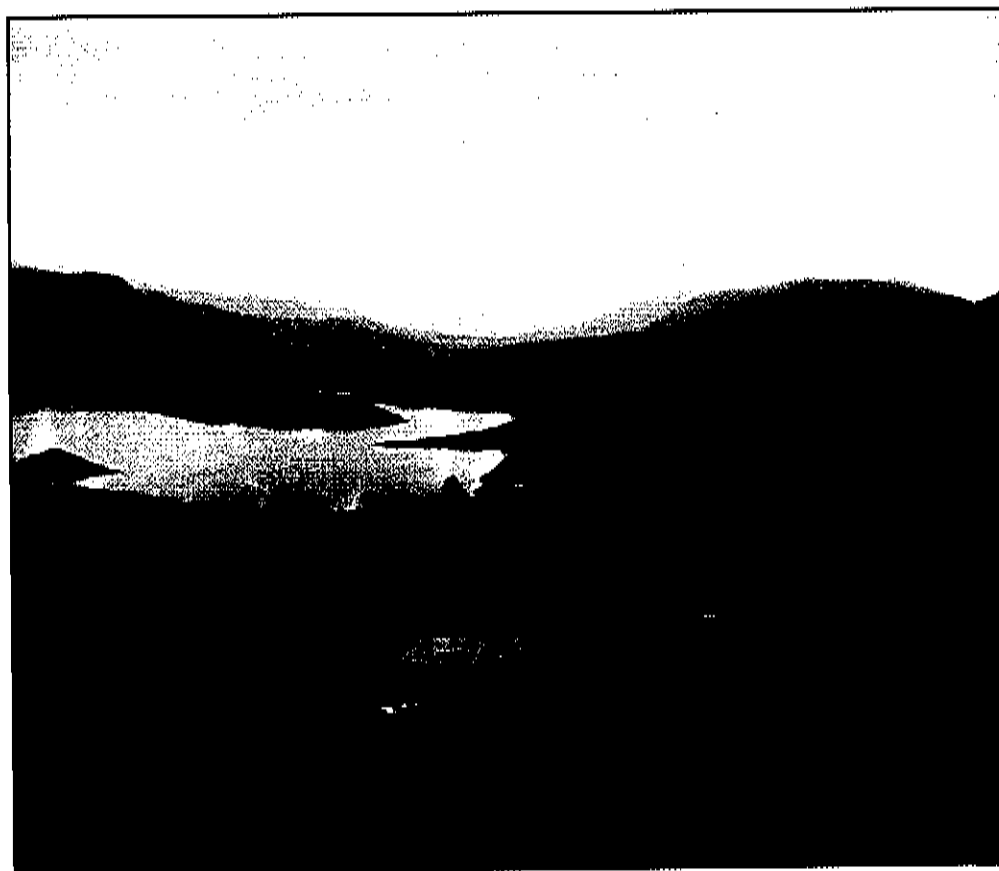


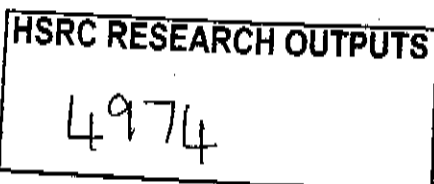


LESOTHO HIGHLANDS DEVELOPMENT AUTHORITY
CONTRACT 1204
A socio-economic and epidemiological survey for
the upstream and downstream areas of the
LHWP Phase 1 Dams

