AN EVALUATION OF ENVIRONMENTAL IMPACT ASSESSMENT PROCEDURES IN THE LESOTHO HIGHLANDS WATER PROJECT - PHASE 1A

Setenane Nkopane

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Department of Environmental and Geographical Science
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ABSTRACT

Environmental Impact Assessment is a procedure that ensures that the environmental consequences of development proposals are understood and adequately considered in the planning process. This important project planning requirement is often inadequately addressed in many developing countries - especially with regard to dam projects. Lesotho is a small developing country in Southern Africa which is currently engaged in a multi-phased dam project - the Lesotho Highlands Water Project (LHWP) - in order to utilize its most abundant natural resource - water. Planning for the LHWP incurred some irregularities, particularly with regard to environmental implications.

The purpose of this study is to evaluate the environmental impact assessment procedures of the LHWP, Phase 1A. This includes review of the environmental studies that were carried out and the findings of these studies; assessment of the familiarity of the Lesotho Highlands Development Authority (LHDA) staff with EIA procedures; and examination of the extent to which the communities in the project area were consulted regarding this project.

The study is based on two surveys: firstly, within the Environment Division of the Lesotho Highlands Development Authority to assess the familiarity of staff members with proper EIA procedures. In this survey 28 self-administered questionnaires were issued, and 23 were collected. Secondly, structured interviews and unstructured group discussions were carried out in 14 villages to examine the extent to which the communities affected by the LHWP had been involved in the environmental impact assessments of Phase 1A; and whether the impacts they experienced and the subsequent mitigation efforts had been considered comprehensively by the project proponents. Eighty interviews were conducted in six of the 14 villages selected in the study, in the remaining villages data was collected through group discussions. The groups consisted of 10 - 12 members (usually prominent persons) from the community.

The study revealed that EIA for Phase 1A of the LHWP was not carried out according to recognized standards. Environmental studies that were undertaken were done too late in the EIA process, and did not facilitate the project planning. The study also found that the majority of LHDA staff members are not familiar with the details of the EIA process, and did not participate in Phase 1A project planning. The communities affected by the LHWP were not given the opportunity to raise their concerns about the project. This is manifested by the magnitude and type of impacts which they have incurred because of the LHWP. Members of these communities therefore regard their livelihoods as being worse than before the project.

It is thus recommended that LHDA should revise and significantly improve its project planning approaches - especially for the subsequent phases of the project. It is imperative to incorporate public participation in the EIAs of these phases. Formulation of guidelines and legislation - in Lesotho as a whole - will ensure enforcement and compliance with sound environmental assessment procedures, and improve on LHDA's manpower capabilities with regard to EIA and environmental management. This in turn will enhance an environmentally sustainable development.

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LIST OF ACRONYMS

CSIR	Council for Scientific and Industrial Research
EARP	Environmental Assessment Review Process - Canada
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EEC	European Economic Community
IEM	Integrated Environmental Management - South Africa
IEE	Initial Environmental Examination
JPTC	Joint Permanent Technical Commission

LHDA	Lesotho Highlands Development Authority
LHWP	Lesotho Highlands Water Project
LHC	Lesotho Highlands Consultants
LMC	Lahmeyer MacDonald Consortium
LNDC	Lesotho National Development Corporation
M65.00	65 Maluti - approximately $15 USA
NAR	Northern Access Road
NES	National Environment Secretariat
NEH	Division of Natural Environment and Heritage - LHDA
NEPA	National Environment Policy Act - USA
OSC	Olivier Shand Consortium
OVTS	Orange Vaal Transfer Scheme
RSA	Republic of South Africa
SIA	Social Impact Assessment
TCTA	Trans Caledon Tunnel Authority
TRDC	Thaba-Tseka Rural Development Centre

PREFACE

There are several development organisations in Lesotho, but two dominate. These are the Lesotho Highlands Development Authority (LHDA) and Lesotho National Development Corporation (LNDC). Of these LHDA is greater in size and structure. Another important difference is that LHDA's orientation is project specific - the Lesotho Highlands Water Project (LHWP), while LNDC has a much broader scope. The LHWP is the largest and most intricate civil engineering project undertaken in Lesotho. The government of Lesotho has recently established an environmental department - the National Environment Secretariat (NES) - which reports directly to the Prime Minister's office, but this department has as yet not had the opportunity to influence the LHWP.

The topic of this study is "An Evaluation of Environmental Impact Assessment Procedures in the Lesotho Highlands Water Project, Phase 1A''. The three keywords are; evaluation, Environmental Impact Assessment (EIA) and procedures. In the whole of Lesotho, the Lesotho Highlands Development Authority, which is the institution responsible for the implementation of the Lesotho Highlands Water Project on the Lesotho side of the border with the Republic of South Africa, is the only development organisation that has made any effort to assess the environmental and social consequences of it's development project. This dissertation attempts to evaluate how effective environmental evaluation measures have been in ensuring that the Lesotho Highlands Water Project has minimized the negative aspects and maximized positive aspects of its activities.

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I wish to extend my gratitude to Dr. O. J. Kakonge for the assistance he rendered me in conceptualizing this study; and the United Nations Development Programme (UNDP) office for the financial assistance that enabled me to carry out the field surveys. Thanks are also extended to LHDA management and staff for their co-operation and the invaluable help they gave me in carrying out the field work in the project area; my sincere thanks are due to Dr. M. Nyaphisi, Mrs. M. Mothepu, Mr. D Nkalai, Mr. Khatleli, Dr. S. Hirst, Mr. Sefeane, Mr. Lekholoane, Mr. Sibolla, Mr. S. Lerotholi, Mr. P. Namane, Mr. T. Mahlelebe, Mr. Ramakatane, Mr. Leotlela, Mrs. V. Qheku, Ms. S. Matela, Mr. Nthako, Mr. M. Tshabalala, Mr. D. Nthabane, Mr. Lekhooa and Mr. Moea.

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Finally, I express my deepest appreciation to my parents for all the effort and time they sacrificed for my education.

Chapter One

Introduction

1.1 Lesotho Highlands Water Project

The Lesotho Highlands Water Project (LHWP) is a multi-phased water transfer and hydro-power generation scheme consisting of dams and reservoirs on the Senqu (Orange) River and its tributaries. When completed, the project will extend across the entire north-south axis of the central highlands of Lesotho. A series of tunnels will link the reservoirs and deliver water to the Vaal River system in South Africa. A hydro-power station located at the out-flow of the transfer tunnel, will generate electricity to replace that which is currently purchased by Lesotho from the Republic of South Africa (RSA). The LHWP is governed by "*The Treaty on the Lesotho Highlands Water Project between the Government of the Kingdom of Lesotho and the Government of the Republic of South Africa*" (LHDA Action Plan, 1990). This treaty provides for the establishment of the Lesotho Highlands Development Authority (LHDA) and the Trans Caledon Tunnel Authority (TCTA) which are the two bodies that develop, implement, manage and operate the project in Lesotho and South Africa respectively. However, this study will only focus on the Lesotho part of the project, hence on the LHDA. LHWP has four phases which are planned in the following sequence; Phase 1A, Phase 1B, Phase II and Phase III.

1.1.1 Phases of the LHWP

Phase 1A of the LHWP is presently under construction, and completion is expected during 1997. Phase 1A consists of a large concrete dam at Katse, which will create a reservoir on the Malibamats'o River; 48.3 km of water transfer and 34.3 km of delivery tunnels; and another dam and hydropower station at 'Muela. Katse reservoir has a storage capacity of 2×10^9 m^3 at a maximum depth of 153 m. 'Muela reservoir has a storage capacity of 6×10^6 m^3 and an average depth of about 17 m. The location of the main features of the project are shown in figure 1.1, and the summary of the relevant data is given in the schematic layout in figure 1.2. A total of 121 villages lie within the Phase

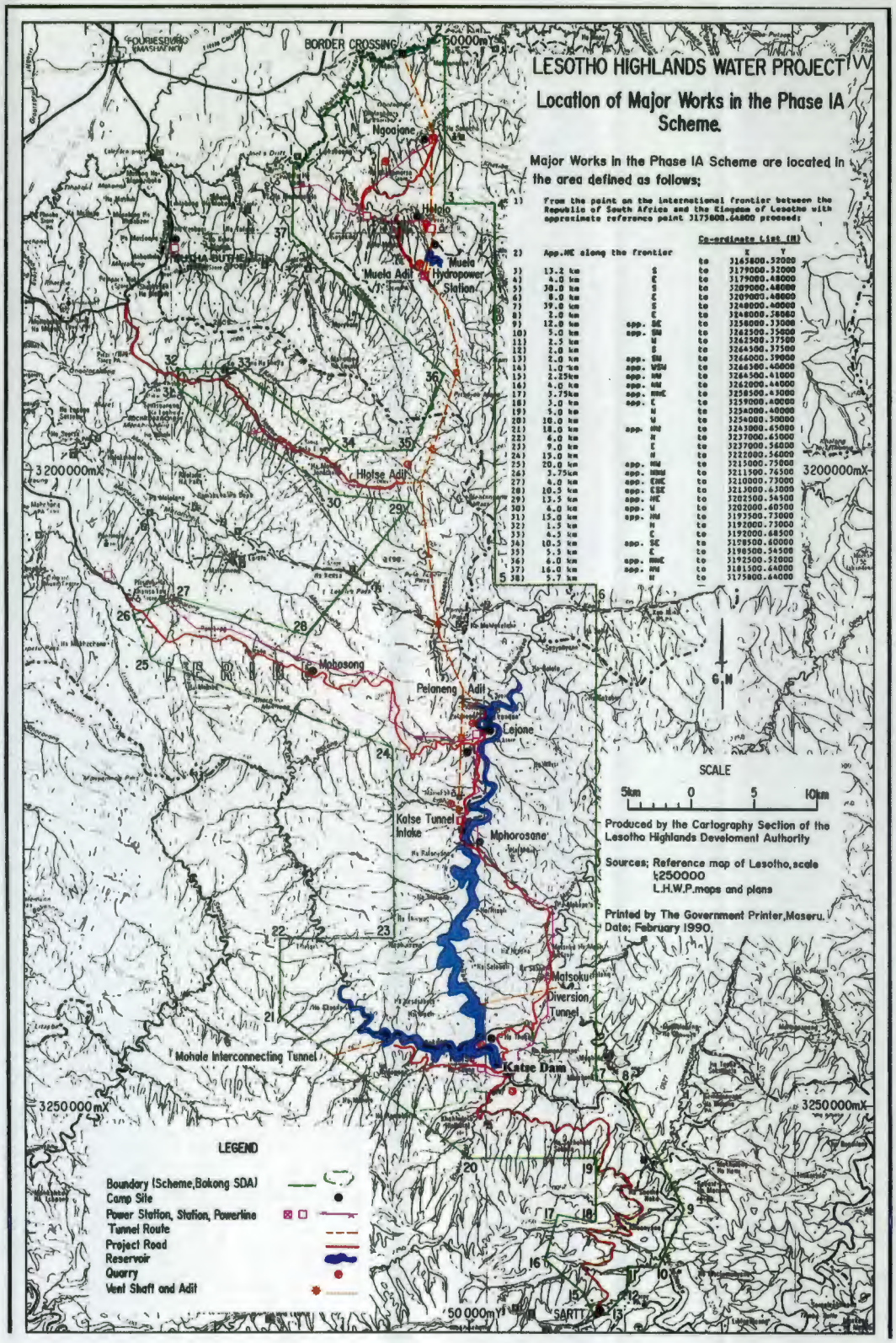

Figure 1.1 The location of the main features of Phase 1A of the LHWP.

1A watersheds and contain a total of approximately 18 000 people. Maize, wheat, sorghum, peas and barley are the common crops (LHDA scope of services document, 1995). People subsist on traditional cropping and pastoralism (LHDA Baseline Biological Survey, 1993).

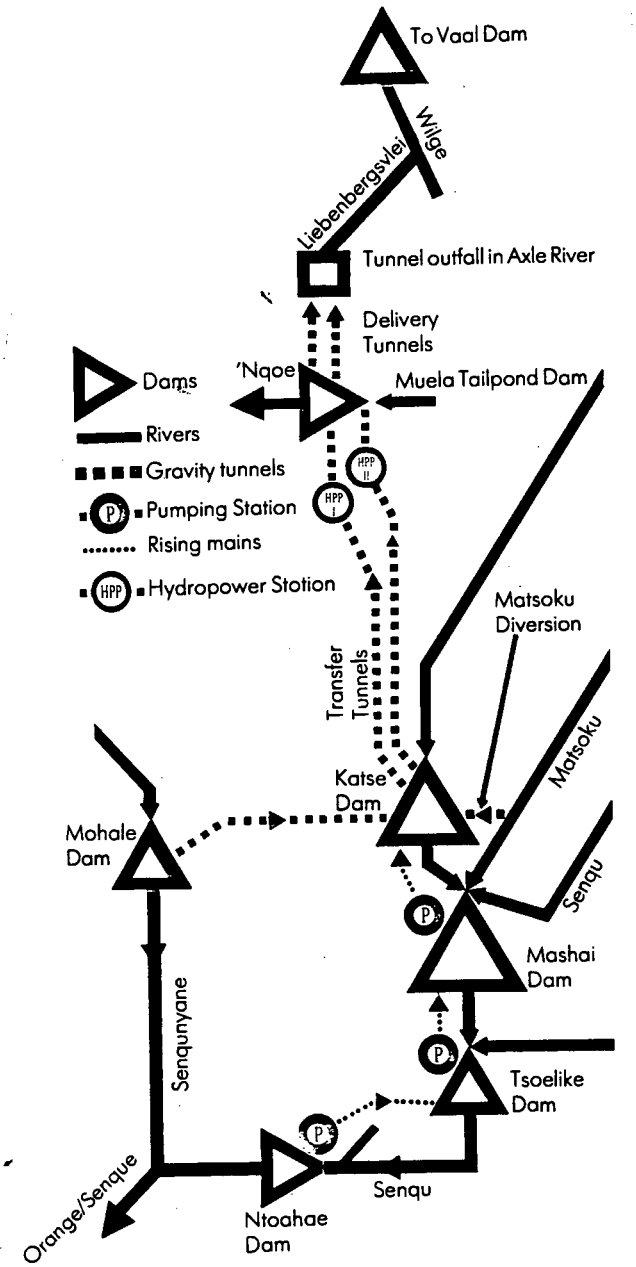

Figure 1.2 The schematic layout of the reservoir system.

Phase1B comprises the construction of a dam at Mohale on the Senqunyane river, a 31.5 km diversion tunnel to deliver water into Katse reservoir and a weir at Matsoku. Construction is scheduled for completion by the end of 2003. The Mohale reservoir would have a total storage capacity of 8×10^6 m^3 (LHDA Public Health Environmental Study, 1990).

In Phase II, a dam will be constructed downstream from Katse at Mashai on the Senqu River, together with a transfer tunnel and pumping station for the transfer of water upstream to Katse reservoir (LHDA, Phase 1A compensation Plan, 1990). This Phase will be commissioned in 2004.

Phase III consists of a dam to be built on the Senqu River at Tsoelike, a transfer tunnel and a pumping station for the transfer of water to Mashai. This Phase is scheduled to begin operation in 2017 (LHDA Phase 1A Compensation Plan, 1990).

1.1.2 Objectives of the LHWP

The main objectives of the LHWP as outlined in the feasibility study (Main Report, 1986) are the following:

- to transfer water from the catchment of the Senqu River in Lesotho to the catchment of the Vaal river in the Republic of South Africa, in order to meet the future water requirements of the Vaal basin, and thereby to provide revenue to the Government of Lesotho as a result of payments to be made by the Republic of South Africa;

- to generate hydro-electric power in Lesotho;

- to promote the general development of the remote and under developed Senqu region, while ensuring that measures are taken to counteract any adverse effects which the project might have on the local population and their environment;

- to provide the opportunity to undertake ancillary developments such as the provision of water for irrigation and potable water supply.

1.2 Statement of the problem

Feasibility and design studies of Phase 1A of the LHWP were undertaken by multi-national consultant companies; Lahmeyer Macdonald Consortium (LMC) and Olivier Shand Consortium (OSC), from 1982 through 1986, before the signing of the treaty. The objectives of these studies were to select the optimal scheme layout and to demonstrate that the project is technically, socially, legally, economically and financially viable. Environmental Impact Assessments (EIA) were included in these studies, and environmental considerations were taken into account when deciding the project outline and arrangement. However, significant deficiencies in screening, scoping, predictions, evaluation, mitigation and monitoring steps of the feasibility EIAs have been noted; particularly lack of public participation in the assessments (Kakonge, 1994). The report of the panel of experts (Hitchcock *et al.* 1991) also highlighted inadequacies in the project's environmental specifications.

The purpose of this study is to review the environmental studies that were undertaken for Phase 1A of the LHWP; to investigate precisely what was found in those studies; what impacts were predicted; what specifications and guidelines, to be followed by LHDA with regard to environmental conservation, were specified and whether LHDA applied these specifications; and what difficulties were encountered - and whether these were due to inadequacies or loop-holes in the EIAs.

1.3 Objectives of the study

The aim of this research project is to produce a critique on Environmental Impact Assessment implementation in Phase 1A of the Lesotho Highlands Water Project. It seeks to accomplish the following specific objectives:

- an assessment of how familiar the staff of the Environment Division of the Lesotho Highlands Development Authority are with Environmental Impact Assessment procedures.

- a review on how the EIA was actually implemented in Phase 1A of the water project. This will include an examination of whether the environmental feasibility studies did comprehensively consider all impacts experienced by the local people and the physical environment. It will also examine the adequacy of impact predictions that were done to enable planning for mitigation of negative effects, and the effectiveness of subsequent implementation of mitigation measures.

- an examination of the extent to which affected communities were involved in Phase 1A environmental assessments. Whether EIAs carried out in Phase 1A were interpreted and communicated in an understandable manner to local communities will also be assessed.

- to derive lessons from the Phase 1A experience and to develop proposals for improving EIA practice in Lesotho.

1.4 Scope of the study

It should be clarified that because of limited manpower and financial resources this study will focus on specific aspects of Phase 1A of the water project. The aspects that will be considered are the access roads (specifically the northern access road to Katse dam); affected settlements (both old and newly established settlements); the Katse dam; quarries and soil dumps. The general environmental effects of tunnels and of water diversion do not form part of this study.

1.5 Hypothesis

The hypothesis to be tested is that EIAs in the LHWP were conducted according to recognized norms and standards.

1.6 Methodology

Although a majority of surveys utilize a single data collection method, it is not uncommon for a combination of methods to be used (Fowler, 1993). A combination of different techniques can improve the quality of data (Judd *et al.* 1991). This research required data from many different sources as it covers most aspects of EIA implementation in the LHWP. Data required in this study - in order to evaluate the efficacy of EIA in Phase 1A - ranged from existing literature on EIA implementation in Phase 1A (which was obtained from LHDA), to data on management policies, and the results of questionnaires administered to establish staff understanding of EIA procedures. Lastly the public affected by the LHWP were questioned. The literature on the theoretical foundations of environmental assessments (Fuggle and Rabie, 1992; Morris and Therivel, 1995; Biswas and Qupeng, 1987; Sadar, 1994; and Turnbull, 1992) was also studied.

1.7 Structure of dissertation

Chapter One highlights the statement of the problem being investigated, and introduces the objectives to be achieved in this research project.

Chapter Two gives a description of the study area in terms of both the physical and social environments, Phases of the project, timing and duration of each phase. LHDA as an institution implementing the LHWP is also discussed.

Chapter Three explains in detail the methodology and approach employed to undertake the study.

Chapter Four gives the literature review of the ideal context of EIA process, principles, and application.

Chapter Five reviews implementation of Phase 1A of the LHWP. The approach used for the LHWP, the objectives of Phase 1A of the project, environmental plans and studies carried out are elaborated in context. The role of the World Bank and other donors is outlined, and the project schedule is illustrated.

Chapter Six analyses the consequences of non-application of proper EIA in Phase 1A, and the role of the Government of Lesotho, based mainly on the data collected in interviews with the interested and affected people.

Chapter Seven concludes with the lessons that can be learnt from the Phase 1A experience and the stage of EIA practice in Lesotho.

Chapter Two

The Study Area and Context

2.1 Introduction

This chapter is intended to give a description of the type of biophysical and social environments that have been affected by the Lesotho Highlands Water Project in the highlands of Lesotho. Most of this information highlights the findings of the baseline studies which were carried out in Phase 1A of the LHWP. The chapter is deemed relevant to the purpose of this study because it establishes the quality of the environment impinged upon by Phase 1A; and environmental quality is what environmental impact assessment seeks to improve or conserve in all forms of development.

2.2 Location and topography

Lesotho is a small, predominantly mountainous country in the southern region of Africa; (Fig. 2.1). Lesotho is divided into three topological regions, the mountains, the foothills and the lowlands (Fig. 2.2). The mountains of Lesotho rise to elevations greater than 3300 m in the northeast and are topped by a rolling upland plateau (LMC and OSC, 1986). These mountains are bounded by steep escarpments to the north and east and are dissected by a series of deeply incised valleys running southwards. A number of rivers have their sources in the mountains, among them being the Caledon which forms Lesotho's north-western and western boundary with South Africa, and the Senqu which flows south-westwards, changing its name to the Orange River as it crosses the border into South Africa. A major tributary of the Senqu is the Malibamats'o River, on which the Katse Dam project is situated (Fig. 2.2).

The foothills range in elevation from about 1750 m to 2100 m and lie immediately to the north and west of the mountains. The lowlands constitute the remaining portion of the country at an elevation below 1750 m. They are characterized by an undulating topography which becomes more gentle towards the north. The major part of the population lives in the lowlands, particularly in the north-west, where the capital, Maseru, and most of the arable land is found.

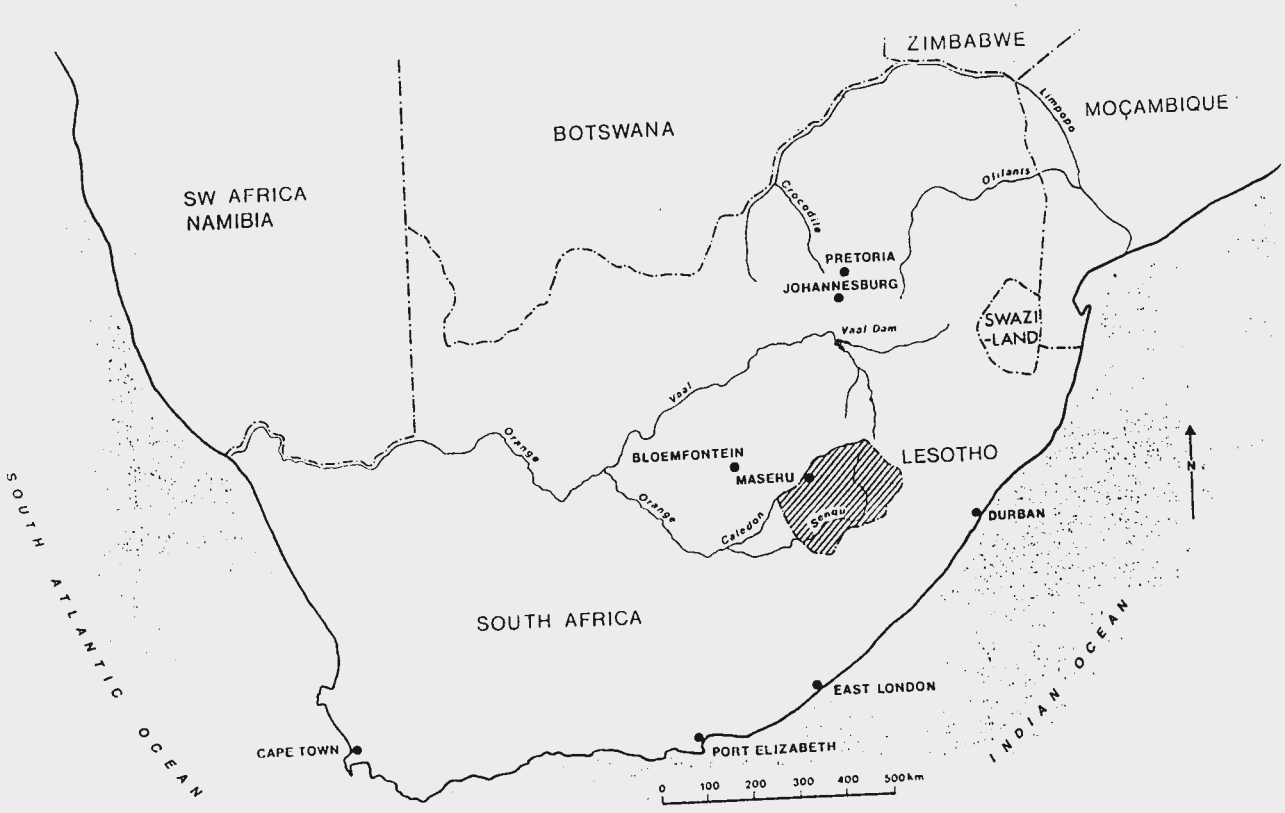

Figure 2.1 Geographical location of Lesotho (Southern Africa)

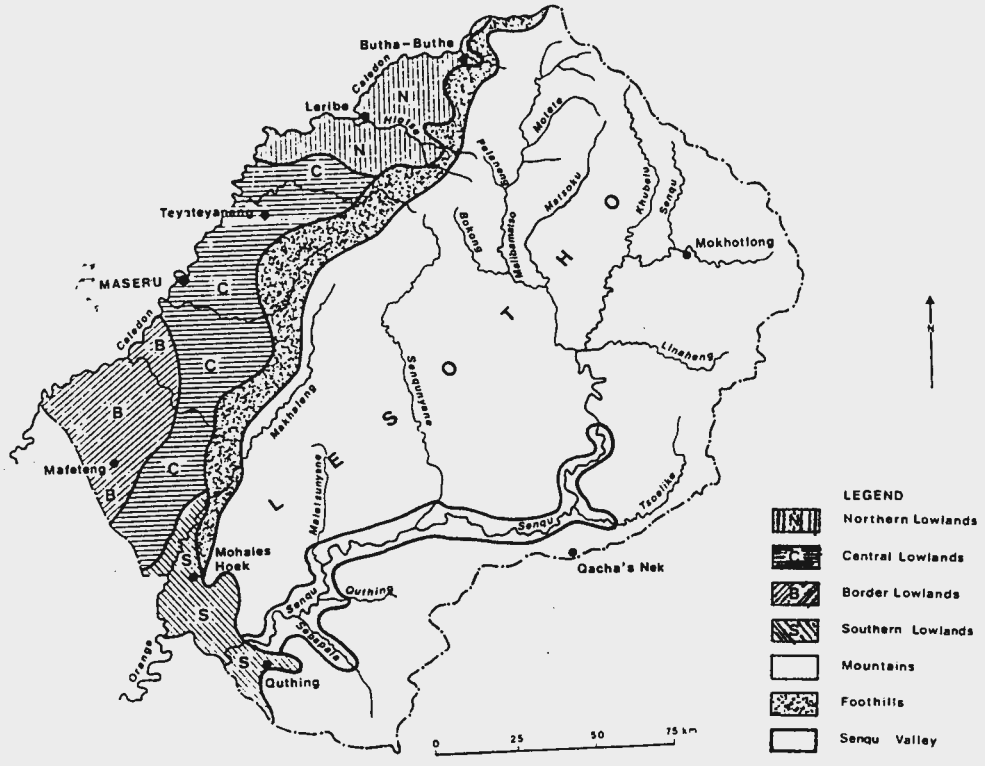

Figure 2.2 Physiographic Regions of Lesotho.

2.3 Institutional framework

The Treaty on the Lesotho Highlands Water Project between the Government of the Kingdom Lesotho and the Government of the Republic of South Africa was signed on 24th October, 1986. The Treaty covered the rights of the parties involved (LHDA Environmental Action Plan, 1990). In this Treaty the institutional framework for the implementation and operation of the project was also established. The Lesotho Highlands Development Authority (LHDA) was consequently created by the Government of Lesotho, Order no: 23 of November 1986, and was placed under the Ministry of Natural Resources and Environment. This body is responsible for the implementation and operation of Lesotho portion of the LHWP, which represents approximately 90 per cent of the total project value. An equivalent body was created by South Africa; the Trans Caledon Tunnel Authority (TCTA).

A Joint Permanent Technical Commission (JPTC) was established to oversee the two bodies, to ensure that obligations are fulfilled and to protect the rights of each country. Equal representation is provided from both governments. The JPTC has certain monitoring, advisory and approval powers binding on the two implementing bodies.

The LHDA organizational structure comprises different but inter-related divisions. The major divisions are the following: Administration, Finance, Public Relations, Construction, Water Resources, and Environment Divisions; and each of these has been assigned responsibility as follows. Administration provides technical and support services and legal advice. Finance monitors all finances required to implement the project, whilst Public Relation provides communication services between LHDA and other institutions, local, national and international communities. All infrastructure such as access roads, camps and towns are the responsibility of the Construction Division. This division is also assigned the task of designing, constructing, operating and maintaining the Katse dam, water transfer and delivery tunnels, 'Muela dam and its hydropower complex. Water Resources collects and analyses information on the hydrology and climate of the project area, management of the reservoir, and input into the

calculations of royalties. Lastly, the Environment Division has the responsibility of enhancing the standard of living of the communities affected by the implementation of the project by providing compensation, health and economic development services. Secondly, the Environment Division enhances public knowledge and participation in conservation, and diligent utilization of natural and cultural resources (LHDA Environment Action Plan, 1990). It seeks to meet these responsibilities by undertaking the following tasks:

- assessing and mitigating the negative impacts of the LHWP on the people, economy and environment;
- enhancing the quality of life of the people affected by the project;
- maximizing the opportunities for sustainable social and economic development;
- creating an environment in which people can operate at optimal levels of competence and excellence, making effective use of resources and utilizing appropriate management systems.

The Environment Division is sub-divided into four sections. These are Compensation, Rural Development, Natural Environment and Heritage, and Public Health.

The compensation section is responsible for implementing the compensation plan. This plan redresses physical losses with physical recompense. It is the duty of this section to implement measures that will compensate and resettle those people that are affected by construction and operation of the LHWP. This section must ensure that timely information and insight into the social and economic conditions of the communities in the LHWP area is provided. Thirdly, they must monitor the impact of the LHWP on the welfare and socio-economic well being of the affected communities; and maintain good community relations and liaison with the people affected by the project. Lastly, planning, implementation and evaluation of resettlement plans for all phases of the LHWP is carried out by the compensation section.

The rural development section seeks to ensure that no person or community suffers a reduction in the standard of living as a result of implementation of the LHWP. It must also promote sustainable and participatory community development in the project area, and ensure that people involuntarily dislocated due to the project are equitably treated. Finally, this section strives to maximize the benefits accruing from project opportunities.

There are three main sectors in the rural development plan, namely; production, education and infrastructure. The production sector has the following programmes: (1) Animal husbandry and range management. This programme aims to produce fodder crops, rehabilitate rangelands, improve livestock management, and develop small-scale livestock-based enterprises. (2) A mountain horticulture and field programme: this involves the improvement of arable land and promotes horticulture, vegetable and field crop production in the affected catchments. (3) The forestry programme must replace all the trees flooded by Katse and 'Muela reservoirs. (4) The objective of landuse planning is to produce land use plans that will cover all villages within the Katse and 'Muela catchments. Lastly, the (5) fisheries programme is aimed at training part-time fishermen, and recreational fishing guides.

The education section provides persons losing income as a result of land acquisition with skills. These skills are intended to make it possible for them to obtain a means of income other than traditional farming or mine labour. The infrastructure section is responsible for upgrading of roads, provision of commercial and domestic electricity, water supply and health and sanitation facilities.

The objectives of the natural environment and heritage section are to minimize the adverse impacts of the project on the natural and cultural environment, and to enhance and maintain the quality of the physical environment in the LHWP areas. Programmes under this section encompass construction, erosion and sedimentation, biological, water quality and heritage monitoring programmes. Rehabilitation and landscaping are also managed under this section, as well as the environmental awareness programmes.

The public health section oversees and plans all medical and public health aspects of the project. This involves monitoring of the environment and public health concerns, rural sanitation and water supply, implementation of public awareness programmes and preparation and delivery of school health programmes. Public health teams have been posted at different locations in the project area.

2.4 Phase 1A of the LHWP.

Phase 1A of the project started in 1986, is currently under construction, and is expected to be complete by the end of 1997. It consists of a 185m high dam at Katse (the highest concrete dam in Africa) on the Malibamats'o River (Fig. 1.1); a transfer tunnel; a reservoir and hydro-power plant at 'Muela. Katse reservoir will have a total catchment area of 1866 km^2, a surface area of approximately 54 km^2, a total storage capacity of 2 x 10^9 m^3, a maximum depth of 153 m and a mean depth of 36 m (LHDA, Scope of Services Report, 1995). 'Muela reservoir has a catchment of 360 km^2, a storage capacity of 6 x 10^6 m^3 and average depth of about 17m. Phase 1B of the project consists of an earth fill dam at Mohale on the Senqunyane River, a weir at Matsoku, and transfer tunnels delivering water into the Katse reservoir. Construction of Phase 1B has been scheduled for 1995 - 2001.

The highlands of Lesotho extend from the north of the country in the Butha-Buthe district, across the whole of the eastern border; and stretch down to the southern part of the country in the Mohale's Hoek district. They cover approximately two thirds of the country's surface area; with the remaining portion shared between the lowlands and the foothills. The highlands are predominantly mountainous with steep slopes and have little arable land; which explains the inaccessibility and remoteness of settlements in the area prior to development projects such as the LHWP.

Phase 1A is located centrally in the midst of these mountains. For planning purposes the boundary of Phase 1A is defined in terms of where major works are located; it stretches from Thaba-Tseka in the south, 55 km downstream of Katse dam, northwards through

Ha Lejone, 50 km upstream of Katse dam to 'Muela, and finally across the border near Ha Masilo (Fig. 1.1). There are three district centers on the periphery of the Phase 1A boundary, and these are Thaba-Tseka in the south, Hlotse in the west and Butha-Buthe to the north. Katse dam is accessible from Hlotse by a 122 km tar road referred to as the Northern Access Road (NAR), and by a 55 km gravel road from Thaba-Tseka. 'Muela dam and its hydro-power station are located on lower land and were fairly accessible even before the upgrading of the 20 km access road from Butha-Buthe.

2.5 Physical environment

2.5.1 Climate

According to Wilken (1978), the climate of Lesotho may be described as better for people than crops. Crisp, clean air and high percentages of sunny days contribute to the country's tourist appeal. However, the semi-arid conditions have become a major limiting factor to agricultural production and development. Lesotho lies entirely within latitudes 28° and 31° South, hence it is dominated by subtropical high pressure belt of the southern hemisphere. The three topographic regions; the highlands, foothills, and lowlands also serve as the climatic zones.

2.5.1.1 Rainfall

Wilken (1978) further showed that more than 75 % of the total precipitation falls during the months of October to March. Rainfall varies from long frontal and orographic drizzle to hard connective downpours. Annual rainfall averages between 690 and 750 mm, depending on the region. Hail is a regular threat. Estimates show that most points in Lesotho can expect hail 7 to 8 times per year. Snowfalls are frequent in the highlands and are occasionally experienced in the lowlands.

2.5.1.2 Temperature

Temperatures in the lowlands vary from just below freezing in winter to about 32 ^{0}C in summer. Temperatures in the highlands are lower. Winter temperatures are frequently below zero and summer temperatures in the mid 20's ^{0}C. In winter skies are almost

cloudless whilst in summer, there is less sunshine due to the generally more cloudy conditions. With altitudes within Lesotho ranging from 1500 m to over 3000 m the winter nights are very cold. Frost is one of the more threatening climatic hazards for agricultural production in Lesotho. Air frosts occur on some 80 days in the lowlands and up to nearly 180 days in the mountains. March to September are the major frost months, however, occasionally frost may come earlier than expected (Wilken, 1978). Wind direction can vary considerably, but northerly winds tend to be predominant (LHWP, Feasibility Study, Report C, 1986).

2.5.2 Geology

The structural development of the African continent has been marked by several periods of mountain building (Schmitz and Rooyani, 1987). Large areas became folded, metarmophosed and were subjected to deep-seated intrusions. The region thus affected ultimately became stable cratons. Goudie (1994) defines cratons as the continental area that has experienced little internal deformation since the Precambrian - about 570 million years ago. One craton of great stability, the Kaapvaal Craton, underlies large areas to the north, east and west of Lesotho.

During the late Palaeozoic (240 million years ago), and early Mesozoic eras, the continent of Africa formed part of the large landmass of the Gondwanaland (Schmitz and Rooyani, 1987). Gondwanaland's cratonized surface is characterized by products that resulted from weathering and erosion of higher lands; which were primarily transported by glaciers, running water and wind. The sediments now form wide spread and thick, largely sub-horizontal strata of mainly continental origin. Schmitz and Rooyani further indicate that Lesotho is situated in one such tectono-sedimentary basin, the Karoo Basin (Fig. 2.3a).

The Karoo basin measures several hundred thousands of square kilometers containing a cluster of sedimentary basins. The first sediments deposited in the Karoo Basin were the Dwyka Tillites (Schmitz and Rooyani, 1987). These Dwyka deposits rest unconformably

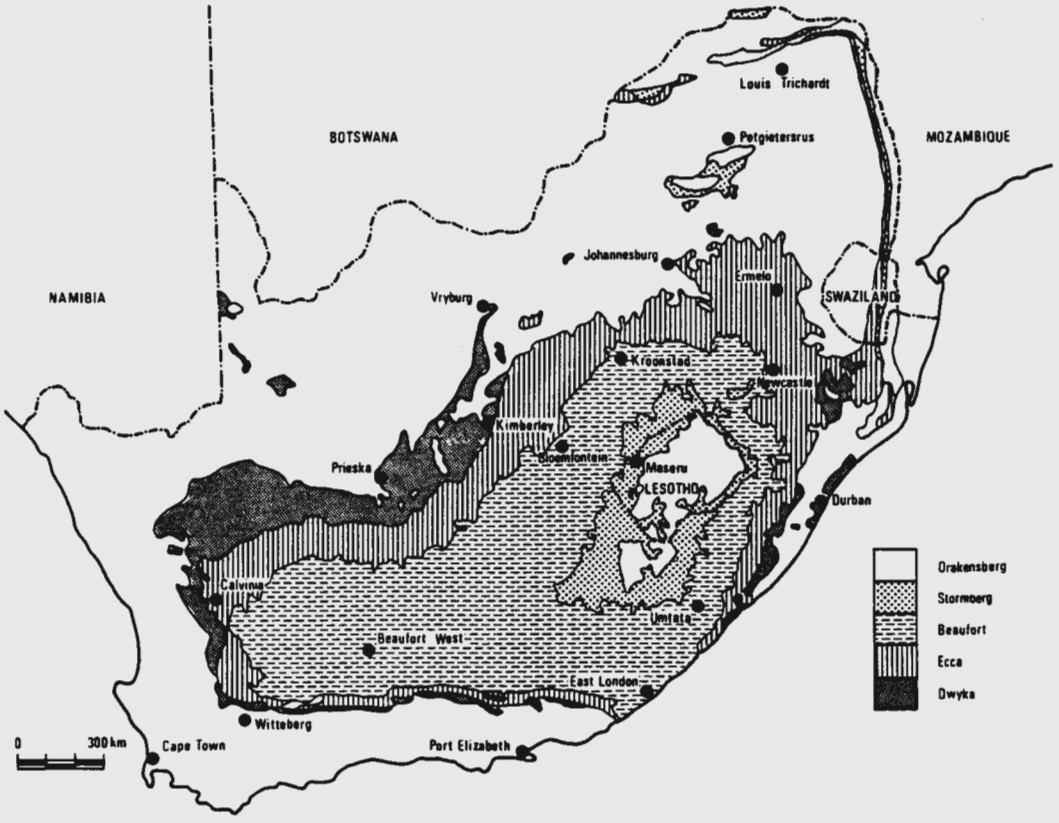

Figure 2.3a The Geology of Lesotho.

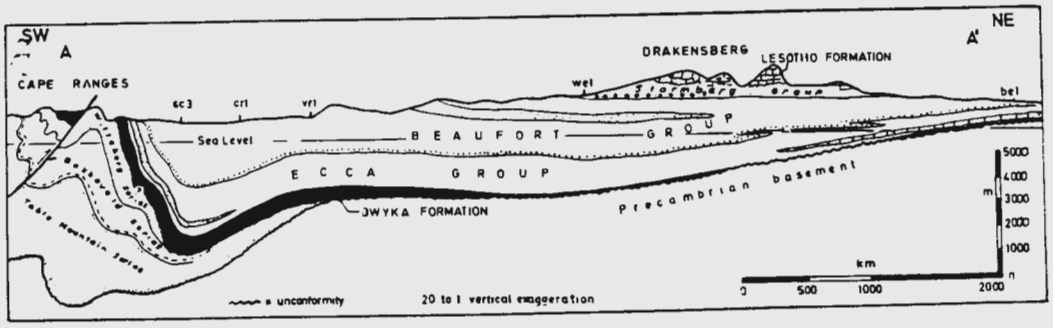

Figure 2.3b The cross-sectional view of the Lesotho formations.

upon the basin floor. According to Rust (1975), after the Dwyka formation, Ecca sediments were deposited in a moderately deep inland sea. Subsequent to the Ecca sequence - during early Triassic period, 230 million years ago - the Karoo Basin became

filled up further with thick and widespread, largely fluvial, accumulations: the Beaufort Group (Schmitz and Rooyani, 1987). During middle Triassic era, compression stresses led to the folding and uplift of the Cape Fold Belt. Schmitz and Rooyani also showed that this Cape Fold Belt was the origin of the sedimentary Molteno and Elliot Formations, which together with Clarens Formation made up the Stormberg Group (Fig. 2.3b). During the final stages of the Clarens Formation in Lesotho, explosive volcanic activity occurred in the early Jurasic period. Magma intruded the sedimentary strata and spread over the sedimentary fill of the Karoo Basin. A succession of basaltic lava flows of varying thickness, known as the Drakensberg Group, was built up and reached a thickness of at least 1600 meters in the north of Lesotho (Fig. 2.3b).

Construction activities of Phase 1A are located in the volcanic rocks of the Drakensberg Group and sedimentary rocks of the Stormberg Group. The Drakensberg group covers all of Lesotho's highland and foothills zones (Fig. 2.3a). This includes the whole of the Katse and 'Muela catchments and the route of the transfer tunnel (LHWP, Environmental Action Plan, 1990). Fossils are extremely rare in the Drakensburg Group. The Clarens Formation is directly under the Drakensburg Group. The carven for the hydro-power plant, the 'Muela dam and almost all of the Lesotho section of the delivery tunnel are built within this formation.

The Elliot Formation; which underlines the Clarens Formation is affected by Phase 1A at the Caledon crossing site works. Rocks of Elliot formation consists of soft siltstones and mudstones which alternate with bench-forming fine and medium grained sandstones (Van Rooijen, 1975). Some of the existing access roads also pass through this formation. Only a small area of the Molteno Formation; which underlies the Elliot Formation is affected by construction at Caledonspoort border crossing facility (LHWP, Environmental Action Plan, 1990). This formation is composed of white, coarse and gutty grained (arkosic) sandstones. The sandstones alternate with subordinate fine bedded, pale, grey or red siltstone-mudstone (Turner, 1970; Dursar, 1978).

2.5.3 Soils

The soils that occupy the Basaltic mountains were developed almost entirely from weathered products of basaltic rocks under a cool climate and grass vegetation. They are mostly dark; shallow to moderately deep; mostly well to moderately drained; almost entirely basalt-derived loam or clay loam, with small intrusion of sandy loam or clay. These soils are described as Mollisols and classified under the **"popa-rockland (basalt)-mats'ana"** association by the soil classification system of Lesotho (1979). Most of the soils in the project area fall within this category. Entisols, otherwise known as lithosols are present on summits and protruding basalt benches. Udolls, having a humid soil moisture regime, are found below 2700 m on south-facing slopes and on warmer slopes where mesic temperature prevails (LHWP, Baseline Biological Survey, 1993). Most of the arable soils are presently cultivated to maize, wheat, potatoes, sorghum, peas and beans.

Soil erosion has been a long continuing problem in Lesotho. The soils of the lowland zone are readily erodible and the area has long been densely settled, intensively cultivated, and heavily grazed. As a result there is severe and wide spread erosion. There is far less erosion in the foothills and highland zones. However, in recent years land pressures have increased tremendously, consequently erosion is now increasing rapidly. Gullies are now common in many parts of the highlands due to widespread sheet and rill erosion. The situation has worsened to the extent that soil erosion is now recognized as one of the major environment problems of the Lesotho highlands, including the LHWP area.

2.5.4 Vegetation

There are four vegetation belts in Lesotho. These are subdivided into seven communities (Table 2.1). The belts and their communities represent a gradient from a temperate to a subtropical flora. The temperate flora occupies cool sites at high elevation and with southerly aspects. Subtropical vegetation occurs on warm sites, at low elevation and on northerly aspects (LHWP, Baseline Biological Survey, 1993).

Rare plants include *Aloe polyphylla, Delosperma ashtonia, Kniphofia thodei* and species of *Rhodohypoxis.* However the LHWP does not directly threaten the status of any of these plant types (LHWP, Baseline Biological Survey, 1993).

Valuable, rare and endangered habitat types which occur in the Phase 1A project area are the *Leucosidea* woodland near the Hlotse adit, and a wetland on the upper Bokong river (LHWP, Baseline Biological Survey, 1993). The woodland is unique in respect of the size and structure of its composite trees. Wetlands like that on the upper Bokong river occur elsewhere. However, this particular example is traversed by the northern access road to Katse dam, and is therefore in the public eye. The wetland has been severely impacted by road and power-line construction.

