cubic metres. This falls far short of projected unrestrained needs of 507–912 million cubic metres a year by 2020. Bulk demand growth through the 1990s was 3–4 per cent a year, roughly in step with demographic growth. The Department of Water Affairs and Forestry (DWAF) identified the Western Cape as one of the first major urban region in South Africa where demand for water will exceed the total potential yield.

The case illustrates how a local authority, government and other stakeholders can make informed decisions that help to meet long term water needs.

Institutional framework

DWAF initiated a study of the current and future water needs of the Western Cape. This study, the Western Cape System Analysis (WCSA), was undertaken between 1989 and 1995. At the end of the study, various schemes were proposed and presented to the public for consultation. In 1998, CCT supported building the Skuifraam Dam to augment storage on the system by a further 18 per cent and sought the approval of the national government.

The project, located on the Berg River 70 km from Cape Town, features a 70 metre high dam with a gross capacity of 126.4 million cubic metres. The project involves the erection of the dam wall and a supplement scheme downstream of the confluence of another river. The supplementary scheme includes pump stations and 9km of pipelines to transfer water from the abstraction works in the Berg River to the dam and into the Western Cape water system.

Case Studies

Table 8 Berg Water Project chronology

1989-95	Western Cape System Analysis: Study of current and future water needs, available resources and augmentation options by DWAF.
1995-96	DWAF public consultation on options. Task team short-listed BWP (and water demand management for further study). Draft EIA report presented for public comment.
1997	Water Services Act (108)
1994	National Water Act, National Environment Management Act
1998	Dam recommended for approval by Cape Metropolitan Council (CMC), endorsed by DWAF. Minister defers decision until CMC water authorities show progress in managing water demand.
1999	Drought and restrictions introduced in water use; initiation of accelerated demand-side management programme by CMC.
1998-01	Options studies and public debate on options in 3 parallel processes (Municipal WSPD, Berg WMA Planning, and EIA of the Skuifraam Dam)
Sept 01	Approval in principle of the Berg Dam by the minister
May 02	Cabinet decision to proceed with Berg Project
2007	Scheduled commissioning of the BWP and dam

Scope of project

The immediate objective of the task force was to increase the water supply of the Cape Town area. Issues considered on the proposal were:

1. Alignment with new policies. The proposal came just after completion of a major transformation of legislation governing water management policies and practices in South Africa. The 1998 National Water Act introduced legal requirements for environmental reserves in the regulation of river flows. The 1997 Water Services Act required that alternatives to dams be given priority over the construction of new dams. New legislation introduced in the water resources and environment management fields also required, or reinforced, participatory planning and public consultation in all major water management decisions at local, provincial, and national levels.
2. Reducing demand. After the former CMC (replaced by City of Cape Town – CCT) requested national approval to proceed with the dam, the minister responsible advised Parliament that any decision to augment water supply in CCT should be predicated on three factors. These included:
 - a review of the demand projections
 - a clear indication of the commitment of the former CMC and relevant Transitional Local Councils and District Councils to demand management; and
 - provision of better technical information on demand management potential, with more detail of the budgetary support for related demand management programs.

Because of these conditions, the Berg project proposal, in effect, became a first major test of the workings of the new legislation in the Western Cape Province. It also triggered a much wider debate about water management policy in the CCT and Berg WMA, and prompted calls for a fundamental rethinking of the approach to demand and supply management. Also at this time, water use restrictions were first imposed by CCT on the agricultural sector (1999–2000) due to the drought and resultant water scarcity.

In response to the minister's direction (and the drought shortly after), the CCT strengthened its water demand management activities with awareness and information programs during 1999–2001. Water tariffs were restructured, and bans and restrictions were introduced on nonessential water uses. It established a Water Demand Management Section to support its position that the new supply was needed on top of demand management.

Case Studies

Stakeholder participation

After the initial studies by DWAF, presentation of the feasibility study marked the first attempt within South Africa to include the full range of stakeholders in decisions affecting water supply and demand. The process involved over 1,100 people and organisations. In December 1995 a meeting was held to introduce the Skuifraam Dam feasibility study and Integrated Environmental Management process to the public. The evaluation study also involved initial contact meetings (including capacity building workshops), five sub-regional public workshops and culminated in April 1996 in a two-and-a-half-day conference at Goudini with over 100 stakeholders representatives. At the conference, guiding principles and criteria to evaluate the options to reconcile demand and supply were developed.