LITERATURE REVIEW OF SELECTED ASPECTS OF THE LESOTHO HIGHLANDS WATER PROJECT



Human Sciences Research Council
2007



LITERATURE REVIEW OF SELECTED ASPECTS OF THE LESOTHO HIGHLANDS WATER PROJECT

CONTRACT 1204

**Human Sciences Research Council
2007**

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ACRONYMS

ADB	African Development Bank
ALC	Area Liaison Committee
BMI	Body Mass Index
BW	Birth Weight
CALC	Combined Area Liaison Committee
CLA	Community Liaison Assistants
CMA	Common Monetary Area
DBSA	Development Bank of Southern Africa
EAP	Environmental Action Plan
ECA	Export Credit Agencies
ELA	Environmental Impact Assessment
EMC	Environmental Management Committee
EMICS	End Decade Multiple Indicator Cluster Survey
EMRS	Environmental Management and Rehabilitation Strategy
FSL	Full supply level
FT3	Free Active Thyroxin
FT4	Free Thyroxin
JPTC	Joint Permanent Technical Commission
LBW	Low Birth Weight
LHDA	Lesotho Highlands Development Agency
LHDA	Lesotho Highlands Development Authority
LHWC	Lesotho Highlands Water Commission
LHWP	Lesotho Highlands Water Project
MDC	Mohale Dam Contractors
mo	month(s)
MUAC	Mid-Upper Arm Circumference
NEHP	Natural Environment and Heritage Plan
NGO	Non-governmental Organisation
OVTS	Orange-Vaal Transfer Scheme
PEM	Protein-Energy Malnutrition
PHT	Public Health Team
PIP	Peoples Involvement Programme
RDA	Recommended Dietary Allowance
RDAP	Resettlement and Development Plan
RDP	Rural Development Plan
SACU	Southern African Customs Union
SADC	Southern African Development Community
SAICE	South African Institute of Civil Engineering
SD	Standard Deviation(s)
STI	Sexually Transmitted Infections
T4	Thyroxin
TCTA	Trans-Caledon Tunnel Authority
TIBC	Total Iron Binding Capacity
TOR	Terms of reference
TS	Transferrin Saturation
TSH	Thyroid Stimulating Hormone
VDC	Village Development Committees
VIP latrines	Ventilated and Improved Pit Latrines
WHO	World Health Organization
y	Year(s)

[illegible]

GLOSSARY

Body mass index: weight (kg) divided by the square of the height (m)

Dietary diversity: the number of foods or food groups consumed over a given reference period

Low birth weight: birth weight <2 500 g

Nutrient adequacy: achievement of recommended intakes of energy and essential nutrients

Stunted: z-score for height-for-age more than 2 SD below the median of the reference population

Underweight: z-score for weight-for-age more than 2 SD below the median of the reference population

Wasted: z-score for weight-for-height more than 2 SD below the median of the reference population

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EDITORIAL NOTE

Contract 1204 was assigned the task to conduct a series of monitoring and evaluation studies covering various topics in the project areas of the LHWP. Of particular interest to LHDA (the contracting agency), was the lasting impact of the Phase 1A and 1B dams on households and individuals that were directly affected by construction activities and impoundment as well as the outcomes of mitigation strategies. To acquaint researchers working on the project with the issues at hand, an initial annotated bibliography was compiled and included in the project Inception Report. An extended annotated bibliography was then compiled separately.

However, what was also required was a more detailed analysis of the vast amount of information and data available about dams in general and the LHWP in particular. The project manager requested a number of researchers to synthesise the available information, particularly on topics that the project team were less familiar with, such as the origins of the LHWP (to provide a specific regional context for the work), a summary of the impact of large dams worldwide and how debates around mitigation issues evolved, (to provide a context for the impacts of dams and compensation issues) and livelihoods in Lesotho (to provide a context of how households in the Highlands make a living). For topics such as nutrition, epidemiology and services, the purpose was to summarise past findings, besides a general introduction (in the case of nutrition and epidemiology this was important in guiding the project as to how these topics should be incorporated into the planned survey).

The project management of Contract 1204 made extensive use of the contributions contained in this volume, while compiling the various research reports that followed. This report is made available as one of a number of project related reports, albeit not an explicit requirement of the scope of services of Contract 1204.

J. van Zyl
Project Manager
Contract 1204
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CHAPTER 1

The Lesotho Highlands Water Project: A historical overview

Marie Wentzel
Chief Researcher
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INTRODUCTION

The Lesotho Highlands Water Project (LHWP), Africa's largest water-transfer project, is a project of epic proportions. The Project's sheer magnitude and ingenious engineering concepts have captured the imagination of water authorities and laymen alike across the world (LHDA, 1996).

The LHWP consists of a multi-phased water transfer and hydropower generation scheme that will include a number of impoundments on the Senqunyane River and its tributaries in the Lesotho highlands. The impoundments will be linked by a series of tunnels that will deliver water to the Vaal River System in South Africa. The project also includes a hydropower station to generate electricity for Lesotho. The entire project is planned over a thirty-year period and will, upon completion, comprise of five dams, 220 kilometres of tunnels, a 152-megawatt hydro-electric power station and 278 kilometres of new roads (LHDA, 1996,1997).

The LHWP was envisaged as a four-phased project with 2020 set as the completion date for the Project.