Table: 2.1 Vegetation belts and vegetation communities.

Belt	Name	Vegetation Community
A	Temperate Alpine Belt.	VC1 - *Merxmuellera* temperate grassland. VC2 - *Merxmuellera disticha/Festuca caprina* temperate grassland.
B	Temperate / Subtropical Alpine Belt.	VC3 - *Merxmuellera disticha / Themeda triandra* mixed grassland. VC4 - *Merxmuellera disticha / Harpochloa falx* mixed grassland.
C	Subtropical Subalpine Belt	VC5 - *Themeda triandra Erogrostis curvula* Subtropical grassland. VC6 - *Catalepis gracilis* Subtropical grassland.
D	Subtropical Montane Belt	VC7 - *Cymbopogon pluminodis* Subtropical grassland.

Source: Baseline Biological survey, Flora, Lesotho Highlands Water Project, contract no: 75, volume 2, 1993.

2.5.5 Hydrology

2.5.5.1 Drainage areas

The main drainage area for the LHWP Phase 1A is the Katse local catchment (Fig. 2.4). This catchment is drained by the Malibamats'o and Bokong rivers. However, in the feasibility studies the local catchment refers only to the area draining laterally into the reservoir (LHWP, Phase 1A Compensation Plan, 1990). Hence areas in the catchment of the Bokong and Malibamats'o rivers upstream of the reservoir are excluded. The Katse local catchment therefore has an area of approximately 535 km^2. Of the two rivers mentioned Malibamats'o is the main channel and Bokong is the tributary. Bokong has its source near the summit of Mphosong Pass; from which it flows southwards, reaching the Katse reservoir near Ha Suoane village. The Malibamats'o also flows southwards and enters Katse reservoir at Pelaneng; about 53 km upstream from the Katse dam wall, to form the longer wing of the reservoir.

The 'Muela area has been taken to be the local catchment of the Nqoe river upstream of 'Muela dam wall (Fig. 2.5), and it has an area of about 29 square km (LHWP, Phase 1A Compensation Plan, 1990).

2.5.5.2 Sedimentation in Phase 1A reservoirs

There is a lack of reliable data on suspended sediment of the rivers in the area and of their substantial bed-loads; the feasibility studies estimate sedimentation rates of 200 to 800 tons/ km^2/year. These rates indicated that in Katse a large delta will build up and move down the reservoir; but this is most unlikely to reach and block the delivery tunnel, because this would require a 50 year flood occurring when the reservoir was at very low level, a chance of only one in a thousand. The 'Muela area has a similar situation.

2.6 Socio-economic environment

2.6.1 Settlement patterns and demography

There are 121 villages in the Katse local catchment with an average of 22.7 households per village. The 1988 census revealed that there were about 18 000 people living in the

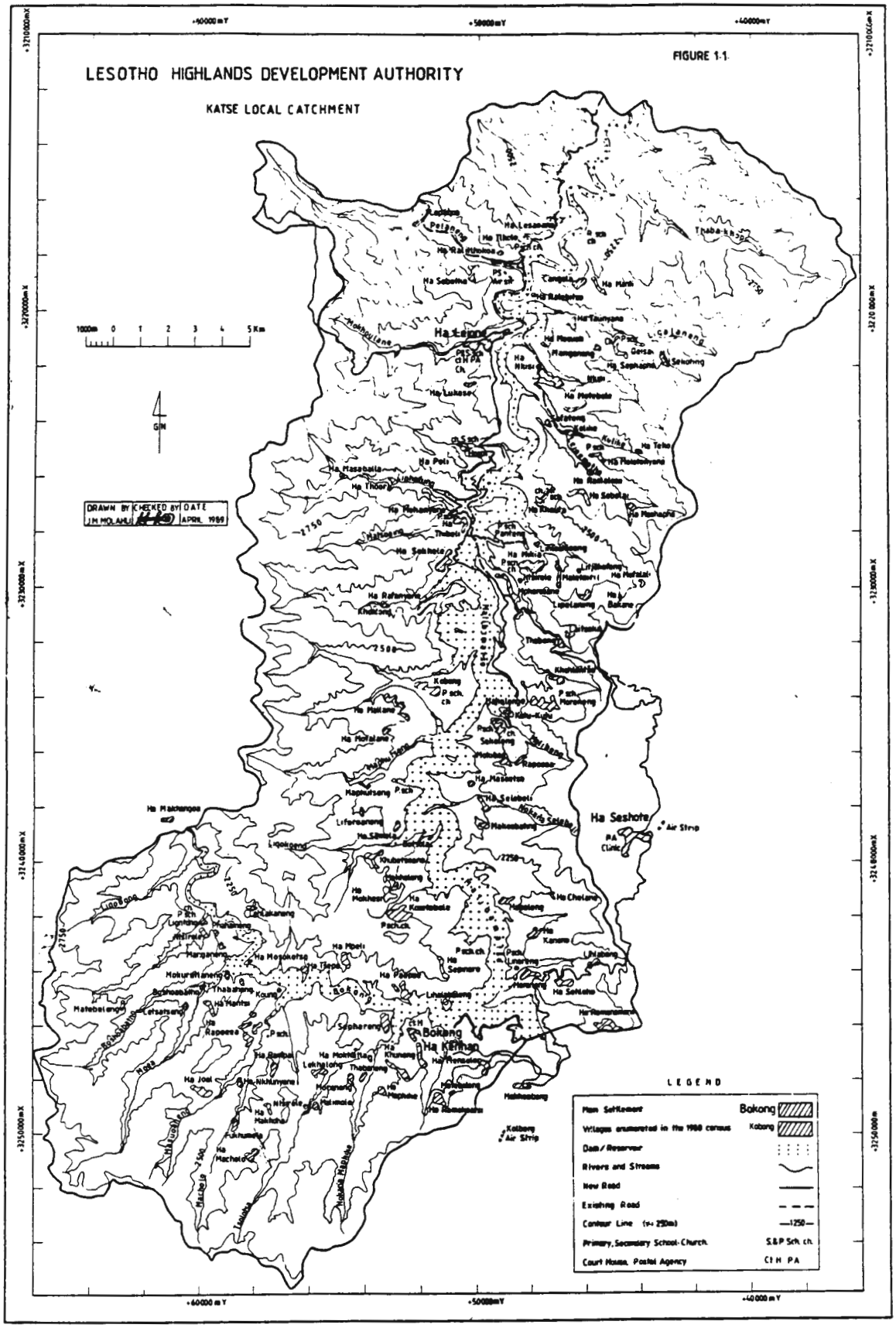

Figure 2.4 Katse Local Catchment.

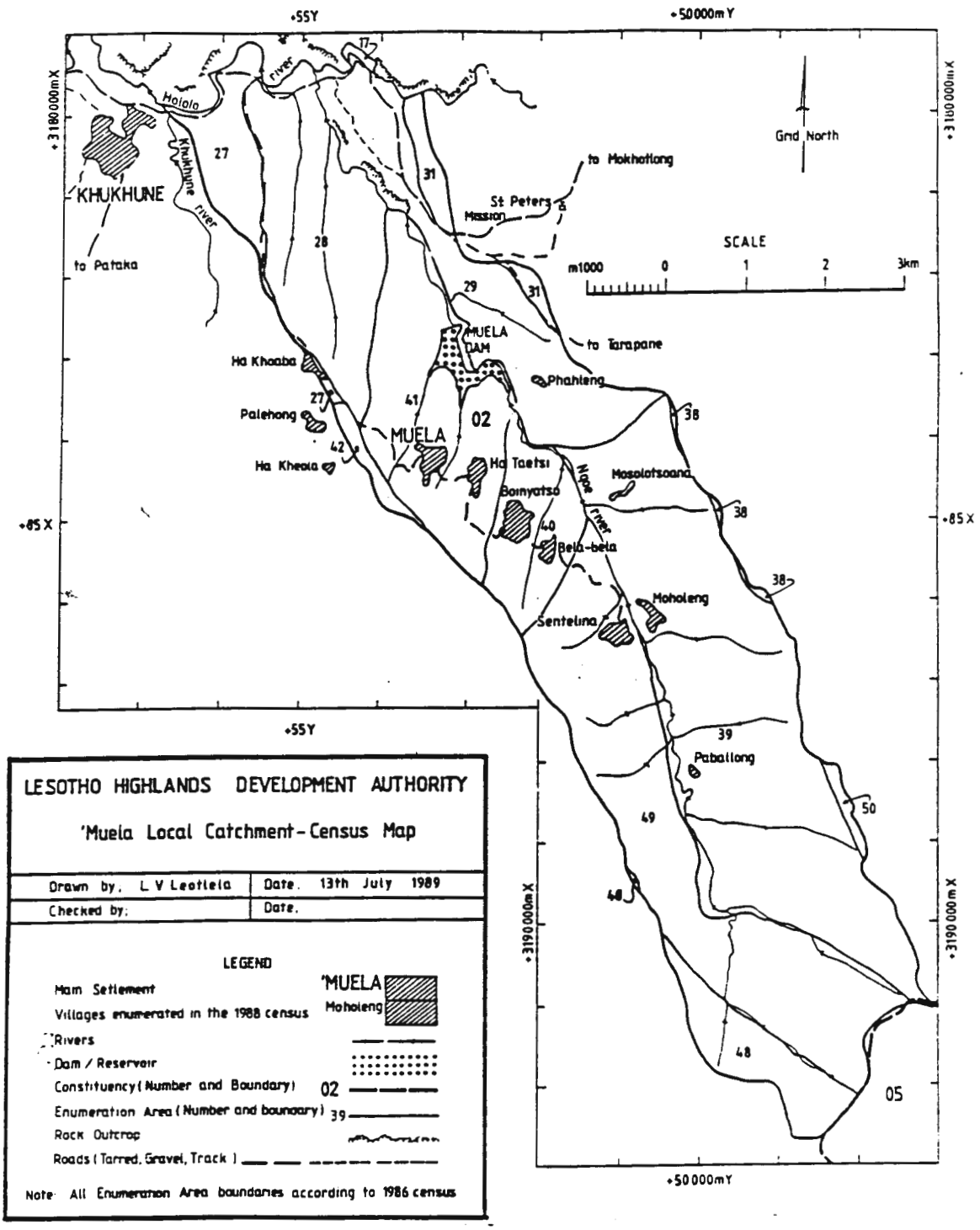

Figure 2.5 'Muela Local Catchment.

Katse local catchment area (Tshabalala & Turner, 1988). 56 % of the population is under the age of 21. Some 38 % of households have one or more members absent, working away from home - 26 % of the households having a member working in South Africa. The average household size is 5.4.

Most of the people in the study area live in the Malibamats'o valley in small villages. Upstream of Katse village, the population in the Bokong catchment is sparse. The availability of arable land is one of the most important factors affecting settlement patterns.

2.6.2 Landuse patterns

The mountainous area is mostly suited for livestock grazing, although there are large numbers of small terraced fields wherever soil depth is suitable. Maize is the principal crop; constituting 63 % of production area. Maize is followed by wheat at 16 % and sorghum, peas and barley total 15 %. Ploughing is generally done with oxen, while cultivation, harvesting and threshing are done by hand. Yields are very low: maize 820 kg per ha, wheat 580 kg per ha and sorghum 360 kg per ha. Crop residues play a role in animal nutrition (Tshabalala and Turner, 1988).

Almost 20 % of households own no livestock, and 50 % of households own 1 to 10 livestock units. There is a tendency to own more units of sheep or goats than of cattle. At the 1988 census there were 13 500 cattle, 46 500 sheep, 24 400 goats, 2 500 horses and 3 500 donkeys in the local catchment area. Traditionally cattle are moved in summer from the residential areas in the lowlands to the highlands. This tradition is still being practiced within Katse area with 75 % of households having access to "cattle posts''.

Industrial production in Lesotho has been limited by the small size of the local market and competition from South African companies. A substantial portion of the male working population is employed in South Africa in the coal and gold mines and in farming. This level of employment is likely to remain constant or decline in the future. In Lesotho the women tend to have a higher standard of general education and to play a much more significant role in the management of business and administrative affairs, including health, services than is the case in many African countries (LHWP, Public Health Environmental Study, 1990).

Chapter Three

Method

3.1 Introduction

Survey research is probably the best known and most widely used research method in the social sciences (Babbie, 1973). This research uses survey research method cited by authors such as Babbie (1973), Oppenhiem (1966), Fowler (1993), King *et al.* (1994), Judd *et al.* (1991) and Harnack *et al.* (1977). This chapter first explains the survey questionnaire and interview schedule designs, as well as pretest and pilot testing of these techniques. Secondly, the group discussion method is explained. The use of field observations and photographic evidence is also elaborated on, as well as the implementation of the survey. Thirdly, less structured interviews and data analysis are discussed.

3.2 Survey design

Research is concerned with producing factual information rather than value judgments (Hammersley, 1993). Thus, this survey aimed at exploring the actual facts surrounding the implementation of Phase 1A of the LHWP. As indicated by King *et al.* (1994), quantitative research is not more scientific than qualitative research, hence this survey was designed to substantiate information collected, not only by the number of respondents, but also by the accuracy with which respondents interpreted information.

As this survey anticipated two groups with different levels of literacy, it was necessary to incorporate techniques that would be appropriate for each group. The Environment Division personnel of LHDA were surveyed using a self-administered questionnaire, and the communities affected by the LHWP were surveyed using interview-schedule and group discussion methods. The latter methods were necessitated by the likelihood of members of the affected communities having low reading and writing skills.

Understanding from the outset what can and what cannot be done helps the researcher to anticipate at least some of the problems when designing the research. Pre-tests and pilot tests of both the questionnaire and interview-schedule were therefore undertaken before conducting any field research.

The questionnaire was written in English and delivered in person by the researcher to each of the Environmental Division staff. The staff had been advised one week in advance by the LHDA management about this study. Community based interviews were conducted in Sesotho by the researcher aided by two assistants. Group discussions were conducted and coordinated in Sesotho by the researcher.

3.2.1 Sampling design

LHDA Environment Division professional staff were taken collectively as one sample because they are unevenly distributed between the four sections of the division. The sample for the affected communities was drawn from fourteen randomly selected villages. This sample constituted only a fraction of the total 18 000 affected population located in 121 villages. Both samples were drawn to save time and effort, yet retaining the concept advocated by Schofield (1993) of obtaining consistent and unbiased estimates of the population status in terms of whatever is being researched. Further details of the LHDA sample are given in section 3.3.4 and of the affected villages in section 3.6.

Kendall (In Schofield, 1993) argued that the words "group and aggregate'' get close to what statisticians mean by a population. The group discussion method applied to a group of prominent figures in the affected communities has therefore been used to represent the perceptions and views of the whole community. Such discussions were coordinated and conducted with groups of 10 - 12 persons. The advantages and short-comings of this approach are discussed in section 3.5.

Section 4 sought to evaluate the staff's knowledge about various environmental impact assessment methods, and their professional opinion on the suitability of these methods for use in Lesotho.

Section 5 dealt with the staff's understanding of the main steps required for carrying out an EIA, and the degree to which each of these steps were carried out in the EIA process of Phase 1A.

Section 6 sought to determine the views of the staff on the accuracy of predicted impacts caused by the Lesotho Highlands Water Project on various elements of the physical and social environments. The effectiveness of the measures applied to reduce and mitigate impacts caused by the project was also assessed.

Section 7. The objective of this section was to establish the problems encountered by the staff when implementing environmental awareness programmes in the Lesotho Highlands Water Project area.

Section 8 to 10 were intended to determine the staff's professional opinions on LHDA's capability to undertake an Environmental Impact assessment; the general status of Environmental Impact Assessment practice in Lesotho; and the role of the Lesotho development institutions and government in Environmental Impact Assessment in Lesotho.

3.3.2 Questionnaire Format

The questionnaire was constructed in the form of information statements followed by the questions to be answered in a Likert scale format. The scale had four slots namely; very knowledgeable; somewhat knowledgeable; not at all knowledgeable; unsure. This was done to determine the respondent's level of Knowledge about the topic being probed (see appendix C-a). The "unsure'' slot was intended to minimize the possibility of an error in reported facts. Errors can arise from memory problems or from response biases of

various forms (Judd *et al.* 1991). The information statements were derived from a range of recognized Environmental Impact Assessment sources, for example Fuggle and Rabie (1992), Turnbull (1992) and Sadar (1994).

Both open and close-ended questions were also used. Open-ended questions allow the respondents to provide their own answer in the space allocated. In the case of closed-ended questions the respondents were asked to select responses from a list provided; this was done in order to gather uniformity of the responses (Babbie, 1973). For each of the topics investigated in the questionnaire all three - Likert scale, open and close-ended - question formats were included, in order to guide the respondent to conceptualize precisely the answers to be submitted. Using both information statements, and open and close-ended questions in the questionnaire also gave the researcher more flexibility in the design of items to make the questionnaire more interesting, while still maintaining the fundamental goal, which was to learn what the respondents know (facts); what they think and feel (attitudes); or what they have done (behaviour) concerning the Environmental Impact Assessment of Phase 1A of the Lesotho Highlands Water Project.

3.3.3 Pre-test and Pilot testing

As recommended by Fowler (1993) and Babbie (1973), prior to conducting the study, the questionnaire was first pre-tested (see Appendix A-a). The pre-test sample comprised three respondents; two were Masters degree students from the Department of Environmental and Geographical Science of the University of Cape Town. The other was a post-graduate, Lesotho citizen. Pre-testing permitted determination of problems not anticipated in structuring the questions. As further advocated by Fowler (1993), the questionnaire was pre-tested in person with the mentioned respondents. First the respondents filled out the questionnaire as they would if they were part of the survey; then a discussion was led by the researcher to establish whether the questionnaire topics were clear; secondly, whether or not the questions were clear; and lastly, whether there were any problems in understanding what kind of answers were expected and the time needed to complete the questionnaire.

Subsequent to this initial testing a pilot-test was also conducted using the same number of respondents. As outlined by Babbie (1973), the pilot study questionnaire contained all the intended questions presented in wording, format and sequence that pre-testing had indicated are the best for the final survey (see Appendix B-a). The pilot test was administered to two University of Cape Town lecturers with some knowledge of the LHWP, and a post-graduate, Lesotho citizen student who is also employed by the National Environment Secretariat (NES) in Lesotho. This pilot group approximated the target sample in terms of professional competence; the underlying requirement for the success of this portion of the study.

3.3.4 Questionnaire Administration

Owing to the fact that the questions were relevant to the staff's professional expertise their competence to respond to the questions was high. The questionnaire was planned to be self-administered and to take about 30 minutes to complete. Self-administered procedures were thought to be the best because the respondent does not have to admit to an interviewer a socially undesirable or negatively valued characteristic, and also it allows time for thought, for checking records, and for consulting (Fowler, 1993). The questionnaires were delivered to the respective respondents offices and collected three days later. This was done to ensure a high response rate. Other data collection methods such as mailing assumes that all members of the initial sample complete and return the questionnaire. However, this seldom happens and the response bias becomes a concern (Babbie, 1973). Consequently, mailing was not used in this study.

The study sample consisted of 28 professional staff members at the Environment Division. This division has four main sections namely; Natural Heritage and Environment, Compensation, Rural Development, and Public Health. Due to uneven distribution of the staff between the four sections, data collection and subsequent analysis was done collectively as one sample. Therefore, all of the 28 staff members were given the questionnaire and from these 23 (82 %) responded.

However well designed a sample, there is always a group of people who either cannot be contacted, or when contacted refuse to take part in the survey (Marsh, 1988), or are only willing to respond to the questionnaire partially. This non-response will inevitably pose a threat to the representativeness of the data. Nonetheless, according to Babbie (1993), a response rate of 70 % or more is very good, hence the 18 % no-response rate is deemed to have minimal effect on the results obtained in this survey. The survey was undertaken from the 15th to 19th April 1996 in the LHDA offices in Maseru, Lesotho.

3.3.5 Limitations of self-administered approach

The main limitation encountered with the self-administered questionnaire was that certain open-ended questions did not produce useful data. This was perhaps because the interviewer was not present to probe incomplete answers, to provide clarity and to ensure consistency in meeting the questions objectives. The answers may therefore not be fully comparable across the respondents.

3.4 Structured Interviews

3.4.1 Interview-schedule design

In rural areas there is no specific address associated with housing units (Fowler, 1993). Hence, unlike the previous sample, the study of affected communities in the project area was carried out using an interview-schedule (Babbie, 1973) and group discussion methods of data collection (Harnack, *et al.* 1977), applying each method where appropriate. The aims behind employing these two methods were to examine the extent to which the communities affected were consulted in Phase 1A and to establish whether all information concerning the impacts had been communicated to these communities. Secondly, the survey sought to reflect how Phase 1A of the LHWP has impacted on the communities in the area and to establish how LHDA as an institution had handled the tasks of curtailing and mitigating predicted environmental and social impacts.

The interview schedule was designed over the month of May, 1996. It was written in English but translated to Sesotho when conducting the interview (see Appendix C-b). As

for the Environment Division of LHDA survey, qualitative results were anticipated from the affected communities. Literature from authors such as Sinclair and Diduck (1995), Bisset (1984), Burdge (1987) and methods from Babbie (1973) were employed in constructing the interview-schedule.

3.4.2 Interview-schedule composition

The interview-schedule was made up of eight sections; sections A - G. Preceeding Section A were demographic type questions which were intended to establish the general living conditions; number of persons; and the methods of subsistence in the households. In designing sections A to G, social impact assessment variables identified by Burdge (1987) were applied. These sections are briefly summarized as follows:

Section A dealt with issues concerning compensation of houses, for example; to what extent the affected persons were consulted about the type and location of new houses with which they would be provided; the living conditions in the compensation houses; and the stress - if any - of having to lose previous homes.

Section B addressed compensation for lost arable land. It sought to determine whether there are any significant differences in the amount and timing of harvests which the affected communities used to reap and those with which they are being compensated by the Lesotho Highlands Development Authority.

Section C was intended to investigate the compensation procedures for trees lost by the communities as a result of the flooding of Phase 1A reservoirs.

Sections D to G sought to study the different population impacts caused by the Lesotho Highlands Water Project. These impacts were investigated at community, family and individual levels.

3.4.3 Interview-schedule format

The first five questions gained the demographic data about the households (see Appendix C-b). Unlike the self-administered questionnaire, these demographic questions were put at the beginning of the interview-schedule because they are generally non-threatening and they facilitate quick rapport between the interviewer and the respondent, before the interview moves into more sensitive matters (Babbie, 1973). With the self-administered questionnaire demographic questions were put towards the end because they were not likely to be interesting to encourage the respondent to complete the whole questionnaire. This is because they are generally considered as routine questions.

Both open and close-ended questions were used in the schedule. Since certain questions were relevant to a subset of the respondents, it was, therefore, considered necessary to construct contingency questions, as follow up questions to responses given to first questions (see Appendix C-b, section A). The use of contingency questions facilitated the flow of the interview and improved the data obtained because they guided the respondent to elaborate on answers following a specific logic. Contingency questions are more appropriate and important to interview-schedules than self-administered questionnaires (Babbie, 1973). They were therefore not applied in the questionnaire for the LHDA Environment Division staff.

Similar to the questionnaire method, the interview-schedule was also pre-tested (see Appendix A-b) and pilot tested (see Appendix B-b). Pre-test sample comprised of two sociology lecturers from the University of Cape Town, and two Lesotho citizen post-graduate students who are familiar with the Lesotho Highlands Water Project. Pilot testing was done with three respondents in the actual survey area; two from Makhoabeng village and one from Mapeleng village.

3.4.4 Interview-schedule administration

All the interviews were administered logically according to a schedule, and translated to the respondent in Sesotho by the interviewer - whose mother tongue is Sesotho (see plate

3.1a). The fundamental rationale behind the use of the interview-schedule approach was that a large majority of the affected communities were likely to be illiterate and would not be competent to comprehend the context of written questions, and submit the required answers on their own; a self-administered questionnaire could therefore not be used. Another reason is that the interview-schedule has a higher success rate than a self-administered questionnaire (Babbie, 1973). This is because respondents are reluctant to turn an interviewer down. The method also allowed the interviewer to clarify the exact context of the questions.

Plate 3.1a Interview with a member of the community.

Plate 3.1b Group discussion with the community members.

Interviewers were instructed to record - in writing - responses verbatim. Judd *et al.* (1991) cautions that paraphrasing the reply; summarizing it in interviewer's words; or "polishing up'' any slang, cursing, or bad grammar not only risks distorting the respondent's meaning and emphasis but also loses the colour of his or her reply.

Prior to conducting the study, three assistant interviewers were trained by the author. Topics covered in the training adhered closely to those shown by Fowler (1993) which sought to ensure that the interviewers were conversant with the following issues:

- procedures for contacting respondents and introducing the study. This ensured that the respondents were made aware and were able to differentiate between regular LHDA staff visitors and the interviewers;

- asking of questions in a consistent and standardized manner;
- methods of probing inadequate answers in a non-directive way;
- recording of answers to open and close-ended questions.

In addition to the instructions on the required procedures, the researcher demonstrated the interview with two respondents to give the assistants a sense of how to administer the interviews. This approach proved to be quick and efficient.

3.4.5 Limitations to interview methods

Of the limitations of the interview method, the major one encountered in this study was similar to that which was also found by Parry and Crossly (1950) (In Judd *et al.* 1991), namely, inaccuracies in certain facts reported in the interviews. These inaccuracies may be due to either the propensity to give socially negative answers because of negative attitudes to the LHWP or to lapse of memory, especially from older respondents.

3.5 Group discussions

Inasmuch as the interview-schedule confines the conversation between the interviewer and the respondent to the questions on the schedule, the group discussion method expands the scope of conversation so that the respondent's answers are uninfluenced by the questioning, as could be the case with structured interviews. Discussions are inquiries motivated by the desire to find answers to problems; and unlike debate which consists of competition between opposing outcomes of thought, discussions attempt to move cooperatively toward some conclusion which will represent the consensus of the group (Mcburney & Hance, 1939). This method accords each group of respondents the freedom to elaborate and expand on particular answers. Another reason which encouraged the use of the group discussion method is that the communities in the rural areas of Lesotho still conform to solving community problems in groups (i.e. community councils or public gatherings). This method of survey was therefore compatible with the cultural norms of the population being surveyed.

3.5.1 Conducting group discussions

The communities were alerted about forthcoming group discussions either the night before or in the morning for afternoon discussions. In both cases, they were only informed about the meeting and not the agenda to be discussed. This was done in order to maximize the use of constructive reasoning and minimize intentional reasoning in the discussions. According to Mcburney and Hance (1939), in constructive reasoning, the reasoner has at the outset no desire to maintain certain points at the expense of others. He or she only wishes to bring out "the truth", whatever it may be. The intentional reasoner, on the other hand, starts reasoning in order to demonstrate, secure, and justify, the accuracy of predetermined assertions in which he or she has a particular interest.

The discussions were of the face-to-face type, whereby the group sits in a circular or semicircular arrangement. Every person was able to contribute, and as each member spoke he or she could see every one present and be seen by them (see plate 3.1b). The groups consisted of 10 - 12 members (usually prominent persons) from the community in question. Discussions typically took place under the direction of a facilitator. Even in face-to-face groups this is indispensable (Mcburney & Hance, 1939). The researcher took on the function of the facilitator in all the discussions to direct and coordinate the discussion activity. All the proceedings of the discussions were recorded on tape and subsequently edited to eliminate any grossly irrelevant information (see Appendix D).

Among the advantages of the group discussion method the following were considered important for this research. Two heads are frequently better than one (Harnack, *et al.* 1977). Two or more heads lend more weight to the issues being discussed and to subsequent judgments. Right answers are supported more tenaciously than wrong answers (Harnack, *et al.* 1977). Conflicts and criticism do occur in discussions because of the differences in opinion among members of the group (Mcburney & Hance, 1939); but it is the combined critical thinking of everyone in the group that is more likely to identify and correct deficiencies in evidence and reasoning; and promote profitable discussions.

3.5.2 Limitations of group discussions

If criticism is not dealt with carefully in the discussion it may motivate prejudice and propaganda within the group (Mcburney & Hance, 1939); hence the researcher carefully ensured that every criticism was well founded. Other limitations encountered with the group discussion method were that it was time consuming and sometimes an individual respondent's perceptions on certain issues were not offered because they failed to receive seconding from other members of the group.

3.6 Selection of villages

It was not feasible for this research to cover all 121 villages affected in Phase 1A; because of limited human resources and the time-frame for the study; hence the researcher picked a village randomly from within a predetermined area. This implies that all the villages had an equal and independent probability of being sampled. As explained by Judd *et al.* (1991), independence meant that the decisions about every village were separate; the inclusion of one village depends not at all on the inclusion of any others. It was also important to select a sample that was geographical spread within the Phase 1A area - rather than to concentrate on one particular geographic cluster. This is because two or more households within the same cluster are likely to be more similar than two from the Phase 1A area at large. The Phase 1A area was thus stratified according to geographical area prior to random selection of the villages. This measure sought to avoid underestimating the full variation of different features (Marsh, 1988), in Phase 1A as a whole. A total of 14 villages, all within the Phase 1A boundary (Fig. 1.1), were selected and investigated. However, only ten of these villages were visited to investigate particular issues, and these are explained in sections 3.6.1 - 3.6.10. The other four villages were added to increase the sample size and varience. The Phase 1A boundary defines the location of all major construction works in the Phase 1A scheme, as determined by the cartography section of the Lesotho Highlands Development Authority. Table 3.1 shows the villages that were visited in this study.

Table 3.1 Villages visited in the study

Name of village	Approx. population	Approx. No: of Households	Location	Available Infrastructure	Old / New Settlement
Makhoabeng	170	30	Katse	shops, tar road	Old
Khokhoba (Ha Mensel)	287	58	Katse	shops, tar road, Clinic	Old
Mapeleng	283	58	Theko	gravel road	Old
Ha Suoane Liontong	170	31	Suoane	gravel road, School	Old
Ha Lejone (Moreneng)	281	55	Lejone	clinic, schools, shops, tar road, Lodge	Old
'Muela	319	54	'Muela	clinic, tar road, schools, church	Old
Ha Kosetabole	300	61	Kosetabole	--	Old
Ha Ts'epo	109	24	Sepinare	gravel road	Old
Ha Nts'eli Mokiba	228	45	Nts'eli	School	Old
Ha 'Mikia (Moreneng)	143	29	'Mikia	--	Old
Ngoajane	**	**	*Ngoajane	gravel road, schools, shops	Old
Ha Jonathane	**	**	*Ts'ehlanyane	gravel road, school	Old
Ha Soai	**	**	*Khohlonts'o	gravel road, school	Old
Katse Village	**	110	Katse	clinic, shops, school, lodge, electricity, tar roads, telecoms	New

Source : 1988 - Socio-economic census of the LHWP, Phase 1A, Vol. 1, main report.

** - Data not available.

* - Village not within the Katse or 'Muela local catchments.

Of these villages Makhoabeng, Mapeleng, KhoKhoba, Ha Suoane, Ha Lejone and 'Muela were investigated using the interview-schedule approach, and with all the remaining ones, the group discussion method was used. A total of 80 households were interviewed from the above six villages, with an average of 12 households randomly interviewed per village. Respondents were the household heads. The field surveys were undertaken from the 10th June to 23rd August, 1996.

3.6.1 Makhoabeng

This village is of particular significance as it was one of the most remote, rural communities in the highlands of Lesotho, prior to the sudden encroachment of informal settlements attracted by the construction work associated with the Katse dam. The type of shelters that have been erected can be considered to be below the basic standard of living (see Plate 3.2a). A survey of this village would provide information on the attitudes of the new migrants and whether these have changed through time, and in which direction. Attitudes of the original residents would also be surveyed to establish, how their previously established social and cultural life has been affected by the construction work. The provision of other basic facilities would be assessed; these will include water supply and sanitation as these are two of the many facilities that LHDA indicated they would improve as a consequence of the LHWP.

Plate 3.2a A shack in Makhoabeng

Plate 3.2b Homes for the engineers constructing the dam in Katse Village

3.6.2 Katse Village

This is a new village in the Katse area that has been constructed to accommodate a portion of the work-force responsible for the construction of the Katse dam (see Plate 3.2b). It is inhabited mainly by families of foreign engineers. The study sought to explore the impacts brought about due to the establishment of this village on the surrounding settlements. Hence comparison was made between the standard of living inside the village - with regard to the basic infrastructure facilities - and the immediate surrounding settlements. The effect of relocation on individuals and their families due to dissimilarity in age, gender, race and ethnic composition would also be studied.

3.6.3 Mapeleng

Mapeleng is about 3-4 km from the Katse dam construction site. This village is located along the right bank of the right wing of the Katse reservoir; near Ha Theko (Fig. 1.1). It is a typical rural village which is characterized by traditional huts and rondavels; and the recently constructed gravel road is the only significant infrastructure. As the Katse reservoir started filling up - towards the end of 1995 - Mapeleng experienced continuous mild earth tremors, and these were followed by the main earth quake which resulted in a crack passing through the village (see plate 5.7a and b). In the process of this seismic activity houses were damaged and the community was unsettled. The study would investigate the effects of this seismicity problem on the Mapeleng community, and assess the measures undertaken by LHDA or the contracting Engineer to alleviate the problems caused. Another repercussion of these earth tremors is the drying of springs, and consequently probable shortage of potable water for the community.

3.6.4 Ha Kosetabole

This village has been cut off from the previously accessible facilities on the Katse Village side, due to Katse reservoir flooding. The communication with settlements on the other side of the valley has been tremendously and permanently tampered with. The effectiveness of measures currently employed to maintain accessibility across the reservoir would be examined. The study would also establish whether LHDA has fulfilled

its promise to establish compensatory facilities such as schools, clinics, and churches, for communities which have been cut from such facilities.

3.6.5 Ha Lejone

This village is at the far northern end of the Katse reservoir (Fig. 1.1). Similar to Makhoabeng, the tremendous change in social and commercial structures of the community would be studied. More business has been established; especially liquor stores and sheebens. The previously rural settings of this community have been changed to semi-rural because of improved infrastructure, such as roads, electricity, telephones and the type of houses. Pelaneng - which is a smaller village near Ha Lejone - required resettlement as a result of reservoir inundation. The village comprised seven households most of which were engaged in brewing and selling beer to travellers and visitors to the adjacent trading stores. Two families relocated to Ha Sebotha and all others relocated to Ha Lejone. The present living conditions of these resettled families would be investigated and compared to conditions of the previous settings.

3.6.6 Ha Nts'eli

Similar to Mapeleng, Ha Nts'eli is a predominantly rural community; without any infrastructure. The village is along the right bank of the Katse reservoir, further upstream near the Malibamats'o bridge at Mphorosane (Fig. 1.1). Photographic evidence indicates that significant agricultural land belonging to this village (as one of the several villages along the banks of the Katse reservoir) has been flooded, as well as other communal resources such as thatching grass, sand and wood for fuel. The study would investigate how the community is presently meeting their basic food needs and other requirements. LHDA's compensation efforts pertaining to the mentioned lost properties would also be checked.

3.6.7 Ngoajane

Ngoajane is a rural village in the lowland part of the LHWP, near the Caledon border crossing in the northern part of Lesotho (Fig. 1.1). Dwellers in this village have lost crop

fields and trees in order to accommodate a site for LHWP offices and a spoil dump from the tunnel crossing works. An improved gravel road to the community is the main benefit resulting from the LHWP. The study seeks to examine whether this village has experienced similar impacts to the highlands communities because of the LHWP; and how LHDA has handled the compensation measures.

3.6.8 Ha Jonathane

This is a rural village near the Hlotse Adit construction site, and it is also within the immediate vicinity of the *Leucosidea* forests in Ts'ehlanyane Pass (see Plate 5.6d). According to the LHWP Baseline Biological Survey (1993), the Hlotse Leucosidea woodland is one the rare and endangered habitats in the Phase 1A area. The quarry for the adit works and the road leading to the quarry site pass through relatively mature woodland. The study sought to investigate efforts implemented by the site contractor and LHDA to preserve this unique woodland and mitigate whatever impacts have been caused by the construction works. Of concern also at this site is that wood collectors residing downstream of the site - Ha Jonathane amongst them - are restricted from using some portions of the forest because of the construction work. The investigation would establish the views of the community regarding the proposed nature reserve in this woodland.

3.6.9 'Muela (Ha Qhobela)

Ha Qhobela is a rural village which is closely and completely surrounded by construction works where the proposed 'Muela hydro-power electric plant is going to be established. The community is therefore subjected to continuous noise impacts, heavy traffic and vibrations due to blasting; which also damages houses in the village. Ha Qhobela is an appropriate sample for a community whose previous social settings are tremendously disrupted on a daily basis. Also of interest is to find out how the community - as an example of a rural community - perceives itself benefiting from the electricity to be generated from the hydro-power plant.

3.6.10 Ha Soai

Unlike the other villages in this study, the community of Ha Soai has not lost significant personal or communal resources to the LHWP. This is a small rural village, and it is about 25 km downstream of the Katse dam. Of concern in this village is the down stream effects of the construction works at Katse dam site. The study sought to determine whether LHWP allows the flow of compensation water to maintain community needs, and most importantly, the environmental needs of the Malibamats'o river.

3.7 Less structured interviews

Although this research followed the standard interview and questionnaire methods, in which questions are predetermined; there were exceptions in which the researcher conducted unstructured interviews with LHDA personnel. These interviews were undertaken concurrently with field surveys in order to clarify and substantiate issues raised by the communities. In unstructured interviews, the interviewer uses an outline of topics or points, and the questions and answers are completely free (Judd, *et al.* 1991).

However, unlike nondirective interviews where the interview is more in the hands of the respondent; these interviews were focused in approach. Merton, Fiske and Kendall (1956) describe that, in focused interviews, the function of the interviewer is to focus attention on a given experience and its effect. Thus, the researcher knew in advance what topics and what aspects of questions he wished to cover. Although the respondents were free to express completely their own line of thought, the direction of the interview was in the hands of the interviewer. Proceedings of these interviews were either recorded on tape or noted on paper according to the preference of the respondent.

One of the advantages of unstructured interviewing - found in this study - is that the method is flexible, and it accords the interviewer the freedom to explore reasons and motives and to probe further in the directions that were not anticipated. Nonetheless, the major shortcoming of these interviews is that they are not comparable with one another; and the analysis is more difficult and time consuming than that of standardized interviews.

3.8 Field observations

Observations were done in the Phase 1A area of the project to determine observable biophysical phenomena. Physical traces or changes such as erosion or landslides showed the frequency or the extent of some events. However, the fundamental purpose of these observations - in this study - was not to test the trend of a particular behaviour; but it was to obtain existing evidence on the biophysical conditions in the Phase 1A area. From this evidence, conclusions can subsequently be drawn - for example, conclusions about the adequacy and effectiveness of mitigation measures on environmental impacts caused by the LHWP. Photographic evidence has been provided to support these field observations. Descriptions of the observed phenomena were also recorded during the observations.

3.9 Data analysis

Data analysis has been carried out using basic inferential and descriptive statistical methods in order to substantiate the answers given on the questionnaires. But essentially, it is the content and quality of the answers, the interviews, group discussions and written literature on EIA implementation by the LHDA/LHWP that are of most importance in this study.

3.9.1 Analysis of unstructured data

Unstructured data was analysed following the principles advocated by Boulton and Hammersley (1993). These authors show that unstructured data is data that are not coded in terms of the researcher's analytical categories. Such data consists mainly but not exclusively of written texts of various sorts; e.g. field notes descriptions written by the researchers, or tape recordings of unstructured interviews. These kinds of data contrast with structured data in that observed phenomena are not assessed from predefined sorts of activity, and respondent's answers are not from a prespecified choice.

Boulton and Hammersley further indicate that the term "unstructured'' does not mean that data lack all structure. All data are structured in some ways. For instance, where texts describe events of various kinds, those events will themselves prove some sort of

structure which the texts capture more or less accurately. Nevertheless, the important factor when analyzing is to find out how what the text says relates to the phenomena it describes.

Qualitative data involves diversity in approaches to analysis; but the crucial determinant of variation is the character of the intended product (Bogdan and Taylor, 1975). This research is largely descriptive in character, therefore it will give a narrative account of events which occurred in the Phase 1A area of the LHWP concerning environmental impact assessment.

Usually data must be prepared before analysis can begin. This need is most obvious with audio - and video - recordings (Boulton and Hammersley, 1993). It was, therefore, usually necessary to transcribe all tape recordings for the purpose of analysis. Unlike with other transcriptions where detailed analyses of the process of discourse are involved, transcripts of the group discussions and unstructured interviews (see Appendices D and E) were not so closely concerned with the discourse features, hence the linguistics have been paraphrased.

An essential first step employed in analyzing the qualitative data was the close review of data. This would involve looking carefully at the data with a view to identify aspects that may be significant, and which are relevant to the research focus (Becker, 1970), or in some way are interesting or surprising. The next step involved gathering together segments of data from different parts of data recorded that are relevant to some specific category. These categories arise from some of the ideas that set the framework for this research; for example, implementation of compensation procedures, rural development in the LHWP and benefits of the LHWP to the highlands communities. The categories would then define happenings at particular points in time or reappearing patterns.

One of the limitations of unstructured data is that it is highly likely to be influenced by the researcher (Boulton and Hammersley, 1993). Therefore when analysing observational field notes strict attention was accorded to how the researcher selected and described what is being portrayed. With interviews, data analysis also considered the effect of the researcher on the respondent's answers, which could have been caused by the approach of questioning.

3.9.2 Analysis of structured data

Both continuous and discrete types of data are involved in this study. Data were analyzed using the nominal and ordinal methods of measurement, and where appropriate ratios would also be employed. Calder (1993) advocates that, together with the type of data, several other criteria are involved which would determine the approach to data analysis used, and these are: the research design, the number of variables, the sample design and size, and, most importantly, the research questions. All these factors were considered when analysing data in this research.

Calder also showed that the aim of analysis is to get information and draw conclusions from the data which have been collected. Hence, in structured data, in order to draw conclusions from the data collected; it was necessary to look for patterns in the data, to summarize and reduce data to look for relationships between different variables. As early as possible in analysis, both the antecedent and consequent variables were determined.

Descriptive statistics focus on the description of data presented. Three methods of descriptive measures were used in the analysis, namely; measures of central tendency (mean, median and mode), measures of spread (standard deviation), and measures of location. Calder explains that in order to make comparisons between distributions using different measures, the measurements have to be transformed in order that they can all be located in one common scale. One common way - which was also used in this study - is the use of percentages. Percentages make it easy to see the differences between distributions within a given table.

Bar charts have been used to display the distribution of nominal scale variables; the height and length of each bar representing the number of cases in a category. The same effect could be achieved by means of percentages (Marsh, 1988). Univariate variables have thus been analysed using bar charts. For bivariate variables, whereby two distributions describe two separate features of a sample, either the three-dimensional bar charts or percentage tables have been used. In addition Marsh (1988) also showed that percentages are the commonest way of making contingency tables readable. Comparisons are done either along the rows or columns, and percentages are subsequently interpreted as probabilities. The same perceptions were therefore applied in this study.

Chapter Four

Environmental Assessment: Principles and Application

4.1 Introduction

This chapter provides literature on the ideal context of EIA procedures, principles and applications. Insight from this chapter is used as reference and basis for comparisons and analysis of the EIA procedure that was carried out in Phase 1A of the LHWP. From these comparisons conclusions have been drawn to evaluate whether EIA of Phase 1A complied with recognized standards and procedures or not.

4.2 Definition of terms

The term environment is a concept which embraces a multitude of ingredients. Sadar (1994) uses the term environment to include land, water and air; all organic and inorganic matter and living organisms; interacting natural systems, social, economic, and cultural conditions that influence the lives of people; and any structure or building made by people. Fuggle and Rabie (1992) caution that the term environment is widely used, and different professions attach specific connotations to the term. Fuggle and Rabie also show that it has become common to speak of a natural environment, social or cultural environment, and an economic environment.

An impact on the environment is any change in the biophysical and socio-economic environments that arises from a cause directly related to the project or proposed activity (Sadar, 1994; Fuggle, 1992; Smith, 1993; Goudie, *et al.* 1985; Morris and Therivel, 1995; Biswas and Geping, 1987). The biophysical component addresses all living organisms and the natural physical environment. The socio-economic component deals with human health, safety and well being. The social and biophysical impacts are inextricably linked together: as humans need a healthy environment in order to survive. The dictionary of Contemporary English defines "an assessment'' as the value or amount at which something is calculated, decided, or judged.

Fuggle defines Environmental Impact Assessment (EIA) as the administrative or regulatory process by which the environmental impact of a project is determined (Fuggle and Rabie, 1992). EIA has also been defined by other authors as:

- a comprehensive evaluation of the effects of human development activities or non-actions on various components of the environment. The main activities include 1) impact identification, 2) impact prediction and measurement, 3) impact interpretation or evaluation, 4) identification of mitigation measures and monitoring requirements (Biswas and Geping, 1987).

- firstly, a study of the effects of a proposed action on the natural and human environment. Secondly, it seeks to compare various alternatives which are available for any project. Thirdly, it is based on predictions to estimate the changes in environmental quality which may be expected from the project. Finally, EIA is a decision making tool (Ahmad and Sammy, 1985).

- a process or set of activities designed to contribute pertinent environmental information to a project or programme decision making (Beanlands and Duinker, 1983 - In Smith, 1993).

The purpose of EIA is, therefore, to evaluate the negative and positive environmental implications of carrying out a development project before irrevocable decisions are made. Such an evaluation can then be integrated with the engineering and economic planning of the proposed project in order to make balanced decisions. Brown and Hill (1995) also recommend that EIA should not be carried out in parallel with project design; instead it is while a project is developing and evolving that environmental input to the design is most valuable.