A task group, elected by the stakeholders at the conference, was tasked by the Minister of Water Affairs and Forestry to short list the options based on the guiding principles and comparative criteria. Subsequently the task group commissioned some further work and appointed experts to assist them. The process was concluded in November 1996 when a shortlist of schemes for further study was agreed upon and recommended to the Minister. Among this list was the Skuifraam Dam and Skuifraam Supplement scheme.

Stakeholders opposed to the Skuifraam Dam argued that a dam option was unnecessary, costly, and environmentally damaging; instead, a package of water recovery and recycling measures could be mobilized to provide new supply for immediate and future needs. They argued that the demand management measures introduced by the CCT were not aggressive and were limited in scope, pointing to achievements of smaller water-stressed municipalities in the region that had mounted programs to reduce peak water demands. Further, they argued that building the Skuifraam Dam would not change the inequities of water use prevalent in the Western Cape, while paying for it would impose high water charges on low-income consumers. Environmentalist also opposed it on grounds that the EIA showed that changing flow regimes would affect downstream wetlands and coastal fisheries.

Options identified

Information and analysis on options was exchanged between the three parallel processes that examined ways to meet immediate and future water services needs. Many of the same parties were involved in each process. The CCT set about evaluating options for water service provision as part of its municipal plan (WSPD), which, under the new Water Services Act, each Municipality was required to develop. Parallel evaluations of water supply and management alternatives for the wider Berg WMA were undertaken in national DWAF-led processes, and the EIA of the Skuifraam Dam followed steps for within-project options assessment prescribed in the 1989 Environmental Conservation Act and the new 1998 National Environment Management Act.

WSDP options

These were demand side options. As prescribed in legislation, each WSDP had to incorporate new water demand projections, identify infrastructure requirements, provide a water balance, and review the environmental management issues associated with current and future water service provision. While it introduced an initial set of conservation measures and restrictions to address the immediate water shortage, the CCT commissioned an Integrated Water Resource Planning Study. Its purpose was to evaluate the principle demand management and supply alternatives for the Council area in the medium and longer term. The study recommended three 'packages' of options, in addition to the Skuifraam dam:

- pressure control, removal of automatic flushing urinals, user education, tariffs metering, credit control, and leakage repair;
- private boreholes (for irrigation users), water efficient fittings, and grey water recycling;
- Voëlvlei Augmentation Scheme and the Table Mountain Group Aquifer pilot study.

Case Studies

Based on the studies, CCT's water demand management policy and strategy was projected to reduce overall, projected demand for water by 20 per cent by the year 2010. Various committees of locally elected officials, expert working group meetings, consultations with interest groups, and public hearings discussing the separate studies were part of the WSDP process. In these engagements, pressure from stakeholders arguing in favor of non-dam options helped to ensure that the scope of options assessment studies stayed broad, and reflected what the Water Services Act had envisaged. Proponents of non-dam options felt the CMC needed to look more closely at the experience of other (smaller) local authorities and emulate their approach, such as the small seaside holiday town of Hermanus where a 12-point water demand management programme had achieved 30 percent reductions in peak water demands. They advocated intensified and accelerated water recycling programs, introducing by-laws on grey water reuse and recycling of the city's treated sewage water (at that time pumped out to sea). Other proposals were for a series of drought management measures with staged restrictions on water use that reflected the severity of the drought.

Berg Project Supply options

These were led by DWAF and considered alternative supply options for the Berg WMA in the context of overall demand-supply balances and inter-basin water transfers between the WMAs. Supply options assessed included the possibility of deep groundwater supply from the Table Mountain Group aquifers, further transfer of water into the Berg WMA from the Breede River, and desalination of seawater. The study team also considered increasing storage capacity by raising the height of the five existing dams. The criteria used for evaluation of options for supply augmentation broadly included economic, environment, social factors, as well as risk and reliability factors. The DWAF studies also took into account the new requirement to provide ecological reserves from existing and potential surface water regulations. These studies were prepared in collaborative processes with public review, as set out in the new guidelines for public consultation guidelines. The Skuifraam Dam emerged as the preferred supply scheme to meet the Berg WMA requirements, in combination with water conservation and water demand management.