- Phase 1A consists of the construction of the Katse Dam¹ (the key collecting and storage reservoir for the entire Project) on the Malibamatso River, the transfer tunnel to the 'Muela Power-station, the 'Muela Dam and delivery tunnels to the Lesotho / South African border and to the Ash River Outfall near the town of Clarens in the Free State respectively. In addition infrastructure such as tarred roads, feeder roads, camps and health facilities were constructed. The development of Phase 1A started in 1987 with consultants being appointed for the design of the engineering works. On 6 September 1996, months ahead of the schedule for receiving fixed royalties, the Katse Dam reached a level of 1993 metres above sea level (LHDA, 1996). Phase 1A was completed in 1997 and the first water from the LHWP reached South Africa on 22 January 1998. (LHDA, 2004). The 'Muela Hydroelectric Power Station was officially opened on 22 January 1999 and Lesotho has thus become self-sufficient with regard to its electricity needs (LHDA & TCTA, 2001).
- Phase 1B consists of the construction of the Mohale Dam² (on the Senqunyane River), the transfer tunnel from the Mohale Dam to the Katse Dam, the Matsoku Weir and diversion tunnel and infrastructure such as tarred roads, feeder roads, camps and health facilities. Mohale Dam and tunnel construction activities commenced in 1998 and were completed towards the end of 2003. The inauguration of Phase 1 of the LHWP took place at Ha Mohale on 16 March 2004 (LHDA, 2004a).

- Phase II consists of the construction of the Mashai Dam on the Senqunyane River downstream of Katse Dam, a pumping station to connect the Mashai and Katse Dams, a second transfer tunnel from Katse Dam to 'Muela Power station; or from the Mashai Dam to 'Muela Power Station with no connection to Katse Dam, and finally a second delivery tunnel from the 'Muela Intake to the Ash River outlet. The completion data for Phase II was initially set for 2008 (LHDA, 1996; LHDA, nd).
- Phase III consists of the construction of the Tsoelike Dam, also on the Senqunyane River, and a pumping station connecting the Tsoelike and Mashai Dams. The completion date for Phase III was set for 2017 (LHDA, 1996; LHDA, nd).
- Phase IV consists of the construction of the Ntoahae Dam and another pump station to lift water from this reservoir into the Tsoelike Dam and onward into the main Katse reservoir. Phase IV will take the project to completion in the year 2020 (LHDA, 1996).

It was planned that Phase 1 A will provide eighteen cubic metres of water per second; Phase 1B eleven cubic metres of water per second; Phase II 36 cubic metres per second while Phase III would provide a further six cubic metres of water per second (LHDA, 1996). Although provision for phases II-IV has been made in the Treaty between South Africa and Lesotho, a decision concerning the construction of these phases will only be made at a later stage. The implementation of further phases would require the negotiation of a further 'no-objection' agreement with Namibia as a downstream riparian state of the Orange River Basin. Under current Treaty conditions an agreement with Namibia exists only for water withheld from the Orange/Senqu catchment by the Katse and Mohale reservoirs of Phases 1A and 1B respectively (Wallis, 2000).

THE NEED FOR THE LHWP

Large tracts of Southern Africa receive less than adequate rainfall. In South Africa the potential to store run-off water for human, agricultural and industrial uses is limited due to the low average rainfall. To make matters worse, many major urban concentrations are not located in the vicinity of an adequate supply of water (for instance, the Greater Johannesburg area is the largest urban centre in the world built on a watershed). During episodes of drought, many urban areas are affected, to varying degrees, by water scarcities. To supply the industrial heartland of South Africa with adequate water supplies, numerous reservoirs were built and water was transported from beyond the escarpment via the Tugela-Vaal scheme, to where the demand was the highest. However, demand for water in the industrial and population centres of South Africa threatened to outgrow the potential supply. The need to develop and improve existing industrial and domestic water demands necessitated the augmentation of water supply from the Vaal River.