4.3 Brief History of EIA

According to Smith (1993), until the 1950's, resource management decision making mostly addressed the technical feasibility, financial viability, and the legal permissibility of development projects or programmes. Smith also claims that this approach resulted in engineering-based answers to resource management problems,

and many projects resulted in major environmental degradation. During the 1950s and 1960s, it became increasingly clear that many industrial and development projects were producing unforeseen and undesirable environmental consequences (Ahmad and Sammy, 1985; Smith, 1993; Fuggle and Rabie, 1992). Sewell, 1973 (In Smith, 1993) indicates that this shortcoming led to the emergence of benefit-cost analysis - initially in the United States - as a means of broadening the approach to resource management decision making. Primarily the benefit-cost analysis could only assess the economic characteristics of a particular project by determining if the project would result in the largest ratio of benefits to costs. Smith (1993) argues that the method was criticized for its focus on easily measured, quantifiable benefits and costs; failure to consider alternatives; and its conceptual inability to account for distribution aspects of costs and benefits.

By the late 1960s, the need to understand and deal with the complex impacts of development projects, if serious problems were to be avoided, became manifest (Fuggle and Rabie, 1992), and the procedure adopted was environmental impact assessment (EIA). EIA was introduced into the realm of public policy through the passage of the National Environment Policy Act (NEPA) of the United States in 1969. On January 1st 1970, the United States of America thus became the first country in the world to legislate EIA on major projects. This was in response to the large national sentiment that federal agencies should take a lead in providing greater protection for the environment (Bass and Herson, 1993). The central requirement of NEPA is that federal agencies should incorporate environmental factors at every level of decision making; and that a detailed statement known as the environmental impact statement (EIS) should be prepared and made available to the government and public (Bregman and Mackenthun, 1992).

Many countries followed the United States lead and the growth of EIA legislation has become quite phenomenal. For example, Canada implemented its Environmental Assessment and Review Process (EARP) on April 1st 1974; the Environmental Impact Assessment Process of China was effected into law in 1979 (Ning, *et al.* 1988); and the South African Integrated Environmental Management was proposed by the

Council for the Environment in 1989. Ahmad and Sammy (1985) show that by 1984 more than three-quarters of the developing countries - and practically all developed countries - had done impact assessments on at least one project.

4.4 EIA procedure

This section presents one approach to the EIA process which is believed to be practical - especially in the developing world context. Major steps involved in the EIA process are shown in Figure 4.1. Each of these steps will be described and particular mention will be made on the timing and resources required for each step.

The first step in development planning is identification of the project, and development of a proposal; then investigations as to whether the plan would be possible and reasonable should it be carried out, a stage referred to as the feasibility study of the project. Primarily, the feasibility study gives information on the technical, economic and social aspects of the project; it provides a brief on the project scale, nature, location, and time frame. The Integrated Environmental Management (IEM) procedure of South Africa, and Ahmad and Sammy (1985) show that at this initial stage of the EIA procedure it is crucial to include several other action steps, and these include notifying the affected and interested parties; establishing the policy, legal and administrative requirements within which the development project will be implemented. This would - amongst other things - identify the decision maker and coordinator (Ahmad and Sammy, 1985).

It is not every project that would require a full detailed EIA, hence, it is important to undertake an initial environment examination (IEE) so as to avoid unnecessary costs and time delays. Biswas and Geping (1987) define this activity as the screening of the project, while IEM refers to it as the classification of the development proposal. This classification is a mechanism that ensures that projects which justify a "full'' EIA are assessed in this manner. Ahmad and Sammy (1985) recommend that costs and time delays can be minimized by carrying out IEE along with the feasibility studies. Screening is done by the project proponent (or his/her consultant) in consultation with the relevant authority or decision maker. IEM also allows for specialist and public

review. The completed IEE should be reviewed by the relevant authority, together with the feasibility studies in order to examine and evaluate the technical, economic, social, and environmental aspects of the project in a comprehensive manner. When it has become clear that the proposal will not result in significant adverse impacts, the

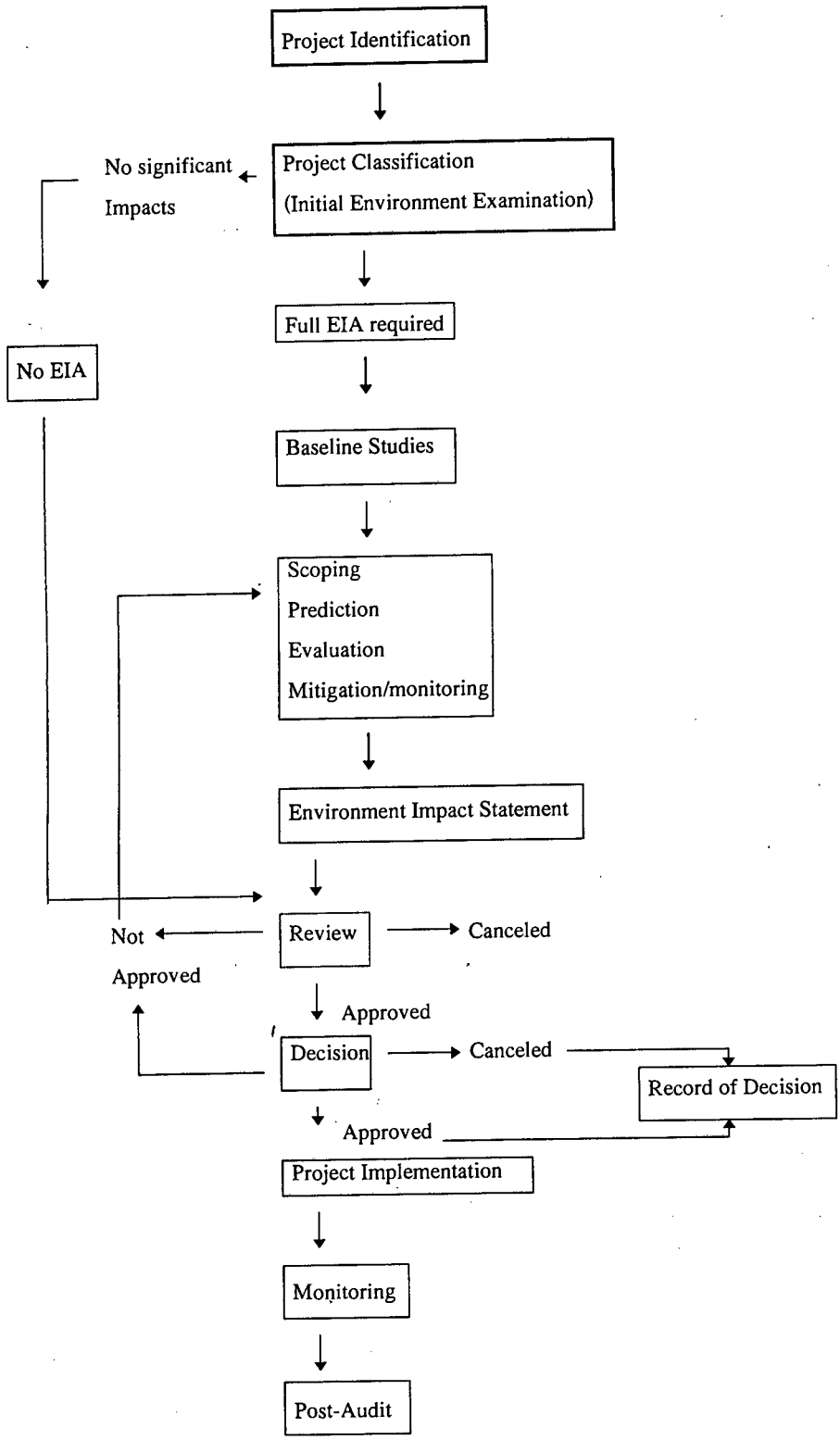

Figure 4.1 Generic framework for EIA procedure

project would be approved for implementation. If, however, the review stage finds negative environmental impacts, the project may either not be approved or channeled to a detailed EIA route.

4.5 Full EIA

Canter (1977) proposes that EIA requires a systematic and inter-disciplinary approach (In Sadar, 1994). This implies that EIA should deliberate on the potential impacts on the biophysical, socio-economic and cultural aspects of the environment in an orderly and objective fashion; and all the disciplines required should be represented. The disciplines should also be oriented to the particular features of the proposed project and the environmental setting. The main steps of carrying out an EIA are scoping, prediction, evaluation, development of plans to mitigate and monitor the predicted impacts, and the report compilation which includes the recommendations. This report is referred to as the Environmental Impact Statement (EIS).

4.5.1 Scoping

Once the decision indicating the requirement of a "full" EIA has been made, it is extremely useful to obtain as wide an agreement as possible relating to the important impacts to be investigated in depth. This sets the scope of the EIA; and Bisset (1987) shows that it is sometimes referred to as the impact identification stage (In Biswas and Geping, 1987). Bisset also cautions that superficially the task of scoping may seem easy, but in practice it is much more complex. This is because there is lack of knowledge concerning the nature and extend of the impacts arising from the variety of developments which are located in different environmental settings. Another reason is that there is a possibility that the impacts of a particular type in one project in one location may be different from those arising from an identical installation in another environment.

According to Ahmad and Sammy (1985) the task of determining which impacts should be studied in detail applies four criteria. These are 1) the magnitude of change that will be experienced; 2) the extent of the impact over the area that will be affected; 3) the significance of an impact; 4) concerns of environmental sensitivity. Selection

normally focuses only on the impacts of great magnitude, extent and significance, or which involve areas of environmental sensitivity. Preston *et al.* (In Fuggle and Rabie, 1992) show that another important aspect of scoping is the identification and notification of parties who would be interested or affected by the proposed development. This would provide the opportunity for all the parties involved to exchange information and express their views and concerns regarding the proposal before the impact assessment in undertaken. Several techniques can be employed to notify the public. For example, surveys, interviews, questionnaires and public gatherings. These and other techniques are discussed at length by authors such as Babbie, 1973; Oppenhiem, 1966; Fowler, 1993; Harnack *et al.* 1964; Schofield, 1993. Important factors to consider when choosing the appropriate technique of notifying the affected and interested people - especially disadvantaged communities - are literacy levels, language medium, level of organizational structure within the community, absence of other members of the community and dominance of a particular social class (Preston *et al.* - In Fuggle and Rabie, 1992).

According to IEM procedure scoping also provides for the identification and examination of the available alternatives to the proposed development. This is one of the fundamental components of EIA because it makes possible the basis of choice among options available to the decision maker. Preston *et al.* (In Fuggle and Rabie, 1992) add that in evaluating the alternatives, it is necessary to consider the social context in which a development will take place. This deliberation will determine whether a separate Social Impact Assessment (SIA) needs to be included in the EIA process. The scoping task requires the resources of a coordinator, decision -maker, and the assistance from experts or other knowledgeable persons in the field concerned, and the public.

4.5.2 Baseline Studies

In some cases - mostly in developing countries like Lesotho - it will be found that there is insufficient existing data on the components of the environment for important impacts to be identified. It is therefore logical to study the baseline levels of environmental parameters and to provide a record of what existed in the area prior to

the proposed project. This would be used at the assessment stage and as a bench-mark for the future. Ahmad and Sammy (1985) indicate that baseline studies may involve review of existing documents, field work, and laboratory tests. It is at baseline study stage that the technical specialists and knowledgeable persons make their first major input into the EIA.

4.5.3 Impact prediction

The first step of impact prediction is to identify where the project activities or elements interact with the social and biophysical environment. This would enable an estimation of the likely nature or characteristics of impacts. Estimation can either be in quantitative or qualitative terms. Bisset (In Biswas and Geping, 1987) show, however, that in many instances it is necessary to predict in quantitative terms the magnitude of change in a particular environment feature. For example, measurement and analytical calculations of pollution concentrations. Qualitative terms seek to predict the effects on humans, animals and plants; and unlike quantitative assessments which use scientific methodologies, qualitative assessments are based more on professional judgments.

Sadar (1994) gives four types of impacts that need to be predicted, and these are the direct, indirect, cumulative, and residual impacts. Fuggle (In Fuggle and Rabie, 1992) classifies a direct impact as first-order or primary impact, and he defines it as any effect in the biophysical and socio-economic environments that arises from an action directly related to the project. An indirect or secondary impact arises from an action which is at least one step from the project cause-effect linkage, and is therefore not initiated directly by the project. Sometimes different project components or impacts can interact to result in cumulative impacts. Preston *et al.* (In Fuggle and Rabie, 1992) mentions that cumulative impacts can be of greater magnitude and significance or a different impact altogether. Residual impacts are those impacts which remain even after mitigation measures have been implemented. All these types of impacts may be positive or negative, short, medium or long term, reversible or irreversible, permanent or temporary (Morris and Therivel, 1995).

Sadar (1994) illustrates four basic predictive techniques used in impact assessment, and these are qualitative models, "worse case" calculations, laboratory and field experimentation, and case studies which employ quantitative and qualitative thresholds. It is, however, emphasized that each task of prediction should be carried out by an expert or competent professional in the respective discipline. A social scientist would be best appropriate to predict social implications of a development on the communities to be affected than a biophysical analyst. Sadar (1994) explains that quantitative models are based on physical principles and mathematical relationships. Worst-case calculations are useful in identifying impacts that are subject to environmental quality standards and regulations. Laboratory and field experiments include determination of specific effects of project nutrients and toxins on biological systems under controlled experimentation. Predictive techniques based on thresholds rely on past experience with specific type of environments. Predictions in themselves are not facts, and as earlier stated are only estimates which will require verification. Ahmad and Sammy (1985) state that it is the responsibility of the EIA coordinator to ensure that the work of predicting the level of impacts proceeds within the stated scope, budget and time schedule.

4.5.4 Impact evaluation (assessment)

Having identified possible impacts of project development, evaluating these impacts with respect to their significance is necessary. Impact evaluations show whether an impact is significantly adverse or beneficial on some aspect of the biophysical and socio-economic environments. Erickson (1994) attests that performing evaluations is necessary as it informs the decision makers about issues to which they should pay careful attention. This would lead them to make conclusions about the overall significance of choosing one project alternative over the other (Fuggle and Rabie, 1992). Similar to other steps of EIA, evaluation groups must be constituted by environmental experts, and the interested and affected public.

The process of evaluation seeks to determine the importance of an impact to the human and biophysical constituencies concerned with the assessment. It also assesses aspects such as relative importance, possible conflict of interests, legislative limits,

carrying capacity, and the public concerns (Morris and Therivel, 1995). Fuggle (In Fuggle and Rabie, 1992) shows that the technical and social components enter in each evaluation activity. These two components are also provided for by the formulation of the rating and weighting panels in the Sondheim EIA methodology (Sondheim, 1978). Fuggle, further shows that the technical component is the assessment of the magnitude of the impact in material terms such as small or large; and the social component is the assessment of significance. This significance reflects the value-judgments to the society. Erickson (1994), Bisset (In Biswas and Geping (1987), and Sadar (1994) also support the view that it is the human judgments about the impacts - not the impact themselves - which determine the impact value. These judgments form the integral part of assigning significance. This therefore indicates that significance can only be assessed in a subjective manner. There is no objective measures which can be used to judge significance (Erickson, 1994). Fuggle (In Fuggle and Rabie, 1992) shows, however, that an element of objectivity can be incorporated in significance assessment by having multi-disciplinary teams working together in order to free the judgments from personal bias.

The following list highlights - but it is not restricted to - a list of criteria for significance (EEU, UCT, 1993)[1] . Significance is determined by the degree to which the proposed action:

- affects public health and safety;
- involves impacts which are irreversible;
- will have affects over a long time;
- affects the availability and functioning of key resources;
- affects environmental qualities, goods and services;
- results in cumulative impacts;
- has the potential to optimize existing conditions.

Scaling of significance may be in descriptive terms (e.g. low, moderate, high), numeric weighting scales, colour coding or symbols. Scaling will then facilitate the ranking of impacts in priority order for avoidance, mitigation, compensation and

[1] Environmental Evaluation Unit, University of Cape Town.

monitoring. Interim or progress reports on EIA study being undertaken should be submitted for review and evaluation at regular intervals so that the parties involved are kept informed of the state of the analysis (Ahmad and Sammy, 1985).

4.5.5 Mitigation and monitoring plans

It is almost impossible to eliminate an adverse environmental impact altogether, but it is much more feasible to reduce its intensity. This endeavor is referred to as mitigation measure in the EIA context. Once the impacts have been predicted and evaluated, it is necessary to formulate mechanisms which will be used to reduce the impacts if they are negative, and enhance them if they are positive. The same technical experts who were involved in impact quantification will work out the potential mitigation measures (Ahmad and Sammy, 1985).

According to Erickson (1994), the task of developing a comprehensive mitigation plan requires a detailed deliberation and outline of what impacts can and should be mitigated; which specific methods will be used; and what factors will influence the successful implementation of specific methods. Because mitigation measure are associated with costs they should be prioritized according to significance of impacts; and once again the EIA coordinator must ensure that the proposed measures are within the scope and budget of the project.

Inasmuch as any impact may have several contributing causes, Erickson (1994) cautions that the assessment of alternative mitigation efforts must be conducted with precise consideration of the specific causal pathways leading to the impact. There are both the structural and non-structural methods that can be used for mitigation (Erickson, 1994). Costs are intrinsic to structural methods, because these must be designed, constructed and maintained. Examples include, fencing to control wildlife or protect sensitive habitat; fish ladders and elevators; concrete slope support facilities and erosion control barriers or furrows.

Non-structural methods of mitigation include managerial protocols such as careful storage of excavated soil so that it can be used as replacement in the case of soil

dumps and quarries. Non-structural methods use relatively low cost material, for example, riprap to maintain slope stability. It is therefore advisable for the assessment team to consider non-structural methods before they opt for structural ones.

Sometimes intended mitigation measures may result in cumulative impacts. It is, conformably, in the best interest of the environment to formulate alternative mitigation measures as soon as the potential cumulative impacts are identified. In evaluating the efficacy of any proposed mitigation, special attention should be given to reviewing any documentation of the measures success or failures in previous mitigation efforts (Erickson, 1994).

Concurrent with mitigation measures, plans for environmental monitoring should be formulated. Bisset (In Biswas and Geping, 1987) gives three main reasons for the need for monitoring during construction and operation of a project as follows. Monitoring is necessary to :

- ensure that allowable legal standards for environmental contamination are not exceeded;
- check that mitigation measures are implemented in a manner described in the environmental impact statement;
- provide early warning of environmental damage of unwanted and unexpected impacts.

Bisset further shows that monitoring can be used to check the accuracy of predicted impacts made prior to project authorization. This knowledge can then be used to improve the accuracy of future EIAs. Lack of monitoring is a serious deficiency in EIA practice (Valappil and Devuyst, 1994).

4.5.6 Environmental Impact Statement (EIS)

The results of the environmental impacts assessment are compiled together in a formal report. This report assumes various names in different countries. For example IEM of South Africa refers to it as the impact report; NEPA of USA, EIA of China, EARP of Canada refer to it as the environmental impact statement. It is also referred to in

some countries as Environmental Statement (ES) or Impact Statement (IS) (Biswas and Geping, 1987). Preston *et al.* (In Fuggle and Rabie, 1992) advocate that in order to enable the authority to reach a decision, the EIS should meet three primary requirements:

"Firstly, the information should be integrated; secondly, the format of writing should be short and clear; and thirdly the report must be understandable to non-specialists".

Ahmad and Sammy (1985) categorize two separate reports that arise from an EIA work. These are reference and working reports. A reference report is defined as the detailed record of the EIA work that is necessary for future referencing; and the working report conveys information for immediate action. Reference reports contain all the information pertaining to EIA work and may be used by persons working on future EIA, EIA students and interested parties. The working report communicates EIA work from the experts directly to the decision-maker. It needs to be mentioned, however, that a detailed document can suffice to serve the purpose of future referencing and decision making.

The format of EIS should normally be in accordance with the authority rules and regulations. These rules may slightly differ with different administrations, for example, the Council for Environmental Quality in USA (Bass and Herson, 1993); Council for the Environment in South Africa (Fuggle and Rabie, 1992); National Environment Secretariat in Lesotho; and the Department of Environment in India (Valappil and Devuyst, 1994). The basic contents which should be included in an EIS include the following:

1. cover page
2. executive summary
3. table of contents
4. title, description, purposes and need of the proposed development
5. administrative, legal and policy requirements
6. Alternatives - including the proposed action
7. affected environment
8. evaluation of the proposed development
9. definition of technical terms
10. list of prepares
11. references
12. appendices

4.6 Review

The preliminary EIS will be submitted to the relevant authority for review and approval. The primary purpose for reviewing is to assess the content and adequacy of the report as a decision making tool. Some impact assessment procedures, such as IEM of South Africa also provides for public and specialist review and comments (Fuggle and Rabie, 1992). Bregman and Mackenthun (1992), indicate that the relevant authority must answer any administrative or policy questions from the public and interested groups.

The decision making step starts when the EIS reaches the decision-maker (Ahmad and Sammy, 1985). From the list of alternatives outlined in the report, the decision-maker will select the acceptable route. Ahmad and Sammy (1985) also state that, it might occur that there are several generally acceptable alternatives, and the decision-maker will have to use his/her discretion: considering however, the political realities together with economic and environmental information. Once approved the development action will proceed to implementation stage. The decision-maker may require further clarification on certain issues, in which case the report is sent back to assessment stage, or the whole project may be canceled on environmental grounds. The record of the decision, as well as the rationale for that decision must be documented for future referencing.

4.7 Environmental Auditing

EIA does not end after the project approval. It is a sine qua non that all the predicted impacts and the formulated mitigation measures to be monitored. Monitoring keeps the project proponents on-guard for any unexpected or cumulative impacts. A formal exercise referred to as environmental auditing should be conducted at intervals throughout the implementation of the development action to assess the adequacy of the EIA that was undertaken. Environmental auditing is, thus, defined as a series of activities carried out on the initiative of an organisation's management to evaluate the environmental performance, in order to verify environmental compliance,

management, and responsibilities (ICC, 1991)[2]. It can, therefore, be deduced that environmental auditing should not be treated separately, but should form part of the overall environment management system. In this regard, ICC (1991) shows that an environmental management system is a framework for guiding an organisation to achieve sustainable performance in accordance with established goals, and in response to constantly changing regulations, environmental risks, and social and economic pressures. Environmental auditing, therefore, checks on the performance of the environmental management system. Auditing can be done internally by the organisation itself or provided by external environmental professionals (Palmisano, 1989).

4.8 EIA Methods

The legal framework that instructs the requirement of an EIA is normally not specific enough to ensure that the project proponent will examine (Leopold, 1971), and how he/she will examine the environmental effects of the project. Several procedures or methods have therefore been devised by authors such as Leopold, (1971); Sondheim (1978); McHarg, (1968); to assist in the environmental analysis of a project impacts.. Fuggle (In Fuggle and Rabie, 1992), shows that a method of environmental impact describes all activities for analyzing the impacts within an environmental assessment. Fuggle also argues that ideally the method used in environmental analysis should be able to meet the tasks of collection of data on various variables relevant for impact prediction; analysis and interpretation of data; identification of significant impacts; and communication of the results of the analysis.

[2] International Chamber of Commerce. 1991. Guide to Effective Environmental Auditing. ICC Publishing, South Africa.

Chapter Five

Phase 1A of the LHWP

5.1 Introduction

This chapter explains how Phase 1A was planned and implemented. It also outlines the environmental studies that were undertaken to describe the Phase 1A environment. Insight from LHDA staff and documents is provided to give a step by step account of the implementation of Phase 1A. The chapter also includes data from the communities to show how they were impacted by construction of Phase 1A, and how LHDA mitigated these impacts. This chapter, therefore, provides the EIA process of Phase 1A, which is evaluated in chapter six.

5.2 Feasibility Studies

The feasibility studies for the Lesotho Highlands Water Project were undertaken jointly by the Government of Lesotho study consultant - Lahmeyer MacDonald Consortium - (LMC) and the Republic of South Africa study consultant - Olivier Shand Consortium - (OSC). The Lahmeyer MacDonald Consortium is a consortium of Lahmeyer International of Frankfort, Germany, and Sir MacDonald and Partners of Cambridge, United Kingdom. The Olivier Shand Consortium is a consortium of Henry Olivier and Associates and Ninham Shand Inc., both of Johannesburg, South Africa. The responsibilities for the feasibility studies were divided between the two study consultants; and they were each accorded primary responsibility for certain activities. For example, the studies related to the hydro-power component of the project were the sole responsibility of LMC because all the hydro-power requirements are the responsibility of the Lesotho government (LMC and OSC, 1986).

Preliminary studies on the feasibility of using the rivers of Lesotho as a source of water for the Republic of South Africa were carried out in 1955/6, 1967-68, 1971, and 1974 (LMC and OSC, 1986). Following the completion of these preliminary feasibility the governments of Lesotho and South Africa agreed to proceed with a joint detailed

feasibility study that was carried out over the period August 1983 to April 1986 (LMC and OSC, 1986). According to the feasibility study main report (LMC and OSC, 1986), several studies were carried out at the feasibility stage; namely: hydrology; geotechnical and construction materials; topographic surveys and mapping; management and manpower; legal; infrastructure; design; project costs; economic and financial appraisal; and environmental and social studies of the LHWP. However, this research would give more emphasis to the environmental and social studies of the LHWP.

All the information about the implementation of the detailed feasibility study of the LHWP was obtained from the main and supporting reports submitted by LMC and OSC (1986). The main objectives of the feasibility study were outlined as follows:

- to select the optimal scheme which is acceptable to both governments;
- to demonstrate that the project is technically, socially, legally, economically and financially viable;
- to carry out studies and prepare designs and costing which can be used as a basis for the preparation of tender design and associated investigations, procurement of finance and establishment of institution and legal arrangements.

From the objectives outlined above it can be argued that environmental viability was not considered one of the fundamental considerations in the initial project planning.

The feasibility studies were carried out in three stages. Stage 1 was the identification of the project layout; Stage 2A sought to refine the project layout; and Stage 2B was the detailed feasibility studies of the selected layout. Stage 1 was carried out from August to December 1983, stage 2A from February to April 1984 and stage 2B from October 1984 to March 1986. Apart from the data collected from the topographic survey, the geotechnical investigations and some limited socio-economic field surveys, the feasibility studies were based on existing available data.

Concurrent with the stage 2A studies of the LHWP, Ninham Shand Inc. also studied an

alternative project located wholly within South Africa - the Orange Vaal Transfer Scheme (OVTS) (Fig. 5.1). The stage 2A studies showed that LHWP would be less costly than the OVTS. This conclusion was based on the difference in distance between the two schemes in relation to the Vaal reservoir in South Africa.

5.2.1 Physical surveys and studies

Because of the limiting time factor for the study periods for stage 1 and 2A certain components in the feasibility studies were based on existing information. For example, topographical studies were used. Existing aerial photographs and the only available 1:50 000 and 1:20 000 maps were used. For the stage 2A feasibility studies new mapping was undertaken using aerial mapping techniques, extension of existing 1:10 000 maps, and ground surveys.

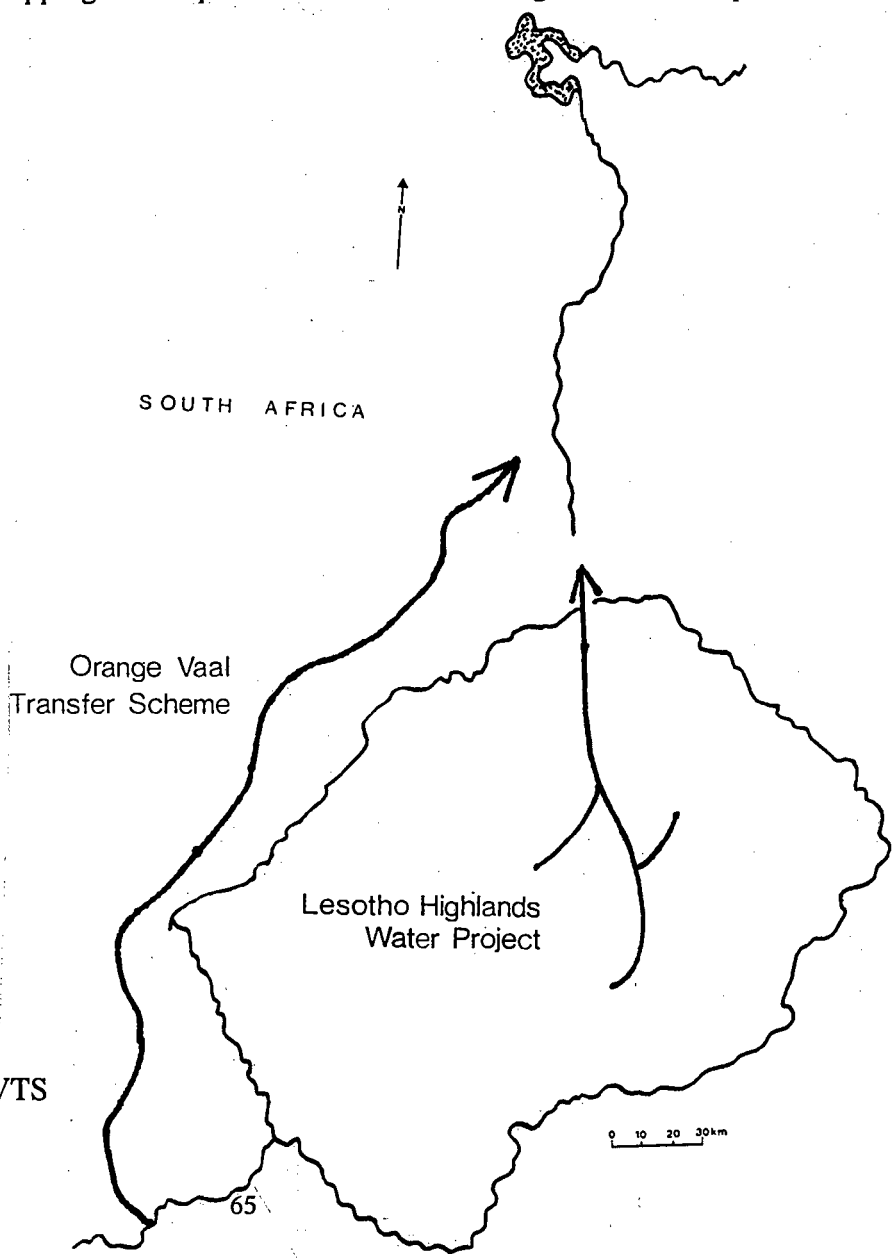

Figure 5.1 LHWP and OVTS

5.2.2 Geotechnical studies

Geotechnical and construction material studies were undertaken to provide sufficient geotechnical data for engineering designs, and to show the technical possibilities of the proposed works. Similar to topographic investigations, the geotechnical studies were based on general reviews of data from previous studies and publications. In addition field work and laboratory tests were also carried out. Investigations for the Phase 1A sites of the LHWP were carried out in detail, but for the later phases investigations were less detailed. LMC and OSC (1986) highlight that the extent of geotechnical investigations were limited to the level appropriate for feasibility studies.

Geotechnical evaluations indicated that the sites for the proposed Katse, Mohale and Mashai dams are underlain by basalt, and that of 'Muela dam is located on fine grained, massive sandstone of the Clarens formation. It was also concluded that the project is located in the area of low tectonic activity and seismic risk. This was because tectonic features such as dykes, faults, and other linear features did not show any evidence of recent activity. This assumption required further investigations, especially considering the fact that large reservoir projects are normally associated with seismic activity. Studies of the ability of existing community properties (e.g. houses) to sustain any seismic level were also imperative at this early stage of the LHWP; but these were not included.

5.2.3 Hydrological studies

One of the determinants of the feasibility of the project in the long term is the availability of water (LMC and OSC, 1986). Hydrological studies were carried out during the three stages of feasibility studies; 1, 2A and 2B. Several estimates of river flow sequences and resultant reservoir yields were made to enable the planning studies to proceed without delay. It was recommended that hydrological studies should continue throughout the implementation period of the project to enable estimates of the reservoir inflows to be improved as additional data become available.

5.2.4 Environmental and social studies during feasibility

According to the feasibility studies supporting report C (LMC and OSC, 1986), the studies of the environmental and social impacts in Lesotho were carried out from October to December 1984. Information on the effects of inundation were based on the topographical information available at that time. Socio-economic surveys were carried out at 2 villages in the Katse area, 2 in the Mohale area, and 2 in the 'Muela area. The environmental and social impact assessments concentrated on Phase 1A and 1B, and not the later phases because the two study teams perceived inaccuracies of prediction in the long term.

The implementation programme for the LHWP is shown on the chart in figure 5.2. It was established in the feasibility studies that construction of access roads - scheduled to start in 1986 - would occupy about 130 hectares of land; including 26 hectares which was arable. On the positive side, access roads would improve transport and communications to the once remote and isolated mountain regions. Tunnels, construction camps, and quarries were scheduled to start in 1988. It was envisaged that quarries and rock dumps, and construction sites would cause some disturbance on the biophysical environment. A general recommendation was that, since some quarries would not be flooded, they should be filled with soil from the reservoir basins and be made suitable for agriculture, wherever this was possible.

LMC and OSC (1986) found that the dams and reservoirs were the main components of the LHWP which would cause biophysical and social impacts. (However, as mentioned, this research will focus only on the Katse reservoir). Thus, not all the impacts covered in the feasibility studies reports will be discussed; but only those relevant to the scope of this research.

It was foreseen that the Katse reservoir would occupy large areas of arable and grazing land and displace people from their homes. Nonetheless, the exact number of people to be displaced and affected by loss of fields was not known and this information

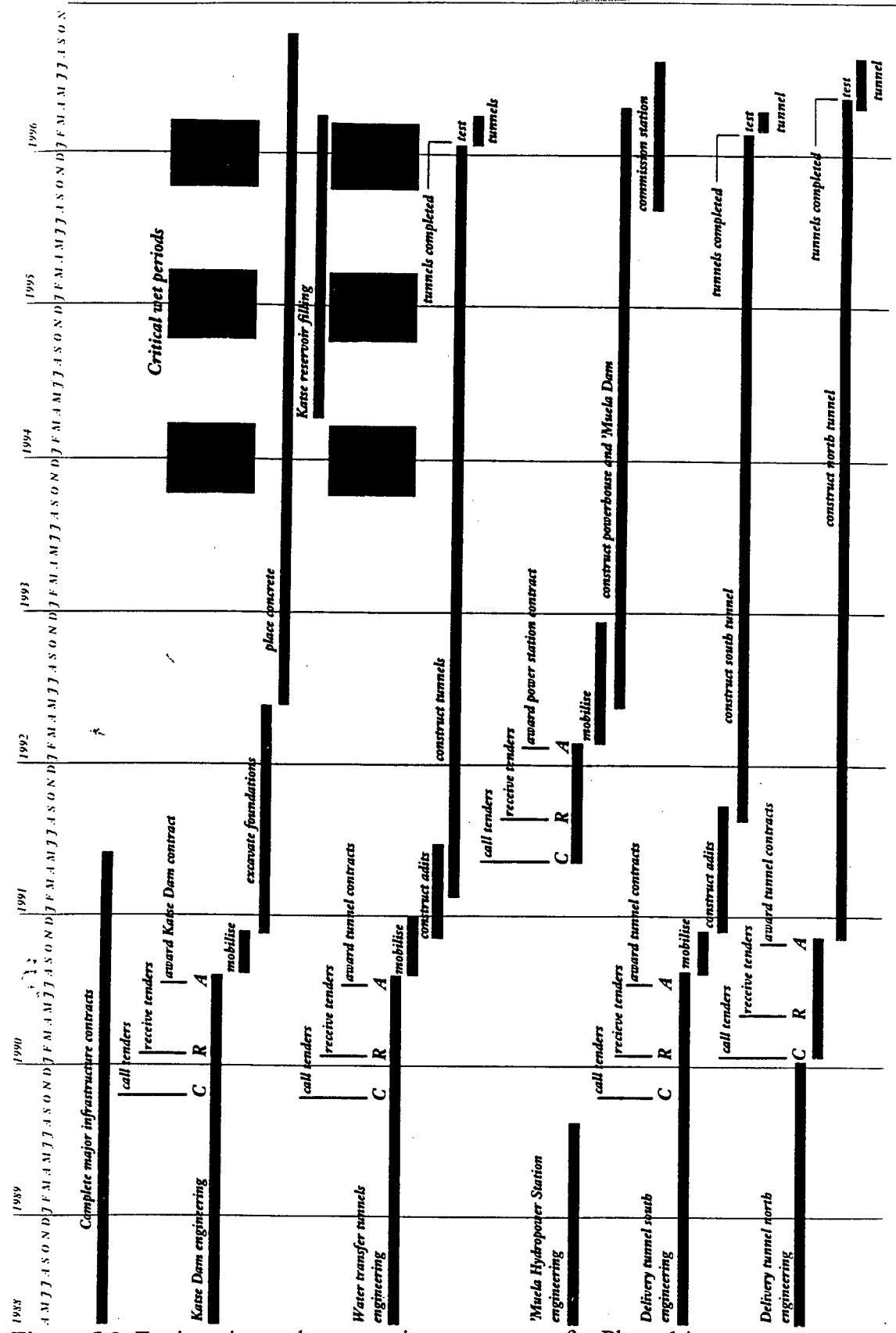

Figure 5.2 Enginnering and construction programme for Phase 1A

awaited detailed socio-economic studies of the basin. It can therefore be deduced that calculations and conclusions taken at this stage were mainly based on assumptions. Studies showed that some villages would be cut off from schools, clinics, shops, churches and other facilities they have been accustomed to use. This is because the reservoir would cut many existing routes, including some roads, which were heavily used by people and livestock. The blocking of these routes could only partially be compensated by ferries. These villages would therefore have to be provided with their own facilities. However, as has been mentioned, the decision on these replacements could not be finalized pending further studies and discussions with the communities affected.

Table 5.1 summarizes arable and grazing land losses in Phase 1A. LMC (1986) village surveys in the reservoir indicated a high proportion of families deriving an income from agriculture. For example, these proportions were 86 % at Katse and 97% at 'Muela. The average annual net return per hectare of arable land was calculated to be M312.00 (approximately US$70) (1984 crop prices). Feasibility studies showed that reservoirs would also flood considerable areas of grazing land which are used mainly in winter, when higher ground is too cold and exposed for livestock. These grazing areas also produce thatch grass, a scarce and valuable commodity in the mountain communities.

Table 5.1 Summary of arable and grazing land losses in Phase 1A

Aspects of the Project	Arable Land Lost (ha)	Grazing Land Lost (ha)
Katse Dam	570	2640
'Muela Dam	29	78
Access Roads	26	104
Rock Dumps	--	45
Construction Camps	44	96
Hydropower Station	--	300
Total	**669**	**3263**

Source: Feasibility Study, Report C (OSC and LMC, 1986).

Employment predictions anticipated that the LHWP would offer temporary relief from the unemployment problem in Lesotho, and would create only a limited number of new permanent jobs. Studies also indicated that the people around the reservoir areas would benefit temporarily from the construction programme, but unless concerted effort was made to strengthen their rural economy - the task which was to be executed by the LHDA rural development section - they would ultimately be substantially worse off than before the project.

Feasibility studies envisaged that a project of LHWP magnitude would inevitably present health hazards. The construction camps would attract informal settlements which would pose problems of sanitation and pollution, and of sexually transmitted diseases, and possibly also of security. It was therefore found necessary that adequate health facilities and monitoring programmes be provided. Two major health hazards of African lakes - Schistosomiasis and Malaria were not regarded as hazards because the highlands altitude and temperatures are hostile to these parasites.

Studies predicted that LHWP would intentionally modify the landscape and aesthetics of the highlands of Lesotho by roads, dams, reservoirs, construction camps, rock dumps and quarries, and powerlines. Unintentional effects would be erosion scars, informal settlements and increased littering. Disturbance of vegetation by construction also posed a major erosion impact. Recommendations were made that conservation and rehabilitation programmes would be required, as well as the removal of temporary camp structures.

At the time of feasibility studies little was known about the quality of water in the project area. It was assumed that water in the LHWP would be typical of high mountain catchments. That is, water with low total dissolved salts and unsaturated with calcium carbonate. However, it was foreseen that the construction phase would increase the sediment loads of the rivers downstream of the operations sites and that this would impact on aquatic life.

Feasibility studies did not anticipate any impact of the LHWP on the few small indigenous mammals remaining in the project area. This was because no significant habitat of any rare species, or game migration routes, would be reduced. During the feasibility studies there were no known rare plants threatened by the project. There were no considerations accorded to medicinal plants that would be affected by the reservoir; yet these plants are very important to traditional healers in the rural areas of Lesotho. However, further surveys of rare and protected plants and aquatic vegetation in the project area were recommended.

It was clear during feasibility studies that most trees in the project area grew in the valleys, along river banks; and a high proportion of these trees would be flooded by the LHWP reservoirs - Katse inclusive. As timber is extremely scarce in the mountain areas, this flooding would present a substantial loss to the local communities. A forestry programme to replace the lost trees was recommended. It was also stated that this programme would have to be initiated as soon as possible because trees grow extremely slowly, especially at high altitude.

Among the potential impacts on river flows downstream of the reservoirs, the following were mentioned. Firstly, dams would influence irrigation potential. It was nevertheless observed in this study that, for the Katse area, there is very limited arable land that can be used for large scale irrigation purposes for at least 25 km downstream of the dam. Another impact identified was that the dam would regulate the river flows and reduce the risk of floods in low-lying areas. Reduced flood risks would in turn facilitate river crossings. Feasibility findings also indicated that the majority of rural population obtained water for domestic uses from springs, and used river water for watering livestock; but the studies do not show how these practices would be affected by the dam. Aquatic life, especially indigenous fish production would be affected by modification of the river flows, but no details were provided.

5.3 Financing of the LHWP

Some heads of state have given official instructions to obtain funding for dams prior to completion of the necessary feasibility studies (Scudder, 1989). Similarly, for the LHWP; besides the responsibility to implement and operate the project, LHDA was charged with the task of raising the required finance in respect of the approved project components (Nthako and Bohloa, 1996). The funding was raised by way of loans. Other contemporary examples in Africa are the Balingo dam in Gambia and Baardheere dam in Somalia (Scudder, 1989). In terms of the LHWP Treaty, the government of the Republic of South Africa assumes responsibility for costs relating to water transfer and as such provides guaranties required for funding this component. Similarly, the Lesotho government assumes responsibility for the costs of implementing the 'Muela hydro-power plant.

Nthako and Bohloa (1996), further show that LHDA was advised to appoint advisors of international repute to facilitate contact with attractive sources of funding. The World Bank became involved at the invitation of the government of Lesotho, primarily to strengthen Lesotho's hand in negotiations with South Africa and to advise on the tendering and contract procedures. Their involvement in the review of these procedures helped to lend credibility that was essential in generating the necessary confidence on the part of the contractors. The World Bank also had the capacity to advise and ensure that adequate attention was given to environmental concerns, because lenders and contractors would not want to commit themselves to a contract that may be abandoned because of environmental problems. But despite section 26 of World Bank policy, the LHWP was accorded financial clearance without a proper environmental impact assessment report being received by the World Bank. Scudder (1989), also mentions that the World Bank, like a number of other bilateral and multilateral donors, has formulated environmental guidelines (1982); but has frequently ignored these guidelines. Kiambere dam and Bura irrigation project, both in Kenya are other examples of inadequate planning and implementation, where the World Bank was involved.

Table 5.2 summarizes the total financing costs of Phase 1A of the LHWP. Much of the foreign finance was raised from foreign development banks; for example the World Bank and the Development Bank of South Africa.

Table 5.2 Phase 1A - Summarised Cost Schedule

Total Financing Requirement Expressed in US Dollars x 000	**Non-CMA**	**CMA**	**TOTAL**
Capital Costs			
Katse Dam Construction	148,640	236,728	385,368
Transfer Tunnel Construction	183,944	225,251	409,195
Delivery Tunnel Construction	44,352	53,328	97,680
Infrastructure Construction		149,361	149,361
Major Works Engineering	31,799	86,961	118,760
Other Engineering		31,.720	31,720
Environment		61,111	61,111
Administration	38,898	113,953	152,851
Sub-Total	447,633	958,683	1,406,316
Finance Costs			
Charges capitalised during construction	40,997	244,525	285,522
Charges paid during construction	140,232	230,424	370,656
Total Capital and Finance Costs	**628,862**	**1,433,632**	**2,062,494**

Source: Nthako and Bohloa (1996). LHWP, Phase 1A Financing Strategy.

*CMA = Common Monetary Area.

5.4 Baseline environmental and social studies in the LHWP

The feasibility studies indicated that there was a need for further studies on several identified environmental and social impacts associated with the LHWP. According to the Environmental Action Plan (LHDA, 1990), LHDA decided to commission more than thirty separate studies in the area affected by the water project. The first studies were started in 1988, and the remaining ones in the early 1989. The Plan further indicates that the last of the studies were to be completed in February 1990. However, there are some baseline studies that were commissioned much later - in 1991, and were completed in

1993 - for example, the Baseline Biological Survey for Phase 1A. The project definition report on the natural environment (LHDA, 1993), indicates that environmental planning in Phase 1A was assisted by the European Economic Community (EEC) and the World Bank. The following studies were carried out under the management of LHDA, Environment Division (LHDA, 1990):

1. Wildlife/Botany
2. Aquatic Weeds
3. Fisheries
4. Archaeology
5. Paleontology
6. Public Health
7. Construction Training
8. Rural Training, Development, Enterprises
9. Range Management
10. Mountain Horticulture
11. Village Woodlots
12. Tourism
13. Socio-economic Surveys
14. Preliminary Sub-regional Study
15. Limnology
16. Compensation Economics
17. Wildlife (Birds) - Transmission Lines
18. Wetland on the northern access road
19. Marketing

The studies which are relevant to the scope of this research are briefly discussed as follows:

5.4.1 Socio-economic surveys

These surveys were undertaken to facilitate the preparation of the compensation and environmental action plans. The objective was to provide baseline information on the demography, economy, and living conditions of the communities affected by Phase 1A of the LHWP (Tshabalala and Turner, 1989). The census was carried out from March to July 1988 by the authors (Tshabalala and Turner) and a team of six survey staff from LHDA Environment Division. Surveys were restricted to the Katse local catchment and 'Muela areas. The local catchment is defined by Tshabalala and Turner as the area draining laterally into the reservoir. It therefore, excludes the catchment upstream of the top end of the Katse reservoir (see Fig. 2.4 and 2.5). 'Muela catchment was taken to be the catchment of the Nqoe river, upstream of the "Muela dam wall.