EIA alternatives

Within-project alternatives for the Skuifraam Dam were assessed in the EIA process, involving issues such as the design and location of major structures, construction schedules, and environmental mitigation, management, and monitoring provisions. Environmental stakeholders were concerned about the impacts on downstream wetlands and downstream coastal fisheries, so the EIA evaluated in-stream flow requirements downstream of the proposed dam site. Provisions were made in the design of the dam to provide for both low-flow and flood releases in normal, wet and dry years.

Other measures of stakeholder participation were:

- The framework and mechanisms for stakeholder involvement reflected the legislation and regulations governing each of the three options evaluations. For example, the Water Services Act required the WSPD to be taken through a full public participation process, with the public, stakeholders, and water services authorities/providers given an opportunity to comment at each step in the plan formulation. DWAF responded to provisions in the National Water Act (1998), which required stakeholder involvement in the Berg WMA analysis as well as an extensive public participation process in connection with the National Water Resource Strategy.
- Media interest led to greater public awareness and precipitated an immediate benefit where an immediate benefit from the options assessment was that Cape Town adopted a more aggressive demand management programme and achieved greater (short-term) water security. While the legislation required options assessment and prioritization of demand management, it did not specify the level of effort. The explicit political support for demand management and the debate this prompted on the actual measures and their effectiveness resulted in more resources being directed by the Water Authorities to demand management, water recycling, and non-conventional supply options.
- Greater public acceptance of the higher water tariffs (the Berg Water Capital Charge), which over the medium-term would also make water conservation more effective

Case Studies

Although approval to proceed with the project in principle had been given, work could not proceed until all the preconditions had been made. This was finally achieved in April 2003 when two agreements were signed between DWAF and Trans-Caledon Tunnel Authority (TCTA) relating to bulk water supply and implementation including the transfer to TCTA of revenue from water sales for the project. TCTA, a parastatal, will implement the project and raise the funds from the private sector without a government guarantee. The Water Services Act requires full cost recovery where possible; thus, water users will pay for the scheme through what is called the Berg Water Capital Charge on the bulk tariff. The agreement includes targets such as the city of Cape Town achieving a 20 per cent water saving by 2010. There are also incentives such as domestic users not charging consumers the first 6,000 litres of water supplied and 4200 litres of sewage treated per month, after which they are billed according to a steeply rising incremental tariff that discourages high consumption. The provision of 6,000 litres of free basic water assists in alleviating poverty and, together with the affordable tariff increases, ensures that the poor are able to afford the cost of water for basic human consumption needs.

Lessons

The case illustrates that while longer-term options are pursued, immediate needs for water services can be met by a mixture of voluntary conservation measures and restrictions. Other lessons include:

- Legislative and regulatory provisions requiring that alternatives be prioritized before new dams can be approved were a catalyst for the options exercise to occur. They provided an enabling environment and a foundation for political support to implement demand management measures that helped meet immediate needs. The legislation also helped move options assessment 'upstream' in the planning process and institutionalize this practice on a regular basis.
- Trials can reduce the uncertainty over the impact of demand management measures in the short and longer term. Early and serious efforts in demand-side management can reduce disruptions to water supply and help avoid the worst conflicts.
- It is imperative that future water-resource planning starts at an early stage, as the lead time to implement a water resource scheme is about eight years.

BIBLIOGRAPHY AND FURTHER RESOURCES

Berg Water Project (BWP) (2005) Monthly Technical Project Briefing Document, July 2005.