ORIGIN OF THE LHWP

The possibility of diverting water from the Lesotho highlands to the Vaal River was mooted many decades ago. The highlands of Lesotho are the source of a number of rivers, e.g. the Malibamatso and the Senqunyane that is fed by melting snow and rain. Since the early 1950s feasibility studies on the possibility of diverting the Senqu River's headwaters under gravity to the upper reaches of the Vaal River have been conducted. In the early 1950s the High Commissioner to Lesotho (formerly Basutoland) Sir Evelyn Baring, requested a survey of the water potential of the territory. Cape Town-based engineer Ninham Shand was appointed to determine the viability of exporting Lesotho's water to areas in surrounding South Africa that needed augmented supplies. Shand proposed the Oxbow Project, a scheme that envisaged

storage reservoirs at Oxbow and Pelaneng on the Malibamats'o River with tunnels northward to convey water to South Africa. (TCTA, 2004). South Africa, however, rejected this plan, due to disagreement between the two countries on issues regarding the payment of water and the costs for environmental mitigation measures (Mochebelele, 1999). By the mid-1970s the need for water in Gauteng had become so great that interest in Lesotho's water was again revived.

In 1974 South Africa appointed Henry Olivier and Associates to carry out studies in connection with water and power projects in the neighbouring states. In their report Olivier and Associates described ten alternative layouts for diversion of water from Lesotho to the Vaal basin and for possible hydroelectric projects associated with such projects.

In 1978 a Joint Technical Committee comprising of experts from both countries conducted a preliminary feasibility study. In 1983, agreement was reached on a more detailed project layout, which in turn required joint detailed feasibility studies. These studies were completed towards the end of 1985 (TCTA, 2004). The studies concluded that there were no technical, social, environmental, legal, economic or financial considerations, which would invalidate the conclusions that the recommended project would provide considerable benefits for both countries (Mochebelele, 1999). However, according to Tricarico (2000:3) 'no comprehensive environmental impact assessment was ever made for Phase 1A, nor were erosion or sedimentation studies conducted.' The detailed feasibility studies were carried out by Lahmeyer MacDonald Consortium for the Government of Lesotho and by Olivier Shand Consortium for the Republic of South Africa.

After evaluation of more than 2000 variations amongst several main alternatives (e.g. the Orange-Vaal Transfer System, OVTS³), the final proposals for the transfer of water from Lesotho to supplement the Vaal Dam were endorsed in 1986, and the LHWP came into existence through the signing of a treaty on 24 October 1986 between the Kingdom of Lesotho and the Republic of South Africa (TCTA, 2004; LHDA, 1996).

REASONS TO PROCEED WITH THE LHWP

Apart from the LHWP other potential projects, as mentioned above, were also considered. The reasons for the selection of the LHWP include the following:

- The aggregate benefits (savings) to both Lesotho and South Africa amassed from the LHWP have a net value of about US \$1-billion for Phases 1A and 1B combined. Fifty-six percent of the cost benefit savings⁴ between this scheme and the original Orange-Vaal Transfer System, based solely in South Africa, will go to Lesotho in the form of royalties for the sale of the water to South Africa. The royalties paid by South Africa to Lesotho for delivered water will amount to US \$55 million per year for the first two phases. This figure represents 25 per cent of Lesotho's total annual export revenue and 14 per cent of its public revenue over a period of fifty years. The royalties payable to Lesotho were based on the actual volume of water in storage or transfer. It was agreed that South Africa would start paying the royalties to Lesotho when the volume of water in the Katse Dam was at 1 993 metres above sea level. This level was reached on 6 September 1996 and since that date, South Africa pays royalties to Lesotho for the actual volume of water in the Katse Dam or in transfer (Smith, nd: 2,3; LHDA, 1996, 1,20,21).
- The quality of water from the LHWP is of a high standard since it has very little silt, no dissolved nutrients and is unpolluted (TCTA, 2004). In 1951 the Commission of

Enquiry into the water laws of the Union of South Africa noted the high incidence of silt in the Orange and Caledon Rivers. By building the dams in the Lesotho Highlands clean and relatively silt-free water could be dammed up and delivered to South Africa. It was thus unnecessary to construct and run expensive plants to remove silt from the water (Smith, nd).

THE TREATY

The 1986 Treaty on the LHWP between the Government of the Kingdom of Lesotho and the Government of the Republic of South Africa 'provide for the establishment, implementation, operation and maintenance of the Project' (Kingdom of Lesotho, 1986:13). The Treaty contains 19 articles establishing the rights and responsibilities of each party. Amongst others the project implementation, the establishment of the Lesotho Highlands Development Authority (LHDA), the Trans-Caledon Tunnel Authority (TCTA) and the Joint Permanent Technical Commission (JPTC), issues of cost related payments, financing and royalties, payments with regard to excess water, downstream releases and water abstractions, social and environmental considerations, the prevention and settlement of disputes and procedures for review and revision are captured (Kingdom of Lesotho, 1986).