5.4.2 Fish biology and aquatic weeds

The objective of the fish biology study was to assess the fish production potential of the reservoirs in Phase 1A; to assess the need for compensation water downstream of the Katse and 'Muela dams; and to report on the potential effect of Phase 1A of the LHWP on the aquatic communities. The aquatic weeds study was undertaken to assess the potential problems of these weeds in the Phase 1A reservoirs. Both these studies were short reconnaissance surveys and were followed by the detailed baseline biology survey in 1993 (LHDA, 1993).

5.4.3 Baseline biology survey

The Baseline Biology Survey (LHDA, 1993), was undertaken to provide baseline information against which the future status of fauna and flora could be measured. The survey was carried out by Loxton, Venn and Associates of South Africa from January 1991 to February 1992. The study highlighted the following impacts would be incurred during construction, filling and operational sequences of LHWP in the Katse basin:

- Construction and excavation would create bare areas from which there would be high soil erosion by water and wind. A certain amount of plant and animal life would perish as a direct result of excavation.

- The *Leucosidea* woodland at Hlotse Adit and the Bokong wetland are the sensitive habitats that would be severely impacted on by construction. Indirect impacts due to construction include chopping of wood; wildfires; pollutants - such as sediment, cement, oil, sewage, household garbage, and human excrement - being carried downslope into streams and rivers.

- Given the all weather access road to Katse, tourism and sight-seeing traffic will increase. These will promote demand for goods and services, and open opportunities for various entrepreneurial activities. Improved access and increased local demand for

meat from the construction work force could lower the local stocking rate and improve rangelands for the benefit of indigenous flora and fauna.

The study recommended the need for monitoring, with more emphasis on rare and endangered fauna and flora species; environmental awareness to local communities; and promotion of ecotourism.

5.4.4 Baseline water quality and aquatic communities study

This study was carried out to provide data on the chemical, physical and biological characteristics of aquatic ecosystems in the LHWP rivers; and occurrence, bionomics, distribution and abundance of aquatic organisms. The study also sought to develop and test a water quality information system and model for monitoring. This information was intended to serve as background from which to determine sampling sites and frequency for long term monitoring. The study was completed in February 1993 under LHDA contract 83, by the Division of Water Technology, CSIR of South Africa.

5.4.5 Public health study

The LHWP public health environmental study was done by Environmental Resource Limited of London in association with Sir MacDonald and Partners, and in collaboration with LHDA, Environment Division staff. The study was completed in 1990. The principal objectives of this study were to review information concerning health and disease - especially those that are water and development related. The study also aimed at reviewing the health situation of the population affected by Phase 1A of the LHWP and prepare inputs to the rural development plans.

In addition to the health impacts outlined in the feasibility study (LMC and OSC, 1986), this survey found that Typhoid could become a common water pathogen in the LHWP area. At the time of the study, little river water was used for drinking, but it was evident that until effective sanitation was established, the risk of water-borne disease from Katse reservoir would increase. The study also envisaged that without proper sanitation, refuse

disposal, and rudimentary planning control, the informal settlements around the Katse dam works would become overcrowded, insanitary, disease generating centres. It was proposed that adequate control must be exercised from the beginning because once lost, control is recoverable only at great cost. The study concluded that the climate of Lesotho is not condusive for common water borne diseases such as Malaria and Schistosomiasis.

5.5 The Environmental Action Plan

The Environmental Action Plan for the LHWP (LHDA, 1990) was prepared by the Environment Division of the LHDA; and is currently being implemented. The action plan concentrates on the Phase 1A of the water project, but in some cases considers actions affecting later phases of the project. According to the synopsis of this plan (LHDA, 1990), it was prepared in accordance with the LHWP Treaty which states that all reasonable measures will be taken to ensure that the implementation, operation and maintenance of the project are compatible with the protection of the existing quality of the environment. The plan comprises three main sections, the natural environment and heritage plan (including public health); the compensation plan; and the rural development plan. The plan synopsis (LHDA, 1990) further indicates that proposals for actions were synthesized from the 1986 feasibility and some of the studies (summarized above) which were commissioned in 1988/89. The preliminary draft of the plan was prepared in April 1989, and the final plan in the months of August to October 1989.

Sometimes national policymakers decide to proceed with dam construction before the necessary studies have been completed (Scudder, 1989). This is the case with Phase 1A of the LHWP. According to the environmental action plan (LHDA, 1990), LHDA could not afford to await the results of social and environmental investigations before commencing with the initial construction work - especially the access roads and other infrastructure, such as construction camps. The plan indicates that environmental considerations were only incorporated into the contractor's tender documents as specifications to meet immediate requirements. These covered areas such as environmental monitoring of construction and provision of public health care.

5.6 The Northern Access Road (NAR)

5.6.1 Construction of the northern access road

Construction related to upgrading of roads, bridges, border facilities both in Lesotho and South Africa, as well as the establishment of advanced camp facilities, commenced in 1988 to pave the way for the construction activities. This included the construction of the 100 km all weather main access road from Pitseng to the Katse dam area (see Figure 1.1); this was completed in May 1991. Construction of this road was implemented through two LHDA contracts; contract 103 and 104. These were from Pitseng to Malibamats'o bridge and from the bridge to Katse dam respectively.

The first 15-20 km section of the road from Pitseng falls within the lowland zone (<1800m), and passes through several settlements. From this point it ascends up the steep basalt slopes towards the Mphosong Pass (> 2500 m), through Ha Lejone at 50 km and Ha Seshote at 70 km. From the ascent to Mphosong onwards to Katse dam, the road is characterized by steep gradients and sharp curves. Drainage structures - such as culverts, bridges and diversion furrows - have been constructed along existing water channels. Recently, further diversion furrows were constructed to control soil erosion - mainly of the crop fields along the road - that was being aggravated by increased run-off because of the road surface (see Plate 5.1a and b). Malibamats'o bridge has been built across the Malibamats'o river, at approximately 62 km (see Plate 5.2).

Plate 5.1a Diversion furrow to control erosion between crop fields.

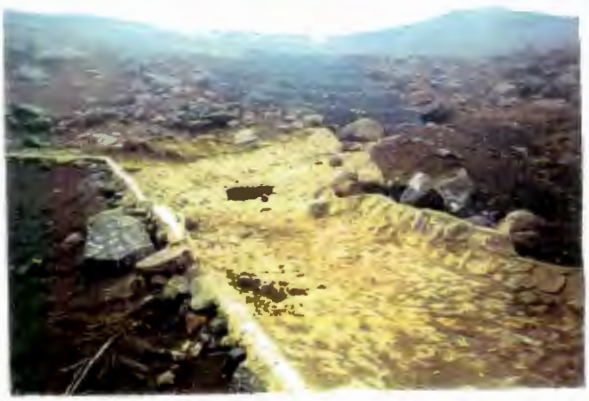

Plate 5.1b Diversion furrow to collect run-off from the main road

Plate 5.2 Malibamats'o Bridge.

The LHDA materials report (Contract 104, 1988), shows that construction material for the road was obtained from borrow pits and quarries in the Phase 1A area. The 1986 feasibility studies also showed that dolerite and doleritic basalt were the most suitable rocks for use as aggregate in concrete and road pavements; quarries identified along the NAR were sources of such rock types.

Investigations that were carried out were concerned with geotechnical, geological and pavement studies for the purpose of road design. Environmental concerns mentioned in the LHDA document (Contract 104, Vol. iv, 1988), only considered the aesthetic impact of the blasted rock on the side slopes. These scars would affect the aesthetics of the slopes.

Geotechnical studies (Contract 104, Vol. iv, 1988), envisaged soil creep along the steeper side slopes of the NAR (see Plate 5.3a). Nonetheless, this slope instability was considered insignificant because the soil material which slumps down into the side drain of the road would be removed by hand labour or machine. This perception under estimated the long term soil erosion impact of the sliding slope, and the short term impact on road safety. The road was designed for a life-span of approximately 20 years. It is currently being maintained by LHDA contractors for the construction of Phase 1A of the

LHWP. Thereafter, the road will become the responsibility of the Roads Department of the Government of Lesotho. It is highly likely that the NAR - like many other main roads in Lesotho - will not receive the immediate attention and maintenance it is getting presently. Current maintenance efforts only partially alleviate the problem; because after removing rubble, the slope is still left unprotected, and susceptible to further sliding. This is also contrary to the NAR standard specification, section 5101 (LHDA, 1988), which states that exposed surfaces such as earth slopes shall be furnished with protective covering in stone pitching, cast in situ concrete pitching, as well as construction of a masonry wall.

The NAR traverses through arable land - especially near settlements of Ha Lejone, Ha Mahlomola and Ha Seshote - and a sensitive wetland habitat at Mphosong, where the Bokong river has its source. Community crop fields have thus been affected, and at Ha Lejone a few households were displaced. According to the Environment Division, at the time of road construction the engineer did not see any value in the wetland; even when cautioned that the sponge is the source of the Bokong river; a tributary which provides the Katse reservoir with water (see Appendix E, section F,13). The construction of the road and access to the power-line has had massive impact on the Bokong wetland. The wetland has been exposed to gully erosion and silt deposition in different localities. While there are several wetlands in the LHWP, Bokong is the only one that has been affected (LHWP, Baseline Biology Study, 1993).

On the other hand the NAR has tremendously improved the transport communication between the rural highlands of Lesotho and the lowland commercial centers; as was determined in the feasibility studies. It is now safer and quicker to travel - especially in bad weather and at night (see Plate 5.3 b).

5.6.2 Rehabilitation of the northern access road

The Natural Environment and Heritage (NEH) section, in the Environment Division, asserts that planning of the NAR was carried out by engineers only (see Appendix E,

section F 10) . At that time, the engineers had no environmental sympathy to natural resources. The Environment Division was established with the plan already in place, and their task was to mitigate whatever impacts had been caused.

Plate 5.3a Soil creep along the slope of the northern access road.

Plate 5.3b All weather access road to the highlands of Lesotho.

Section 10 of the Katse dam tender document provide specifications for roadworks and landscaping. However, these specifications were not accurately complied with, because the costs which the consultant calculated for rehabilitation were far above the allowed amount in the LHDA bill of quantities; and The Joint Permanent Technical Commission (JPTC) did not approve the rehabilitation proposal. The Environment Division proposed - successfully - to the JPTC to carry out the rehabilitation using cheap manual labour methods. The NEH section also affirms that this proposal only selected certain disturbed surfaces along the NAR (see Appendix E, section F8). The engineer had rehabilitated the spoils, borrow-pits and gentle slopes with topsoil. Nonetheless, because of earlier problems with JPTC which delayed the rehabilitation programme, topsoiling was not concurrent with grassing. Some of the topsoil had already been eroded by the time the new grass was planted.

Clause 10.4.4 of the Katse dam specifications outlines the different grass seed mixtures that could be used for rehabilitation purposes. Examples of these mixtures include *Eragrostis teff, Agrostis tenius* and *Lolium perenne* for elevations lower than 2100 m, and

Dactylis glomerata, Bromus inermus, and *Festuca arandinacea* for elevations higher than 2100 m. These seed mixtures were supposed to be sown in proportions as stated in the specifications. The NEH section indicates that due to changes in rehabilitation plans - instead of the above mixtures - *Eragrostis curvula and teff* were the commonly used seeds (see Appendix E, section F9), nevertheless growth has been successful in many areas (see Plate 5.4a). However, livestock owners grazed the rehabilitation grass in several places. Because the grass had not yet grown firmly into the ground; the animals uproot and expose the surface again. LHDA has implemented several environmental awareness programmes on this issue, as a reactive measure to alleviate the problem. Proactive environmental awareness, backed by laws governing use of rangelands might have been more appropriate and effective.

The NEH section affirms that, the Bokong wetland - being part of the NAR rehabilitation programme - also encountered financial problems. The NEH section further showed that generally, environmental programmes encounter more problems with the JPTC than their engineering counter-parts. Rehabilitation programmes must take place within 12 months: after this period no more funding is given (see Appendix E, section F14). Unlike engineering programmes, some environmental impacts only become evident after one year; and sometimes the natural phenomena does not allow certain environments to stabilize after only one year. Hence the JPTC has, on several occasions, hindered the success of mitigation efforts being pursued by the Environment Division. Scudder (1989) mentions that, although some developers are concerned conservationists; the relationship between developers and conservationist in Africa, as elsewhere, has become increasingly combative. This appears to be the case between the JPTC and the Environment Division of the LHDA. In 1992 gabions were constructed (see Plate 5.4b) in an attempt to stabilize the degrading wetland; but these gabions have not been maintained since. Consequently, flowing water has cut its way around the gabions as the channel erodes away (see Plate 5.4c and 5.4d).

Plate 5.4a Regrassing along the nothern access road.

Plate 5.4b Gabions to control erosion in the Bokong wetland.

Plate 5.4c Mud-flow in the Bokong wetland.

Plate 5.4d Eroded channel, around the gabions.

5.7 Katse Dam

5.7.1 Construction of Katse dam

Construction of major structures of Phase 1A was initiated in February 1991 (Nthako and Bohloa, 1996), and these include the Katse dam. Katse reservoir is the main storage reservoir for water to be transferred to the Republic of South Africa, and to generate hydro-electric power at 'Muela. The reservoir will be fed by other subsidiary reservoirs to be constructed in the later phases of the LHWP. Katse dam will be considered an accomplishment which will generate significant economic and social gains through the

production of clean and cheap electricity. In this context, the dam is an integral part of the country's programme against energy dependency (Roggeri, 1985). According to the Environmental Action Plan (LHDA, 1990), initial plans anticipated that Katse dam works would start in 1989, and the first deliveries of water to the Republic of South Africa were expected in 1995/6. The project is, therefore, slightly behind schedule; and water transfers are now expected in 1998. The Katse dam works are nearing the final stages of placing concrete (see Plate 5.5a i.e. dam wall). Filling of the reservoir started towards the end of 1995 - from mid-October to November - and the reservoir had filled approximately one third of its maximum volume at the time of this study (see Plate 5.5b).

Plate 5.5a Katse dam.

Plate 5.5b Katse reservoir.

According to the Katse dam tender document (LHDA, Vol. 5.1, 1989), prior to construction, dam site investigations were carried out to determine the optimum dam position. These investigations included geological mapping, core drilling, the excavation of exploratory adits and the execution of field and laboratory tests. They were carried out by the Lesotho Highlands Consultant (LHC) to provide geotechnical information for the design of the Katse dam and appurtenant works. The dam site was found to have a valley slopes of 22° which steepen to 40° on the upper slopes of exposed basalt cliffs. The river bed has a width of approximately 50 meters. The size and volume of the Katse reservoir were discussed in Chapter two (see section 2.4).

It can, therefore, be deduced that the criteria for dam position did not take into consideration - amongst other environmental factors - the need to identify the plant species that would be flooded by the reservoir - especially the medicinal plants that are important to the traditional healers of the region. It was only in June 1994 that a brief survey was undertaken by LHDA with the assistance of the traditional healers to identify medicinal plants that would be flooded by the reservoir; and collect plant species for the establishment of the proposed botanical garden at Katse. Further studies to identify plant species in the reservoir area were done in 1995. Collection of plants for a botanical nursery at Katse (see Plate 5.5c) was initiated in November to December 1995; and by this time the reservoir had already flooded a significant portion of the valley. The reservoir, also flooded extensive areas of arable and grazing land, as well as other communally held resources, e.g. trees, reed beds, thatching grass and sand.

Plate 5.5c Botanical nursery at Katse

Similar to Kariba dam in Zambia and Kainji dam in Nigeria (Scudder, 1989), backing up the reservoir behind the Katse dam wall would regulate down stream flow by increasing river flow during dry seasons, and virtually eliminating annual flooding. Another potential benefit of the Katse reservoir is the development of fisheries; similar to lakes Kossou in Ivory Coast; Volta in Ghana, and Nasser in Egypt. The water in the Katse reservoir is relatively clear, and this implies that turbidity is very low. Low turbidity - if

maintained - will allow light to enter the water, hence facilitate the development of plankton or plants on which fish feed.

5.7.2 Mapeleng seismicity

Mapeleng village is situated on the eastern bank of the Malibamats'o river and approximately 5 km upstream, north-north west of Katse dam (see Fig. 5.3). According to the Lesotho Highlands Consultants (LHC) report (1996), seismicity in this village was reported by the residents as from the beginning of November 1995; shortly after the commencement of reservoir impounding. LHC (1996) also mentions that during December 1995 and early January 1996 more seismic activity was noted and a surface crack was manifest. These earth tremors caused damage to houses in the community. The respondents from Mapeleng indicate that the crack and rumbling noises resulted in social unrest in the village. For example Mr Thabo Ts'ehlahali of Mapeleng stated that:

> " I have quarrelled with my wife many times ever since the occurance of these earth quakes. She wants to leave the village immediately, but I refuse on the grounds that damage has been done and LHDA is reponsible, therefore should bear the costs of resettlement. Another reason is that I have graves of my ancestors in this village, and I feel I must depart with them."

Respondents also attest that the community was never told to expect such occurrences, while the dam fills. This implies that LHDA under estimated the impact that could be caused by seismicity; despite predictions done by Merry and Merry (1991), that filling of large reservoirs are known to cause deformation of the earth's crust, for example Kariba and Gariep dams (LHC, 1996). Seismic risk assessment (LHC, 1988) also concluded that the Katse dam project falls within the range of reservoirs where potential reservoir induced seismicity may occur (In Hendron and Gibson, 1996). It was, thus, necessary for LHDA to notify the LHWP villages of the seismic possibility - especially those which are in the proximity of the reservoir.

LHDA affirms that geological investigations that were carried out in 1988 focused on the dam site. No detailed investigations were done upstream of the dam, prior to dam construction (see Appendix E, section B15). Thorough studies were only carried out recently. The Katse dam has been constructed to withstand seismic magnitude of 6.5 on the Richter scale. This magnitude was selected as the maximum credible earthquake that can occur; as was assessed by the LHC in 1988 (Hendron and Gibson, 1996).

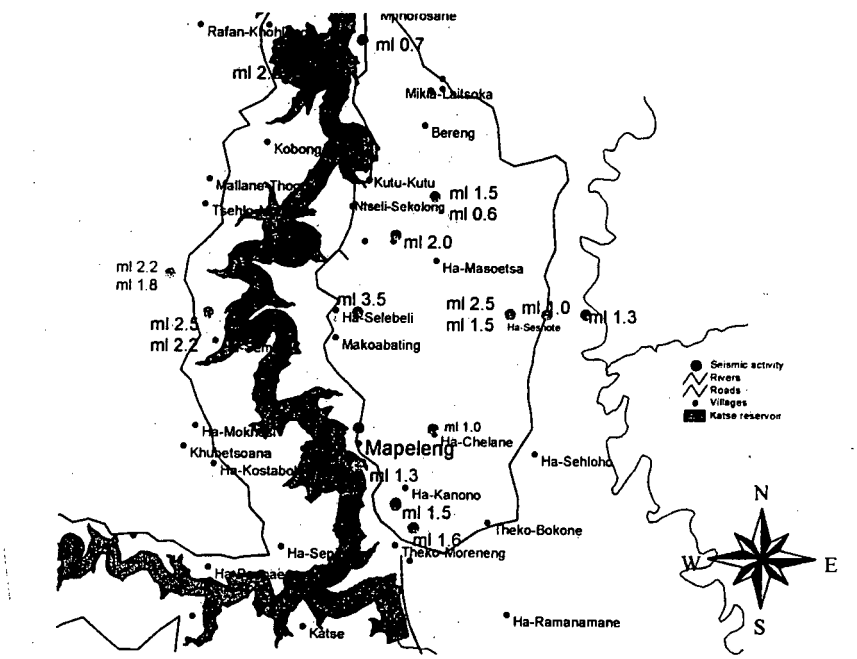

Figure 5.3 Mapeleng village, and other areas where reservoir induced seismicity has been recorded.

The figure was based on judgments of the historical earthquake and geological records of the area. These records indicated that the largest historical earthquake in the region was of magnitude 6.0, in Koffiefontein, 300 km from the Katse dam. Hendron and Gibson (1996) also acknowledge that there is no evidence from the activity that has occurred to date which suggest that a large deep seated earthquake was imminent; hence there is no reason to expect an earthquake at Katse dam. However, some academics, such as Hartnady (Department of Geology, University of Cape Town), are of the view that the largest earthquake that can be expected in the future should not be assumed to be

equivalent to the largest one that has been recorded already (Sunday Times, 10th March 1996). Hartnady showed that what needs to be looked at is the crustal stress, and not the seismic activity.

The seismic risk assessment study (LHC, 1988), concluded that the hazard for reservoir induced seismicity was very low. The expected magnitudes would be in the order of 2.0 or less (In Hendron and Gibson, 1996). However, microseismic events registered at Ha Lejone seismic station were of magnitude 2.7-3.1 on the seismograph scale (LHC, 1996). LHC (1996) also attest that due to the poor quality of house construction in the Mapeleng village, the damage observed was in line with the reported magnitude of seismicity; that the magnitude was very low and should only have been felt by humans with little damage to property. The LHC speculate that with further reservoir impounding damage to houses may result in injury and loss of life. LHDA has, therefore, proposed to relocate all the residents of Ha Mapeleng village to another site with better constructed seismic resistant houses. Even the residents who do not want to relocate will be provided with new houses.

Three seismic stations have been installed around the Katse dam; two at Katse and one at Ha Lejone. Hendron and Gibson (1996) indicate that seismograph data have been recorded since October 1991. This means that pre-filling observation period was for four years rather than one year as was initially proposed by the LHC in 1988. Hendron and Gibson further show that the installed seismograph network concentrated on the reservoir, but was operated as part of the surrounding South African network, rather than as a local microearthquake network. Problems have thus been encountered because of operating the network from a distance. For example earthquake depth could not be determined because of difficulties in timing precision.

According to LHC (1996), the Mapeleng crack is being monitored closely. A beacon survey system has been installed into rock and located at various positions to monitor large scale movements across the fault and to indicate more accurately the extent of

movement taking place. Hendron and Gibson (1996) recommended that settings of existing seismic instruments should be optimized to record local events rather than distant events; and the timing of the installed seismographs should be operated to a precision which allows precise location of earthquake epicenters and depth.

5.8 Quarries and Soil Dumps

The intention of LHDA is to deposit the muck - from the tunnels - and spoils in a fashion that is least harmful to the environment, and, if possible, to rehabilitate the dumps and quarries for productive end-use (Grindley, 1989). Among the quarries and soil dumps in the Phase 1A, the following were visited in this study; Katse quarry No: 5, Pelaneng adit spoil dump; Ngoajane crossing spoil dump; and Hlotse adit quarry and spoil dump. (see Plates 5.6 a,b,c and e)

Grindley (1989) shows that all the quarries and soil dumps that are visible - not inundated by the reservoirs - should be rehabilitated. The rehabilitation procedures should follow the intended end-use of the quarry or soil dump. The end-use option could be influenced by the current land-use in the vicinity of the quarry or soil dump. Examples of possible end-uses include grazing and crop lands, woodlots, improved pastures, indigenous shrub forest, and housing. Grindley also affirms that local people affected by the siting of the quarry or soil dump should be consulted with regard to the end-use that they would prefer for a particular site. The community of Ngoajane claimed that they were not consulted as such, but were informed about the intended end-use of the Ngoajane spoil (see Appendix D, section E2). Grindley recommended that progressive rehabilitation should wherever possible be applied. The idea of progressive rehabilitation is to complete the quarrying of discrete portions of the site and then to prepare them for revegetation while working on the next area; hence revegetation becomes an on-going process.

Topsoil is the fundamental biological and agricultural resource that is virtually irreplaceable, and as such requires conservation (Grindley, 1989). The Katse dam

specifications, clause 2.2.2, states that after a quarry or soil dump has been cleared of any vegetation, the contractor shall remove and stockpile topsoil for future use. Topsoil shall be stockpiled in uncompacted mounds of not more than 2m high, located where erosion by storm water is prevented, and suitably protected against surface erosion by mulching and grassing. Replacement of the topsoil shall be in accordance with the requirements of the specifications; section 10, clause 10.3.2.1, which states that all material which is deposited in a place prior to compaction shall be evenly spread over the designated area.

Plate 5.6a Katse Quarry

Plate 5.6b Pelaneng soil dump

Plate 5.6c Ngoajane soil dump

Plate 5.6d Leocosidea forests near Hlotse Adit.

5.6a shows progressive rehabilitation being implemented in this quarry. Nonetheless, a very high portion is still exposed and requires topsoiling.

5.8.2 Pelaneng adit spoil

This spoil is located upstream of the Katse dam; at the northern end of the reservoir. The spoil will be permanently above full supply level of the reservoir. LHDA attests that the possible end-use options include crop and grazing land, woodlots and improved pastures. At the time of this study no rehabilitation efforts were being implemented, and rock dumping was still active (see Plate 5.6b).

5.8.3 Ngoajane crossing spoil

Similar to the Katse quarry, at the Ngoajane spoil, progressive rehabilitation was practiced. The grass had grown successfully to cover the side slopes (see Plate 5.6c). The spoil had been fenced to prevent livestock grazing. The community of Ngoajane asserts that LHDA has indicated that after the construction is completed, the spoil will be available to the community to use as crop land. The top of the spoil has been leveled to facilitate this proposed end-use. The issue of concern at this site is that topsoil stockpiles have continuously been overridden by vehicles, and the soil has compacted. This soil will require further treatment, such as fertilizer supplementation.

5.8.4 Hlotse adit spoil dump and quarry

This site is for the transfer tunnel construction works, and it is located in the *Leucosidea* forests in the Ts'ehlanyane area. These *Leucosidea* forests are classified under sensitive habitats in the LHWP by the baseline Biological studies (Loxton Venn and Associates, 1993), hence it is important to ensure the well-being of the valley (see Plate 5.6d). To the communities in the proximity of the forests - such as Ha Jonathane - natural growing *Leucosidea* is a very good fuel. Restricted access to the forests is causing fire wood shortages in these communities (see Appendix D, section F7).

Progressive rehabilitation is being implemented on the waste dump (see Plate 5.6e). Erosion had, however, occurred on one side of the dump, and the flowing tunnel waste had suffocated part of the forest vegetation (see Plate 5.6f). According to the site Engineer, environmental specifications require topsoil to be hydro-seeded; but at the Hlotse adit site this had not been possible because there are no flat open spaces (see Appendix E, section G3). The Engineer further mentioned that an on site nursery should have been established to grow indigenous plants that would be used for rehabilitation purposes, but this has not been done. The nursery was supposed to have been implemented by LHDA. The LHDA environmental monitor has visited this site only once in the five years since construction started (see Appendix E, section G4) . It is of great importance to continue monitoring, both during and following completion of construction (Ludwig, 1982); therefore LHDA should revise its monitoring strategies.

The quarry was fenced to protect animals from falling over the cliff. A small ridge has also been constructed along the edge of the quarry to prevent rockfall over the slope during blasting (see Plate 5.6g). The road leading to the quarry site has cut through lose rock (see Plate 5.6h). These lose rocks may in the long term cause slope instability, and subsequent erosion. Effluent from the tunnel works is treated through a series of settling ponds prior to joining the natural stream; which is the source of the Hlotse river (see Plate 5.6i).

Plate 5.6i Settling ponds to treat effluent before depositing into the stream.

5.9 Settlements in the Phase 1A of LHWP

African nations have been developing the hydroelectric potential of their rivers at the expense of their ecological residency, human populations, and agricultural potential - agriculture includes livestock management, forestry and crop culture (Scudder, 1989). This section will mainly focus on the property losses that people have incurred because of the construction of different components of the project. Changes in these settlements will be viewed from the rural development and income generation perspectives. This is to determine whether after 10 years since LHWP implementation of Phase 1A, the standard of living in the communities affected by the project has been maintained at a level not inferior to that pertaining prior to project implementation, as provided in Article 7, paragraph 18 of the Treaty on the Lesotho Highlands Water Project (1986).

5.9.1 Household property affected by the LHWP.

5.9.1.1 Houses.

Several houses have been affected at Mapeleng and Ha Suoane due to actions of seismicity and road works respectively. However, no housing compensation had yet been received by individual households, because in both cases the whole village required relocation to another proposed site; implementation of which was at the new site surveying stage, at the time of this study. At Mapeleng the new site is only 500m from the original affected settlement. LHDA indicates that, in general the new sites have been chosen by the community (see Appendix E, section B10). This implies that the community only wants to move away from the current surface crack (see Plate 5.7a and b), and not away from seismicity. LHDA is of the view that a better location would be several kilometers from the shore-line. This is because the entire shore-line - especially the eastern bank of the reservoir - is deemed prone to seismicity. Temporary prefab housing has been provided for houses that have been seriously destabilized by the seismic activity. However, all the repondents who have these prefabs indicated that they are too cold to sleep in (especially in winter) because they have bare cement floors.

Plate 5.7a Surface crack at Mapeleng.

Plate 5.7b Surface crack through the village.

The people of Ha Ts'epo feel that they are situated too close to the reservoir, and therefore, request possible relocation (see Appendix D, section B3). LHDA on the other hand would only accept relocation of villages that are situated within full supply level of the reservoir; or within 100m from this level, at the discretion of the community. Ha Ts'epo is slightly outside this range, but is it at the very edge of a steep slope leading into the reservoir.

Clause 6(1) of the LHWP, compensation regulations (1990) , states that where LHDA acquires residential land on which one or more habitable houses are standing, it shall build one or more houses of the same total internal floor area as the habitable houses on the residential land acquired, and be of a similar quality. 29 of the households in this study had their houses affected in one way or the other by the LHWP; 19 had received compensation houses (see Plate 5.8a and b).

Provision of hostels at Katse dam construction works, and housing at Katse village and Ha Lejone camp are some of the positive mitigation efforts for the accommodation of the Phase 1A work force. Compensation for housing has also been outstanding - especially the recent houses which were compensated with additional facilities e.g. fencing and toilets, regardless of whether these facilities were present or not in the initial dwellings.

Compared to similar community displacement e.g. Kiambare dam in Kenya (Roggeri, 1985), where the people were only given cash compensation, and left to search for alternative settlement locations on their own, LHDA's assistance ameliorated this impact for the Phase 1A communities.

Plate 5.8a Initial compensation houses

Plate 5.8c Leaking chimney in the initial compensation houses.

Plate 5.8b Improved compensation houses

5.9.1.2 Fields

Socio-economic studies (Tshabalala and Turner, 1989) and LHWP compensation policy, clause 2.2, indicated that alternative arable land is not available in Lesotho. Therefore, where a field is permanently acquired by the project, LHDA must replace the income lost

to the affected household and its descendants. Similar to Masinga dam in Kenya (Roggeri, 1985), the acquired land in the LHWP belonged to the state, and there was no compensation for its value. Clause 3 (1) of the LHWP compensation regulations (1990), shows that payments shall be made in the form of grain over a period of fifteen years, with at least one such payment made each year.

Clause 2.5 of the 1989 LHWP compensation policy states that replacement income would be based on the assumption of 1000 kg per hectare and on what the field holder would have to pay to buy that amount of unprocessed crop on his/her own. LHDA argues that according to its socio-economic studies (1989), most people were receiving approximately 600 kg/hectare as average yields; but LHDA is compensating with 1000 kg/hectare, plus 30 kg/hectare of pulse (see Appendix E, section A11). LHDA compensation does not consider the occurrence of drought, poor soil condition or any limiting factor that could have impaired yields on the previous land.

From the group discussions is was deduced that most communities are not satisfied with compensation in the form of maize and pulse only (see Appendix D, sections A2, B7, C5, D3, and E4). This was because the communities grew a variety of crops (e.g. peas, sorghum, wheat, potatoes etc.). In fact initially, compensation was only in the form of grain, as indicated by clause 3(1) of the compensation regulations. Addition of pulse was a reactive measure by LHDA to service the complaint. In some cases, similar to Phase 1B, dagga (*Canabis sativa*) was grown as a source of income. But this was never reported to LHDA because it was regarded as illegal; this has resulted in depreciation in the standard of living on those individual households who depended on dagga.

According to LHWP compensation regulations, clause 3(3), any land of less than 1000 m^2 acquired by the project shall be compensated with a single standard cash payment. Some households feel that the cash payment was far less than what the soil was worth, especially because soil is a long term resource; however, since all land belongs to the

state, its value is not considered in these crop compensations. Seemingly, LHDA did not communicate this with the affected communities.

Another issue that seems to be disturbing to all the communities whose agricultural land has been acquired by the project, is clause 3(1) of the LHWP compensation regulation (1990), which declares that compensation payments of grain shall be made over a period of 15 years, from the time of land acquisition. According to the communities land is inheritable, hence grain compensation should be perpetual. Another reason given was that the majority of the population are senior citizens, and will not be able to be self sustaining after the 15 year interim compensation period (see Appendix D, sections B7). LHDA accepts that the 15 year cut-off period for the interim compensation has no scientific basis, but it was a compromise reached by the compensation advisory committee. LHDA was hoping that inside 15 years the proposed long term rural development and income generation programmes would be self-sustaining (see Appendix E, section B2). LHDA further affirms that it will review its position regarding compensation after the 15 year period; and it also has an obligation to maintain the old and disabled citizens for the 50 year economic life of the water project (see Appendix E, section A8). However, seemingly the communities are still insecure as to their future well being in the LHWP area. This is largely because most of the rural development projects that were promised prior to LHWP implementation have not yet taken shape; and the standard of living in the communities has not improved for the majority as had been advocated by the project proponents.

The trend of events between the communities affected and LHDA indicate that in Phase 1A the public was not satisfactorily involved in the decisions taken - especially with regard to compensation for field and trees - as will also be seen in section 5.9.1.3. LHDA affirms that, in 1987, a compensation advisory committee was put in place to formulate the compensation policy. This committee was made up of people who were familiar with land acquisition and compensation matters, these were; three principal chiefs; the commissioner of lands and survey; the attorney general - to ensure legal backing of the

policy; and four LHDA representatives, namely; the principal rural development officer, the principal compensation officer, public relations division manager, and the environment division manager. Ordinary citizens - especially those who would be affected by the project were not represented on the committee.

In Lesotho - similar to several other African countries - this river basin development project is not only the largest project within the national development plan, but it also received the direct interest and backing of the head of government (at that time), whose goals for such a project were as much political as economic (Scudder, 1989). Kainji dam in Nigeria, Bandama dam in Ivory Coast and Akosombo dam in Ghana are examples of projects that had strong backing from heads of government (Scudder, 1989). The LHWP was put in place under a military junta. Respondents and group discussions attest that public gatherings were conducted by local and government dignitaries at that time. There was no freedom of speech and most government policies were more dictatorial than consultative, hence the communities - especially rural ones - felt intimidated. The military did not pay much attention to the welfare of the local people to be affected by the project. This socio-political practice could best be summarized as paternalistic, authoritative, and monolithic; and these approaches are similar to those practiced in China, as an example (Fu-Keung IP, 1990). LHDA also confirms that politics played a significant role in the approval and implementation of Phase 1A of the LHWP (see Appendix E, section B1 and F15).

5.9.1.3 Trees

Clause 9, sub-clause (1) and (2) of the LHWP compensation regulations (1990) provide for the compensation payment of five seedlings of the same or another acceptable species per non-coppicing and coppicing trees acquired by the LHWP respectively. Sub-clause (3) of the same regulation states that, in addition to the compensation arrangements made under sub-clauses (1) and (2), the authority shall make a single cash payment to the owner of the trees acquired for income lost while the new trees are growing. Prices that are currently used - as formulated in the LHWP compensation policy (1989) are such that

M65 (approximately US$15) is paid for a recognized tree that can be singled out, and for a cluster of small trees - mainly poplar - M1.00 per square meter is paid. The price ratios are unbalanced. M1.00 for a cluster of trees within a square meter is too little, if M65 is paid for a single identifiable tree. These prices were fixed by the compensation advisory committee. However, according to LHDA, the prices were not the judgment of the advisory committee, but were agreed upon by the governments of Lesotho and the Republic of South Africa - without the involvement of the affected communities. The prices were based on 1989 prices, and have not been revised since that time. LHDA further states that, the Lesotho government in its capacity did not have money to compensate the people affected by the project; thus the money came from South Africa. South Africa on the other hand dictated the prices they were willing to offer (see Appendix E, section B7) . The amount of M65 is inequitable: this is argued from the perspective that a two year old tree is not the same size as a 20-30 year old tree, but the compensation is equal.

Group discussions at Ha Kosetabole, Ngoajane, Ha Mikia and Ha Ts'epo highlighted major community dissatisfaction concerning the rates that LHDA pays for trees. Ngoajane and Ha Mikia (see Appendix D, sections E9 and D5) also added that communities were intimidated by LHDA officials during the tree surveys. Complaints were mainly about over-looked individual trees within a cluster. LHDA admits that there was possible negligence by its staff, but the issue is being addressed.

5.9.1.4 Communal resources.

In addition to the property that has been lost by individual persons, communally owned resources such as rangelands, thatching grass, sand and medicinal plants acquired by the LHWP were highlighted in the group discussions and interviews. Presently LHDA has only compensated for rangelands. This compensation is in the form of fodder which is delivered and left for the communities to administer and share (see Plate 5.9). However, misuse of compensation fodder was mentioned at Ha Nts'eli, Makhoabeng, 'Muela, Mapeleng, Ha Kosetabole and Ha Ts'epo; it was indicated that some people who do not

own any livestock sell the fodder to lowlands people at very cheap rates. In such cases the laws that govern rangelands should be enforced by the communities themselves to minimize this discordance.

Plate 5.9 Fodder deliveries in the affected communities.

Clause 1.4 of the LHWP compensation policy (1989), attests that individual rights of future generations are vested in the community; therefore community compensation is an indispensable component of the compensation programme. LHDA affirms that it has received complaints from the communities with regard to compensation for sand and medicinal plants. Complaints for sand were raised at Mapeleng, Ha Kosetabole, Ha Ts'epo, and Ha Nts'eli; most likely because all these villages are located close to the banks of the Katse reservoir; and they had direct access to river sand prior to inundation. LHDA agrees that the 1989 compensation policy did not provide for compensation for sand and medicinal plants. However, LHDA shows that in the lowlands, for one to be able to mine sand, he or she must hold a sand lease (see Appendix E, section A6). The people in the highlands do not have such documents, hence LHDA is currently reviewing the compensation policy to determine how much compensation is due for sand and medicinal plants. This would be based on how much loss the community has suffered by losing the two resources. LHDA insists that the primary requirement for any sand compensation will be a valid lease for sand mining. Inasmuch as it is not every household that uses medicinal plants, LHDA argues against the view that every

household should be compensated for these plants. Another problem is that LHDA does not know how many of the medicinal plants were inundated because these plants grow in a scattered and irregular manner. There were no thorough studies undertaken to determine the actual populations of medicinal plants in the Katse basin prior to reservoir flooding. Studies only identified and collected samples of available species.

5.9.2 Rural Development

Most of the rural development progammes, mentioned under the objectives of the rural development section (see Chapter Two, section 2.3), are behind schedule, and others still have not been implemented. According to the report written by the site engineer at 'Muela, four million Maluti has been earmarked for the 'Muela area enhancement of services programme. This programme will include the construction of a community hall, 3 foot-bridges, primary school classrooms, 3 kinder-gardens, 450 VIP toilets, 6 small dams, water supply facilities, and 6.2 km of road. Of the rural development programmes currently underway, the infrastructure programme is the most tangible. This programme involved upgrading of rural roads, village water supply, rural sanitation and provision of infrastructure facilities such as community market places, halls, local administration offices and upgrading of existing schools. Table 5.3 shows infrastructure facilities that have either been completed or were being constructed at the time of this study in the 14 villages that were visited. Plates 5.10a - f show some of the projects under the management of LHDA. There were no water supply facilities in most of the villages visited in this study (see Table 5.3). However, unlike families living near lake Kyle in Zimbabwe and Kindaruma in Kenya, who fetch drinking water from the lakes (Roggeri, 1985); communities living around Katse reservoir do not draw water from the reservoir for drinking needs. Water is obtained from springs, and some of these have been upgraded by LHDA (see Plate 5.10f). Several communities do not have adequate sanitary facilities. Human and animal excreta deposited on the slopes leading to the reservoir will rapidly pollute the standing water.

It is highly likely that most - if not all - of the electricity to be generated at 'Muela will be channeled to the national grid and then distributed to the towns and other electrified areas of Lesotho. Local dwellings at Makhoabeng, Ha Lejone, and 'Muela do not have electricity, and yet the villages which were built for the engineers and technicians working on the LHWP plants in these areas are supplied with electricity. This indicates that it was possible to supply the villages in the region with electricity. This lack of benefit for the local people can be explained in financial terms, or it could have simply been a matter of neglect. This was also the case with Masinga and Kamburu plants in Kenya (Roggeri, 1985).

Table 5.3 Infrastructure facilities provided by LHDA in the village:

Name of village	Location	Infrastructure provided by LHDA	Name of village	Location	Infrastructure provided by LHDA
Makhoabeng	Katse	market, hall, office, schools, water supply.	Ha Ts'epo	Sepinare	gravel road
Khokhoba (Ha Mensel)	Katse	gravel road, market, clinic	Ha Nts'eli Mokiba	Nts'eli	--
Mapeleng	Theko	gravel road, new houses proposed	Ha 'Mikia (Moreneng)	'Mikia	--
Ha Suoane Liontong	Suoane	gravel road, new houses proposed	Ngoajane	*Ngoajane	gravel road
Ha Lejone (Moreneng)	Lejone	clinic, hall, office, market tar road,	Ha Jonathane	*Ts'ehlanyane	gravel road,
'Muela	'Muela	clinic, tar road, water supply	Ha Soai	*Khohlonts'o	gravel road,
Ha Kosetabole	Kosetabole	--	Katse Village	Katse	clinic, water, school, lodge, electricity, tar roads, telecoms

* villages outside Katse and 'Muela local catchments.

Plate 5.10a Upgrading of local schools.

Plate 5.10b Sanitary facilities in local Schools.

Plate 5.10c Community hall under construction

Plate 5.10d Improved spring.

Plate 5.10e Water supply facility

Plate 5.10f Upgrading of village roads.

5.9.2.1 Training

The rural development plan (1990), also made a provision that during the 15 years of Phase 1A implementation of the LHWP, individuals from the households in the Katse and 'Muela catchments would have access to training that would assist them to secure new modes of income generation. The Thaba-Tseka Rural Development Centre (TRDC) was therefore established in 1989. According to the LHDA consultant at TRDC, the centre was initially for construction skills training (see Appendix E, section E1). The centre recruited locals to train them so that they could be employed by the contractor. After the construction skills programme, the centre has recently been converted by LHDA into a facility which focuses on income generation and rural development programmes. This shows that income generation did not receive priority, as had been promised by LHDA and expected by communities; such as 'Muela, Ha Kosetabole, Ha Ts'epo, and Ngoajane. This short-coming has in turn developed mistrust in the communities towards LHDA.

Eleven of the communities visited in this study show that they had members who were sent to the TRDC for training, but all these people have not been assisted beyond the training stage; in income generating projects. Discussions indicate that this was largely because of insufficient funds to start new modes of living. TRDC has recently established a credit facility which will provide trainees with loans to purchase equipment and materials to start up their own business. The trainees must be able to service the loan as business progresses. TRDC affirms that monitoring is an important component of the credit facility, hence two field officers are deployed in the communities on a full time basis (see Appendix E, section E10).

TRDC offers both formal and informal training. Formal training includes sewing, block-laying, knitting, poultry and horticulture (see Plate 5.11a and b). Informal training includes bread baking and candle making; and it is normally a simple and short (2 days) programme. The formal training can take up to six months. All the training is free at the TRDC, including food and accommodation. TRDC has categorized the people affected

by the LHWP into five categories. Category 1 are the people who have lost houses and had to relocate to other places; category 2 are the people who have lost houses only; and categories 3 - 5 are the people who have lost 100 %, 75 % and 25 % of their arable land respectively. The center was engaged in training category 1 - at the time of this study - and the first set of graduates had graduated in May 1996. Arguments raised by some of the respondents and in group discussions, indicated that, in the 10 years since the start of the LHWP, a large majority of the communities felt that their way of living had not improved. However, if LHDA rural development and income generation programmes can gather more momentum, this perception may change.

Plate 5.11a Sewing and knitting class - TRDC

Plate 5.11b Brick-laying class - TRDC

5.9.2.2 Agriculture

According to LHDA there are two grazing associations on either side of the Katse valley. The third association is at the southern end of the Katse reservoir; at Ha Suoane (see Appendix E, section D4). These associations are established to improve range management in the LHWP. LHDA also attests that a mountain horticulture and fields programme was started in 1993, with the assistance of 5 staff members from the Ministry of Agriculture. The programme started with 5 farmers participating. These have increased to 45, and are working on 90 hectares of land. There is also the potato-seed multiplication programme being operated by 34 farmers on about 50 hectares of land. LHDA claims that progress of both programmes is commendable and gathering momentum.

LHDA further indicates that pilot test dairy programmes have been started at 'Muela. Fifty eight people have purchased sixty cows, and each cow produces an average of 18 liters per day of milk. However, problems were encountered due to the collapse of the milk market. The Maseru Central Dairy Board has embraced the market problem, and LHDA is anticipating an improvement in the dairy programme.