Dalal-Clayton, B. and Sadler, B. (1999) 'Strategic Environmental Assessment: A Rapidly Evolving Approach. International Institute for Environment and Development', Environmental Planning Issues No. 18, London. <http://pubs.iied.org/pdfs/7790IIED.pdf>

Emerton, L. (2008) 'Ecosystems, Infrastructure, and the Use of Economics to Influence Decision Making'. Paper presented at Economics and Conservation in the Tropics: A Strategic Dialogue, January 31 to February 1, 2008. http://www.rff.org/Documents/08_Tropics_Conference/Tropics_Conference_Papers/Tropics_Conference_Emerton_Ecosystems_Infrastructure.pdf

Equator Principles (2006) The "Equator Principles": A financial industry benchmark for determining, assessing and managing social & environmental risk in project financing. http://www.equator-principles.com/documents/Equator_Principles.pdf

ESMAP & BNWPP (2003) Stakeholder Involvement in Options Assessment: Promoting Dialogue in Meeting Water and Energy Needs. A Sourcebook, World Bank-UNDP Energy Sector Management Assistance Programme and Bank Netherlands Water Partnership Program. http://www.adb.org/water/topics/dams/pdf/esm2640paper_sourcebook.pdf

Foster, V. (2008) 'The changing landscape of infrastructure finance in Africa: Nontraditional sources take on a growing role', Gridlines, Note no. 43, Public-Private Infrastructure Advisory Facility, World Bank, Washington, DC. <http://www.ppiaf.org/ppiaf/sites/ppiaf.org/files/publication/Gridlines-43-Finance%20Infrastructure%20in%20Africa%20-%20VFoster.pdf>

Goodland, R., Mercier J. R., and Muntemba S. (eds.) (1995) 'Strategic Environmental Assessment: Strengthening the EA Process' in South Africa – A World Bank Commitment, Proceedings of the Durban World Bank Workshop, June 25, 1995, World Bank, Washington, D.C.

Hirji, R. F. and Ziegler, H. R. (1999) 'Ensuring Environmental Quality in Water Resource Projects'. World Bank, Washington, DC. <http://siteresources.worldbank.org/INTWRD/903856-1112617194010/20434062/EnsuringEnvironmentalQuality1999.pdf>

Hollingworth, B. E. (2008) A Training Manual on Environmental Management Plans for the Sustainable Major Water Infrastructure Development Programme in Eastern and Southern Africa. SADC, EAC, UNEP, InWent.

Hydro Quebec (2001) 'Comparing Environmental Impacts of Power Generation Options', Montreal.

International Energy Agency (IEA) (2000) 'Implementing Agreement for Hydropower Technologies and Programmes. Annex III. Hydropower and the Environment: Present Context and Guidelines for Future Action,' IEA, Oslo. <http://www.ieahydro.org/reports/HyA3S5V2.pdf>

IHA (International Hydropower Association) (2010) Hydropower Sustainability Assessment Protocol: Background Document. IHA, London. http://www.hydropower.org/sustainable_hydropower/Hydropower_Sustainability_Assessment_Protocol_November_2010.pdf

Kaplinsky, R. and Morris, M. (2010) 'The Policy Challenge for Sub-Saharan Africa of Large-Scale Chinese FDI. Elcano Royal Institute of International and Strategic Studies', Elcano Royal Institute Analyses 169, Madrid. <http://www.isn.ethz.ch/isn/Digital-Library/Publications/Detail/?lng=en&id=124899>