The Treaty provides that South Africa is responsible for all the costs of the LHWP related to the transfer of the water to South Africa, covering the cost of implementing, operating and maintaining the scheme. South Africa would also provide lone guarantees if required by lenders. Lesotho is responsible for the costs of the hydropower development as well as the ancillary developments associated with the project (Kingdom of Lesotho, 1986).

Over time six protocols, three of which were envisaged in the Treaty, were added. The protocols deal, amongst others, with the calculation of the royalties due to Lesotho; the effect of the project on the Southern African Customs Union (SACU) revenue due to Lesotho, cost apportionment between Lesotho and South Africa; supplementary arrangements between the two states including cost related payments, concessionary finance, insurance and the point at which royalty payment to Lesotho would start; how taxation in Lesotho would apply to the project and changes to the governance of the project by changing the name of the JPTC to the Lesotho Highlands Water Commission (LHWC) (LHWP, nd).

MANAGEMENT OF THE LHWP

In accordance with the provisions of the Treaty, Lesotho has the overall responsibility for that part of the project situated in Lesotho while South Africa has the overall responsibility for the part situated in South Africa. The Treaty sets out the structures that are required to implement the LHWP. In Lesotho the implementation of the project is managed on behalf of the Government of Lesotho through its Ministry of Natural Resources by the LHDA with assistance from Acres International of Canada. In South Africa, the government through its Department of Water Affairs and Forestry, established the TCTA to manage the implementation of those sections which lie in South Africa; to repay all loans, including those raised by Lesotho, for those elements of the Project related specifically to the transfer of water to South Africa and to operate the water transfer scheme in South Africa under the articles of the Treaty (Kingdom of Lesotho, 1986; Wallis, 1993).

The Treaty also makes provision for a bi-national commission, the JPTC, based in Maseru with monitoring, advisory and approval powers with regard to administrative, technical, and financial activities of both the LHDA and TCTA. (Kingdom of Lesotho, 1986). The JPTC

comprised three delegates from each country. Amendments to the LHWP Treaty (Protocol VI), which facilitated the implementation of a more efficient and effective project governance model, resulted in the change of the JPTC's name to the Lesotho Highlands Water Commission in 1999, reflecting the new role of the Commission (Mochebelele, 1999). Although its composition and internal structures remain the same, its responsibilities are widened to include implementation of the new governance model. As the organisation ultimately responsible for the implementation of all aspects of the Project, the LHWC, acting on behalf of the two governments, will be the single conduit for communication with the project authorities. Under the new model, LHWC will be responsible for all strategic policy matters, while the LHDA Board will be responsible for the operational policies of the LHDA. The new governance model also applies to TCTA in South Africa with regard to all aspects of its operation and maintenance functions, and its role on possible construction on future phases (Wallis, 2000: 5).

The LHDA, based in Maseru, is a semi-autonomous statutory body with responsibility for the implementation, operation and maintenance of that part of the project situated within Lesotho. It is also responsible for the local communities affected by the project including issues on relocation, resettlement and compensation (TCTA, 2004). With regard to the latter Article 7 (clause 18) of the Treaty stated that:

'The LHDA shall effect all measures to ensure that members of local communities in the Kingdom of Lesotho, who will be affected by flooding, construction works, or other similar project related causes, will be enabled to maintain a standard of living not inferior to that obtaining at the time of first disturbance: Provided that such Authority shall effect compensation for any loss to such member as a result of such Project related cause, not adequately met by such measures.' (Kingdom of Lesotho, 1986).

The TCTA is responsible for the implementation, operation and maintenance of that part of the project located in South Africa, including the construction and maintenance of the Delivery Tunnel North, the financing and financial risk management of the water delivery component of the project and the implementation of social upliftment programmes in and around the project area. The TCTA is also responsible for the management of the debt incurred with the water transfer component of the project (LHDA, 1996).

The government of Lesotho invited the World Bank to become involved in the project primarily to assist in the negotiations of the Treaty and in the appointment of consultants. The World Bank also ensures that its guidelines on resettlement and social impacts are met (LHDA, 1996).