Chapter Six

Results - Evaluation of Phase 1A, EIA

6.1 Introduction

This chapter provides the results of the study on evaluation of EIA implementation in Phase 1A outlined in Chapter five. The evaluation is structured such that the steps of EIA are each considered chronologically. Other important issues related to EIA that are analyzed are public participation, institutionalization, and role of government.

6. 2 Feasibility studies

The feasibility studies sought to describe the project and identify the impacts that would arise in relation to the project; but these studies could only consider the project briefly in general terms. For example, feasibility studies indicated that quarries and rock dumps, and construction sites would cause some disturbance on the biophysical environment; but did not show what type, how and where the disturbance would occur. The decision that was, thereafter, taken to proceed with construction of the initial infrastructure based only on the feasibility study was the first major short-coming in Phase 1A, EIA. The impact assessments done at feasibility study stage were not assessments per se. This is because these studies only identified the potential impacts. The studies did not follow any specific EIA procedure or methodology; and they do not show the significance of the identified impacts. Most of the conclusions that were reached during the feasibility studies were more indicative than definitive, hence further investigations were required.

6.3 Baseline studies

Since the baseline studies of Phase 1A were undertaken with the LHWP construction already in progress; they do not provide accurate baseline data of what existed in the biophysical and social environments of Phase 1A area. These studies cannot therefore be used as an ideal bench-mark for future EIAs in the subsequent phases of the project, and the rest of Lesotho. As there was no direct link between the outcome of these baseline studies and the decision that was taken earlier to proceed with the water project, the

fundamental purpose of the studies was ignored. The different studies were carried out disparately by different consultants with one study having no bearing or relation to the other, hence the inter-disciplinary nature of EIA was somewhat distorted.

Should the baseline studies have manifested any major environmental hazards that were not anticipated by the earlier feasibility studies, the chances of alternative planning and design would have been minimal - if not impossible - since unavoidable costs would have already been incurred. Except for improved availability of environmental and social data, the baseline studies have played no significant role in the implementation of Phase 1A. Perhaps these studies will be of use for operation and maintenance stages of Phase 1A and for planning of subsequent phases of the water project, but this assumption is suspect because a large majority of LHDA environmental division professional staff are not conversant with the details contained in the baseline studies. This is because their main task was to combat whatever environmental and social impacts had already been caused, and were accumulating, because of the project in Phase 1A.

6.4 EIA Steps

In this section each of the steps of EIA is analyzed in the context of proper EIA - as shown in Chapter four, sections 4.4 and 4.5 - to probe for deficiencies in the Phase 1A, EIA. Discussions that follow are based on the results of the surveys with LHDA and the affected communities; in order to highlight the practical problems - and consequences of these problems - that were experienced in Phase 1A. From these results conclusions are drawn as to whether LHDA, Environment Division staff members are familiar with EIA procedures, and the extent to which affected communities were involved in Phase 1A environmental assessments.

6.4.1 Screening

Available documentation does not indicate in which category LHWP was placed after screening. The environmental aspects of the project in Phase 1A were not evaluated and examined in a comprehensive manner. However, following the trend of events and the

size of the LHWP, it is indisputable that Phase 1A of the project required a full EIA; and so will the subsequent phases. Table 6.1 shows that 90 % of the LHDA, Environment Division staff respondents are also of the belief that screening for Phase 1A of the LHWP was not done correctly. There is, therefore, a significant number of staff member who indicate the loophole in the screening for Phase 1A EIA. The results of table 6.1 are most probably based on the degree to which the staff were involved in each of the steps of Phase 1A EIA- which was very low for the first four steps.

Table 6.1 Results to the question about the degree to which EIA was carried out

Do you think each of the following steps was carried out to a satisfactory degree in the EIA process of Phase 1A?		
Steps	% Yes	% No
Screening	10	90
Scoping	12	88
Prediction	12	88
Evaluation	20	80
Plans to mitigate	78	22
Recommendations	80	20

6.4.2 Scoping

It needs to be mentioned that the impact assessment undertaken for Phase 1A was during the feasibility study stage, and only the steps of scoping and prediction were carried out at this stage. Scoping encountered some inconsistencies due to unavailability of enough baseline data. There was inadequate knowledge concerning the nature and extent of impacts that would arise because of the project. The impacts were simply identified and not investigated in-depth. Table 6.2 shows community responses to questions about the public gatherings that were held by the project proponents prior to LHWP implementation.

It can therefore be deduced that even though public gatherings were held prior to LHWP implementation, which a significant majority (71 %) of the local people attended; these

gatherings were not conducted according to proper norms of public consultation, and that the affected communities felt intimidated and did not contribute meaningfully to the scoping exercise (see also appendix D, sections B2, C2, D1, E2, F2, and G2). This therefore indicates that the project proponents did not adequately consider the social context in which the LHWP was to take place. This would have highlighted the need for a separate social impact assessment of this project (see Section 4.5.1).

Table 6.2 Summary of results to questions on Phase 1A public gatherings

Concept	Response	Response
were public gatherings held to explain the impacts of LHWP?	83 % agree gatherings were held	6 % disagree
when were the gatherings held - prior to or during implementation?	70 % indicate prior	16 % indicate during
were you able to attend the gatherings?	71 % attended	14 % did not attend
what issues of concern were raised by the public or by the authorities?	71 % indicate the gatherings were top-down in approach	15 % were unsure 14 % did not attend

Input from the people who were to be directly affected by the project could have provided valuable information to enable the feasibility study consultant to understand the physical and social settings. Only the project proponent (i.e. consultant) undertook the task of scoping. As a result, any decision made at this stage was not based on realistic understanding of what was to be included or excluded in the assessment. As the project could not be described in sufficient detail at scoping stage, recommendations were made for further studies to be undertaken. All the impacts identified during feasibility studies were, thus, given the same weighting. The impacts were not prioritized as to which ones were more or less important than others. 88 % of staff respondents in the LHDA, Environment Division also attest that scoping was not done accurately for Phase 1A of the project (Table 6.1).

6.4.3 Prediction

At both the feasibility and baseline levels of studies, impacts were explained in general terms and were not focused and precise; it was, therefore, not shown whether these impacts would be direct, indirect, cumulative or residual as is required under proper EIA norms and applications (see section 4.5.3). These predictions did not indicate the probability, magnitude, distribution and timing of the expected impacts. For example the impacts that occurred in the Bokong wetland due to construction of the northern access road, and the impacts of loss of property by local people were not adequately assessed. The no go alternative was not thoroughly investigated. Predictions done during feasibility were not accurate due to lack of detailed baseline data. 88% of the respondents in the LHDA, Environment Division were also of the view that many impact predictions were not accurate (Table 6.1). Figure 6.1 a and b shows the levels of accuracy of predicted impacts according to LHDA, Environment Division personnel.

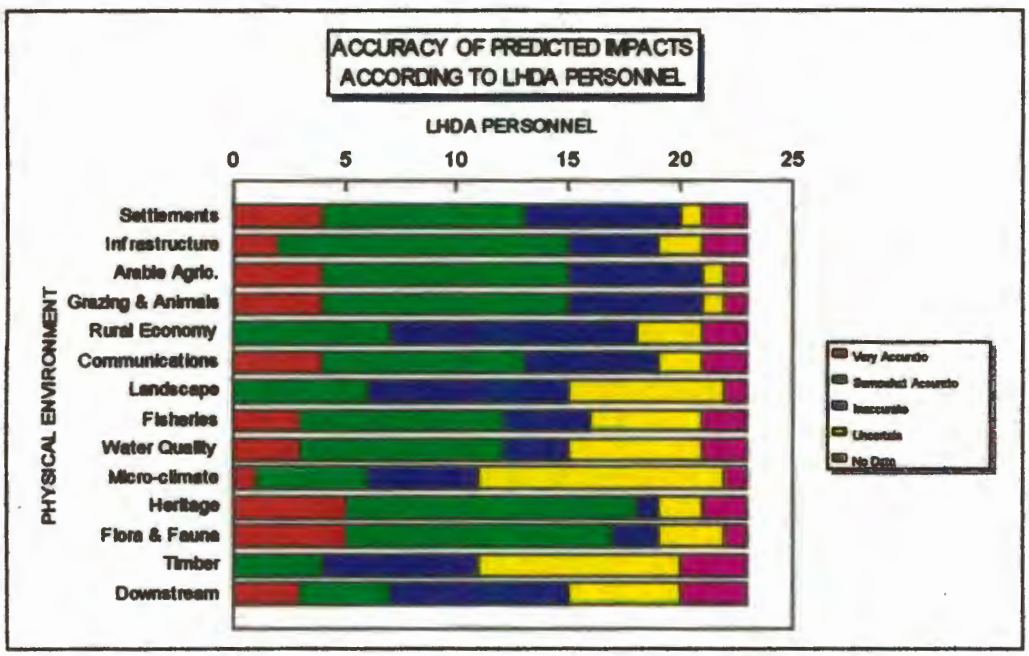

Figure 6.1a Accuracy of predicted impacts on the physical environment according to LHDA personnel

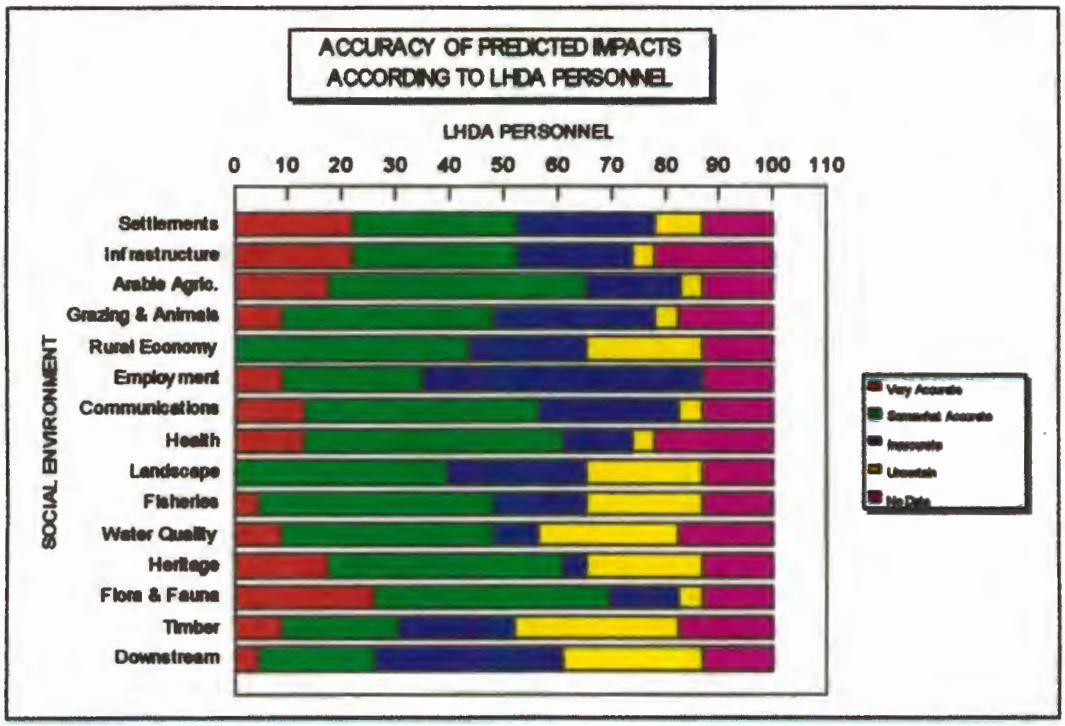

Figure 6.1b Accuracy of predicted impacts on the social environment according to LHDA personnel

Figure 6.1 a shows that more than half (approximately 10-15) of the respondents in the LHDA, Environment Division are of the opinion that impact predictions on the physical environment of Phase 1A were accurate to somewhat accurate with respect to: settlements, infrastructure, grazing and animals, heritage, and flora and fauna; while those related to rural economy, landscape and down stream effects were significantly inaccurate. Approximately 10 of the staff are unsure of the accuracy of predicted impacts on micro-climate and timber.

Based on field observations, these opinions do not reflect the actual impacts caused by Phase 1A. For example the impact estimates for the northern access road, quarries and soil dumps, Katse reservoir, and Katse housing developments did not consider impacts on the soil. Accurate assessments on these components would have - amongst other important issues - highlighted the need for in-depth considerations of the physical, chemical and landuse properties of the soils in the Phase 1A project area. Phase 1A

impact predictions also did not show what change and effect the project actions would have upon the existing fresh-water flora and fauna. Predictions did not take into account changes in water depth and habitat composition of vulnerable ecosystems, changes in flow regime of the Malibamats'o and Bokong river - which are the rivers which flow onto the Katse reservoir - consequently changes in the aquatic environments of these rivers were ignored.

According to 50 % of LHDA personnel respondents (Figure 6.1b), LHWP impact predictions on the social environment were accurate to somewhat accurate on aspects of settlements, infrastructure, flora and fauna, arable land for agriculture, rural economy, communications, health, landscape, fisheries, and water quality. 55 % of LHDA personnel state that impact predictions were inaccurate on aspects of employment and downstream impacts.

Predictions of impacts on settlements and flora and fauna were considered somewhat accurate (40 %) and accurate (30 %) - Figure 6.1b. However, field observations indicate that these predictions did not estimate the population changes that would occur in the rural villages - especially those within the immediate vicinity of major construction works, such as Makhoabeng near Katse dam. This resulted in basic facilities and services e.g. water supply, public toilets, sufficient police force, not being incorporated into the project plan. For example there is a clean water tap at every house in the new Katse village but there is only one tap for the whole village of Khokhoba which is located next to Katse village. Predictions on flora and fauna did not foresee the impact of the Katse reservoir on medicinal plants, yet these plants are very important to traditional healers.

Figure 6.1b shows that impact estimates were considered accurate to somewhat accurate for infrastructure and health aspects, and inaccurate for employment: field observations suggest these opinions reflect the actual situation. The accuracy of these predictions include the improved infrastructure - such as accessibility to the highlands because of the northern access road - and absence of any Malaria and Schistomiasis cases because of

water storage in the Katse reservoir. Employment predictions were inaccurate because they anticipated LHWP would solve the unemployment problem in the rural area; but this has not been the case, and many local people are not employed - especially by the LHWP.

6.4.4 Evaluation

For Phase 1A, evaluation of impacts to determine their significance and magnitude was not carried out. This is mainly because, for all the impacts identified in Phase 1A, it had not been indicated whether they would be significantly adverse or beneficial on the socio-economic and biophysical environments; hence the values of Phase 1A impacts were not determined (see section 4.5.4). Table 6.1 shows 80 % of LHDA staff respondents are also of this view. Similar to the previous steps - but more crucial in this step - evaluation was hindered by lack of public involvement in the Phase 1A assessment; and expert opinion on several biophysical impacts only came later in the baseline studies. The essential part of assigning significance is human judgment about the impacts (Erickson, 1994; Bisset, 1987; Sadar, 1994). Lack of input from two essential parties (the public and experts) resulted in a failure to consider the extent to which ordinary people were directly affected by the project. This is a significant shortcoming in the EIA.

Other crucial components of the evaluation stage such as ranking of impacts in order of priority for avoidance, mitigation, compensation and monitoring were also omitted. This problem is clearly evident with regard to social impacts. It is only since the project commenced that issues raised by the public have received the priority they deserved, largely due to community complaints and external criticism.

Examples of unforeseen significant impacts in Phase 1A are: overloading of local services in the villages near major construction sites - such as Makhoabeng and Khokhoba - because of immigrant populations; degradation of the Bokong wetland; improved rural transport communication; inadequate reservoir crossing facilities (see

Plate 6.1); and shortages of thatching grass (see Plate 6.2), fire wood and sand; loss of personal property; and high unemployment rates among locals (see Table 6.3)

Plate 6.1 Reservoir crossing facilities.

Plate 6.2 Plastic roofing due to shortage of thatching grass.

Table 6.3 Summary of results to questions about numbers of employed locals

Total no: of respondents	% employed	% unemployed
80	45	55

The grossly inaccurate prediction of improved employment opportunities is serious. Factors which have caused the high local unemployment in Phase 1A are that the majority of locals are either illiterate or very old and no longer fit to work in heavy construction works (see Table 6.4). Young people constitute the lowest percentage of the available human resources in these communities, while the majority is made up of people who can no longer work (see Table 6.4). This in turn contributes to very high unemployment rates in these rural areas. This does not appear to have been considered in the impact predictions.

Of the 45 % respondents who are employed, most (44 %) are employed by the LHWP, as shown in Table 6.5. Other occupations are mining in the Republic of South African (22 %) and self-employment (17 %).

Table 6.4 Age and education levels in the Phase 1A area

Age	**%**
> 55	43
35 - 55	39
18 - 35	16
Education level	**%**
low	68
moderate	19
high	13

Table 6.5 Various occupations in the Phase 1A area.

Occupation	**%**
LHWP	44
RSA mines	22
Self-employed	17
Teaching	8
Chiefs	6
Kao mine	3
Total	100
Total respondents employed	(36)

Respondents were not asked directly for their education level. Instead this was inferred by the interviewer from the ability of the respondent to answer questions. 14 % of the respondents were categorized as having a high level of education. 19 % were assessed as having a moderate level of education while 68% were considered to be of low education standard. Almost every householder interviewed raised concern and frustration due to high unemployment rates in these areas (see also Appendix D, sections A7, B9, C8, D8, E11, F6, and G4). But it can be deduced from the education levels that a large portion of the population can only offer unskilled labour, whereas the project mainly offers skilled and semi-skilled employment.

6.4.5 Mitigation

Inasmuch as engineering works had already been started, environmental and social mitigation measures used by LHDA were reactive rather than proactive in approach. LHDA's environmental division had not yet been established at the time of the feasibility studies and project approval, hence most of their environmental efforts were more mitigative than preventative. However, of all the steps in EIA implementation, LHDA's mitigation and compensation efforts are the most commendable - especially when compared to similar reservoir developments in other African countries. It was at the mitigation stage that the environmental division's major input was given - with the formulation of the environmental action plan. 78 % of LHDA staff respondents support the view that LHDA's major input is evident in their mitigation efforts, and that this step was carried out satisfactorily (see Table 6.1). Figure 6.2 illustrates the views of LHDA, Environment Division personnel on the effectiveness of the mitigation efforts in Phase 1A of the LHWP.

However, there have been serious deficiencies. Mitigation measures were largely effective for the biophysical environment; but lack of proper public consultation has brought dissatisfaction and misunderstandings in handling the social implications of the project, especially the programme of compensation.

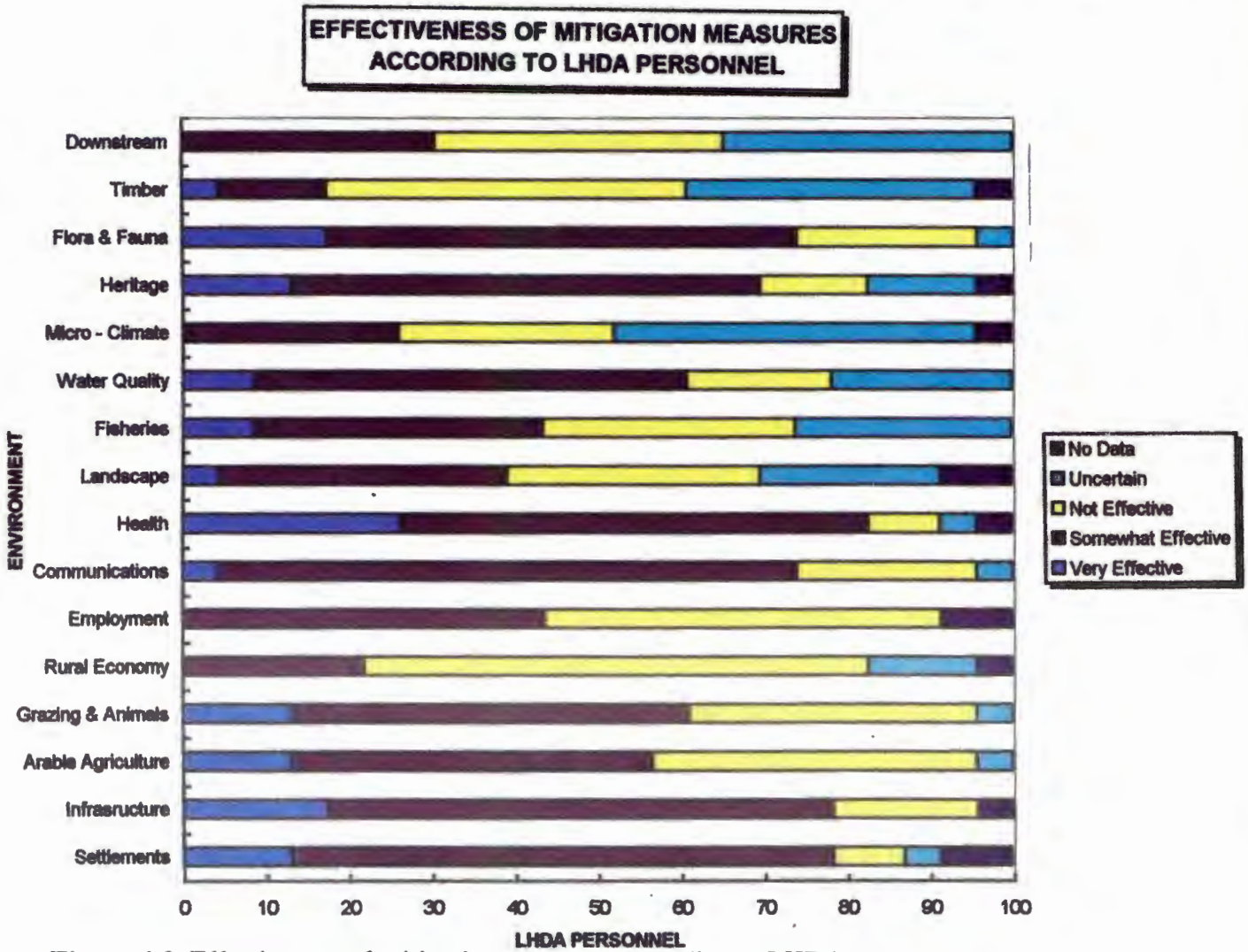

Figure 6.2 Effectiveness of mitigation measures according to LHDA personnel

Figure 6.2 shows that LHDA believes its mitigation efforts were somewhat effective on many components of both the physical and social environments - especially settlements, infrastructure, arable agriculture, grazing and animals, communications, health, water quality, heritage, and flora and fauna. The chart shows that measures were ineffective to mitigate impacts on rural economy and employment; in fact, these two aspects required enhancement and improvement rather than mitigation.

At the time of the drafting of the environmental action plan, many baseline studies were not yet completed, and the plan was therefore designed to address the immediate environmental degradation that was occurring without proper background information on which impacts to mitigate. The plan sought to mitigate impacts that had not been

accurately scoped, predicted, or evaluated. This was because it was drafted mainly from the findings of the feasibility studies only.

Most of the problems encountered with the compensation programme arose because there was limited dialogue between the project proponent and the communities affected by the project, and because of the irregularities with early steps (scoping, prediction and evaluation).

6.4.5.1 Houses

Table 6.6 A summary of results to questions about loss of houses

Total respondents who lost houses to the LHWP = 29/80 = 36 %	
Concept being assessed	**% response**
respondents who received compensation houses	62
respondents who chose the type of house	50
respondents who did NOT choose the type of house	44
respondents who are happy with the new house	50
respondents who are not happy with the new house	39
respondents who find maintenance more costly	89
respondents who find maintenance less costly	11

Contrary to clause 6(2) of the LHWP compensation regulations (1990), 44 % of the respondents did not choose the type of housing they were given by LHDA (see table 6.6) to compensate them for the loss of their dwelling. This clause states that the owner shall be consulted as to the number and style of the replacement houses to be provided. Some preferred types of houses different from the standard, and others wanted similar houses to their old ones; and others claim they were not given a chance to choose. There is also a view that demolition of houses, although uncommon in the villages, was done too quickly, as a result people were regarded as obstacles in the way of the LHWP plans.

39 % of the respondents were not happy with the compensation houses they received (Table 6.6). They find them less comfortable than their previous houses. Major

complaints are that chimneys leak on rainy days, and houses are too cold in winter because of bare cement floors. LHDA considers these houses as a form of development, and assumes the cement floors are an improvement from the old soil floors in traditional houses; because they do not require frequent resurfacing. This improvement does not, however, out-weigh the fact that old soil floors were warmer in winter. LHDA also indicates that affected people should be able to provide themselves with paraffin heaters. This requirement would impose a high economic burden, on the rural populations, where the majority are unemployed. While concerns for development are well-founded; overestimating such concerns will doom thousands of low income people to worsening poverty with all the accompanying misery.

Designs for compensation houses have changed three times in order to accommodate grievances from the communities (see Plate 5.8b). Initial houses had built-in fire places (see Plate 5.8c); but the leaking chimneys led to very strong objections from the communities to these fire places. According to LHDA, compensation houses were therefore redesigned, with slight modifications to remove the fire places. Improvements on the new plan incorporated small unroofed half-walled rooms for the purposes of cooking and making a fire (see Appendix E, section A14). A limitation to this improvement is that in rainy weather, the small unroofed room cannot be used. With regard to leaking chimneys, LHDA misunderstood the real problem behind the community objection. It was not the fire place that was causing dissatisfaction, but the chimneys. It would have been more appropriate to redesign the chimney to prevent leakage, instead of eliminating the fire place from the design. Even though the majority of the communities may have experienced problems with fire places; individual households feel dissatisfied with this general assumption, since they would have wanted warming facilities in the new house similar to their previous ones. This brings up the question of whether it is correct to address a direct social issue according to majority perceptions or to assess the concerned individual's needs and priorities, as is also provided for in clause 6(2) of the LHWP compensation regulations (1990).

50 % of the respondents are happy and more comfortable in their new houses (Table 6.6). Some even feel they have gained more status in the community because the new houses look better than the previous ones. 67 % of these happy respondents still insist that the houses are extremely cold in winter because of the cement floors. Despite the complaint about the cold floors, they indicate that they still do not want leaking fire places. Some households have built separate shacks for the purpose of cooking and making fires to keep warm. Recent compensation houses have additional facilities such as fences and toilets even though these were not present in their previous premises (see Plate 5.8b). Initial compensation houses (i.e. 1990) did not get these benefits; however LHDA now intends to build sanitation facilities throughout the whole project area.

89 % of the respondents find their new houses more costly to maintain due to the more expensive building material used (Table 6.6) . LHDA only allows a one year guarantee, after which the house becomes the owner's responsibility. The problem is that 67 % of households with compensation houses are currently unemployed. Formerly houses could be maintained using natural and available resources. Materials to maintain new houses must be purchased.

One of the major concerns raised in both the interviews and group discussions is lack of employment in the local villages. The best approach would have been to ensure the maximum recruitment of labour from local communities. Nevertheless, for Phase 1A no studies were undertaken prior to project implementation to determine the available local skills; and if low standards of skills had been identified, rural training through the Thaba-Tseka Rural Development Center could have been implemented well in advance. This would have reduced the numbers of immigrant labourers, and indirectly prevented the current high level of crime, informal settlements, and prostitution; and in turn would have helped maintain the ethical and cultural norms which the communities had established prior to the LHWP.

It is well-known that dams are very rarely built in uninhabitable areas, thus before flooding, people who live in the identified dam sites have to be moved and resettled (Roggeri, 1985). The history of dam induced resettlements in Africa is largely a history of failure; starting with Kariba dam in the 1950s, and continuing to the present day World Bank financed Kiambare dam in Kenya. These resettlements were involuntary because the majority of the people did not wish to move (Scudder, 1989). In the LHWP, Phase 1A, resettlement did not encounter major opposition. This is largely because so few people affected by the project required relocation; as compared to the four largest man-made lakes in Africa - Lake Nasser in Egypt; Lake Volta in Ghana; Lake Kainji in Nigeria; and lake Kariba in Zambia and Zimbabwe (Roggeri, 1985). Roggeri indicates that Lake Nasser displaced 120 000 persons; Lake Kariba displaced 86 000 persons; Lake Volta displaced 80 000; and Lake Kainji displaced 50 000 persons. Katse reservoir displaced less than 400 households (including Mapeleng and Ha Suoane) - on average there were 8 persons in each household, therefore Katse reservoir displaced approximately 3200 persons.

Table 6.7 A summary of results to questions assessing respondents involvement in relocation measures.

Total respondents who received compensation houses = 18/29	
respondents who had to relocate to other villages = 8/18	
Concept being assessed	**% response**
respondents who were consulted about resettlement sites	88
respondents who experienced stress of relocation	63
respondents who encountered discrimination or dissimilarity	0

8 of the respondents who received compensation houses had to relocate to other villages, and of these 88 % were consulted about their new sites (Table 6.7). Most of these households were from Pelaneng - an area which would be flooded by the reservoir - to Ha Lejone (see Fig. 2.4). This indicates some improvement in public consultation - especially in handling compensation issues.

The study shows that 63 % of the households that relocated experience the stress of missing their old homes (Table 6.7); mainly established friends and neighbours, the good soil and fruit trees. Roggeri (1985) sees the "stress of relocation" as a notion that is difficult to quantify, but which needs to be taken into account when a person is torn away from his land and familiar surroundings. Relocation in The LHWP, Phase 1A did not undermine the authority of the local leaders, because people were relocated within the same chief's area of jurisdiction. No household has experienced any discrimination or alienation from their present communities, or conflicts over rights to land (see also Appendix D, section H2). This is a positive feature of the LHWP.

LHDA assisted relocating households by providing transport facilities. However, several of the new sites have poor soil conditions for establishment of vegetable plots; and LHDA has yet to ensure that the new gardens are provided with topsoil, as provided for in clause 3.8 of the LHWP compensation policy (1989).

The main problem associated with LHDA compensation for housing in Phase 1A was the approach to the type of housing offered and the removal of fire places from the new houses. LHDA designed and modified the compensation house plans without consulting with those affected, and assumed that all the people would accept these plans. People were asked to choose houses from standard designs, but there were some individuals who preferred their original type of housing. Among the respondents in the community interviews and the group discussions, it was established that it was not every household that objected to the installation of the fire place - especially those which had such a facility in their previous settings. It was therefore necessary for LHDA to approach such personal compensation on an individual rather than a group basis. This would have reduced the frustration and stress of relocation being experienced by some of the households relocated by the LHWP.

6.4.5.2 Trees

Planning and implementation to mitigate the impacts of the losses of both trees and fields were top-down in approach. In both cases the affected communities' needs were not investigated at grass-root level. This is again attributed to lack of proper public representation in the groups which made the decision concerning compensation issues. A major shortcoming on the part of LHDA was failure to adhere to some of the original compensation regulations. Table 6.8 shows that trees are an important resource for rural communities; 49 % of the respondents had lost trees to the LHWP. These trees were mainly used for fruit production (62 %) and firewood (56 %). The results also indicate that contrary to the feasibility studies' recommendation, which clearly indicated that there would be wood shortages because of the flooding reservoir, and advised the forestry programmes to be initiated as soon as possible; only 10 % of the respondents had received both compensation seedlings and the money for the trees lost; 46 % had received money only; and 33 % had not received any compensation. These results indicate that LHDA has not complied with LHWP compensation regulations (1990) Clause 9 (see section 5.8.1.3). The first forestry programme was only planned to start towards the end of 1996 (see Appendix E, section D4) - ten years after the recommendations were made (see Plate 6.3). This is bound to impact heavily on the people who had lost trees to the LHWP, 69 % of whom did not have alternative trees to meet their needs (see Table 6.8). Generally more people (54 %) were not able to cut their trees before reservoir inundation. This reflects insufficient dialogue and public awareness about the impacts of the project to the communities. In addition to the trees, other vegetation in the valley was also inundated (see Plate 6.4). According to Roggeri (1985), the decomposition of submerged organic matter (particularly plants) can lead to deoxygenation of the water. This may in turn impair fish production in the reservoir. Vegetation should be burned prior to reservoir flooding. This was not done.

Table 6.8 A summary of results to questions about loss of trees

Total respondents who lost trees to the LHWP = 39/80 = 49 %	
Concept being assessed	**% response**
respondents who received seedlings and money	10
respondents who received money only	46
respondents who had not been compensated yet	33
respondents who were able to cut their trees	33
respondents who did not cut their trees	54
respondents who had alternative trees	18
respondents who did not have alternative trees	69
Uses of trees: Fruit	62
Firewood	56
Building	5
Commercially	3

It had also been decided by the compensation advisory committee that the fixed compensation prices for trees would be revised on regular intervals in relation to changes in economic price indices. However, within the ten year economic life of Phase 1A implementation, this revision had been carried out only once (see Appendix E, section A3). In fact this revision was only being planned at the time of this study; most likely to be implemented in the subsequent phases of the project, and will have little bearing on Phase 1A.

Plate 6.3 proposed forestry nursery at Ha Lejone

Plate 6.4 Inundated vegetation

6.4.5.3 Fields

Of the three personal properties - houses, trees, and fields - agricultural land was the most important resource that had been lost to the LHWP, in terms of the highest number of people who have been affected. 63 % of the respondents had lost land to the LHWP; and of these 60 % had lost at least two fields. This is more than the 49 % and 36 % for trees and houses respectively (see Tables 6.8 and 6.6).

Table 6.9 also shows that only 32 % of the households whose fields have been affected indicated that they are now receiving more grain than they used to grow. They are able to sell extra bags to purchase other family requirements. However, there are more people (66 %) with the opposite view. They believe LHDA grain bags contain less grain than their traditional Sesotho bags. This complaint was also raised in almost all the group discussions held in this study (see Appendix D, sections B7, C5, D3, and E4). This indicates that calculations for the quantity of grain compensation to be received by the affected persons was not explained at a level understandable to them, and these people still do not understand the procedure used.

Table 6.9 A summary of results to question about loss of agricultural land

Total respondents who lost agricultural land to the LHWP = 50/80 = 63 %	
Concept being assessed	**% response**
respondents who lost two fields and more	60
respondents who feel they are receiving more grain than they used to grow	32
respondents who feel they are receiving less grain than they used to grow	66
respondents who feel the grains are of the same quantity as before	2
respondents who agree that LHDA delivers grain on time	38
respondents who say deliveries are not on time	62
respondents who have alternative agricultural land	52

Table 6.9 shows that 62 % of the respondents indicate that deliveries are done very late in the year. Deliveries are made during the 8th or 9th month of the year, whereas normal harvest time is around the 6th or 7th month. This delay in deliveries by LHDA aggravated the impact of food shortage on affected communities. Another problem raised is that communities are never sure as to the exact time grain will be delivered. They wait helplessly until LHDA decides to deliver grain.

There are some grievances regarding compensation for agricultural crops only in the form of standard grain and pulses (see Appendix D, sections A2, B7, C5, D3, and E4). LHDA assumes this form of compensation is the best approach, as other crops which the communities claim they grew, are perishable. It would therefore be impossible to collect and distribute them in large quantities because there are no storage facilities in the affected rural communities.

6.4.5.4 Communal resources

Mitigation for loss of communal resources, such as fodder, has been meritorious. Perhaps this is because the responsibility for distributing compensation fodder has been vested in the communities themselves. It is their responsibility to share these resources equitably amongst the members. However, other communal resources such as thatching grass, had not been compensated at the time of this study. Sand - which is another important resource - was totally omitted in the Phase 1A compensation plan, policy and regulation. This again shows that the public was not involved in environmental impact identification and considerations of Phase 1A, otherwise it is highly likely that impacts on these communal properties would have been highlighted by the communities. Probably, as LHDA indicates, it is only a small number of people in any one community who mine sand (see Appendix E, section A6); it is, however, an indisputable fact, that prior to the LHWP, sand was mined freely as the legal sand lease requirements which apply in the lowlands do not apply in the rural mountain communities. LHDA should therefore carry out studies to estimate the sand requirement in all the communities which had direct

access to sand - i.e. those along the flooded river banks - and compensate them in the same manner as for other communal resources.

Table 6.10 A summary of results to questions about attitudes towards LHWP

Total number of respondents = 80	
Concept being assessed	% response
respondents who have benefited from the LHWP	34
respondents who have not benefited from the LHWP	60
respondents who see occupational changes since LHWP	36
respondents who do not see any changes in occupational opportunities	55
respondent's attitude towards the LHWP:	
happy	38
negative	55
respondent's attitude about their future with LHWP:	
optimistic	28
pessimistic	62

The irregularities in handling compensation and the lack of employment for local people have resulted in a generally negative attitude towards the LHWP (55 % of the respondents), who do not see any benefit since the LHWP started (see Table 6.10). Generally, people (60 %) do not regard LHWP as being of any benefit to their well-being; and 62 % of the respondents are pessimistic about their future well being in the LHWP area.

6.4.5.5 Environmental awareness

LHDA claims that many of its mitigation programmes have been hindered by the affected communities themselves. LHDA argues that many of their environmental awareness attempts are fruitless because the general public in Lesotho does not understand and appreciate environmental issues. Of the factors associated with this lack of

understanding, 57 % of LHDA, Environment Division respondents believe that ignorance is the main factor, 21 % believe illiteracy is the main factor, while 30 % show that other factors are involved - such as illiteracy, negligence, and cultural practices (see Figure 6.3). Figure 6.3 suggests that the LHDA shifts the blame for failed mitigation efforts on to the public. However, it is the responsibility of LHDA to ensure that the public are aware; hence it is unfortunate that the blame should be put on the public when the environmental awareness programme has failed to fulfill its aim

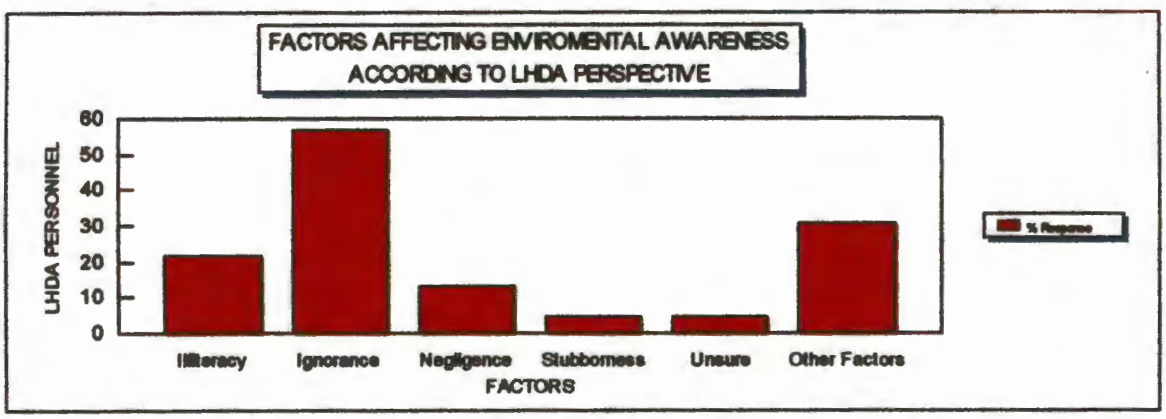

Figure 6.3 Factors affecting environmental awareness according to LHDA

Examples of failed mitigation efforts include increasing litter pollution in some settlements (e.g. Makhoabeng) despite the availability of rubbish-bins provided by LHDA. Other increasing impacts are the transmission of sexually transmitted diseases in major construction centers and road accidents caused by pedestrians who do not obey road signs (see Plate 6.5). These are despite health education facilities and road safety programmes provided by LHDA. Continued burning of rangelands and livestock grazing on regrassed surfaces, mostly along the northern access road, are other problems being encountered in Phase 1A.

Plate 6.5 Oxen trailers that cause accidents on the road.

6.4.6 Monitoring

Monitoring of mitigation efforts for both the physical and social environment has been irregular. LHDA is aware of the need for monitoring during construction and operation of the LHWP, but, in general, direct guidance has not been provided and minimal monitoring has actually been carried out. This is mainly because of unavailability of transport; a problem which was also found by Preeze *et al.* (1992) (In Kakonge, 1994). LHDA cannot confirm that the contractors on several major construction sites have been complying with environmental standards and implementing appropriate mitigation measures, as outlined in the tender specifications. LHDA environmental monitors also hardly ever visit the construction sites. Some contractors have even taken the liberty of undertaking monitoring on their own because LHDA's environmental monitors rarely visit the construction sites. Some rehabilitation programs on the northern access road have become fruitless due to inconsistency in maintaining them. Regrassing of areas disturbed by road construction and maintenance of erosion control structures in the Bokong sensitive habitat ought to be given greater attention. LHDA management suffers the cost implications of maintaining the Bokong wetland because it did not prioritize and accord this wetland the attention it deserved.

Another purpose of monitoring is to check the accuracy of impact predictions (Biswas and Geping, 1987). Similarly, adequate and regular monitoring of impacts and performance of mitigation measures must continue throughout the project lifetime, and sometimes beyond, to ensure that the project environmental goals are being met. This knowledge can be used to improve the accuracy of future EIAs by recommending those predictive techniques which are the most successful and identifying those impacts that actually occurred. At present this knowledge is scarce in LHDA. Phase 1B EIA predictions will, therefore, not be accurate if they are based on those of Phase 1A.

6.5 Public participation

Public participation is an integral part of EIA. Appropriate input by the public is important to identify issues which are relevant to them, for evaluating significance, and for deciding the measures that should be implemented to mitigate the impacts. It is uncertain whether both the general and affected public fully accepted the LHWP. Firstly, the LHWP was signed by a military junta, and neither the treaty nor the rationale for the project was subjected to public scrutiny. Secondly, the approach to public consultation in Phase 1A was top-down. There was no two-way communication between the project proponents and the public, hence a key aspect to public participation (Erickson, 1994) was ignored. Prior to Phase 1A implementation, the public affected were not consulted per se, but instead they were informed of what had already been decided by the political leaders at that time (see Table 6.2 and Appendix D, sections B2, C2, D1, E2, F2, and G2). Communication between the two parties was a simple transmission of information from the authorities to the public. The public affected by Phase 1A, therefore, surrendered to LHWP. They were not given the opportunity to give active input, nor to participate in constructive exchanges of information. Today they consequently feel cheated by the government and LHDA. This attitude has created a weak relationship between the public and the two institutions implementing the LHWP (see Table 6.10) .

Insufficient public participation and inadequate mitigation programmes have obscured the fact that Phase 1A of the LHWP could be good for long-term sustainable development.

As most people tend to be dependent on short term compensation they seek to gain as much immediate income as possible: a large majority of the affected people (62 %) are uncertain as to their future well-being within the LHWP area - as shown in Table 6.10.

In recent years there has been some improvement in public consultation (Table 6.6 and 6.7) - especially with regard to compensation for lost houses. The affected people gave input to the type of houses (50 %) they wanted and the new site for their relocation (75%).

6.6 Institutionalization

Within the four sections of LHDA, Environment Division - Natural Heritage and Environment, Compensation, Rural Development, and Public Health - there are 28 professional staff members. Of the 23 staff members who responded to the questionnaire survey the percentage distribution in each section is 39 %, 30 %, 26 %, and 5 % respectively. The results show a need to improve manpower in the field of public health, in order to ameliorate the section's abilities to implement - amongst other responsibilities - awareness programmes on sexually transmitted diseases and AIDS in subsequent phases of the project.

Many LHDA, Environment Division personnel had been employed previously by various government and academic institutions which deal with different environmental components, such as soil conservation and agriculture, range management, forestry, water affairs, climate, and natural and human resources. They are, therefore, able to relate without difficulty to the components of the physical and social environment in their present work. However, for almost all of the respondents it is their first attempt to apply their expertise in an inter-disciplinary manner, as is required for proper EIA practice.

Table 6.11 shows that 65 % of the respondents claim that they are somewhat knowledgeable about EIA, 48 % of the respondents indicate that they are somewhat knowledgeable about EIA methods; and 61 % of the respondents acknowledge that

LHDA does have enough qualified staff to carry out EIA on its own. These results show over-optimism as to the levels of EIA knowledge, especially considering the low involvement of staff in the Phase 1A EIA process (see Figure 6.4). It is only with the subsequent phases of the project that LHDA staff's involvement in the EIA process increased.

Table 6.11 A summary of results to questions about the knowledge of EIA - LHDA staff

Total number of respondents = 23	
Concept being assessed	**% response**
respondent's knowledge about EIA:	
very knowledgeable	35
Somewhat knowledgeable	65
respondent's knowledge about EIA methods:	
Very knowledgeable	43
Somewhat knowledgeable	48
Not at all knowledgeable	9
respondent's opinion about LHDA's capability to carry out EIA:	
Well equipped	17
Somewhat equipped	61
Not well equipped	17
Unsure	9

The institution, therefore, requires external assistance. Kakonge and Imevbore (1993) also caution that lack of sufficient experience and expertise in environmental disciplines will obviously result in a poor EIA, and poorly executed environmental impact statement (EIS); hence it is fundamental for LHDA to improve its human resource capabilities to undertake EIA's through staff involvement in the process.

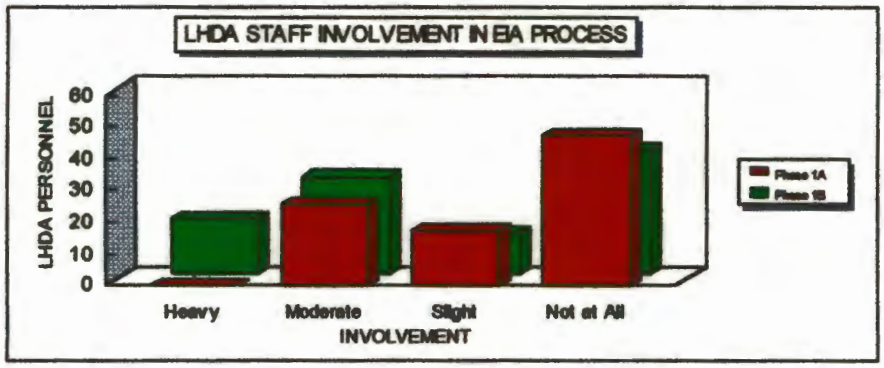

Figure 6.4 LHDA staff involvement in EIA processes of Phase 1A and 1B

Despite the LHWP being LHDA's first experience with environmental assessments, the World Bank - which had earlier been asked by the government of Lesotho to ensure that adequate attention was accorded to environmental concerns - only started monitoring the environmental performance of the project in 1989 (Hitchcock *et al.* 1996). In fact, Kakonge (1994) shows that before 1990 there was no monitoring of the environmental aspects of the project. This suggests that the World Bank's primary reason for involvement - like other financial institutions - was more economic than environmental. It was unfortunate for Phase 1A of the LHWP that the World Bank did not guide and oversee the environmental management of the project for the first four years of project implementation.