BIBLIOGRAPHY AND FURTHER RESOURCES

- Lesotho Highlands Development Authority (LHDA) (2002) 'Lesotho Highlands Water Project Phase 1, Draft Policy for Instream Flow Requirements.'
- Longo, A. and Markandya A. (2005) Identification of Options and Policy Instruments for the Internalisation of External Costs of Electricity Generation: Dissemination of External Costs of Electricity Supply Making Electricity External Costs Known to Policy-Makers. Fondazione Eni Enrico Mattei, Working Paper 2005.74, Milan. <http://www.feem.it/userfiles/attach/Publication/NDL2005/NDL2005-074.pdf>
- Nepal Electricity Authority (NEA) and Canadian International Water and Energy Consultants (CIWEC) (1998) Inter-Agency and Public Consultations, Phase I – Fine Screening and Ranking Report, Volume 6 of 6.
- OECD Convention on Combating Bribery of Foreign Public Officials in International Business Transactions (1997). http://www.oecd.org/document/20/0,3343,en_2649_34859_2017813_1_1_1_1,00.html
- Ontario Hydro (1990) Providing the Balance of Power, Demand/Supply Report.
- Practical Action (2006) Issue of Identification of Options in the Context of Dam Planning and Management Final Report. http://www.unep.org/dams/files/Compendium/Report_IO.pdf
- Sheng, F. (2004) Comparative Assessment of Development Options, Center for Conservation and Government, Conservation International.
- Sutherland, D. and Fenn C. (2000) 'Assessment of Water Supply Options', Thematic Review IV.3 prepared as an input to the World Commission on Dams.
- United Nations Development Programme (UNDP) (2000) Human Development Report 2000: Human Rights and Human Development, UNDP and Oxford University Press, New York and London. <http://hdr.undp.org/en/reports/global/hdr2000>
- United Nations Environmental Programme (UNEP) (2007) Dams and Development: Relevant Practices for Improved Decision Making. A Compendium of Relevant Practices for Improved Decision-Making on Dams and Their Alternatives, UNEP Dams and Development Project, Nairobi. <http://www.unep.org/dams/files/Compendium/Compendium.pdf>
- UNEP (2007b) UNEP Dams and Development Project: Final Report of Phase 2, UNEP, Nairobi. http://www.unep.org/dams/files/FinalReport_Phase2.pdf
- United Nations Environmental Programme – Dams and Development Project (UNEP-DDP) (2004) Comprehensive Options Assessment of Dams and their Alternatives. Proceedings. September 22–24, 2003, Geneva, Switzerland. http://www.unep.org/dams/files/Issue-basedWorkshops/OA_procs.pdf
- UNEP-DDP (2005) Final Report Phase 1: Covering the period November 2001 to December 2004, UNEP-DDP Secretariat, January 2005, Nairobi. <http://www.unep.org/dams/files/ddp.final.report.pdf>
- World Bank (1991) Environmental Assessment Sourcebook. Washington, DC. <http://go.worldbank.org/LLF3CMS110>
- World Commission on Dams (WCD) (2000) Dams and Development: a New Framework for Decision-Making. The Report of the World Commission on Dams, Earthscan, London. <http://www.unep.org/dams/WCD/report.asp>
- Usher AD, 1997a, 'Pangani Power Struggle: Nordic Dam Builders on a Tanzanian River,' in Usher AD (ed), Dams as Aid: A Political Anatomy of Nordic Development Thinking, London, Routledge, WCD Submission eco026.
- Water Resources and Power Development Authority (WAPDA) (1994) Pakistan National Power Plan (22 Volumes)

BIBLIOGRAPHY AND FURTHER RESOURCES

Mung'ong'o C, 1997, 'Pangani Dam Versus the People,' in Usher AD (ed), Dams as Aid: A Political Anatomy of Nordic Development Thinking, London, Routledge, WCD Submission eco026.

WWF Poland (2000). An options assessment for the Wloclawek dam: threats and solutions.

Yepes, T., Pierce, J., Foster, V. (2009) Making Sense of Africa's Infrastructure Endowment A Benchmarking Approach. World Bank Policy Research Working Paper No. 4912, Washington, DC.

The following are examples of international organizations involved in the debate on options assessment and stakeholder involvement for water and energy development, including large dams. Entries are placed in alphabetical order (ESMAP & BNWPP, 2003: 263).

Dams and Development Project (DDP)

DDP's goal is to promote a dialogue on improving decision-making, planning and management of dams and their alternatives based on the World Commission on Dams (WCD) core values and strategic priorities. The objectives are to:

- Support country- level, regional and global dialogues on the WCD report and the issues it addresses with the aim of engaging all stakeholders with emphasis on those not currently involved;
- Strengthen interaction and networking among participants in the dams debate;
- Support the widespread dissemination of the WCD report and the report of the Third WCD Forum, and make available other stakeholders' responses; and
- Facilitate the flow of information and advice concerning initiatives relevant to dams and development.
<http://www.unep-dams.org>

Global Water Partnership (GWP)

The mission of the Global Water Partnership is to support countries in the sustainable management of their water resources. The Global Water Partnership is a working partnership among all those involved in water management and committed to the Dublin-Rio principles. It provides a constant stream of information, toolkits and resources on the latest practices and experience in IWRM around the world including on options assessment and stakeholder questions.

<http://www.gwpforum.org/servlet/PSP>

International Association for Impact Assessment (IAIA)

IAIA is a forum for advancing innovation, development and communication of best practice in impact assessment. Its international membership promotes development of local and global capacity for the application of environmental assessment in which sound science and full public participation provide a foundation for equitable and sustainable development.