COST AND FUNDING OF THE LHWP

The cost of building the LHWP is divided into two sections. The first covers all structures required for the transfer of water from Lesotho to South Africa. As indicated earlier South Africa has agreed to pay all costs relating to water transfer. This includes all costs incurred by Lesotho for that purpose as well as the servicing of all loans raised by Lesotho for water transfer requirements. The second part is for the construction of the hydroelectric component of the Project for which Lesotho, as sole beneficiary, is responsible.

The total project cost up to the completion of construction of Phases 1A and 1B was estimated in 2000 at M17.5 billion or R17.5 billion.⁵ Phase 1A was completed in 1999 at an approximated cost of M11 billion consisting of M9.7 billion for water transfer and M1.3

billion for the hydropower plant at 'Muela. Construction costs constituted 65%, finance costs 33% and royalties 2% of the total cost of Phase 1A. Phase 1B was completed in 2004 at an estimated cost of M6.5 billion of which construction costs constituted 57%, finance costs 39% and estimated escalation 4% (LHDA & TCTA, 2001).

Funding of this enormous bilateral project is extremely complex involving more than a dozen international currencies and different payment arrangements. Lesotho is required under the Treaty to raise the loans needed to fund the capital costs of all water-transfer related construction within Lesotho as well as its own hydropower costs. By raising the loans on behalf of South Africa for Phase 1A the economic and trading sanctions against South Africa's past political regime were bypassed. Due to the economic sanctions, no direct South African government guarantees were provided for the foreign funding component of Phase 1A. Instead, South Africa entered into a Deed of Undertaking with the Law Debenture Trust Corporation whereby the country undertook indirectly to repay all offshore loans (Wallis, 1996:22,23).

Due to the democratization of South Africa in 1994 and the country's re-instatement in the international community the same arrangements for the raising and servicing of loans for Phase 1B and future phases of the project were not necessary (Wallis, 1996). South Africa could attract direct borrowings from the international community and would issue direct sovereign guarantees to the banks, thus providing security for all water transfer borrowings by the LHDA.

Funding for the construction of Phase 1A was secured from several sources with the largest contribution being raised as loans within the Rand-based Common Monetary Area (CMA). This includes financial institutions in Lesotho, South Africa, Namibia and Swaziland. Export credit agreements were negotiated by the foreign contractors involved on the Project and submitted as part of their tenders. The funds obtained from the Development Bank of Southern Africa (DBSA) were allocated to the building of roads and other necessary infrastructure through the Project area. In addition, concessionary loans were raised from both multi-lateral and bi-lateral aid agencies such as the Commonwealth Development Corporation of the United Kingdom. The World Bank provided a relative small loan of \$US110 million to the Project, but the Bank's involvement opened the door for loan negotiations with other international banks and funding agencies. The World Bank's credit criteria is extremely strict and a ten-member team of independent advisors regularly visits the project to monitor progress, advise on organizational matters and to ensure that the project is implemented with minimum damage to the environment and maximum benefit to the people of Lesotho (Wallis, 2000).

Finance for the 'Muela hydropower scheme was mainly raised through concessionary aid agreements and by loans committed by the Development Fund and Investment Bank of the European Community and bilaterally from some of its member countries including the UK, Sweden, France and Germany. Commercial loans have also been obtained from the Development Bank of Southern Africa, the Lesotho Bank and the African Development Bank (ADB) (LHWP, nd).

The funding strategy followed for Phase 1B was that foreign funding was procured to fund foreign costs while local costs were to be funded out of CMA funding. It was agreed that ECA (Export Credit Agencies) Finance and associated Commercial Finance should form the core source of finance for harder construction elements of the project. The prime strategy of

including Contractor-Arranged Finance in the tender documentation made the ECA's the natural choice. The World Bank, the European Investment Bank, the African Development Bank and DBSA⁶ funded components of Phase 1B (LHWP, nd). The World Bank, the DBSA and the ADB were involved in technical supervision, advice and monitoring of the project. Independent panels of experts were also appointed to monitor the project.

South Africa finances the repayment of the water transfer loans and the obligatory royalties to Lesotho through the sale of water to the consumers of the Vaal River system, the beneficiaries of the scheme. Prior to the delivery of water from the LHWP the Department of Water Affairs and Forestry imposed a levy on the sale of water in the area. This levy was introduced in April 1988 at 2 cents per cubic metre and has increased annually to meet early cash flow demands. Since the Highlands water came on stream the levy is incorporated into the normal water tariff; revenues are used to service on-going water transfer related Project debt, to pay for the maintenance and operation of the transfer scheme and to contribute to future Project phases. Since the levies are the Project's principal source of revenue, the tariff for Vaal River system water consumers are adjusted annually so as to redeem all Phase 1A water transfer related loans within 25 years from the start of water delivery (Wallis, 1995).