In some cases LHDA did not adhere to its principles and plans. This irregularity may jeopardize the credibility of its environmental and safety awareness programmes, and aggravate the negative attitudes which some communities hold towards the institution. For example, it is LHDA's policy to move all settlements or dwellings that are located directly under or within electricity power-line corridors; but the LHDA constructed a market place at Ha Lejone directly under a power-line (see Plate 6.6a). There are also some instances where residents whose houses are under the power-line have received compensation money to relocate, but have seemingly used the money for other purposes and have not relocated (see Plate 6.6b). It is therefore necessary for LHDA to implement other firmer mechanisms to enforce their principles.

Plate 6.6a A house under the power-lines.

Plate 6.6b A market place under a power-line.

Similarly, LHDA's initial plan was to review tree compensation price indices at regular intervals. However, this has not been carried out in the 10 years of Phase 1A of the project. It was also the responsibility of LHDA to establish an indigenous plant nursery at Hlotse adit site (Ts'ehlanyane Leucosidea woodland), but this programme has not yet been implemented despite construction destroying many of the valuable plants in the area.

6.7 Role of Government

Lesotho's commitment to proper environmental planning became evident in 1989 with the formulation of the National Environment Action Plan (NEAP). But it was only in 1994 that the government launched the National Environment Secretariat (NES) in the Prime Minister's Office to coordinate all activities concerning the environment.

Among its important activities, NES has formulated an environmental policy which was adopted by the government in May, 1996. In addition the process to formulate and legislate an environmental framework law is underway. Prior to the LHWP, and specifically for Phase 1A, legislation protecting the environment had been provided under various acts, such as water and soil acts. Lastly, EIA guidelines for Lesotho are in the

drafting stage. The first six years of Phase 1A implementation did not follow any specific EIA guidelines, until 1991, when the World Bank issued its EIA guidelines. These guidelines have subsequently been used for the subsequent phases of the project. Owing to the fact that guidelines are normally general; it is imperative to formulate a specific EIA procedure for Lesotho, similar to the Integrated Environmental Management (IEM) procedure for the Republic of South Africa, and the Botswana National Conservation Strategy (BNCS). This, therefore implies that EIA practice in Lesotho is still in its early stages. 87 % of the LHDA respondents also indicated that EIA practice in Lesotho is very young (see Table 6.12). Nonetheless, the circumscription of EIA into official government policy and the establishment of NES are positive efforts that show that EIA is improving in Lesotho, as it is also indicated by 65 % of LHDA staff.

The government of Lesotho did not make any major input to the environmental concerns and rural development of Phase 1A. This is largely because most of the government environmental efforts came into being after many aspects of Phase 1A had already been implemented. Figure 6.5 shows the LHDA respondents' ratings of the roles different agencies played in EIA issues in Lesotho. The results show very low EIA contribution for Phase 1A of the LHWP from all agencies.

Table 6.12 A summary of results to questions about the stage of EIA practice in Lesotho

Total number of respondents = 23	
Concept being assessed	**% response**
respondents who think EIA practice is still young	87
respondents who think EIA is in early maturity	13
respondents who indicate that EIA is improving	65
respondents who indicate that EIA is deteriorating	4
respondents who are not sure	26

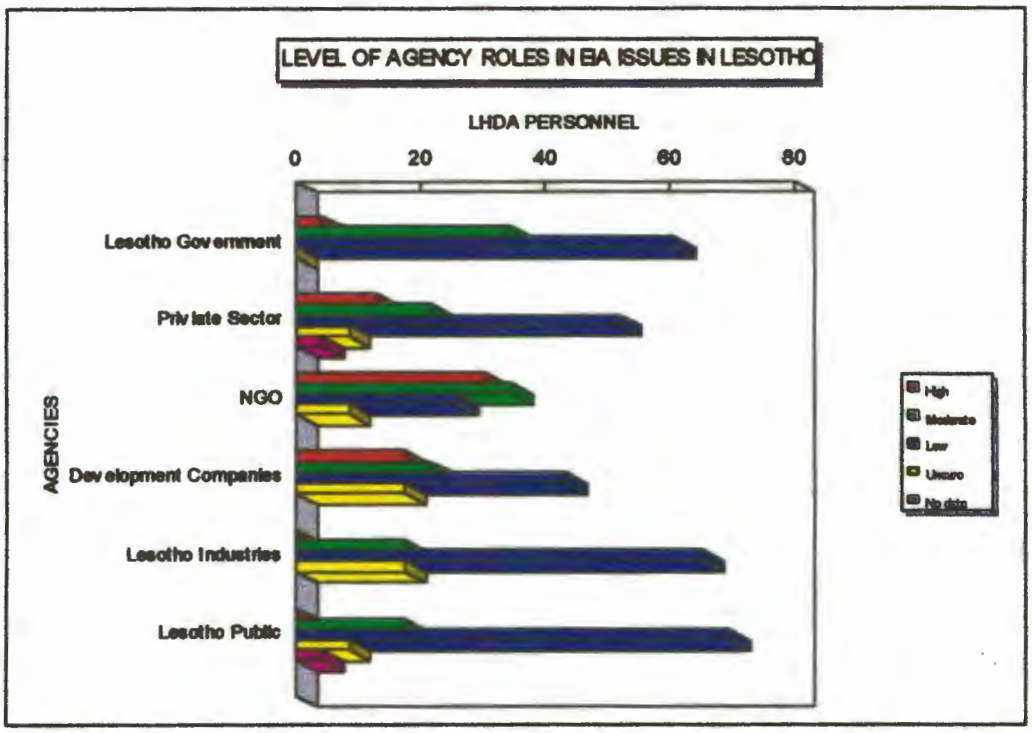

Figure 6.5 Levels of agency roles in EIA issues in Lesotho according to LHDA personnel

With regard to rural development, the government rural development programmes were mainly initiated for political recognition, rather than sustainable development. These have often conflicted with, and hindered the LHDA rural development programmes. For example, it was LHDA's intention to upgrade and develop all the sanitary facilities in the Phase 1A area of the project. LHDA proposed that it would provide all the necessary equipment free of charge, and the communities should in turn provide free labour. In this way the communities are not just the recipients, but they become part of the whole development programme (see Appendix E, section G3). Concurrently, however, the government offered low wage programmes for upgrading rural roads using cheap labour and materials. The communities were therefore attracted to this small government incentive, and neglected LHDA's proposals (see Appendix E, section C5). Within a short time these poorly constructed roads were eroded with subsequent environmental degradation; hence environmentally conscious sustainable development was never achieved.

Chapter Seven

Conclusion and Recommendations

7.1 Summary of conclusions

The general conclusion drawn from the study is that the implementation of Phase 1A of the Lesotho Highlands Water Project did not comply with recognized standards and norms of environmental impact assessment - as outlined in chapter four. Environmental concerns were addressed too late in the project cycle. Planning for Phase 1A of the project was affected by several factors, such as politics, lack of EIA experience on the part of project proponents, lack of adequate baseline data on the environment affected, and most importantly lack of public consultation. There was no Environmental Impact Statement (EIS) issued for Phase 1A of the LHWP.

The study also showed that significant problems relate to procedural matters. Firstly, the environmental concerns addressed during the feasibility studies were limited, and appropriate only for the feasibility level of project planning. These feasibility studies did not comprehensively consider all the impacts that could be experienced by local people or the physical environment. Impacts were only identified and explained in general terms, and were not precise. No methodology or environmental guidelines were followed during feasibility study assessments, and the adequacy and success of these environmental considerations was minimal right from the beginning of Phase 1A.

Secondly, the project was not screened in order to determine whether it would require a full EIA or not. The majority (90 %) of LHDA staff also acknowledge that screening was not done for Phase 1A. This irregularity tainted all the steps that followed. Lack of baseline data prevented the project proponents from being able to explain precisely the impacts they had identified to the public that was affected by the project. The timing of the studies that were later undertaken was inappropriate; thus, these studies had little or no bearing on Phase 1A environmental protection.

Scoping of the impacts identified during feasibility studies was inadequately carried out because of insufficient baseline data and lack of public participation. The majority of the villages visited in this study (see Appendix D, sections B2, C2, D1, and E2) indicate that they were not given the opportunity to contribute to the impact analysis of Phase 1A. The impacts were therefore not prioritized according to local importance or significance.

Most of the predictions on the impacts identified in Phase 1A were done during the feasibility studies; and therefore, were simple and inaccurate - especially the social impacts. This too was aggravated by lack of proper public involvement.

Lack of public consultation in the EIA process jeopardized the credibility of each step; the majority of people and villages visited (Appendix D, section B2, C2, D1, and E2) did not contribute to the decisions taken by the project proponents. It is thus concluded that planning for Phase 1A omitted an important element of environmental impact assessments. The environmental assessments carried out were, therefore, not interpreted and communicated in an understandable manner to local communities: their involvement was therefore nominal.

Inaccurate scoping and prediction, and omission of impact evaluation resulted in ineffective planning and implementation of LHDA mitigation efforts. Even though the majority of LHDA staff (87 %) believes this step is adequate, praise is mainly accorded to mitigation efforts on the biophysical environment - such as regrassing and erosion control along the northern access road. The complaints highlighted by affected communities relate to compensation for agricultural land, houses, and trees. These indicate that LHDA mitigation efforts for social impacts were unacceptable to the communities affected by the project. Monitoring of Phase 1A impacts was also very irregular and sloppy because LHDA hardly ever visited the construction site to monitor the impacts that had been identified.

The composition and professional expertise of the environmental division of LHDA is adequate. However, the experience of Phase 1A indicates that LHDA was incapable of implementing EIA on its own. Both the government and LHDA were not familiar with the environmental impact assessment procedures. The LHDA failed to coordinate and monitor their various disciplines to produce parallel and interdisciplinary results - which is one of the crucial factors that facilitate the success of EIA implementation - between the four sections of the Environmental Division. This is attributed to lack of adequate internal communication and cooperation between the sections themselves, and with the executive management of the project (i.e. JPTC). Greater involvement in carrying out EIA for Phase 1B has however improved LHDA staff's perceptions, familiarity, and knowledge of the fundamental requirements of a proper EIA.

7.2 Recommendations

Experience derived from Phase 1A EIA implementation indicates that:

- proper EIA procedures and guidelines must be formulated for Lesotho to ensure compliance with recognized EIA standards;
- LHDA needs to improve its manpower capabilities through intensive EIA involvement in the subsequent phases of the project;
- LHDA needs to revise its compensation policies and regulations and involve the public in drawing up these policies;
- public involvement is a crucial component in EIA, and should be incorporated into project planning;
- There is an urgent need to formulate environmental legislation both at LHDA and national levels in Lesotho so as to ensure that recognized environmental standards are adhered to.

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APPENDIX A

INITIAL QUESTIONS FOR PRE-TESTING

APPENDIX A-a Questionnaire for LHDA personnel
APPENDIX A-b Interview-schedule for the communities

Denami

LESOTHO HIGHLANDS DEV AUTHORITY
ENV. DIVISION

as well as

University of Cape Town
Department of Environmental and Geographical Science

APPENDIX A-a

The Survey:

This survey is being conducted amongst the Environmental Division personnel of the Lesotho Highlands Development Authority (From whom permission to conduct this survey has been received) as part of the research for an Msc degree in Environmental Science at the University of Cape Town. The purpose of the survey is to review the environmental studies which were undertaken as part of Phase 1A of the Lesotho Highlands Water Project (LHWP). Feasibility and design studies of Phase 1A of the LHWP were undertaken by multi-national consultant companies from 1982 through 1986, before signing of the treaty between Lesotho and South Africa. Environmental Impact Assessments (EIAs) were included in these studies, and environmental considerations were taken into account when deciding on the overall project configuration and layout.

Phase 1A of the project started in 1986 and currently under construction, is expected to be complete by the end of 1997. It consists of a 185m high dam at Katse on Malibamats'o River; a transfer tunnel; and a reservoir and hydropower plant at 'Muela. Phase 1B of the project consists of the earthfill dam at Mohale on the Senqunyane River, a weir at Matsoku River and transfer tunnels delivering water into Katse Reservoir. Construction of Phase 1B has been Scheduled for 1995-2001.

General Information:

All responses to this survey will be treated in strict confidence. Please answer the questions to the best of your ability. Completion of the questionnaire will involve about **30 minutes** of your time. The questionnaire will be collected from your office **three days** after it was delivered to you.

Instructions:

Please **circle** or **tick** the correct answer and **write in** the space allocated where applicable. ~~Some questions are preceded by a brief information statement to introduce a topic. These statements are not intended to influence or direct your response~~

1. Please indicate the section within the LHDA in which you are employed:

__ Natural Heritage __ Compensation __ Rural Development

__ Public Health

2. Please rate each of the following environmental/social elements according to their relevance to your work:

Physical Environment	*Very relevant*	*Somewhat relevant*	*Neutral*	*Not very relevant*	*Not at all relevant*	*Uncertain*
Geology	1	2	3	4	5	6
Soils	1	2	3	4	5	6
Climate	1	2	3	4	5	6
Vegetation	1	2	3	4	5	6
Fauna	1	2	3	4	5	6
Infrastructure	1	2	3	4	5	6

Social Environment	**Very relevant**	**Somewhat relevant**	**Neutral**	**Not very relevant**	**Not at all relevant**	**Uncertain**
Population	1	2	3	4	5	6
Income	1	2	3	4	5	6
Land-use	1	2	3	4	5	6
Land-tenure	1	2	3	4	5	6
Local Administration	1	2	3	4	5	6
Employment	1	2	3	4	5	6
Communications	1	2	3	4	5	6
Environmental Awareness	1	2	3	4	5	6

3. **Environmental Impact assessment (EIA):**

Environmental Impact Assessment is a comprehensive evaluation of the effects of human development activities or non-actions on various components of the environment. It is essentially a preventative process which avoids costly mistakes in planning and development. Therefore, it is necessary to carry out EIA during feasibility study stage of the planning process. If ~~such a process~~ is taken, it is likely to provide a description of potential environmental consequences stemming from an action in sufficient detail so as to enable decision-makers to make rational decisions (Biswas & Geping, 1987).

a) Please indicate what you consider to be your level of knowledge about this topic:

__ Very knowledgeable __ Not at all knowledgeable

__ Somewhat knowledgeable __ Unsure

b) Please evaluate the information statement that appears above :

__ Accurate __ Inaccurate

__ Somewhat accurate __ Unsure

c) If you think the information statement was "somewhat accurate or inaccurate" what should be added, deleted or changed ?.....

.....

what is the purpose of this question — are you trying to formulate another definition of an EIA?

.....

.....

d) 1. Please rate the level of adequacy of EIA in Phase 1A:

__ Very adequate __ Inadequate

__ Somewhat adequate __ Unsure / Not involved in EIA in Phase 1A

2. If you think it was " somewhat adequate or inadequate," briefly outline its main limitations

.....

.....

.....

.....

.....

.....

e) 1. Has EIA been carried out for Phase 1B of the LHWP?

__ Yes __ No __ Unsure

2. If Yes, do you think this EIA is adequate ?

__ Yes __ No __ Unsure

4. **EIA methods :**

EIA methods are structured mechanisms for identification, collection and organization of environmental impact data. These methods should provide an organized approach for predicting and evaluating anticipated impacts of proposed actions, including beneficial and adverse impacts, and lead to appropriate and effective mitigation and monitoring measures on adverse impacts (Sadar, 1994).

a) Please rate your level of knowledge about this topic:

__ Very knowledgeable __ Not at all knowledgeable __ Somewhat knowledgeable

__ Unsure

Rather ask whether they have been directly involved in an EIA. or how many years they have been working doing EIAs

This question is rather similar to 3a)

b) Please evaluate the information statement that appears above :

__ Accurate __ Inaccurate

__ Somewhat accurate __ Unsure

c) If you think the information statement was " somewhat accurate or inaccurate" what should be added, deleted or changed.....

.....

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.....

.....

d) Please give your evaluation of the level of accuracy and efficiency of each of the following EIA methods :

Methods	*Accurate & Efficient*	*Accurate but Inefficient*	*Neutral*	*Inaccurate & Inefficient*	*Uncertain*
Ad-hoc methods	1	2	3	4	5
Checklists	1	2	3	4	5
Matrices	1	2	3	4	5
Overlays	1	2	3	4	5
Networks	1	2	3	4	5
Cost-benefit / Cost-effective	1	2	3	4	5
Modeling	1	2	3	4	5

e) Which EIA methods do you consider suitable for use in Lesotho? Please rank the level of suitability from 1(the method you consider to be most suitable for use in Lesotho) to 7 (methods you consider least suitable).

Methods	**Rank**
Ad hoc methods	
Checklists	
Matrices	
Overlays	
Networks	
Cost-benefit/ Cost-analysis	
Modeling	

None of the above	
Unsure	

No one will read this. A diagram will be much more useful. (ie the flowchart in the IEM guideline booklet 1)

5. **Main Steps for Carrying out an EIA.**

In concept, and reality, EIA is an interactive, multi-stage process. The main steps are :-

- Screening: is a mechanism for ensuring that only those projects which warrant a " full " EIA are assessed in this manner.
- Scoping: gives a description of the project environment and identification of all issues that arise in relation to the project.
- Prediction: serves to predict anticipated impacts on the biophysical environment and the directly related social consequences.
- Evaluation: determines significance and importance of impacts.
- Development of plans: to avoid, mitigate/enhance, monitor and follow up on the predicted impacts.
- Recommendations: which among others may include better alternative/s to proposed project.

a) Please rate your level of ~~knowledge~~ experience about the steps of the EIA process:

EIA Steps	Very Knowledgeable	Somewhat Knowledgeable	Not at all Knowledgeable	Unsure
Screening	1	2	3	4
Scoping	1	2	3	4
Prediction	1	2	3	4
Evaluation	1	2	3	4
Plans to mitigate	1	2	3	4
Recommendations	1	2	3	4

b) Please evaluate the information statement that appears above:

__ Accurate __ Inaccurate

__ Somewhat accurate __ Unsure

ditto

c) If you think the information statement was " somewhat accurate or inaccurate" what should be added, deleted or changed?.....

.....

.....

.....

.....

d) Please indicate which steps were included in the EIA process for Phase 1A?

EIA Steps	Yes	No	Unsure
Screening	1	2	3
Scoping	1	2	3
Prediction	1	2	3
Evaluation	1	2	3
Plans to mitigate	1	2	3
Recommendations	1	2	3

Surely you can get hold of the Phase 1A EIA and get a much more RELIABLE answer than this will give you.

Rather ~~combine this question~~ ~~ask~~ ask whether they think each of these steps were carried out to a satisfactory degree

make the bold

e) Please indicate which steps were included in the EIA process for Phase 1B:

EIA Steps	Yes	No	Unsure
Screening	1	2	3
Scoping	1	2	3
Prediction	1	2	3
Evaluation	1	2	3
Plans to mitigate	1	2	3
Recommendations	1	2	3

ditto as above

what if they weren't involved in ...

6. a) From your knowledge of Phase 1A, please rate the accuracy of predicted impacts on the natural environment caused by the project on each of the following issues in Phase 1A:

bold

bold.

Impacts	Very Accurate	Somewhat Accurate	Neutral	Inaccurate	Uncertain
Land & Settlements	1	2	3	4	5
Infrastructure	1	2	3	4	5
Arable agriculture	1	2	3	4	5
Grazing & Animal product.	1	2	3	4	5
Rural economy	1	2	3	4	5
Employment	1	2	3	4	5
Communications	1	2	3	4	5
Health	1	2	3	4	5
Landscape & Aesthetics	1	2	3	4	5
Fisheries	1	2	3	4	5
Water quality	1	2	3	4	5
Micro-climate	1	2	3	4	5
Heritage	1	2	3	4	5
Flora & Fauna	1	2	3	4	5
Timber	1	2	3	4	5
Downstream effects	1	2	3	4	5

b) Are/were there any other environmental impacts that were not envisaged or predicted?

__ Yes __ No __ Unsure

c) If Yes, please list some of the important impacts, either positive or negative:

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(perhaps also ask them to indicate why they think they were not predicted)

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.....
.....
.....

d) From your knowledge of Phase 1A, please rate the accuracy of predicted impacts on the social environment caused by the project on each of the following issues in Phase 1A:

Impacts	Very Accurate	Somewhat Accurate	Neutral	Inaccurate	Uncertain
Land & Settlements	1	2	3	4	5
Infrastructure	1	2	3	4	5
Arable agriculture	1	2	3	4	5
Grazing & Animal product.	1	2	3	4	5
Rural economy	1	2	3	4	5
Employment	1	2	3	4	5
Communications	1	2	3	4	5
Health	1	2	3	4	5
Landscape & Aesthetics	1	2	3	4	5
Fisheries	1	2	3	4	5
Water quality	1	2	3	4	5
Micro-climate	1	2	3	4	5
Heritage	1	2	3	4	5
Flora & Fauna	1	2	3	4	5
Timber	1	2	3	4	5
Downstream effects	1	2	3	4	5

e) Are/were there any other social impacts that were not envisaged or predicted?

__ Yes __ No __ Unsure

f) If Yes, please list some of the important impacts, either positive or negative:

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g) From your personal experience, please rate the effectiveness of measures applied to reduce and mitigate impacts caused by the project on each of the following:

Impacts	Very effective	Somewhat effective	Neutral	Not effective	Uncertain
Land & Settlements	1	2	3	4	5
Infrastructure	1	2	3	4	5
Arable agriculture	1	2	3	4	5
Grazing & Animal product.	1	2	3	4	5
Rural economy	1	2	3	4	5
Employment	1	2	3	4	5
Communications	1	2	3	4	5
Health	1	2	3	4	5
Landscape & Aesthetics	1	2	3	4	5
Fisheries	1	2	3	4	5
Water quality	1	2	3	4	5
Micro-climate	1	2	3	4	5
Heritage	1	2	3	4	5
Flora & Fauna	1	2	3	4	5
Timber	1	2	3	4	5
Downstream effects	1	2	3	4	5

good question

7. **Environmental Awareness:**

a) Do you think the general public understand and appreciate your role in protecting the environment?

There are different views

__ Yes __ No __ Unsure

b) If No, do you think the problem is associated with :
(Tick as appropriate)

__ Illiteracy
__ Ignorance
__ Negligence
__ Stubbornness
__ ~~None of these factors~~
__ Unsure
__ other (please specify _____)

c) Has any of the above factors affected your specific programmes?

__ Yes __ No __ Unsure

d) If Yes, please indicate the factors that have had an effect:

__ Illiteracy __ Ignorance __ Negligence __ Stubbornness

8. a) How would you categorize LHDA's ability to carry out the task of EIA?

__ Very well equipped __ Not well equipped

__ Somewhat equipped __ Unsure

b) Are you satisfied with the LHDA EIA procedure that was used in Phase 1A?

__ Yes __ No __ Unsure

9. a) In your opinion at what stage is EIA practice in Lesotho?

__ Very young __ early maturity
__ Young __ mature

b) How do you assess the trend of EIA practice in Lesotho?

__ Improving __ Deteriorating __ Unsure

c) How would you rate the roles currently being played by each of the agencies listed below in EIA and Environmental issues in Lesotho:

Agency	*High*	*Moderate*	*Low*	*Unsure*
Lesotho Government	1	2	3	4
Private sector	1	2	3	4
Non Governmental Organisations	1	2	3	4
Development companies	1	2	3	4
Lesotho Industries	1	2	3	4
Lesotho Public	1	2	3	4

10. a) How would you categorize your involvement in carrying out the EIA process of Phase 1A?

__ Heavily __ Slightly

__ Moderately __ Not at all involved

b) How would you categorize your involvement in carrying out the EIA process of Phase 1B?

__ Heavily __ Slightly

__ Moderately __ Not at all involved

c) How long have you been employed by the LHDA?

__ More than 5 yrs __ 2 - 3 yrs

__ 3- 5 yrs __ Less than 2 yrs

d) Please give a brief description of your job.....

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Date that you completed this questionnaire: ___/___/19__

In general

1. Ask your self "what is the purpose" of each question, and what you are going to do with the answers
2. Good use of white space. Layout is clear.
3. Be sure to print back to back!
4. Good use of stripes in tables to guide the eye. But shading (especially headings) is TOO DARK)
5. I'm glad someone's evaluating how EIAs are being done. EVERYthing usually stops at the implementation phase. Evaluating is vital ~~for~~ future improvement. Perhaps you could state your questions that they convey this positive message and ~~not~~ are not ~~quite so~~ ~~pointing~~ ~~being~~ pointing fingers at people. Its important to get the "lessor learned" and be guided by other people's experience.

* Need to find out which areas ~~are of~~ within EIA need improvement. And how they can be improved

Dept. of ENGEO
U C T
27/5/96

APPENDIX A-b

1. Name of village.....

2. Name of Household head.....

3. Household information.

Household Members	Age	Employment	Education H	M	L
Head					
Wife					

What do these mean what about the educ. category.

Children	Male	Female	Total
Other			
High School			
Primary			
Kinder-garden			
Born after 1990			
Other Dependents			

This is a bit confused what do you want to achieve

Absent Members	Age	Male	Female	Employment

4. Household assets in numbers:

Type of houses

1 = Shack [ ]

2 = Hut [ ]

3 = Rondovel [ ]

4 = Huis [ ]

5 = 3 and more rooms [ ]

Roofing

1 = Tiles [ ]

2 = Corrugated Iron [ ]

3 = Thatch [ ]

Wall material

1 = Brick [ ]

2 = Stone [ ]

3 = Corrugated Iron [ ]

4 = Plastics [ ]

Confused what do you want lets talk.

6 = Toilet [ ] **Comments**.....

.....

7 = kraal [ ] .....

.....

Why do you ask for it? Will they fill you the truth?

8 = Livestock assets in numbers: 1 = Cattle [ ] 4 = Horses & Donkeys [ ]
2 = Sheep [ ] 5 = Other [ ]
3 = Goats [ ]

5. Household property lost to the LHWP: write in full?

Property	Total No:	Type
Houses		

Comments:.....

.....

.....

.....

Fields	Total No:	Type

Comments:.....

.....

.....

.....

Trees	Total No:	Type

Comments:.....

.....

.....

.....

CTION A ?

a) Compensation for the house/s: BOLD LETTERS. What is this?

i) What form of compensation was received?

Compensation house

INTERVIEWER INSTRUCTIONS?

What do you mean? Question not clear

10 Are you encountering any dissimilarity with your present community?

__ Age __ Gender __ Racial __ Ethnic composition __ Other

11. Has LHDA assisted you in anyway to rehabilitate/adjust to the new living conditions? e.g. to obtain new land for agriculture.

__ Yes __ No

12 If yes explain fully.....

13 If No, list three good things that are not found in this new location but were present in the previous one.....
.....
.....
.....
.....

14 Is there anything you do not like about the place you are now living in?.....
.....
.....
.....

SECTION B b) Compensation for lost fields: Bush clearing

15 i) Are compensation grains enough?

If yes __ Yes

If no __ No

17 What quantities are you receiving?
.....
.....

16 Are the grains delivered timeously?
__ Yes __ No

Explain

At what rate are you they delivered?
.....
.....

18 ~~iii)~~ Do you have any other alternative means of agricultural produce?.....
.....
.....

c) Compensation for lost trees:

i) Were you able to cut all your trees ? __ Yes __ No

If No, Why.....
.....

ii) Were the seedlings of the type that you wanted?

__ Yes

Are the compensation seedlings successfully growing?

__ All of them __ Few of them
__ Some of them __ None of them
__ Unsure

__ No

22 Why are they the wrong type ?
.....
.....
.....

iv) What were you using the trees for?

__ Firewood __ Commercially Other.....

v) Do you have any alternative to meet the above needs?.....
.....
.....
.....

d) What other properties have been lost to the LHWP and how have they been compensated for?.....
.....
.....
.....

6. Population Impacts:

a) Are you an original resident of this village? __ Yes __ No

If No, where have you relocated from and why?.....
.....
.....
.....

b) Have you noticed any changes in the community? __ Yes __ No

36 If Yes, are they finding a place in the community ~~__Yes__ __No__~~

Comment on your answer ... .
.....
.....

37 ~~b)~~ Has any of your property been stolen this year? __ Yes __ No

38 If Yes, How may times?

__ More than 5 times __ 3-5 times __ 2 times __ once

~~8.~~ Individual and Family level Impacts:

39 ~~a)~~ Are your daily living and movement patterns disrupted by the LHWP?

__ Yes __ No

40 If Yes, In what way are they disrupted?.....
.....
.....
.....
.....
.....

41 ~~b)~~ Has your family structure been altered in any way because of the LHWP

__ Yes __ No

42. If Yes, In What way has it been changed?.....
.....
.....
.....
.....
.....

43 ~~c)~~ What do you use for your family medical needs?

__ Clinic __ Traditional medicine __ Both

44 If clinic, Is it easily accessible? __ Yes __ No

If No, why?.....
.....

55 ~~11.2)~~ Did LHDA ever hold public gatherings in this village to explain the LHWP and how it was going to affect your lives? __ Yes __ No

56 ~~b)~~ If Yes, when were these gatherings held?

__ Prior to LHWP implementation __ During implementation __ Unsure

57 ~~c)~~ Did you participate in these public gatherings? __ Yes __ No

58 If No, why not.....

.....

.....

59 ~~d)~~ If Yes, which issues of concern were raised by the community?.....

.....

.....

.....

.....

60 ~~e)~~ Generally speaking, do you think LHDA has addressed issues that were raised by the community? __ Yes __ No

Comment on your answer to e).....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Overall, the questionnaire is OK. But you need to reorganize how you structure them in a questionnaire. The questions must be clear and simple. Read my comments carefully and correct structure accordingly.

MUTHARALALA

28/5/96

APPENDIX B

QUESTIONS FOR PILOT TESTING

APPENDIX B-a Questionnaire for LHDA personnel
APPENDIX B-b Interview-schedule for the communities

LAURENCE

APPENDIX B-a

PLEASE RESPOND TO THE QUESTIONS, AND MAKE YOUR GENERAL COMMENTS ABOUT THE FORMAT AND TYPE OF QUESTIONS

THANKS

28/3/96

RICHER

€

Lesotho Highlands Development Authority
Environment Division

Environmental Aspects of LHWP, Phase 1A

University of Cape Town
Department of Environmental and Geographical Science

The Survey:

This survey is being conducted amongst the Environmental Division personnel of the Lesotho Highlands Development Authority (from whom permission to conduct this survey has been received) as part of the research for an MSc degree in Environmental Science at the University of Cape Town. The purpose of the survey is to review the environmental studies which were undertaken as part of Phase 1A of the Lesotho Highlands Water Project (LHWP). Feasibility and design studies of Phase 1A of the LHWP were undertaken by multi-national consultant companies from 1982 through 1986, before signing of the treaty between Lesotho and South Africa. Environmental Impact Assessments (EIAs) were included in these studies, and environmental considerations were taken into account when deciding on the overall project configuration and layout.

Phase 1A of the project started in 1986 ~~and~~ is currently under construction, and is expected to be complete by the end of 1997. It consists of a 185m high dam at Katse on Malibamats'o River; a transfer tunnel; and a reservoir and hydropower plant at 'Muela. Phase 1B of the project consists of the earthfill dam at Mohale on the Senqunyane River, a weir at Matsoku River and transfer tunnels delivering water into Katse Reservoir. Construction of Phase 1B has been Scheduled for 1995-2001.

General Information:

All responses to this survey will be treated in strict confidence. Please answer the questions to the best of your ability. Completion of the questionnaire will involve about **30 minutes** of your time. The questionnaire will be collected from your office **three days** after it was delivered to you.

Instructions:

Please **circle or tick** the correct answer and **write in** the space allocated where applicable. Some questions are preceded by a brief information statement to introduce a topic. These statements are not intended to influence or direct your response.

1. Please indicate the section within the LHDA in which you are employed:

__ Natural Heritage __ Compensation __ Rural Development

__ Public Health

2. Please rate each of the following environmental/social elements according to their relevance to your work:

Physical Environment	*Very relevant*	*Somewhat relevant*	*Not very relevant*	*Not at all relevant*	*Uncertain*
Geology	1	2	3	4	5
Soils	1	2	3	4	5
Climate	1	2	3	4	5
Vegetation	1	2	3	4	5
Fauna	1	2	3	4	5
Infrastructure	1	2	3	4	5

Social Environment	**Very relevant**	**Somewhat relevant**	**Not very relevant**	**Not at all relevant**	**Uncertain**
Population	1	2	3	4	5
Income	1	2	3	4	5
Land-use	1	2	3	4	5
Land-tenure	1	2	3	4	5
Local Administration	1	2	3	4	5
Employment	1	2	3	4	5
Communications: intervillage paths	1	2	3	4	5
Environmental Awareness	1	2	3	4	5

3. Environmental Impact assessment (EIA):

Environmental Impact Assessment is a comprehensive evaluation of the effects of human development activities or non-actions on various components of the environment. It is essentially a preventative process which avoids costly mistakes in planning and development. Therefore, it is necessary to carry out EIA during feasibility study stage of the planning process. If EIA is undertaken, it is likely to provide a description of potential environmental consequences stemming from an action in sufficient detail so as to enable decision-makers to make rational decisions.

a) Please indicate what you consider to be your level of knowledge about this topic:

__ Very knowledgeable Somewhat knowledgeable __ Not at all knowledgeable

__ Unsure

Which one ? the one on EIA?

b) Please evaluate the information statement that appears above : it's not above, question a) is above (change order)

__ Accurate __ Somewhat accurate __ Inaccurate __ Unsure

c) If you think the information statement was "somewhat accurate or inaccurate" what should be added, deleted or changed ?.....

.....

.....

.....

.....

.....

d) 1. Please rate the level of adequacy of EIA in Phase 1A:

__ Very adequate __ Somewhat adequate __ Inadequate __ Unsure

2. If you think it was " somewhat adequate or inadequate," briefly outline its main limitations

.....

.....

.....

.....

.....

.....

.....

4. EIA methods :

EIA methods are structured mechanisms for identification, collection and organization of environmental impact data. These methods should provide an organized approach for predicting and evaluating anticipated impacts of proposed actions, including beneficial and adverse impacts, and lead to appropriate and effective mitigation and monitoring measures on adverse impacts.

a) Please rate your level of knowledge about this topic:

__ Very knowledgeable __ Somewhat knowledgeable __ Not at all knowledgeable

__ Unsure

?

b) Please evaluate the information statement that appears above :

__ Accurate __ Somewhat accurate __ Inaccurate __ Unsure

c) If you think the information statement was " somewhat accurate or inaccurate" what should be added, deleted or changed.....

.....

.....

.....

.....
.....
.....

d) Please give your evaluation of the level of accuracy and efficiency of each of the following EIA methods :

Methods	*Accurate & Efficient*	*Accurate but Inefficient*	*Inaccurate & Inefficient*	*Uncertain*
Ad-hoc methods	1	2	3	4
Checklists	1	2	3	4
Matrices	1	2	3	4
Overlays	1	2	3	4
Networks	1	2	3	4
Cost-benefit / Cost-effective	1	2	3	4
Modeling	1	2	3	4

e) Which EIA methods do you generally consider suitable for use in Lesotho? Please rank the level of suitability from 1(the method you consider to be most suitable for use in Lesotho) to 7 (methods you consider least suitable).

Methods	*Rank*
Ad hoc methods	
Checklists	
Matrices	
Overlays	
Networks	
Cost-benefit/ Cost-analysis	
Modeling	

None of the above	
Unsure	

5. Main Steps for Carrying out an EIA.

In concept, EIA is an interactive, multi-stage process. The main steps are :-

- **Screening:** is a mechanism for ensuring that only those projects which warrant a " full " EIA are assessed in this manner.
- **Scoping:** gives a description of the project environment and identification of all issues that arise in relation to the project.
- **Prediction:** serves to predict anticipated impacts on the biophysical environment and the directly related social consequences.
- **Evaluation:** determines significance and importance of impacts.
- **Development of plans:** to avoid, mitigate/enhance, monitor and follow up on the predicted impacts.
- **Recommendations:** which among others may include better alternative/s to proposed project.

a) Please evaluate the information statement that appears above:

__ Accurate __ Somewhat accurate __ Inaccurate __ Unsure

b) If you think this information statement is " somewhat accurate or inaccurate" what should be added, deleted or changed?.....

.....

.....

.....

.....

c) Please rate your level of familiarity with the steps of the EIA process:

EIA Steps	Very Familiar	Somewhat Familiar	Not at all Familiar	Unsure
Screening	1	2	3	4
Scoping	1	2	3	4
Prediction	1	2	3	4
Evaluation	1	2	3	4
Plans to mitigate	1	2	3	4
Recommendations	1	2	3	4

d) Do you think each of the following steps were carried out to a satisfactory degree in the EIA process for **Phase 1A**? and qualify your answer 1 or 2 below with a few sentences (in the comment space below) of why you said yes or no.

EIA Steps	Yes	No	Unsure
Screening	1	2	3
Scoping	1	2	3
Prediction	1	2	3
Evaluation	1	2	3
Plans to mitigate	1	2	3
Recommendations	1	2	3

Comment :

e) Do you think each of the following steps were carried out to a satisfactory degree in the EIA process for **Phase 1B**? change as for d)

EIA Steps	Yes	No	Unsure
Screening	1	2	3
Scoping	1	2	3
Prediction	1	2	3
Evaluation	1	2	3
Plans to mitigate	1	2	3
Recommendations	1	2	3

/ as for d)

Comments

6. a) From your knowledge of **Phase 1A**, please rate the accuracy of predicted impacts on the **natural environment** caused by the project on each of the following issues in **Phase 1A**:

Impacts	Very Accurate	Somewhat Accurate	Inaccurate	Uncertain
Land and Settlements	1	2	3	4
Infrastructure	1	2	3	4
Arable agriculture	1	2	3	4
Grazing and Animal product.	1	2	3	4
Rural economy	1	2	3	4
Employment	1	2	3	4
Communications: intervillage paths	1	2	3	4
Health	1	2	3	4
Landscape and Aesthetics	1	2	3	4
Fisheries	1	2	3	4
Water quality	1	2	3	4
Micro-climate	1	2	3	4
Heritage	1	2	3	4
Flora & Fauna	1	2	3	4
Timber	1	2	3	4
Downstream effects	1	2	3	4

As in d) & e) above I found the results of this question somewhat meaningless if I didn't know why (but I do have a bias to qualitative or descriptive research, and there is some value in the quantitative answer you will get from this question as it stands.

b) Are/were there any other environmental impacts that were not envisaged or predicted?

__ Yes __ No __ Unsure

c) If Yes, please list some of the important impacts, either positive or negative:

.....

.....

.....

.....
.....
.....
.....
.....
.....
.....
.....

d) In your opinion, why do you think they were not predicted? (Briefly explain).....
.....
.....
.....
.....
.....

e) From your knowledge of **Phase 1A,** please rate the accuracy of predicted impacts on the **social environment** caused by the project on each of the following issues in **Phase 1A**:

Impacts	Very Accurate	Somewhat Accurate	Inaccurate	Uncertain
Land and Settlements	1	2	3	4
Infrastructure	1	2	3	4
Arable agriculture	1	2	3	4
Grazing and Animal product.	1	2	3	4
Rural economy	1	2	3	4
Employment	1	2	3	4
Communications: intervillage paths	1	2	3	4
Health	1	2	3	4
Landscape and Aesthetics	1	2	3	4
Fisheries	1	2	3	4
Water quality	1	2	3	4
Heritage	1	2	3	4
Flora & Fauna	1	2	3	4
Timber	1	2	3	4
Downstream effects	1	2	3	4

comment as for 6a above

f) Are/were there any other social impacts that were not envisaged or predicted?

__ Yes __ No __ Unsure

g) If Yes, please list some of the important impacts, either positive or negative:

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

h) In your opinion, why do you think they were not predicted? (Briefly explain).....

.....
.....
.....
.....
.....

i) From your personal experience, please rate the effectiveness of measures applied to reduce and mitigate impacts caused by the project on each of the following:

Impacts	Very effective	Somewhat effective	Not effective	Uncertain
Land and Settlements	1	2	3	4
Infrastructure	1	2	3	4
Arable agriculture	1	2	3	4
Grazing and Animal product.	1	2	3	4
Rural economy	1	2	3	4
Employment	1	2	3	4
Communications: intervillage paths	1	2	3	4
Health	1	2	3	4
Landscape and Aesthetics	1	2	3	4
Fisheries	1	2	3	4
Water quality	1	2	3	4
Micro-climate	1	2	3	4
Heritage	1	2	3	4
Flora & Fauna	1	2	3	4
Timber	1	2	3	4
Downstream effects	1	2	3	4

What were they?

7. Environmental Awareness:

a) Do you think the general public understand and appreciate your role in environmental issues?

__ Yes __ No __ Unsure

b) If No, do you think the problem is associated with :
(Tick as appropriate)

__ Illiteracy __ Stubbornness

__ Ignorance __ Unsure

__ Negligence __ Other (Please specify).....
.....

c) Has any of the above factors affected your specific programmes? — to what ? — Vague

__ Yes __ No __ Unsure

d) If Yes, please indicate the factors that have had an effect:

__ Illiteracy __ Ignorance __ Negligence __ Stubbornness __ Other

8. a) In your opinion, How well equipped is LHDA to undertake Environmental Impact Assessments? Did LHDA undertake EIA's for Phase 1A, or did the donor countries do it.

__ Very well equipped __ Somewhat equipped __ Not well equipped

__ Unsure

b) Are you satisfied with the LHDA EIA procedure that was used in Phase 1A?

__ Yes __ No __ Unsure

9. a) In your opinion at what stage is EIA practice in general in Lesotho?

__ Very young __ Young __ early maturity __ mature

Comment : Why ?

b) How do you assess the trend of EIA practice in Lesotho?

__ Improving __ Deteriorating __ Unsure

Comment :
Why? - _____

c) How would you rate the roles currently being played by each of the agencies listed below in EIA issues in Lesotho:

Agency	*High*	*Moderate*	*Low*	*Unsure*
Lesotho Government	1	2	3	4
Private sector	1	2	3	4
Non Governmental Organisations	1	2	3	4
Development companies	1	2	3	4
Lesotho Industries	1	2	3	4
Lesotho Public	1	2	3	4

10. a) How would you categorize your direct involvement in carrying out the EIA process of **Phase 1A**? in terms of ~~time~~ % of working time allocated?

__ Heavy __ Moderate __ Slight __ Not at all

b) How would you categorize your direct involvement in carrying out the EIA process of **Phase 1B**?

__ Heavy __ Moderate __ Slight __ Not at all

c) How long have you been employed by the LHDA?

__ More than 5 yrs __ 3 - 5 yrs __ 2- 3 yrs __ Less than 2 yrs

d) Please give a brief description of your job.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Date that you completed this questionnaire: ___/___/19__

APPENDIX B-b

Interview schedule for villages affected by the Lesotho Highlands water Project.

1. Name of village Makhoabeng

2. Name of Household head Kopano Mokoma Mkando Mkhondo

3. Household information.

Household Members	Age 18-35	35-55	< 55	Employment	Education H	M	L
Head			✓	Pensioner	✓		
Wife			✓	N/A			

Total number of people in household: 14

Children	Male	Female	Total
Other	1	1	
High School			
Primary	1	1	
Kinder-garden			
Born after 1990	3	1	
Other Dependents	2	4	

Absent Members	Age	Male	Female	Employment

4. **Household assets in numbers:**

Type of houses

1 = Shack [ ]

2 = Hut [5]

3 = Rondavel [ ]

Roofing

1 = Tiles [ ]

2 = Corrugated Iron [1]

3 = Thatch [5]

Wall material

1 = Brick [ ]

2 = Stone [6]

3 = Corrugated Iron [ ]

4 = Huis [1] 4 = Plastics [ ]

5 = 3 and more rooms [ ]

6 = Toilet [ ] **Comments**.....

.....

7 = kraal [r] .....

8 = **Livestock assets in numbers:** 1 = Cattle [4] 4 = Horses & Donkeys [4]
2 = Sheep [10] 5 = Other [ ]
3 = Goats [15]

5. **Household property affected by the LHWP:**

Property	Total No:	Type
Houses		

Comments:.....

.....

.....

.....

Fields	Total No:	Size: S	M	L	Type
	2	2			Maize
					Wheat

Comments:.....

.....

.....

.....

Trees	Total No:	Type
		Poplar
	Orchard	Fruit tree

Comments:.....

.....

.....

.....

Section A

6) Did you receive compensation for a house? __ Yes __X__ No

If No, go to Section B.

7) If Yes,

Did you choose the type of house that you have been compensated with ?

__ Yes

Why did you choose it?

.....

.....

.....

__ No

Why not? would you have preferred something different?.....

.....

.....

Did you notify LHDA prior to building this house? If Yes what was their response ?

.....

.....

.....

Are you happy with this house ?

__ Yes __ No

How are the living conditions in the house?

__ More comfortable __ No difference

__ Less comfortable __ Unsure

Why ?.....

.....

.....

How?.....

.....

.....

Are you finding it more or less costly to maintain this house? .....

Why?.....

.....

.....

.....