<http://www.iaia.org>

International Commission on Irrigation and Drainage (ICID)

The Commission is dedicated to enhancing the worldwide supply of food and fiber for all people by improving water and land management and the productivity of irrigated and drained lands through appropriate management of water, environment and application of irrigation, drainage and flood management techniques. ICID provides a range of research and case studies on options and methods for irrigation water supply and efficiency improvement in developing countries.

<http://www.icid.org/>

International Commission on Large Dams (ICOLD)

Provides a range of up-to-date technical guidelines, research, case studies and advice on development of dam options around the world. In the options assessment area it reports on recent policy dialogue (in relation to dams) and advances in assessment methodologies and practices that apply to all stages of the life cycle of dams.

<http://www.icold-cigb.org>



BIBLIOGRAPHY AND FURTHER RESOURCES

International Energy Agency (IEA)

The IEA is the energy forum for 26 Member countries. IEA Member governments are committed to taking joint measures to meet oil supply emergencies. They have also agreed to share energy information, to co-ordinate their energy policies and to co-operate in the development of rational energy programs.

<http://www.iea.org>

International Hydropower Association (IHA)

The IHA tackles technical, social, environmental, economic, financial and administrative aspects of hydropower development and operation. Its mission is to assess and promote good practice within its membership, and to increase general awareness of the integrated role of hydropower in the sustainable supply of water and electricity.

<http://www.hydropower.org>

The World Conservation Union (IUCN)

The IUCN wants to influence, encourage and assist societies throughout the world conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable. The IUCN focuses in particular on species and biodiversity conservation and the management of habitats and natural resources.

<http://www.iucn.org/>

World Wide Fund for Nature (WWF)

WWF believes there are often alternative better solutions than large dams that extend power and water services to the poor. WWF's Dams Initiative (DamRight!) is challenging financial institutions to ensure, post WCD, that investment in dams and other large infrastructure projects become more

financially viable, as well as environmentally responsible and socially sustainable.

<http://www.panda.org/dams>

ENDNOTES

¹See <http://www.transparency.org>

²See <http://go.worldbank.org/WTA1ODE7T0>

³See <http://www.sapp.co.zw>

⁴The Copenhagen Accord is a document that delegates at the 15th session of the Conference of Parties to the United Nations Framework Convention on Climate Change agreed to "take note of" at the final plenary on 18 December 2009. See <http://unfccc.int/resource/docs/2009/cop15/eng/l07.pdf>

⁵See http://www.unece.org/env/eia/sea_manual/

⁶Emission Limit Values apply to facilities with rated thermal input greater than 70 MWth, based on the lower calorific value of coal used. Note the above ELVs are expressed at 0 °C, 101.325 kPa, with 6% oxygen in the flue gas.

⁷See <http://www.iea-coal.org.uk/site/ieacoal/databases/worldwide-emission-standards/south-africa>

⁸ Externalities are defined as costs incurred by parties that are not engaged in any market transaction with the generator of the externality. An externality arises when the social or economic activities of one group of persons have an impact on another group and that impact is not fully accounted for by the first group. Thus, a power station that generates emissions of SO₂ causing damage to building materials and human health is generating an externality because the resulting impacts are not taken into account by the electricity generator when deciding to operate the power station. The European Environment Agency defines the internalization externalities as: 'Incorporation of an externality into the market decision making process through pricing or regulatory interventions. In the narrow sense, internalisation is achieved by charging polluters (for example) with the damage costs of the pollution generated by them, in accordance with the polluter pays principle.' See <http://glossary.eea.europa.eu>.

⁹The main source for the case study ESMAP & BNWPP, 2003: 205-212. Also see BWP; 2005; Sutherland and Fenn, 2000.

www.unep.org/depi

United Nations Environment Programme
PO Box 30552 Nairobi, 00100 Kenya
Tel: (254 20) 7623508
Fax: (254 20) 7623917
E-mail: depiinfo@unep.org



ISBN: 978-92-807-3442-9
Job Number: DEW/1490/NA



1972-2012:
Serving People
and the Planet