8) Did you have to relocate to another village? __ Yes __ No

9) To what extent were you consulted about resettlement alternatives?.....
.....
.....

Assessment of "stress of relocation":

10) Do you miss your old home? __ Yes __ No

Explain.....
.....
.....
.....

11) Are you encountering any dissimilarity with your present community?

__ Age __ Gender __ Racial __ Ethnic composition __ Other

12) Has LHDA assisted you to rehabilitate/adjust to the new living conditions?

__ Yes __ No

If Yes, explain fully.....
.....
.....

13) If No, list three good things that are not found in this new location but were present in the previous one.....
.....
.....

14) Is there anything you do not like about the place you are now living in?.....
.....
.....

Section B: Compensation for lost fields:

15) Are compensation grains more or less than you used to grow?

X More

8 bags of maize will be provided once a year for the next 15 years. But o

__ Less

Why are they less?.....
.....

What quantities are you receiving?.....

Are the grains delivered timeously?

__ Yes __ No

Sometimes But most of the time they are delivered timeously

How often is the grain delivered?

Once a year

16) Do you have any other alternative means of agricultural produce? A few small fields (3), even though they are not enough because family is very large.

Section C: Compensation for lost trees:

17) Were you able to cut all your trees ? __ Yes ✓ No

If No, Why Was at work

18) Were the seedlings of the type that you wanted?

X Yes

Are the compensation seedlings successfully growing?

__ All of them __ Few of them

X Some of them __ None of them

__ Unsure

__ No

Why are they the wrong type ?

19) What were you using the trees for?

✓ Firewood ✓ Fruit __ Commercially __ Other.....

20) Do you have any alternative to meet the above needs? Yes, he has trees in his garden for firewood and fruit. He made an orchard

21) What other properties have been lost to the LHWP and how have they been compensated for? None other than the trees and the fields

Section D: Population Impacts:

22) Are you an original resident of this village? ✓ Yes __ No

If No, where have you relocated from and why?.....

.....

.....

.....

23) Have you noticed any changes in the community? ✓ Yes __ No

If Yes, how have these changes affected you? Crowding of people. People without self-respect, prostitution. They have affected the belief in churches.

However After project is finished local people will benefit from the project.

24) Have you benefited from the LHWP?

✓ Yes __ No

If Yes, how have you benefited? Trees will be provided for many years to come and some grains will also be provided. Schools have been provided with toilets, roads have been built Makhaobeng has been given M1 million ~~+~~ Everyone will be given a toilet, water tap. And a hall and a market will be built An airport has been built.

If No, what are the problems?.....

.....

.....

.....

Section E: Community Arrangements:

25) How do you feel about the LHWP? Not happy or negative, but accept condit rather than when there was nothing.

__ Happy ✓ Neutral __ Negative __ Don't know

26) Which factors/issues do you think LHDA should have addressed before implementing the LHWP? They could have consulted with the people whether they wanted the project or not. For example, where they call Katse it is Ka-tse because Katse is somewhere, so they should have consulted the community. Lira Berenger (link) has not symphathized with the people. The chief was bribed so as to make some things possible for the project

27) Do you think the local Chief still has authority over the community?

✓ Yes __ No

Explain Because of bribes. The chief has to ask the people not order them. There is no person who has to be put in reserve by the chief. The chief has to ask

28) Has there been any change in occupational opportunities? No not at all. The LHDA hire people outside of the village of Makhoabeng. They also practise nepotism. Most of employees are casual labours. The Italians are all rubbish.

29) What do you feel about the future? i.e. Optimistic or pessimistic.....
Why? If the World Bank people are not lying of the money used for "fate-fate" is used for the irrigation schemes, agriculture and on livestock he will be optimistic instead of being used for the benefit of the ruling party to get votes in the next elections.

Section F: Conflicts between Local Residents and Newcomers:

30) Are there any newcomers in the community? ✓Yes __No

If Yes, are they finding a place in the community ✓Yes __No

Comment on your answer 2 kinds. There are people living here, and people working who will leave when the project is finished. So there is no problem whether they will stay or they will leave.

31) Has any of your property been stolen this year? ✓Yes __No

If Yes, How may times? Each and everyday. They steal cattle, sheep, horses, donkeys

✓More than 5 times __3-5 times __2 times __once

Is this more or less than before the LHWP started? There has always been stock theft. The new kind of theft is pickpocketing. Even people who earn high salaries pickpockets. So these theft is not caused by LHWP rather it has promoted it

Section G: Individual and Family level Impacts:

32) Are your daily living and movement patterns changed by the LHWP?

__Yes X No But during workdays there are some restrictions because of the danger in some areas.

If Yes, In what way are they changed?.....

33) Has your family structure been altered in any way because of the LHWP

✓Yes __No

If Yes, In What way has it been changed? Night is making noise and the people who drink alcohol make noise. some people can't sleep.

34) What do you use for your family medical needs?

__ Clinic __ Traditional medicine x Both

If clinic, Is it easily accessible? ✓ Yes __ No

If No, why?.....

If traditional medicine, Have any of your medicinal herbs been flooded?

✓ Yes __ No

If yes, Are there any alternative sites for medicine and how far are they? There are some people who without permission just take these herbs to sell them away from the village, even outside of ~~but~~ borders. The roads have ruined some of them. There should be restrictions.

35) Are there any development programmes initiated by LHDA in this village?

✓ Yes __ No __ Unsure

36) If Yes, what kind of programmes are they? There is a budget of M1 million+ set aside for the village to make toilets, build schools & hall, water taps and a market place where people will buy goods

37) Are you involved in any of these programmes?

✓ Yes

Which programmes are you involved in?
Member of committee of hall board

In what way are you involved?
member of board (lehakela la motse)
Forward Planning committee member
To plan for farmers and the programmes of the villages. They look at necessities of people not in the board

__ No

Why are you not involved?.....

.....
.....
.....

Have these programmes improved your standard of living?

✓ Yes __ No

How has your life improved?
Agriculture has already his way of life
Other than age he has his passion to survive

Why do you think there is no change?.....
.....
.....
.....

38) Did LHDA ever hold public gatherings in this village to explain the LHWP and how it was going to affect your lives? __ Yes ✓ No

39) If Yes, when were these gatherings held?

__ Prior to LHWP implementation __ During implementation __ Unsure

40) Did you participate in these public gatherings? __ Yes __ No

If No, why not.....
.....
.....

41) If Yes, which issues of concern were raised by the community?.....
.....
.....
.....
.....
.....

42) Generally speaking, do you think LHDA has addressed issues that were raised by the community? __ Yes __ No

Comment on your answer .....
.....
.....
.....
.....

43) General and other comments

There are bad things it has made, but the good overshadows the bad. eg At the Clinic Malitapole said the people should go to a far away clinic. Because he likes tennis Matlata Mendong said will give him a net and he is going to take over the Italians tennis courts and Mr Lieta secorded him.

Date: 10/04/1996.

APPENDIX C

Appendix C-a : Final questions used for LHDA survey, and the summary of questionnaire responses from LHDA personnel.

Appendix C-b : Final questions used for the communities survey, and the summary of responses from the communities.

APPENDIX C-a

Lesotho Highlands Development Authority
Environment Division

Environmental Aspects of LHWP, Phase 1A

University of Cape Town
Department of Environmental and Geographical Science

The Survey:

This survey is being conducted amongst the Environmental Division personnel of the Lesotho Highlands Development Authority (from whom permission to conduct this survey has been received) as part of the research for an MSc degree in Environmental Science at the University of Cape Town. The purpose of the survey is to review the environmental studies which were undertaken as part of Phase 1A of the Lesotho Highlands Water Project (LHWP). Feasibility and design studies of Phase 1A of the LHWP were undertaken by multi-national consultant companies from 1982 through 1986, before signing of the treaty between Lesotho and South Africa. Environmental Impact Assessments (EIAs) were included in these studies, and environmental considerations were taken into account when deciding on the overall project configuration and layout.

Phase 1A of the project started in 1986, is currently under construction, and is expected to be complete by the end of 1997. It consists of a 185m high dam at Katse on Malibamats'o River, a transfer tunnel, and a reservoir and hydropower plant at 'Muela. Phase 1B of the project consists of the earthfill dam at Mohale on the Senqunyane River, a weir at Matsoku River and transfer tunnels delivering water into Katse Reservoir. Construction of Phase 1B has been Scheduled for 1995-2001.

General Information:

All responses to this survey will be treated in strict confidence. Please answer the questions to the best of your ability. Completion of the questionnaire will involve about **30 minutes** of your time. The questionnaire will be collected from your office **three days** after it was delivered to you.

Instructions:

Please **circle** or **tick** the correct answer and **write in** the space allocated where applicable. Some questions are preceded by a brief information statement to introduce a topic. These statements are not intended to influence or direct your response.

1. Please indicate the section within the LHDA in which you are employed:

39% Natural Heritage 26% Compensation 30% Rural Development

5% Public Health

2. Please rate each of the following environmental/social elements according to their relevance to your work:

Physical Environment	*Very relevant*	*Somewhat relevant*	*Not very relevant*	*Not at all relevant*	*Uncertain*
Geology	43%	13%	35%	9%	17%
Soils	65%	21%	13%	0%	22%
Climate	57%	35%	0%	9%	21%
Vegetation	65%	35%	9%	9%	0%
Fauna	43%	52%	22%	9%	9%
Infrastructure	43%	56%	13%	0%	0%

Social Environment	Very relevant	Somewhat relevant	Not very relevant	Not at all relevant	Uncertain
Population	69%	22%	9%	0%	13%
Income	43%	26%	17%	0%	22%
Land-use	57%	22%	9%	0%	22%
Land-tenure	47%	26%	9%	0%	17%
Local Administration	39%	34%	9%	0%	26%
Employment	43%	22%	13%	9%	0%
Communications: intervillage paths	35%	22%	9%	9%	0%
Environmental Awareness	65%	26%	0%	0%	0%

3. Environmental Impact assessment (EIA):

Environmental Impact Assessment is a comprehensive evaluation of the effects of human development activities or non-actions on various components of the environment. It is essentially a preventative process which avoids costly mistakes in planning and development. Therefore, it is necessary to carry out EIA during feasibility study stage of the planning process. If EIA is undertaken, it is likely to provide a description of potential environmental consequences stemming from an action in sufficient detail so as to enable decision-makers to make rational decisions.

a) Please indicate what you consider to be your level of knowledge about this topic:

35% Very knowledgeable 65% Somewhat knowledgeable __ Not at all knowledgeable

__ Unsure

b) Please evaluate the information statement that appears above :

15% Accurate 50% Somewhat accurate 30% Inaccurate 5% Unsure

c) If you think the information statement was "somewhat accurate or inaccurate" what should be added, deleted or changed? *Assess negative and positive impacts during planning, and plan for mitigation measures.*

d) 1. Please rate the level of adequacy of EIA in Phase 1A:

13% Very adequate 26%Somewhat adequate 57%Inadequate 4% Unsure

2. If you think it was " somewhat adequate or inadequate," briefly outline its main limitations *The project was inevitably oriented to engineering aspects; environmental studies started after construction activities had commenced; No public involvement in the EIA process of Phase 1A; Ideally no EIA was carried for Phase 1A.*

4. EIA methods :

EIA methods are structured mechanisms for identification, collection and organization of environmental impact data. These methods should provide an organized approach for predicting and evaluating anticipated impacts of proposed actions, including beneficial and adverse impacts, and lead to appropriate and effective mitigation and monitoring measures on adverse impacts.

a) Please rate your level of knowledge about this topic:

43%Very knowledgeable 48%Somewhat knowledgeable 9%Not at all knowledgeable

b) Please evaluate the information statement that appears above :

40%Accurate 34%Somewhat accurate 20%Inaccurate 6%Unsure

c) If you think the information statement was " somewhat accurate or inaccurate" what should be added, deleted or changed *No response*

d) Please give your evaluation of the level of accuracy and efficiency of each of the following EIA methods :

Methods	*Accurate & Efficient*	*Accurate but Inefficient*	*Inaccurate & Inefficient*	*Uncertain*
Ad-hoc methods	9%	17%	30%	30%
Checklists	35%	39%	4%	13%
Matrices	26%	26%	4%	30%
Overlays	22%	22%	13%	39%
Networks	13%	22%	9%	39%
Cost-benefit /	39%	26%	4%	29%
Modeling	22%	30%	9%	30%

e) Which EIA methods do you generally consider suitable for use in Lesotho? Please rank the level of suitability from 1(the method you consider to be most suitable for use in Lesotho) to 7 (methods you consider least suitable). *results of the most frequent response, i.e. mode*

Methods	*Rank*
Ad hoc methods	7
Checklists	2,3
Matrices	2
Overlays	5
Networks	6
Cost-benefit/ Cost-analysis	1
Modeling	2

None of the above	
Unsure	

5. Main Steps for Carrying out an EIA.

In concept, EIA is an interactive, multi-stage process. The main steps are :-

- **Screening:** is a mechanism for ensuring that only those projects which warrant a " full " EIA are assessed in this manner.
- **Scoping:** gives a description of the project environment and identification of all issues that arise in relation to the project.
- **Prediction:** serves to predict anticipated impacts on the biophysical environment and the directly related social consequences.
- **Evaluation:** determines significance and importance of impacts.
- **Development of plans:** to avoid, mitigate/enhance, monitor and follow up on the predicted impacts.
- **Recommendations:** which among others may include better alternative/s to proposed project.

a) Please evaluate the information statement that appears above:

78%Accurate 13%Somewhat accurate 9%Inaccurate __ Unsure

b) If you think this information statement is " somewhat accurate or inaccurate" what should be added, deleted or changed *No response.*

c) Please rate your level of familiarity with the steps of the EIA process:

EIA Steps	Very Familiar	Somewhat Familiar	Not at all Familiar	Unsure
Screening	43%	30%	22%	4%
Scoping	39%	39%	17%	4%
Prediction	35%	48%	13%	4%
Evaluation	30%	48%	22%	0%
Plans to mitigate	43%	35%	22%	0%
Recommendations	61%	22%	17%	0%

d) Do you think each of the following steps were carried out to a satisfactory degree in the EIA process for **Phase 1A?**

EIA Steps	Yes	No	Unsure
Screening	10%	90%	0%
Scoping	12%	88%	0%
Prediction	12%	88%	0%
Evaluation	20%	80%	0%
Plans to mitigate	78%	22%	0%
Recommendations	80%	20%	0%

e) Do you think each of the following steps were carried out to a satisfactory degree in the EIA process for **Phase 1B?**

EIA Steps	Yes	No	Unsure
Screening	35%	17%	35%
Scoping	39%	17%	35%
Prediction	43%	9%	35%
Evaluation	39%	17%	34%
Plans to mitigate	49%	0%	39%
Recommendations	39%	4%	39%

6. a) From your knowledge of **Phase 1A**, please rate the accuracy of predicted impacts caused by the project on the following elements of the **physical environment:**

Impact on:	Very Accurate	Somewhat Accurate	Inaccurate	Uncertain
Land and Settlements	17%	39%	30%	4%
Infrastructure	9%	57%	17%	9%
Arable agriculture	17%	48%	26%	4%
Grazing and Animal product.	17%	48%	26%	4%
Rural economy	0%	30%	48%	13%

Communications: intervillage paths	17%	39%	26%	9%
Landscape and Aesthetics	0%	26%	39%	30%
Fisheries	13%	39%	17%	22%
Water quality	13%	39%	13%	26%
Micro-climate	4%	22%	22%	48%
Heritage	22%	57%	4%	9%
Flora & Fauna	22%	52%	9%	13%
Timber	0%	17%	30%	39%
Downstream effects	13%	17%	35%	22%

b) Are/were there any other environmental impacts that were not envisaged or predicted?

26%Yes 30%No 30%Unsure

c) If Yes, please list some of the important impacts, either positive or negative:
Reservoir induced seismicity; soil erosion and landslides; downstream effects; limnology of reservoir; biological impacts; landuse changes; dust; and waste disposal - solid and sewage.

d) In your opinion, why do you think they were not predicted? (Briefly explain: *lack of experience in the staff that carried out the studies; lack of proper screening and scoping; EIA was not integrated in the decision making process; the project proponents did not care for the environment.*

e) From your knowledge of **Phase 1A**, please rate the accuracy of predicted impacts caused by the project on the following elements of the **social environment:**

Impacts	**Very Accurate**	**Somewhat Accurate**	**Inaccurate**	**Uncertain**
Land and Settlements	22%	30%	26%	9%
Infrastructure	22%	30%	22%	4%
Arable agriculture	17%	48%	17%	4%
Grazing and Animal product.	9%	39%	30%	4%
Rural economy	0%	43%	22%	22%
Employment	9%	26%	52%	0%
Communications: intervillage paths	13%	44%	26%	4%
Health	13%	48%	13%	4%
Landscape and Aesthetics	0%	39%	26%	22%
Fisheries	4%	43%	17%	21%
Water quality	9%	39%	9%	26%

Heritage	17%	43%	4%	22%
Flora & Fauna	26%	43%	13%	4%
Timber	9%	22%	22%	30%
Downstream effects	4%	22%	35%	26%

f) Are/were there any other social impacts that were not envisaged or predicted?

52%Yes 9%No 26%Unsure

g) If Yes, please list some of the important impacts, either positive or negative:
Upliftment of local populations; population influx; trauma suffered by people due to sudden changes in landscapes and renewed livelihoods; academic benefits from researches on the LHWP; legal aspects; noise and dust; community and economic disruption; and accidents in the project work place

h) In your opinion, why do you think they were not predicted? (Briefly explain) *Same answers as in 6(d).*

i) From your personal experience, please rate the effectiveness of measures applied to reduce and mitigate impacts caused by the project on each of the following:

Impacts	Very effective	Somewhat effective	Not effective	Uncertain
Land and Settlements	13%	65%	9%	4%
Infrastructure	17%	68%	17%	0%
Arable agriculture	13%	43%	39%	4%
Grazing and Animal product.	13%	43%	39%	4%
Rural economy	0%	22%	61%	4%
Employment	0%	43%	49%	0%
Communications: intervillage paths	4%	70%	22%	4%
Health	26%	57%	9%	4%
Landscape and Aesthetics	4%	35%	30%	22%
Fisheries	9%	35%	30%	26%
Water quality	9%	52%	17%	26%
Micro-climate	0%	26%	26%	44%
Heritage	13%	57%	13%	13%
Flora & Fauna	17%	57%	22%	4%
Timber	4%	13%	43%	35%
Downstream effects	0%	30%	35%	35%

7. Environmental Awareness:

a) Do you think the general public understand and appreciate your role in environmental issues?

22%Yes 70%No 8%Unsure

b) If No, do you think the problem is associated with :
(Tick as appropriate)

22%Illiteracy 4%Stubbornness

57%Ignorance 4%Unsure

13%Negligence 30%Other (Please specify *Cultural practices*

c) Has any of the above factors affected your specific programmes?

57%Yes 39%No 4%Unsure

d) If Yes, please give an example of any affected programme and briefly explain how it was affected: *Range management programmes - continued burning of the rangelands; waste management programmes - uncontrolled waste disposal; rehabilitation programmes- grazing of seeded areas; water quality programmes - water pollution; and compensation programmes - the public does not understand that compensation is not similar to employment.*

8. a) In your opinion, How well equipped is LHDA to undertake Environmental Impact Assessments?

17%Very well equipped 61%Somewhat equipped 17%Not well equipped

9%Unsure

b) Are you satisfied with the LHDA EIA procedure that was used in Phase 1A?

10%Yes 74%No 16%Unsure

9. a) In your opinion at what stage is EIA practice in general in Lesotho?

81% young 13% early maturity 0%mature

b) Please comment on your answer to **a)** *Responses for Young -- No legislation and EIA guidelines, and no sufficiently experienced staff; EIA is only done by projects such as LHWP, while many government departments to do not bother; EIA is not yet widely accepted in Lesotho, it is only done under donor pressure, hence is done more for the benefit of the donors than for the country; the general public still has to learn more about EIA.*

c) How do you assess the trend of EIA practice in Lesotho?

65%Improving 4%Deteriorating 26%Unsure

d) Please comment on your answer to c) *Responses for improving -- EIA has been institutionalized with the establishment of the National Environment Secretariat; several on-going constructions now carry out EIA; engineers are forced to consider environmental impacts; lessons of Phase 1A will improve EIA for Phase 1B.*

e) How would you rate the roles currently being played by each of the agencies listed below in EIA issues in Lesotho:

Agency	*High*	*Moderate*	*Low*	*Unsure*
Lesotho Government	4%	35%	60%	0%
Private sector	13%	22%	52%	9%
Non Governmental Organisations	30%	35%	26%	9%
Development companies	17%	22%	43%	17%
Lesotho Industries	0%	17%	65%	17%
Lesotho Public	0%	17%	70%	9%

10. a) How would you categorize your direct involvement in carrying out the EIA process of **Phase 1A**?

0% Heavy 26% Moderate 17% Slight 48% Not at all

b) How would you categorize your direct involvement in carrying out the EIA process of **Phase 1B**?

17% Heavy 30% Moderate 13% Slight 39% Not at all

c) How long have you been employed by the LHDA?

39% More than 5 yrs 35% 3 - 5 yrs 13 % 2- 3 yrs 13% Less than 2 yrs

d) Please give a brief description of your job. *Compensation officers; environment officers; public health officers; rural development officers; forestry officers; field assistants etc.*

Date that you completed this questionnaire: ___/___/19__

APPENDIX C-b

Interview schedule for villages affected by the Lesotho Highlands water Project.

1. Name of village.....

2. Name of Household head.....

3. Household information.

Household Members	Age			Employment	Education		
	18-35	35-55	< 55		H	M	L
Head	16 %	39 %	43 %	45 %	13 %	19 %	68 %
Wife							

Total number of people in household: 8 Average

Children	Male	Female	Total
Other			19 %
High School			30 %
Primary			36 %
Kinder-garden			
Born after 1990			6 %
Other Dependents			

Absent Members	Age	Male	Female	Employment

4. **Household assets in numbers:** [x] *indicates presence of asset in the household*

Type of houses

1 = Shack [x]

2 = Hut [x]

3 = Rondavel [x]

Roofing

1 = Tiles [x]

2 = Corrugated Iron [x]

3 = Thatch [x]

Wall material

1 = Brick [x]

2 = Stone [x]

3 = Corrugated Iron [x]

4 = Huis [x] 4 = Plastics [x]

5 = 3 and more rooms [x]

6 = Toilet [x] **Comments** *Most houses were traditional huts and rondavels which were very old. All the shacks were in an unsatisfatory condition.*

7 = kraal [x]

8 = **Livestock assets in numbers:** 1 = Cattle [x] 4 = Horses & Donkeys [x]
2 = Sheep [x] 5 = Other [x]
3 = Goats [x]

5. **Household property affected by the LHWP:**

Property	Total No:	Type
Houses	36 %	Huts, Rondavels

Comments:...29/80 respondents had their houses affected.

Fields	Total No:	Size: S	M	L	Type
	63 %				maize, wheat, sorghum,
					potatoes, peas, beans etc.

Comments: 50/80 respondents lost their fields to the LHWP

Trees	Total No:	Type
	49 %	poplar, willow, fruit

Comments : 39/80 respondents lost their trees to the LHWP.

Section A

6) Did you receive compensation for a house? 62 % Yes 38 % No

If No, go to Section B.

7) If Yes,

Did you choose the type of house that you have been compensated with ?

50 % Yes

Why did you choose it?
we wanted to change from previous homes; we were impressed by bricks and corrugated iron roofing.

Are you happy with this house ?

50 % Yes

39 % No

How are the living conditions in the house?

50 % More comfortable

39 % Less comfortable

__ No difference

__ Unsure

Why? : *Less - houses are too cold in winter; leaking chimneys*
More - houses are better looking; we have additional facilities such as fences and toilets.

Are you finding it **more** or **less** costly to maintain this house?

Less - *11 % indicate that they are employed so they can maintain the houses*

More - *89 % indicate that the houses are too expensive to maintain since they not employed.*

44 % No

Why not? would you have preferred something different? *we preferred other type of houses different from the standard plan offered by LHDA; Some wanted similar houses to old ones. Demolition of houses was uncommon in the village .*

Did you notify LHDA prior to building this house? If Yes what was their response ?

8) Did you have to relocate to another village? 44% Yes 56% No
Total = 18/29

9) To what extent were you consulted about resettlement alternatives *75 % of the respondents were consulted about new relocation sites.*

Assessment of "stress of relocation":

10) Do you miss your old home? 63 % Yes 37 % No

Explain: *We mainly miss the good friends and neighbours we had in our previous villages. We were able to take care of each other as the community during difficult time. We now have to start all over again.*

11) Are you encountering any dissimilarity with your present community?

0% Age 0% Gender 0% Racial 0% Ethnic composition 0% Other

12) Has LHDA assisted you to rehabilitate/adjust to the new living conditions?

100 % Yes __ No

If Yes, explain fully: *LHDA provided transport for relocation; fences and toilets in new sites, and transferred the graves of our ancestors to the new premises.*

13) If No, list three good things that are not found in this new location but were present in the previous one *good soil, fruit trees, and mostly the established friends and neighbours*

14) Is there anything you do not like about the place you are now living in? *The bad soil which does not allow establishment of small vegetable plots.*

Section B: Compensation for lost fields: 50/80 respondents

15) Are compensation grains more or less than you used to grow?

32% More

66% Less

Why are they less *LHDA grain bags are smaller than out traditional Sesotho bags.*

Are the grains delivered timeously?

38% Yes 62% No

How often is the grain delivered?

Annually

16) Do you have any other alternative means of agricultural produce *52 % of the respondents have alternative agricultural land.*

Section C: Compensation for lost trees: 39/80 respondents.

17) Were you able to cut all your trees ? 33% Yes 54% No

If No, Why *LHDA notified us too late, and the water filled up quickly in the reservoir. We also did not have the necessary equipment to cut the huge trees.*

18) Were the seedlings of the type that you wanted?
10 % of the respondents received money and seedlings for trees, and 46 % received money only.

__ Yes

Are the compensation seedlings successfully growing?

2% All of them 8% Few of them

__ Some of them __ None of them

__ Unsure

__ No

Why are they the wrong type ?

.....

.....

.....

19) What were you using the trees for?

56% Firewood 62% Fruit 3% Commercially 5% Building

20) Do you have any alternative to meet the above needs? *18 % of the respondents had alternative trees, while 69 % did not have alternative trees.*

21) What other properties have been lost to the LHWP and how have they been compensated for? *Mostly none.*

Section D: Population Impacts:

22) Are you an original resident of this village? 69% Yes 23% No

If No, where have you relocated from and why? *respondents who had relocated were from either the surrounding village or from the lowlands, and had been attracted by job opportunities in their present villages.*

23) Have you noticed any changes in the community? 62%Yes 38% No

If Yes, how have these changes affected you? *Prostitution, crime, and pollution. The ethical and cultural norms of several communities have been changed by the new comers in these villages.*

24) Have you benefited from the LHWP?

34% Yes 60% No

If Yes, how have you benefited? *Employment, construction or upgrading of rural roads, and water supply facilities where these have been implemented.*

If No, what are the problems? *Mostly lack of employment.*

Section E: Community Arrangements:

25) How do you feel about the LHWP?

38% Happy 0% Neutral 55% Negative 7% Don't know

26) Which factors/issues do you think LHDA should have addressed before implementing the LHWP? *employment for locals; methods of compensation; fencing of the dam; clean water facilities for dried springs; rural development plans; and proper public consultation.*

27) Do you think the local Chief still has authority over the community?
64% Yes 21% No

Explain. *Yes = LHDA still reports to local chiefs before doing anything in the villages*
No = Their chief listen to LHDA more than the community.

28) Has there been any change in occupational opportunities? *36 % of the respondents say Yes; while 55 % say No.*

29) What do you feel about the future? *28 % are Optimistic, and 62 % are pessimistic*
Why? *Pessimistic respondents indicate that there too many unfulfilled promises that were made by the government and LHDA - e.g. employment for locals. Optimistic respondents still have hope that more benefits will be derived from the LHWP in the future.*

Section F: Conflicts between Local Residents and Newcomers:

30) Are there any newcomers in the community? X Yes __ No
Mainly in Makhoabeng, Ha Lejone, Khokhoba, and 'Muela, as these locations are near LHWP major construction works.

If Yes, are they finding a place in the community X Yes __ No

Comment on your answer: *They were welcomed in our villages and given sites to build houses or shacks. The only problem is that most of their behaviour is unacceptable to our cultural practices - e.g. prostitution and alcohol abuse.*

31) Has any of your property been stolen this year? __ Yes __ No

If Yes, How may times?

14% More than 5 times __ 3-5 times __ 2 times 34% once

Is this more or less than before the LHWP started? *63 % of the respondents indicate there is more theft than before the project started, and 37 % are saying it is the same.*

Section G: Individual and Family level Impacts:

32) Are your daily living and movement patterns changed by the LHWP?

55% Yes 45% No

If Yes, In what way are they changed? *Mainly access restriction to construction sites; which were freely accessed before the project.*

33) Has your family structure been altered in any way because of the LHWP

15% Yes 85% No

If Yes, In What way has it been changed? *With employment we are able to change the lives of our families. - e.g. sent children to lowlands schools, and build better houses.*

34) What do you use for your family medical needs?

50% Clinic 50% Traditional medicine __ Both

If clinic, Is it easily accessible? 95% Yes 5% No

If No, why? *Crossing of the reservoir is a problem because sometimes the boats are not available when we want to cross in order to get to the clinic.*

If traditional medicine, Have any of your medicinal herbs been flooded?

100% Yes __ No

If yes, Are there any alternative sites for medicine and how far are they? *80 % of the respondents who use traditional medicine indicate that there are alternative sites for medicine, but these are very far away, and they will have to travel long distances to get this medicine*

35) Are there any development programmes initiated by LHDA in this village?

80% Yes 20% No __ Unsure

36) If Yes, what kind of programmes are they? *Upgrading of rural roads; construction of village administration offices, halls, market place, and water supply facilities was being implemented.*

37) Are you involved in any of these programmes?

__ Yes

Which programmes are you involved in?

.....

.....

.....

In what way are you involved?.....

.....

.....

.....

.....

Have these programmes improved your standard of living?

__ Yes

How has your life improved?

.....

.....

.....

__ No

Why do you think there is no change?.....

.....

.....

.....

100% No

Why are you not involved? *This programme are mostly being implemented by LHDA contractors*

38) Did LHDA ever hold public gatherings in this village to explain the LHWP and how it was going to affect your lives? 84% Yes 16% No

39) If Yes, when were these gatherings held?

84% Prior to LHWP implementation __ During implementation __ Unsure

40) Did you participate in these public gatherings? 71% Yes 14% No

If No, why not. *Newcomers in the villages.*

41) If Yes, which issues of concern were raised by the community? *We raised the issue of employment, but generally in these gathering we were only being informed about the LHWP plans by the government at that time (the Military Government), and we were not given the opportunity to challenge the decision that had been taken already. The government indicated*

that properties which will be lost will be compensated, and we will be given jobs in the project works.

42) Generally speaking, do you think LHDA has addressed issues that were raised by the community? 24% Yes 44% No

Comment on your answer: *No response is with regard to lack of employment for local people, and mishandling of compensation procedures.*

Date: __/__/1996.

APPENDIX D

SUMMARY OF GROUP DISCUSSIONS
(Edited and translated)

APPENDIX D

Group Discussions with Local Communities

Section A: Ha Kosetabole.

Introduction.

This group discussion was held with the village Chief and 10 village council members. This community had mainly been affected by the LHWP with regard to crop fields and trees. Only about 3 families had relocated to this village. The major concern raised by the community was about the fixed 15 year period for compensation of lost crop fields; i.e. the period specified by LHDA within which people will receive compensation grains. Locals are not certain as to what will happen after the 15 years elapse. This is largely due to the fact that they regard soil as a form of inheritance upon which they will depend for the rest of their lives and their forth coming generations; hence if all their land is acquired by LHWP they will not have any alternative means of agriculture.

Quest 1. Why didn't the people resist the 15 year fixed offer from the onset ? i.e. prior to LHWP implementation.

Answer: The 15 year proposal was given more as an order by LHDA and the government at that time, and the people were not consulted per say. Another reason is that the people agreed to sign the compensation contracts without full understanding of how the whole process will be carried out; largely because most of the community members are not educated, and they believed LHDA's simple explanation that all damages will be paid for.

Quest 2. Why didn't you ask about the type of compensation payment?

Answer: LHDA official who held the public gatherings indicated that other officials who specialize in agricultural issues would come to explain further how the compensation will be dealt with. Instead, however, the communities were given contract forms to fill and specify how much produce they harvested from their respective fields. LHDA sent its consultants to the communities to measure and calculate - on their own, without any explanation to the field owners as to how the calculation is derived - how much grains will be afforded to the respective field owners. LHDA also indicated that it will compensate the communities with maize and beans; yet LHDA knew very well that different crops are grown.

Quest 3. When the people realized the problem (15 years), why haven't they notified LHDA in order to get some clarifications and revise the initial contract?

Answer: We have tried to call upon all the neighbouring communities affected by LHWP to form one body which is still to go to LHDA at a proposed date.

Quest 4. Are there any community members who have lost trees to the LHWP in this village?

Answer: Yes, people have lost both individual trees and forest size trees. These trees have been compensated for with money, but no seedlings have been received yet. However, it seems that some members of the community are not satisfied with the payment. This is because LHDA has paid M65.02 per individually singled out trees regardless of the sizes of these trees; yet some single trees could generate much more income than the fixed M65.02 value. Another complaint

is that there are people who claim they received even less money than the number of trees initially recorded by LHDA.

There are now major shortages of firewood in the village, and most villagers resort to small shrubs; the availability of which is decreasing at an alarming rate.

Quest 5. Were you able to cut your trees before reservoir flooding?

Answer: LHDA informed us that we should cut the trees which would be flooded by the Katse reservoir, but we did not have the machinery to do so. LHDA promised to organize these machinery, however, the water collected very fast in the reservoir, even before the promised machinery could arrive, and all the trees were lost.

Quest 6. Have you received any compensation for sand?

Answer: No, the sand shortage problem has only been realized recently by the communities, hence it has not even been addressed with LHDA. The sand that has been covered by the reservoir was used for building purposes in the village.

Quest 7. Are there any rural development programmes implemented by LHDA in this village?

Answer: No there are no rural development programmes in this village; only the unfulfilled promises by LHDA. Even for employment, no one from this village has been employed by the LHWP, yet the government promised us jobs from the project. However, there is one access road being constructed which will pass near the village.

Promises were made by those who held the public gatherings prior to LHWP implementation that all local communities would benefit in terms of improved standard of living and availability of employment. To this villages this has been a saying in vain. No one from the village of Ha Kosetabole has been employed by the LHWP. Two or three people have been sent to the Thaba-Tseka Rural Development Center for training, but have since returned home and are not benefiting from this training due because they do not find jobs.

Quest 8. How does the community feel about the presence of the LHWP?

Answer: The project is already in place, so whether we like it or not there is little we can do about it.

Quest 9. How does the community envisage the future with the LHWP?

Answer: We are pessimistic, but we will wait and see how things turn out.

Quest 10. What future plans does the community have about the water in the project?

Answer: There is lack of coordination and cooperation within the community itself. This is largely due to ignorance and illiteracy. Issues are easily planned but later communication and commitment breaks down; in turn community intentions become unsuccessful. Notwithstanding this weakness, we would appreciate assistance from LHDA to start our own irrigation project, water supplies, and electricity. Another future development which we think is necessary is that of upgrading of rangelands as they are now terribly overgrazed, and some are covered by the

reservoir. Upgrading of the existing reservoir crossing facilities - especially the boat used for crossing livestock is also important.

Section B: Ha Ts'epo

Introduction

The group discussion was held with the local Chief, six members of the local council, and six members of the community. This community is mainly disturbed by the fact that their village is situated close to the edge of the Katse reservoir bank; hence the reservoir poses danger to their lives - especially children - and livestock. They would, therefore, prefer to be relocated to a safer place. Other issues raised are with regard to compensation issues - such as lost personal property.

Question 1. Were there any public gatherings held by the project proponents about the LHWP in this village?

Answer: Yes, gatherings were held prior to implementation of the LHWP by the government.

Question 2. Did the community members exchange views about the LHWP with the government?

Answer: No, the community was merely informed about the proposed water project and the decisions which had already been decided upon; hence we were not asked for opinion as such. We were flattered by the promises which were made to us of the good things which the project will bring.

Question 3. What is the most disturbing factor about this project that your village is experiencing now.

Answer: We now realize that this village needs to be relocated because it is too close to the Katse reservoir. The steep slope leading into the reservoir is a threat to our children and livestock.

Question 4. Why did you wait until now to raise this matter?

Answer: We were unaware that the water will fill-up at the rate it did - and actually never believe it will fill up as it did.

Question 5. Have you made LHDA aware of this matter?

Answer: No, we are still organizing ourselves to take the matter to LHDA.
NB. According to LHDA policy a village qualifies for relocation only when it falls within 100m from the highest levels of the reservoir. Ha Ts'epo falls slightly outside this range.

Question 6. Are there any other factors about the project which you are not content with?

Answer: Yes, we are unsatisfied with the fixed 15 year grain compensation period, lack of employment for locals, compensation for small vegetable plots and trees, and reservoir crossing facilities.

Question 7. What disturbs you about the 15 year compensation period?

Answer: The main factor is that the community is unsure as to what will happen when the 15 years elapse. Some of us in this village are very old, and we depended on our fields, so if LHDA terminates compensation after 15 years, then, how will our children and grandchildren survive. Another issue is that LHDA is only compensating us with grains (maize) and pulse, yet in our fields we were able to grow different crops - sorghum, wheat, barley, pumpkins, potatoes etc. We also used to harvest more grain than the quantities we're receiving from LHDA.

Question 8. Why didn't you raise the complain before signing the contracts?

Answer: A lot of us here in the village are uneducated, signing of contracts was new for most of us. It seemed at that time - or at least we believed - that LHDA will ensure for our well being.

Question 9. Can you elaborate on the issue of unemployment for locals?

Answer: During the public gatherings which were held prior to LHWP implementation, local people were promised jobs to accrue from the LHWP. However, the people who made these promises - government - have distanced themselves from the communities, and have done nothing to ensure that local are given priority. The contractors use their own discretion, which - unfortunately for local people - mainly prefers people from outside who can offer skilled and semi-skilled labour. This has created a lot of frustrations in the community, and negative attitudes towards the LHWP.

Question 10. What about the compensation for small vegetable plots and trees?

Answer? With both forms of property LHDA has decided on it's own - without first consulting with us as the owners - to put specific prices for the acquired property. LHDA did not even - at the very least - try to explain the criteria used to come up with the given prices. e.g. M65.02 for a single identifiable tree, with the size of the tree having no bearing on the price. Sand is another important resource which we have not been compensated. The reservoir has covered the valleys where we used to get sand. However, we are only realising this problem resently after the reservoir filling. So LHDA probably does not know it yet.

Question 11. What is the problem with reservoir crossing facilities?

Answer: As far as crossing the reservoir is concerned, our major concerns are that all the crossing points are very far from Ha Ts'epo, and the boat drivers refuse to compromise and transport people closer to the village. This creates a problem for old people and the sick. Another issue is that the boats are very small and can only transport very few people at a time; which greatly inconveniences the travelers.

Question 12. Has LHDA addressed any of these complaints?

Answer: The problem is that LHDA sends different officer to address community complaints. And each time one officer claims he/she is unaware that the same complaint had been raised to his/her predecessors. It is therefore highly possible that many of the complaints raised by the community never reach the head-office because it seems the LHDA officers do not take us serious in the first place.

Question 13. Are there any rural development projects initiated by LHDA in this village?

Answer: The only development which we can mention is the access road which will pass next to our village.

Question 14. Now that the LHWP is here how do you as the community plan to benefit from it?
Answer: Looking into the future we would appreciate assistance from the government and LHDA to improve the water supply facilities - as all the good springs have been inundated, and electrification in the village.

Section C: Ha Nts'eli

Introduction

The group discussion was held with the local Chief, five village council members, and seven members of the community. Similar to the other two village, members of the community are disturbed by the compensation procedure for lost personal property - such as fields and trees. This village is situated on the bank of the Katse reservoir, and much of their crop land which was in the river valley has been covered by the reservoir.

Question 1. Were there any public gatherings held in this village prior to LHWP implementation to discuss the project?

Answer: Yes, LHDA and the government held the gatherings in this village to inform us about the project. Even the late King Moshoeshoe II came to address the people. He was the only one who envisaged - when looking at the Nts'eli valley and the amount of cultivation in the valley - that the people of this village are going to suffer.

Question 2. How were these gatherings conducted? i.e. were you able to raise your concerns about the project?

Answer: No, at that time we were just told by the government that a big project is going to be undertaken in our village. It was our own Chiefs who also ordered us not to oppose the water project as it would be of utmost benefit to us.

Question 3. In this village what are the main issues which you are not satisfied with regarding the LHWP?

Answer: We have several complaints, but mainly we are not happy about the compensation procedure for lost personal property (crop fields and trees) and the 15 year compensation period for crop fields, compensation for communal resources (e.g. sand and rangelands), and unemployment.

Question 4. Starting with compensation for fields, why didn't you raise your concerns before signing the contracts so that they could be address at that time?

Answer: We think LHDA never took us seriously in the first place. Most of us are not educated here in the village, so we did not question the contracts because they were given to us completely drafted from LHDA head-quarters in Maseru. Our task was only to sign and acknowledge whatever has already been decided upon by LHDA even though we did not fully understand some of the clauses. To add to the confusion LHDA had the tendency of sending different officers to the village. At one point it would be group of officers to collect names of community members who have lost property to the project; the next time another group brings the contract

forms and claims it does not know about any prior discussions between the community and the first group of LHDA officers, hence communication with LHDA has always been problematic.

Question 5. What would the community prefer as far as compensation for crop fields is concerned?

Answer: We want food to be provided forever - not only for the first 15 years of the project. This is because even our next generations will require food. We used to harvest some crops in May to sustain throughout the winter months (June-July), but LHDA does not cater for this. We also want to be compensated for the other crops we used to grow in our fields - such as pumpkins, potatoes, wheat etc. We need, still, definite dates on which compensation grains are delivered. This would help us to use up the food in a sustainable manner to last until the next delivery. Currently we just know that the grains will be delivered on the seventh or eighth month of the year, but we are never sure of the specific dates until shortly before the deliveries. We also want the exact amount of grain that we used to harvest; LHDA gives us smaller bags of grain.

Question 6. What about the communal resources?

Answer: LHDA promised it would compensate us for lost rangelands, but this fodder has not been given yet - we are still expecting it though. Sand is another important loss which we have incurred because of the LHWP. However, this has not yet been discussed with LHDA yet because we are only realizing it recently, after the reservoir flooding.

Question 7. What are you not happy about with regard to trees?

Answer: First of all we feel the money which we have received is not enough since some of the trees are very big, yet the price is the same. Secondly, we think it would be better if we receive annual compensation for trees - similar to grain compensation - especially because the compensation seedlings have not been received yet - even when received it is going to take some time for the trees grow and be used for fuel.

Question 8. Are there any people from this village who are or have been employed in the LHWP?

Answer: Very few people from this village have worked in the LHWP. Most of them were only employed temporarily. We were made to understand - by the government and LHDA - during the public gatherings which were held prior to project implementation that, since the LHWP will be within our localities preference for employment will be afforded to local people. But this has not occurred. Instead only people from outside (e.g. Maseru), and even from out of the country have been employed in the LHWP. This is one of the main reasons for our negative attitudes towards this water project.

Question 9. Are there any rural development programmes being implemented in this village?

Answer: None; we are told that an access road to our village will be constructed, but we are not sure how soon this will be accomplished. It is probably one of LHDA's empty promises. Surveys were carried out earlier by LHDA to establish what the community wanted in terms of development and improvement of our standard of living - e.g. schools, irrigation projects, chicken farms, dairies etc. - but none of these has yet been implemented.

Question 10. What are your future plans with the water that has been collected in the Katse reservoir?

Answer: We hope to use it for irrigation and water supply projects, and provision of electricity. Of course we will need some assistance from the government because we do not have the necessary funds to initiate such projects on our own.

Section D: Ha Mikia
Introduction.
This group discussion was held with the local Chief, nine village council members, and three members of the community. There are no families who have been resettled either to or from this village because it is not situated within the immediate banks of the reservoir or near any main road. There is no infrastructure, and the only development programme so far intended for the village is the proposed clean water pipeline. This village has only been affected through loss of property such as fields and trees.

Question 1. Were there any public gatherings held in this village - prior to project implementation - to discuss the project with local communities?

Answer: Yes, we were called by the government - at that time - to be informed about the coming water project. If you remember it was during the reign of the military government, and in these gatherings, the public was not given a chance to question the proposed project. The whole scheme was more or less imposed - as an order - on the communities. The decision about the project had been taken by the government on its own; hence we were left with no choice but to comply with this order like approach.

Question 2. How has this community been affected by the project?

Answer: In this village we have mainly lost crop fields and trees. Other important resources lost to the LHWP include rangelands and thatching grass.

Question 3. Starting with the crop fields; are you satisfied with the compensation you are currently receiving from LHDA?

Answer: No we are not satisfied. There are several disturbing factors about this compensation. Initially, LHDA compensated us with grain in the form of maize only, and later when we complained they added beans to supplement other crops. However, this measure is still unacceptable, because on our lost fields we used to grow a variety of crops e.g. beans, peas, pumpkins, sorghum, and potatoes. We, therefore, feel that LHDA should compensate us for all these crops. If these perishable foods are hard to collect as they (LHDA) claim, then they should give us the money so that we can buy them locally. On one hand, however, we are partly to blame for the way LHDA is handling this crop compensation. This whole project of the LHWP is the first of its kind in this country, and people did not know what to expect, hence could not resist LHDA's proposals at the right time. Another disturbing issue is the fixed 15 year compensation period. Soil is God's gift to man for life, therefore, LHDA should compensate us forever, since they have acquired our land. This shouldn't be a problem since we are told the project is going to sell water to the Republic of South Africa. Lastly, we want the same amount of grain we used to harvest, and not the small bags of grain LHDA is cheating us with.

PS. A woman in the group objected to compensation in the form of money - indicating that since men are the household heads, and the compensation money is received by them, they misuse this money (i.e. in alcohol and prostitution); hence, the children and women suffer in the family.

Question 4. Are you happy with compensation for trees?

Answer: No we cannot be happy because we do not know what criteria was used to fix the tree prices. We strongly believe that trees of different sizes should be priced differently. Also, since we have been using these trees for fuel for all these years, LHDA should compensate us annually until the proposed tree seedlings are delivered and fully grown. Right now we have used all the little money we received as compensation for trees, but the seedling have not been delivered yet.

Question 5. But why did you take the money compensation if you believed it was not enough?

Answer: A lot of people in the rural communities are very poor, and they take advantage of anything that comes their way; but later realize that they have actually trapped themselves in a situation they are unhappy about. People felt intimidated by the government and LHDA officials who proposed these compensation procedures; that is why they took the money without asking for all the details which are now disturbing to them.

Question 6. What about compensation for rangelands, have you received any fodder compensation in this village?

Answer: No, not yet but we are expecting it this year.

Question 7. What about the compensation for thatching grass?

Answer: This issue has been raised to LHDA but as yet we have not yet received any response as to how they will compensate us for thatching grass.

Question 8. Are there any rural development project initiated by LHDA in this village?

Answer: None, This furrow that you see here for the clean water pipeline is the only development in this village. But there is no employment for local people.

Question 9. What are your future plans with the LHWP?

Answer: We request assistance either from LHDA or the government to establish irrigation projects and construct clean water facilities for the community.

Section E: Ngoajane.
Introduction.
This group discussion was held with 10 village council members. Unlike the above villages, Ngoajane falls within the lowland section of the LHWP. However, it is still a rural community with agriculture as a form of subsistence. Therefore similar to other rural communities affected by the LHWP this community has lost crop fields and trees to the project. Only one household had been displace - by a few meters - from its original position due to construction of the main access road to the Ngoajane crossing works - which are the major LHWP works in this area.

Question 1. Were there any public gatherings held prior to the LHWP to discuss the project with the local community? If yes, who held them?

Answer: Yes, public gatherings were held and conducted by the government and LHDA in collaboration with the local chief, to explain the LHWP and how the compensation for lost property would be handled. i.e. lost sites, fields, trees, etc.

Question 2. How were these gatherings conducted?, were the public given the opportunity to express their views?

Answer: No, the community was not given an opportunity to challenge LHDA's proposals. We were informed about the LHWP and the compensation procedures which had already been decided upon by LHDA. For example, if LHDA acquires one's field, they (LHDA) would come and measure the field and compensate it accordingly without any consideration of how much yields the owner used to harvest from the field. LHDA also decided on their own what the end-use for the spoil dump will be; we could have chosen something different if we were given such opportunity.

Question 3. Was the compensation arrangement between the community and LHDA a consensus or an order?

Answer: It was more like an order because LHDA did not negotiate with the owners of land as to which areas were going to be acquired, and the community did not discuss the actual measurement procedure.

Question 4. Are you satisfied with the food you are being compensated with?

Answer: No we are not. Firstly, we are receiving less food than we used to harvest. The bags are smaller than out traditional bags. And, also, sometimes the grains are spoiled. We do not deny that we used to harvest bad grain, but at least we selected the good grain from the bad one. Seemingly, LHDA does not make any effort to separate the good grain from the bad one. Secondly, we used to harvest different crops from our fields, but LHDA is only compensating with grain (maize) and beans. We also used to harvest before the winter season starts, but LHDA only delivers compensation once a year, after winter.

Question 5. When you took and signed the compensation contracts were you unaware of this complaint you are raising now?

Answer: Because most of us are uneducated we did not think about these problems until they actually happened, but we think LHDA cheated us purposely because they knew better what was going to happen.

Question 6. What measures have you taken to solve these complaints?

Answer: We have launched these complaints through the Non-Governmental-Organizations (NGOs) which are concerned with the way the LHWP has affected the rural communities. As far as LHDA itself is concerned we are not able to communicate our problems with them because LHDA uses too many officers to handle, and in turn nothing gets solved.

Question 7. What is your opinion about the 15 year compensation period?, Do you know what will happen after the 15 years.

Answer: We were told that after the 15 years our fields will be returned to us. This implies the fields have only been acquired temporarily. Initially, also, when the project started LHDA promised us other sources of income generation methods - such as milk cows, chicken poultry etc. But now they (LHDA) do not touch those issue anymore. Instead LHDA is now telling us that construction is complete, and they will be returning our fields. What fields are they going to return because they have dumped rock waste on them? How are we going to use these fields.

Question 8. What about the compensation for trees? Are you satisfied with what you have received?
Answer: No, generally people are not satisfied with the money they have received, and the seedlings have not been delivered yet.

Question 9. Why did you take the money?

Answer: People felt intimidated and did not know what will happen if they refused to take the money at that time. They thought LHDA might take their trees for free.

Question 10. Has the community lost any rangelands?

Answer: Yes we have, and obviously it will never be returned to us because the rock dump has destroyed all vegetation.

Question 11. Are there any job for locals in the LHWP?

Answer: When the project started LHDA promised that preference concerning employment would be given to local people - specifically the affected individuals. But this has not been the case. To add to the frustration, the LHDA community liaison officer admitted that he was lying when he promised jobs for the communities. Employment has only been given to people from outside - who are supposedly more skilled than locals.

Question 12. Have you sent any persons from this village to the Thaba-Tseka Rural Development Center (TRDC) for skills training?

Answer: Eight people were sent to the TRDC, but they have not implemented or benefited from these skills because they are still unemployed.

Question 13. Are there any rural development programmes being implemented by LHDA in this village?

Answer: The only development we can mention is the upgrading of the main road going to the construction site. Besides this road there is nothing in this village from LHDA. LHDA did not even acknowledge our plea for assistance to upgrade the community spring.

Question 14. What are your future plans with the LHWP?

Answer: Generally people are pessimistic about their future with the LHWP. This is because of the negative attitude that built up through the years of project construction. Individually perhaps people have future plans, but collectively the community is not making any plans. Perhaps the people whose fields have been lost to the LHWP will organize themselves - especially after construction is complete - to use the spoil as cropland.

Section F: Ha Jonathane.

Introduction

This group discussion was held with ten village council members. Ha Jonathane is not within the Katse and 'Muela local catchments. The important aspect about this village is that it is located near the Hlotse adit works construction site, and also within the immediate vicinity of the Leucosidea forests. The community depended on the forest for wood, but access to the forests have been restricted by the construction work.

Question 1. Were there any public gatherings in this village prior to LHWP implementation?
Answer: Yes, there were gatherings held by LHDA and the government to inform us about the LHWP.

Question 2. How were these gatherings conducted? i.e. were you able to express your views as the community?

Answer: No, we were just called from our respective villages and informed about the plan to implement the LHWP in our villages, and that some of the project activities were going to affect our property.

Question 3. Which components of the project have affected your properties in this village, and which properties have been severely affected?

Answer: Two major components have affected us in this village. Firstly, the upgrading of the gravel road to the construction site has cut through some of our fields, and some houses had to be relocated. Secondly, the construction site itself has taken a considerable area our forest rangelands and wood for fuel. We are now restricted to use some parts of the forest which were freely accessible before the project.

Question 4. Have the fields which have been affected by the project been compensated?

Answer: Yes, the people whose fields were cut by the road works have been compensated. They were given money because in most fields only small parts have been affected, while the rest of the field is still undisturbed.

Question 5. What about the houses, are the people who received new houses from LHDA satisfied with these new houses?

Answer: There hasn't been any complaints, so it is our general feeling that most people are happy with the houses the received from LHDA.

Question 6. Are there any benefits which local are getting from the LHWP - such as employment opportunities in the LHWP construction works?

Answer: The only major benefit that we can mention is the upgrading of the main road to the construction site- which happens to pass near our village. As for employment, many locals are still unemployed. LHWP only recruits people from outside, while our sons are left looming around with nothing to do.

Question 7. You mentioned restrictions to wood access; are there any alternatives other than the Leucosidea forests where you can get wood or there are wood shortages?

Answer: There are shortages for wood because the project has fenced large portions of the forest. We are also told that after construction is complete, the area might be turned into a game park. This implies we will never be able to use the wood again.

Question 8. What are your future plans about the LHWP?

Answer: We do not know what to expect in the future with this project. We also do not know whether the government will support us with money it is going to get from selling water. But generally we have little hope about of deriving any benefits from this project after it has been completed. This is because we did not get any major benefits as was promised by the government. e.g. employment. LHDA promised us rural development programmes such as electricity, so we will just wait and see if this promise will come true.

Section G: Ha Soai.

Introduction

The group discussion was held with the local chief, seven members of the village council members, and 4 members of the community. Similar to Ha Jonathane, this village is not within the Katse or 'Muela local catchments. The village is located approximately 25 km downstream of the Katse dam. Of importance in this village - as one of the many others downstream of the dam - is the availability of compensation water to maintain both the aquatic environment of the Malibamats'o river, and social uses.

Question 1. Were there any public gatherings held in this village about the LHWP?

Answer: Public gatherings were held prior to the implementation of the LHWP. However, these gatherings we not in this village per se; instead we were called to attend the gatherings which were held in villages close to the project construction sites such as Makhoabeng.

Question 2. Was the public given the opportunity to express their views and opinions about the project?

Answer: Generally we were just being informed by members of the military government at that time that LHWP was going to be implemented. People had little to say or oppose what was being planned - especially because the project proponents were indicating that whatever personal property that would be affected by the project would be compensated.

Question 3. How has the LHWP affected you in this village?

Answer: The only component of LHWP that has affected some people in this village is the upgrading of the gravel road to Thaba-Tseka district center. Several crop fields have been cut by the road works, and these have been compensated. Besides the few fields there are no other properties that have been affected by the project since this village is a bit far from major construction sites and the Katse reservoir.

Question 4. Besides the upgrading of the existing road, are there any other benefits which you derived from the LHWP?

Answer: Well, a few people from this village are employed by LHWP at the Katse dam construction works, but the majority of locals were not able to get employment from the LHWP.

Question 5. Are there any members of the community who have been to the Thaba-Tseka Rural Development Center for skills training?

Answer: Yes, there are some young men who went for training at Thaba-Tseka center. However, they have graduated from the school but most of them are still not employed.

Question 6. How do you see your future with the LHWP?

Answer: There are many unfulfilled promises that were made by the government about this project - especially in relation to employment. So generally most people are pessimistic about their future with the project. We are however, better in this village because there are no major losses of property - such as fields and trees - as is the case in many village near the Katse reservoir. If LHDA can maintain the Malibamats'o following, then there will be no problems.

Question 7. How do you intend to use the LHWP in this village?

Answer: If we can be assisted with irrigation facilities and electricity, we will be able to start on small scale agricultural projects on our own.

Section H: Katse Village

Introduction

This group discussion was held with 10 members of the Katse Village women committee. Katse village is mainly comprised of families of the engineers who are constructing the Katse dam. The majority of these families are foreign engineers who have migrated from their respective countries, and will settled in this village until construction of the dam is complete. Important issues that were considered in this discussion were whether this community had experienced any dissimilarity and discrimination from local villages around the Katse dam area.

Question 1. How were you received by the local communities in this region?

Answer: Generally people around the Katse area were very friendly and welcoming. We have therefore offered domestic jobs to many local women in our homes.

Question 2. Are there any racial discriminations with the local people?

Answer: There are no racial discriminations either from us or from the villages. We work very closely with locals without any problem.

Question 3. Where do your children go to school?

Answer: We have established our own kinder-garden and primary school for our children. This is because most of the local schools are of very low standards.

Question 4. Does this school admit children from the surrounding villages?

Answer: Yes all children are admitted to the school irrespective of whether they are from Katse village or the surrounding area.

Question 5. are there any disturbing factors which you are experiencing in this village?

Answer: Crime is probably the major issue that concerns us in the is village. There were numerous cases of theft when we first came in the area. However, since the introduction of the Lesotho Security guards theft has decreased considerably.

Question 6. Are there any development projects or programmes which you are involved with the local communities?

Answer: Yes, there are church groups in which members of the Katse village are involved.
Question 7. Are you going to stay in this village even after the dam construction is complete?

Answer: We think many of us will be leaving with our husbands when the dam construction is complete.

APPENDIX E

SUMMARY OF UNSTRUCTURED INTERVIEWS WITH LHDA PERSONNEL

APPENDIX E

Unstructured interviews with LHDA personnel
Environment Division

Section A: Mr. L. Lekholoane - Principal Compensation Officer.
Question 1. What was the composition of the compensation advisory committee?

Answer: Towards the end of 1987 - when the environment division of LHDA started - we selected people who were familiar with land acquisition and compensation matters. These were three principal chiefs and the commissioner of lands and survey. These were selected according to the Land Act of 1979, which accords them the power on land acquisition issues. On the law side there was the attorney general to ensure the legal backing of the compensation policy. The committee also comprised some representatives from LHDA; the principal rural development officer; the principal compensation officer; the public relations division manager; and the environment division manager.

Question 2. There are some complaints regarding compensation for trees, crop fields, houses, and communal property. What was the criteria used to come up with the M65.02 for a single tree and M1.00 per square meter for a cluster of small trees?

Answer: There is nothing wrong with the criteria used. The problem is that people misinterpret this criteria and the law. There is no problem with grown up trees within a cluster because these are identified and paid as individual trees apart from the cluster. These prices were fixed depending on what the Republic of South Africa was willing to offer as compensation.

Question 3. According to the compensation advisory committee, was the M1.00 enough for a cluster of trees within a square meter?

Answer: The prices were not the judgment of the advisory committee, but is was an agreement between the governments of the Kingdom of Lesotho and the Republic of South Africa - who were parties to the LHWP treaty. This agreement was reached in 1990 in the report called "The Cost Allocation Report".

An economic study was done to determine the returns that could be derived from a cluster of trees, but the prices were fixed according to the prices of 1989, and these prices have not escalated ever since that time. It is only now that they are being revised.

Question 4. Why were there no community representatives to decide on the prices for the trees?

Answer: During the economic surveys people were asked about alternative means of fuel and they indicated that they would use shrubs for fuel, roofing, and fencing. But when it came to costing - as to how much they would like to be paid for their property - they did not know, hence LHDA had to make the decision. But I do believe that it should be a two way dialogue between the two parties.

Question 5. Why have these prices not been revised according to economic changes since 1989?

Answer: First of all even in 1990 it was a struggle to agree on the price. There were many indices which differed - i.e. South African indices differed from those used in Lesotho. LHDA relies on the consumer indices obtained from the Department of Statistics, and these are also not up-to-date.

Question 6. What about compensation for communal resources - such as sand, thatch and medicinal plants? i.e. How has it been addressed?

Answer: There are no problems with compensation for several communally owned properties (e.g. woodlots and rangelands) because it can be channeled easily. The issue of sand has been reported. However, compensation for sand is very complicated. This is because in the lowlands, for one to be able to mine sand, he/she must hold a sand lease. So LHDA requires people who claim compensation for sand to produce this lease. But, the people in the highlands do not have such documents.

The issue is, however, still under discussion because it has only been raised recently. LHDA has to determine how much compensation is due for sand based on how much loss people have suffered. But, still, the primary requirement before any sand compensation is the license to mine sand. Similar complications are encountered with regard to compensation for medicinal plants. People are saying LHDA should compensate every household approximately M200.00 for medicinal plants; yet it was not every household that used these medicinal plants.

Question 7. Why are the issues of sand and medicinal plants only being raised recently?

Answer: The Phase 1A compensation policy had a lot of irregularities, that is why the policy is being revised now, to rectify all the compensation problems experienced in Phase 1A for the coming Phase 1B.

Question 8. How come the affected communities do know what will happen after the 15 year compensation period?

Answer: The 15 year period has been discussed with the communities, and they have come up with their suggestions and recommendations. For example people indicate that they want the 15 year period scrapped completely, and they should get grains and pulse in perpetuity. But, LHDA cannot agree to such an arrangement. The 15 year period was only meant for them (communities) to be involved in developmental projects for the purpose of new income generation methods, hence this period was found to be sufficient for them (communities) to get established on their own.

The fact is that LHDA has a commitment even after the 15 year cutoff period. We understand that there would still be those people (e.g. old and disabled people) whom money will be set aside to cater for them within the 50 year economic life of the LHWP.

Question 9. Why is compensation for crops given only as maize and pulse, yet people claim they grew different crops in their acquired fields?

Answer: For the purpose of policy and decision making, normally we do not take individual concerns. It would be difficult to implement a project of this magnitude by taking individual opinions. Hence, the compensation policy is based on percentages of the socio-economic survey.

Over 85 % of the people in the Phase 1A indicated that they wanted grain and pulse. The policy has recently been made flexible. LHDA is saying for people who want to convert their grain to cash LHDA will fix the price according to every cost incurred to transport a bag of grain plus the cost of the bag itself; very few people have accepted this offer.

Question 10. Does LHDA take into account the nutritional value of the compensation food?

Answer: The compensation procedure for Phase 1A was purely based on logistical reasons. Studies showed that 97 % of the people in the highlands grew maize, and we as LHDA supplemented other crops by adding pulse to the maize. We found that it was easier to implement the package of maize and pulse than a variety of crops.

Question 11. What about the complaint that grain compensation is less that what people used to harvest on their own?

Answer: This is not true. Our studies showed that on average most people harvested about 600 kg/hectare in yields. But, LHDA is giving the (communities) 1000 kg/hectare, and on top of that LHDA is giving 30 kg/hectare of beans. This is far above what the people used to get. So LHDA is further saying, if people were growing other crops e.g. potatoes, tomatoes, pumpkins, sorghum, etc. they can exchange the surplus they get from compensation for other foods and commodities.

Question 12. Why is that the communities affected by the project do not seem to understand or appreciate LHDA's compensation procedures and efforts? i.e. why are there lots of complaints?

Answer: LHWP is now in its eighth year of compensating the communities affected by the project, and this has created very dependable societies in the highlands. People always want more. So when they see strangers like you (the researcher), they can tell you a lot of unfounded stories. The community does not want to get involved in the most important issues such as development; that is why the communities want the short term compensation (15 year period) to be perpetual.

Question 13. It is LHDA's principle to displace people who live under the power-line corridor. Why aren't the old houses demolished after giving these people new ones?

Answer: Demolition of old premises was not included in LHDA contracts, but this has been reviewed. People are now given some time to salvage whatever material from the old house, after which the house will be demolished.

Question 14. Why are the recent compensation houses build without heating facilities?

Answer: Originally the compensation houses were built with stoves and fire places. But, a very strong objection came up that some people do not want these stoves and fire places due to leaking chimneys. So we then decided to add slight modifications in the design of recent houses to remove these fire places. Standard designs were done and shown to the people. Improvements included small and unroofed half way walled rooms for the purpose of cooking and fire making. We have also recommended that people should build their separate traditional huts for the purpose of fire making - especially in winter.

Section B: Mr. Sefeane - Compensation Officer, Compensation Section.

Question 1. People are saying that prior to LHWP implementation, the public gatherings that were held were intimidating and they were not given a chance to oppose or challenge any of the project proponents proposals. How were these gatherings conducted?

Answer: LHWP was initiated during the military regime; so it could be true that people were afraid to oppose. In those day gatherings were conducted by local and government dignitaries, not LHDA - this could have intimidated the people.

Question 2. Can you explain the rational behind the 15 year compensation period for acquired crop fields.

Answer: The 15 year compensation period was decided upon as a consensus by the compensation advisory committee. This was found to be the ideal period for the initial interim compensation, which will be followed by long term compensation. This long term compensation is meant to restore the lost income through alternative income generating projects e.g. chicken farming; which are currently being administered by the Rural Development section. Interim compensation simply means that LHDA is hoping that inside the first 15 years, the proposed long term income generation projects would have taken shape, and when this period elapse they would be self-sustaining projects. As a result the interim (commodity type) compensation would be terminated.

Therefore, the 15 year period does not have any scientific basis; it is just an estimate. Hence, after the 15 years if the alternative income generating programmes are still insignificant, then LHDA has an obligation to review its position and continue with the interim compensation.

Question 3. How come the affected communities claim they do not know what will happen to them after the 15 year compensation period?

Answer: Well, we have told the people about our future plans regarding food compensation. The problem is perhaps because the rural development programmes are only recently taking off in 8-9 years since Phase 1A implementation - such as agricultural projects.

Question 4. Do you think these income generating programmes would meet the 15 year approximation now that 8-9 year have passed already?

Answer: Yes it is possible that some of these programmes would have taken-off by the 15 year period, since it can take some projects only two years for them to be self-sustaining.

Question 5. People claim they used to grow different crops in their fields. Why is LHDA only compensating with maize and beans; and were the people involved in reaching that decision?

Answer: LHDA carried out surveys in the communities to establish the food preferences or form of compensation that can aggregate all their (community) requirements, and people preferred grain. LHDA also used production statistics from the ministry of agriculture to find out which crops were the most prevalent in the highlands areas. It was found that grain represents about 97% of production, and the rest of the crops fall under the remaining 3 %. Therefore, LHDA thought best to compensate people on aggregate not per individual.

In any case, after receiving the grain compensation each person has the choice to exchange the grains for cash or other commodities. So yes, there were public consultations regarding the type of compensation.

Question 6. There are some complaints regarding the compensation prices for trees i.e. M65.02 for a singled out tree and M1.00 per m^2 of small clustered forest trees; who fixed these prices?

Answer: The current tree rates were fixed in 1990, and were subject to annual review using the consumer price index. However, this reviewing has not taken place until now, but it is under discussion.

Question 7. But aren't the two price ratios unbalanced?

Answer: Well the $1m^2$ is referring mainly to small clustered poplar trees which would otherwise take longer time to count, but if bigger trees are spotted within a cluster, then they should be singled out. The two price ratios were decided upon by the Compensation Advisory Committee. The Lesotho government in its capacity did not have the money to compensate the people affected by the project, hence this money came from the Republic of South Africa. It was, therefore, the Republic of South Africa (RSA) who dictated the prices they were willing to offer. The M65.02 itself is not fair because a two year old tree is not the same size as a 20 year old tree, yet the rate is the same. It must, also, be understood that according to the LHDA policy and regulations that the cash only compensates for the money lost while the new five seedlings for each tree acquired are growing. Thus, the actual compensation is the seedling not the money.

Question 8. Why haven't any seedlings been delivered in many communities?

Answer: That is the responsibility of the forestry unit of the Rural Development section. But ideally, seedlings should be given the same year in which trees are acquired.

Question 9. What happens if the seedling do not survive?

Answer: Out of the five seedlings given for each tree, LHDA expects that at least 50 % should survive. It is again the task of the forestry unit to identify and ensure which trees are suitable for which areas. The unit should also offer technical assistance to the communities to ensure that the trees are grown properly.

Question 10. Regarding the Mapeleng seismicity, why is the new site not very far (less than 500m) from the originally affected settlement.

Answer: Largely this site is the choice of the community; seemingly they want to move away from the current surface crack, and not the seismic activity. A better place would be several kilometers from the shore-line. All the distance along the shore-line (especially the eastern bank) seems to be prone to seismicity. Another reason is that we decided that the new site should not be far away from their (community) productive resources (i.e. crop fields).

Question 11. Have you made the community aware of this danger?

Answer: Yes, they have been aware that even their new location is prone to seismicity.

Question 12. What new improvements can be expected from this new settlement site?

Answer: On the new site LHDA's undertaking is to ensure that the people of Mapeleng live in safe houses - not to prevent seismicity. Even those households who have decided to remain in the original site are going to get new stronger houses.

Question 13. Does the community understand what seismicity is and its causes?

Answer: LHDA has tried to explain the concept of seismicity a number of times, however, most members of the community still do not understand what is causing these earth tremors.

Question 14. Why were the communities never made aware to expect such earth tremors in advance?

Answer: LHDA under estimated the impact that could be caused by seismicity; hence locals were never informed to expect such occurrences when the water fills up in the Katse reservoir. Seismicity was expected to be so low that people would not even feel it on the surface. However, the Katse dam has been design to withstand seismicity of up to the magnitude of 7 on the Richter scale. The consultant only recommended the installation of seismic stations around the reservoir to capture any movement in advance.

Truly, the seismic activity that occurred is of low magnitude - 1 - 3.2. The only problem was caused by the weak surface on which it occurred, and our Basotho houses were not designed to withstand any seismic activity.

Question 15 Didn't you know before-hand that the surface near the Katse reservoir was weak?

Answer: Investigation were only focused on the dam site, and not upstream. It was only recently that the surface was checked, and it was established that there were a number of dykes which pose weak structure, and in turn weak surface.

Question 16. What is your response to the complaints that the new compensation houses are too cold?

Answer: Initially the compensation houses had fire places, but the communities objected to the chimneys indicating that these chimneys leak during rainy seasons. LHDA therefore, decided to remove these fire place structures from the compensation house plans. Another reason is that LHDA considers these compensation houses as a form of development from the old type traditional houses, hence the neat tiles will be spoiled by the fire places.

Section C. Dr. M. Nyaphisi - Principal Public Health Officer.

Question 1. Fire places have been removed from the recent compensation houses plans. Would 'nt this cause health problems - especially in the cold highlands winters?

Answer: Our traditional Basotho houses had more disadvantages than what LHDA is offering. For example, those old houses had fire places, but a large majority did - and still do - not have windows. Thus , when making fire the house become filled with smoke - which will most probably lead to respiratory infections on small children and even adults. Studies undertaken

have indicated that respiratory diseases are the most dominant. When compared to the traditional huts the benefits of the new houses far out-weigh the disadvantage of the cold.

It is true that the old house were warmer because of the building material used (e.g. thatch roofing), and it is also true that the new houses can get extremely cold because of the uncovered cement floors. However, we believe that people should be able to provide themselves with paraffin heaters. LHDA cannot provide every thing for these communities because we do not want hem to be fully dependent on LHDA. In as much as possible the communities must be self sufficient and independent. Another reason is that it was the people themselves who expressed dissatisfaction about the fire places, and they indicated that they would build themselves some shacks or huts for the purpose of heating and cooking.

Question 2. Wouldn't having to provide own paraffin heaters change the established community way of living and impose a high means of economic survival on already poor rural communities?

Answer: No LHDA is not trying to change anybody; but our fundamental purpose and goal of development is to improve the well-being of the people in the rural areas. Building them new houses is change in itself, so they have to adapt to new life-styles. In any case a lot of people in the rural communities are migrating to towns where they have to live under new conditions; even those who stay behind are gradually moving from the old practice of grass thatching to that of tiles and iron sheets.

Question 3. In most villages there are still no toilets and other sanitary facilities, yet these were promised prior to project implementation as a measure of rural development. Why hasn't this programme been implemented yet?

Answer: LHDA's policy is to build and upgrade the sanitary facilities in all schools within the project area. But when it come to household level LHDA advocates that individuals should take responsibility of their own welfare. Studies undertaken (about 2-3 years ago) indicate that the communities are aware of such responsibility; but unfortunately, they do not have the economic means to carry out the task. LHDA policy require the communities to contribute in development initiatives in their respective areas. We have therefore assigned the communities the task of mobilizing their own human resources for the purpose of digging the toilet pits and building the toilets; while LHDA will provide all the building material. LHDA feels that this will induce some sense of commitment and achievement also on the community.

Question 4. What about water supply facilities?

Answer: A similar case applies with the water supply issue. People themselves should identify their needs. They should contribute by digging the trenches and providing labour free of charge, and LHDA will provide all the material e.g. pipes, cement, taps etc. Each community should also have community water minders - who are trained at the Thaba-Tseka Rural Development Center to enable long term maintenance of these water facilities.

Question 5. What are the communities responses with regard to these proposals?

Answer: In some villages there has been commendable cooperation by the community, but in others, problems have been encountered because of the government low income rural development projects in the LHWP area. People tend to object to LHDA's plans because they do

not get paid - which is reasonable. The Government knows about this problem of conflicting rural development approaches but they (government) also want to achieve their political goals and implement their policies. There is nothing wrong with the government projects, but LHDA foresees a negative impact in the long term because the communities will not be empowered to develop on their own.

Question 6. Are there any water borne diseases which have been reported in the Phase 1A project area so far?

Answer: The climate in the LHWP is simply too cold for water born diseases, such as Malaria and Schistosomiasis, as is the case in other hotter African countries. There are no reports of any major disease outbreak in the area.

Question 7. Most of the slope are contaminated with human excreta due to lack of toilets. Wouldn't this pollute the reservoir water, and in turn impart on fish production?

Answer: Dirty slopes is one of the reasons why LHDA advocates for the establishment of sanitary facilities. As for the present contamination, we believe the amount of faecal contamination is insignificant, especially when compared to the size of the reservoir. It is, however, potential danger which needs to be addressed.

Question 8. Are the communities aware of proper health practices in the LHWP area?

Answer: Our public health officers offer continuous education to schools and communities on health promotion and disease prevention e.g. sexually transmitted diseases and AIDS.

Section D. Mr. Sibolla - Principal Rural Development Officer.

Question 1. Most of the rural development programmes are said to be behind schedule. Which programmes are currently underway and what is their progress?

Answer: Rural development has three areas namely: infrastructure development, agriculture development, and training and income generation programme.

Infrastructure development in Phase 1A involves the construction of access roads to villages and four bridges. Currently, the 44 km road in being constructed from Malibamats'o bridge, through villages on the western side of the Katse Reservoir, to Katse dam site. This road will include the construction of 2 foot - bridges and 2 vehicle bridges, and is scheduled for completion by the end of the year (1996).

Another area of infrastructure which started in April is about the construction of community projects. These covers the villages of Ha Lejone, Mphorosane, Ha Theko, Makhoabeng, Ha 'Mensele, and Ramokoatsi. Different communities have selected their respective projects, but the most common ones are water supply and sanitation, upgrading of schools, construction of village markets, community halls, and local administration offices.

Question 2. On the issue of the construction of the market places, why is the Ha Leone market being constructed under the power-line corridor, yet it is LHDA's policy to displace any dwellings under the power-line?

Answer: In the rural areas of Lesotho a market place has always been located next to the bus stop, so in the case of Ha Leone, the bus stop was already established at the road junction, and we had to build the market next to it. Another reason is that in the case of the market place people are not permanently located under the power-line (i.e. they are only in danger during the day).

Question 3. There are some cases whereby people have been compensated with money (for more than two years) to displace their houses from under the power-line, but they have not yet moved. Even where alternative housing has been provided people still use the danger-zone dwellings. Why doesn't LHDA enforce its principles to ensure the safety and welfare of the people affected by the LHWP?

Answer: LHDA leaves the obligation of demolishing the old house to the owner. This is intended to give the owner the opportunity to salvage any material from the old house for further use. But we believe that we will have to see to it that people comply to our policies and principles.

Question 4. What about agriculture, which programmes have you implemented so far?

Answer: In agriculture there are various forms of projects involved, and these are community driven projects such as range management, forestry, landuse planning, and livestock programmes. Range management and animal husbandry programme is looking at improving the remaining land to increase its carrying capacity and supplement and part that has been inundated. This programme is progressing very well. There are two grazing associations on either side of the Katse valley, and the third one is on the southern end of the Katse reservoir. One of the first two association (former) has started income generating activities - such as selling of fodder to their community. Since last year village training sessions have been held with herd boys to talk about the advantages and disadvantages of burning rangelands.

With the community forestry project, a community nursery has been established at Ha Lejone, and the first crop of trees are due to be planted this year (1996) in October. Earlier on LHDA depended on the Leribe and Butha-Buthe Ministry of Agriculture nurseries for seedlings. Ha Lejone nursery has a capacity of about 100 000 tree seedlings, and will be managed by the ministry of Agriculture.

Under the landuse programme we have the mountain horticulture and fields programme, irrigation, and fruit-tree programme. The mountain horticulture and fields programme is one of the oldest programmes we have. This was started in 1993. It started with 5 members of staff from the Ministry of Agriculture - a project manager, an irrigation person, 2 seed multiplication persons, and a fruit-tree person - and 5 farmers. Presently there are 45 farmers participating in the programme, with 90 hectares of land, hence the progress is commendable. The irrigation programme was developed on three sites. This was started with sites of 0.7 hectares per individual farmer, and progress grew to 7 hectares and 18 hectares per 10 farmers. With the fruit-tree programme, LHDA is encouraging people to plant apple, pears, vines, and nuts which have been found to be good for the highlands altitudes. Where these have been grown, they are in good condition but would require adequate management.

Small scale intensive livestock programmes - such as poultry, pigs, dairy, and fisheries - have been started at 'Muela. Pilot test on dairy programme was started with 58 people who purchased

60 cows. Each cow produces an average of 18 liters of milk per day. However, problems were encountered due to the collapse of the market for milk, and the cultural believes of some Basotho who are reluctant to sell fresh milk for the fear that enemies will bewitch their cows; hence they would rather sell sour milk. The Maseru Central Dairy has embraced the market problem, and hopefully this will be resolved. Many cows are not longer in good health condition because for many people, it was their first encounter to farm with these cattle, but training programmes are being implemented on how to take care of the cows. All these programmes are approached on an individual farmer basis, and not as a group. Nonetheless, LHDA encourages the people to work in groups in order to improve their market opportunities. Another advantage of group framing is that collectively they can minimize expenses such as transport costs to the market places.

Section E. Mr. Ian Long - LHDA Consultant at the Thaba-Tseka Rural Development Center (TRDC).

Question 1. When was this center established?

Answer: The center has been in operation since 1989. It was initially used for construction skills training for the purpose of constructing the Katse dam. The center recruited locals and trained them so that they could be employed by the contractor. After the programme was finished, the center was then converted by LHDA into a rural development and income generation contract. Its main task is to concentrate on all the people directly affected by the dam (approximately 2500). To address this task the center has categorized the affected people into five categories namely:

category one - people who lost houses and had to relocate to other places;
category two - people who lost houses, but did not have to relocate to other villages;
category three - people who have lost 100 % of their agricultural land;
category four - people who have lost 75 % of their agricultural land;
category five - people who have lost 25 % of their agricultural land.

Question 2. In which category are you presently in?

Answer: Currently the TRDC is in category one. We have 25 house in Phase 1A under this category. Socio-economic and intensive surveys have been done. We are saying that if people have any skills, they should come to the TRDC so that we could assist in upgrading those skills. We will also assist them to set a small entrepreneur. TRDC offers some credit to establish such small schemes e.g. most people sell local beer as small time salary; if people want to increase their business, TRDC offers credit which will be paid as business progresses. The center also offers training in business skills. However, our entrepreneur class is only a 10 % of the total number of people we have in the center. A large percentage of people are producers e.g. building and wood-work skills. Another group of people is only interested in being employed by the contractor i.e. in construction work. The last group is more of the pension age, so the TRDC is looking at a scheme which could supply them with pension.

Question 3. Is the programme running according to plan? i.e. are the people responding positively to TRDC offers?

Answer: There are some problems encountered, for example with sewing and knitting training. People want skills in sewing and knitting, but they are only interested in sewing for themselves

or relatives, and not for large scale commercial purposes. TRDC can assist people with credit to buy sewing machines; but they must be able to pay back that loan. Another problem is that not all people in category one want to be trained. This is because they feel training is not necessary since they have received compensation for acquired or damaged property, and new houses. And all these have been received freely from LHDA, so why should they go out of their way and train. These people are of the believe that LHDA will look after them, unaware that compensation is not forever. Other people have families - especially women - and logistically they cannot spent six weeks at the center. In most cases their husbands will not approve. Lastly, lack of numeracy skills prevents some people from coming to the TRDC - especially older members of the family who do not feel comfortable going to school at their age to learn how to count.

Question 4. Does the center have any alternatives to these problems?

Answer: One alternative which we suggested is that if the head or wife in the household cannot come for training, they should nominate another member in the family e.g. son or nephew. However, the condition is that this nominated member should contribute in some way to welfare of that family after training.

Question 5. How do you foresee the training being offered at the TRDC actually restoring the income that these people used to get from their respective properties?

Answer: Hypothetically TRDC is saying it will take compensation of five bags of grain, and calculate its cash value. So if a person gets sewing skills, and manufactures school uniforms; the money they get must match the amount that they received with the five bags of grain. In theory once a person reaches that level (i.e. matching), then the compensation for grain will stop. This approach is unknown to the public for the fear that they will refuse to come to the TRDC.

Question 6. Does the TRDC require any minimum standard or qualification for acceptance in the center?

Answer: The general trend is that female locals are better educated than male ones. However, the TRDC recruits anybody who is willing. Since further skills training require numerical skills, it is to the advantage of the trainee if he or she has them, but if not TRDC offers them also.

Question 7. Are there any fees which trainees have to pay?

Answer: Training at the TRDC is for free- there is free accommodation, food, classes, and stationery. the only payment to the TRDC is the servicing of the loan for the credit facility.

Question 8. What type of training to you offer at the TRDC?

Answer: There are two types of training, the formal and informal training. Formal training includes sewing and knitting, brick laying, poultry and horticulture. Informal training offers, for example, bread making and candle making. These are simple and short term (2 days) programmes. The formal training on the other hand can take up to six months.

Question 9. How many people have graduated from the TRDC since starting with the income generation programme, and how can you access the progress of the programme so far?

Answer: Category one trainees enrolled in November 1995, and the first set of graduates have qualified from the center in May 1996, hence it difficult at this stage to evaluate the trend of progress in the whole scheme.

Question 10. What methods do you use to keep in touch with the graduates after leaving the TRDC?

Answer: Monitoring is the most important component of the scheme after training. Currently the TRDC has two field officers on a full time basis to constantly follow upon the graduates in their respective villages.

Question 11. How do you cater for people who are very far from the TRDC?

Answer: We hope to set up satellite centers at Katse and Ha Lejone to facilitate trainees in these area to kick-start in their own business.

Question 12. Are there any other rural development centers in this area? If yes, do they interfere with your own programmes?

Answer: Yes, there are government rural development centers in Thaba-Tseka, but we are running our programmes side-by-side to avoid duplication and confusion on the members of the community.

Question 13. Is there any other point that you wish to raise?

Answer: Well, in conclusion I can say rural development is a gradual process- it can not be achieved over-night. For Lesotho, especially, this is a total paradigm shift. These people have been living in these mountains practicing traditional methods of living; and all of sudden there is this enormous need to develop them - we should take step by step until all the people are successful.

Section F. Mr. David Nkalai - Principal Environment Officer.

Question 1. When was the Environment Division established?

Answer: The Environment Division was established in 1987, and by this time some programmes had already been planned - e.g. the northern access road, and construction camps.

Question 2. When were the feasibility studies undertaken, before or after the establishment of the environment division?

Answer: The feasibility studies were undertaken before the establishment of the environment division; this was prior to the signing of the LHWP Treaty, hence none of the current environment division staff took part in the study. This implies, therefore, that the present environment division did not give any input on the planning of the advanced infrastructure.

Question 3. What about the baseline studies, when were they undertaken?

Answer: Baseline studies commenced immediately after the establishment of the Environment Division. i.e. Around 1988 when the first contingent of the staff became available. Management was established earlier in 1987.

Question 4. Do you think there was any direct link between the feasibility study and the baseline studies?

Answer: There was no direct link between the two sets of studies, but the feasibility study did indicate that there should be further investigations on several issues.

Question 5. Should the baseline studies found anything negative (especially on those programmes which had been implemented already) was there any chance of alternative planning?

Answer: No, there was no chance due to the costs already incurred.

Question 6. When the environment division came to being, how did it get involved with the Phase 1A environmental impact assessment?

Answer: Since there was no ideal EIA for Phase 1A, the environment division became involved in determining the possible impacts of the major construction works, and give input to specifications to be followed by the contractors.

Question 7. Does this mean you only gave more input at mitigation stage of EIA?

Answer: Yes, our task was to come up with mitigation plans; not the impact assessment. The World Bank i.e. even proposing that LHDA should do a post-environmental impact assessment.

Question 8. How has rehabilitation of the northern access road works been implemented?

Answer: There were some specifications for the rehabilitation of the road. But the problem arose because the costs which the consultant came up with were far above the amount specified in the LHDA bill of quantities. There were some disagreements with the Joint Permanent Technical Commission (JPTC), and the matter was never resolved; until the environment division suggested the use of cheap labour methods. This proposal and its budget were approved by the JPTC. This proposal was not a major rehabilitation programme as such, but only selected disturbed vegetation portion along the northern access road. The engineer rehabilitated the spoils and the borrow-pits with top-soiling.

Question 9. Were you satisfied with the engineer top-soiling?

Answer: Yes, except that this top-soiling was not done concurrently with grassing. i.e. by the time we planted grass for rehabilitation, some top-soil had already been eroded. This was because the agreement with the JPTC to regrass was delayed. We used different seed mixtures from those outlined in the specifications. *Eragrostis curvula and teff* were planted, and growth has been successful in many areas.

Question 10. Is there any environmental representative in the JPTC?

Answer: At the time of the construction of the northern access road, I am not sure whether the was any representative because in those days the JPTC was mainly comprised of engineers. However, presently we have our deputy chief executive officer for the environment in the JPTC.

Question 11. When exactly did the environment division became represented in the JPTC?

Answer: I think around 1990/91.

Question 12. There are some slopes that are collapsing along the northern access road, what is being done to prevent such occurrences?
Answer: The only best alternative is to build stabilizing structure, such as gabions. Grassing on its own will not help, but the JPTC most likely will discard the gabion proposal on cost grounds. The worst point is that there is no way of going back to repair the sliding slopes. It was initially assumed that they will stabilize on their own, but this has not been the case.

Question 13. How was the protection of the Bokong Wetland implemented?

Answer: The Bokong sponge was part of the rehabilitation of the North Access Road (NAR), hence it was not treated separately. At the time of NAR construction, the engineers were not symphathetic to most natural resources. The environment division took along time to convince these engineers about the importance of the sponge. The infrastructure manager wanted the road to go through the sponge even though it had been highlighted that the wetland was the source of the Bokong river - a tributary which provides the Katse reservoir with water. However, their attitudes have changed now. At that time these engineers were from their respective government departments with no environmental consciousness to natural resources.

Question 14. Why is the wetland condition degrading, is the any monitoring on this wetland?

Answer: The financing of the wetland rehabilitation encounters problems with the JPTC. At LHDA it is difficult to run as environmental programme, but it is much easier to run engineering programmes. Programmes are given liability period of only 12 months, and after the twelve months expire no more funding is given. This is wrong because unlike the engineering programmes, most environmental programmes or impacts show up after one year. i.e. the natural phenomenon does not allow some environments to stabilize only after one year.

Question 15. Who is responsible for bearing the environmental costs of the LHWP?

Answer: On the cost side, it is a political issue because there is South Africa as the main financier, even though Lesotho has a share.

Question 16. What, then, is the role of the World Bank?

Answer: The main function of the World Bank was to secure funds because South Africa could not get loans on its own.

Question 17. How many environmental monitors are there in the environment division?

Answer: There were no environmental monitors when the environment division first got started. Every staff member was doing his/her own monitoring. This proved to be an overburden on the

staff. Hence suggestions were made to have consultant monitors to supervise the contractor and the construction work. This proposal was acceptable according to the Fedix conditions and specifications on which LHDA/ LHWP environment standards are based and being implemented under the World Bank auspices.

Question 18. Why does the environment management rely more on foreign consultants than its own staff?

Answer: No, the staff is the overall management of the construction activities; the consultant is only a representative for LHDA to supervise the contractor because LHDA as the client cannot talk directly to the contractor.

Section G. - Mr. S. Adams - Site Engineer at the Hlotse adit works

Question 1. What environmental specifications do you use in this site?

Answer: Environmental aspects are covered in the specifications document, volume 2 of the North Tender document.

Question 2. Who drew up this specifications?

Answer: The specifications were drawn more by enginners than environmetalists. This was in line with what has been the standard practice in South Africa - in particular. These specifications are general guidelines, and it is up to the site engineer to interpret them in his own way.

Question 3. Which aspects are of environmental concern in this construction site?

Answer: The main aspects of concern here are water, soil dumps, and the Leucosidea forests. It is very important that quality of effluent waste discharged from the construction works is controlled. We use Aluminium Sulphate ($AlSO_4$) and Hydrogen Chloride (Hcl) to reduce the pH and separate the solids. This process is done with the use of settling ponds, and it is monitored daily. We have two settling ponds.

We have two types of dumps in this site - these are overburden and spoils. We also have topsoil reserves which are not more than 3 m in height - as recommended in by site environmentalists. Overburden is the waste derived from the quarry works. This is hidden in a convinient place and will be rehabilitited (topsoiled and seeded) shortly before construction is complete. Rock spoils are waste dumps of rock which is primarily from the tunneling. So far we have rehabilitated three sides of the spoils and progress is satisfactory. There is a slight problem, however, of erosion on one side of the spoil because the drainage structures were not done properly; and we were not able to hydro-seed the topsoil because the surface is not flat. Mud has therefore flowed into the forest, and has suffocated some plants. This will be rectified shortly.

Question 4. Are you getting any assistance from LHDA with regard to environmental monitoring?

Answer: LHDA monitors have came to this site only once in five years of this project construction. It was also the responsibility of LHDA to establish a nursery for indigenous plants

which have been destroyed by the constrution activity for rehabilitation purposes; but this has not been done.

Question 5. Are there any other aspects which you are going to rehabilitate?

Answer: As far as construction activity is concerned, we are going to rehabilitate every aspects that requires rehabilitation. We will even upgrade the main road to this site - for the use of surrounding communities - before we close down construction works.