SOCIO-ENVIRONMENTAL IMPACTS

A project of the magnitude (size and complexity) of the LHWP will inevitably impact on both the social and natural environment. Within the Treaty of the LHWP the parties agreed to 'take all reasonable measures to ensure that the implementation, operation, and maintenance of the Project are compatible with the protection of the existing quality of the environment and, in particular, shall pay due regard to the maintenance of the welfare of persons and communities immediately affected by the Project' (Kingdom of Lesotho, 1986:71).

Consequently the Environment Division in LHDA was established in 1987 to address:

- Socio-economic development in the project area;
- Minimisation of negative impacts of the project on the environment; and
- Maximization of the potential impact of the project (LHDA, 1996).

The feasibility studies on the LHWP undertaken during the mid-1980s preceded project design and implementation. The studies also addressed environmental and social impacts that could result from the LHWP and concluded there were no major environmental obstacles for the implementation of the project. This feasibility report was, however, widely criticized as being too generic and inadequate. More than a hundred additional socio-economic and environmental specialist studies were then commissioned, but these were conducted largely once construction had commenced. (TCTA-LHDA, 2003).

When the tender documents for Phase 1A were prepared in 1989, neither Lesotho nor South Africa had comprehensive environmental guidelines for the main construction works. Guidelines developed by international organizations such as the World Bank, the World Health Organisation, the International Commission on Large Dams and the International Tunneling Association were thus inserted into specification clauses for environmental work. To ensure adherence to these environmental specifications, the supervising engineers had to provide for a full-time environmental officer, backed up by an environmental specialists doing audits at regular intervals. Phase 1B, however, was preceded by a planning study that

brought the environmental aspects to the forefront in line with international trends (TCTA-LHDA, 2003).

Environmental Action Plan: Phase 1A (Lesotho)

Detailed feasibility studies on socio-economic and environmental impacts were conducted to form the basis for the Environmental Action Plan (EAP). The EAP was produced in 1990 and implementation of the three components began in 1991. It included:

- **Rural Development Plan (RDP)** – long-term indirect compensation for directly and indirectly affected communities. The RDP is sub-divided into three components:
 - rural infrastructure – feeder roads, bridges, access steps to dams, village water supply and sanitation, etc;
 - training and income generation; and
 - agriculture and forestry – small scale irrigation, conservation, tree planting and growing of trees for firewood
- **Compensation Plan** – for individuals and communities who have lost assets during the development of the LHWP.
- **Natural Environment and Heritage Plan (NEHP)** – designed to ensure that the natural environment and cultural heritage is not adversely affected by the implementation of the LHWP. The NEHP covers the natural environment, including biology, water quality, rehabilitation, erosion, sedimentation, environmental awareness and compliance contract monitoring.
- **Public Health** – monitoring and maintaining the health of construction workers, as well as improving public health for affected communities TCTA -LHDA, 2002).

Environmental Action Plan: Phase 1A (South Africa)

An Environment Impact Assessment was conducted during the planning and design phase of the project and included:

- a description of the Delivery Tunnel North environment;
- the potential impact of construction on the environment; and
- measures to ensure minimum disturbance and possible enhancement of the environment.

TCTA avoided delays to the construction programme by addressing all environmental issues prior to construction. This involved:

- limiting the adverse effects of the construction work on the environment and enhancing the positive spin-offs; and
- ensuring participation and involvement of local communities during the design, but specifically during the construction phase of the project (LHDA: 1996).

An Environmental Management and Rehabilitation Strategy (EMRS) was compiled and an Environmental Management Committee (EMC) comprising of delegates from the South African Department of Environmental Affairs and Tourism, provincial nature conservation organizations and the local communities was established. The EMC ensured implementation

of the EMRS to international standards, which included public involvement in the process (TCTA – LHDA, 2003).

Impact of the EAP: Phase 1A (Lesotho)

Rural Development Programme

The Rural Feeder Roads Project has expanded the networks of roads in the project area while bridges have also been erected. The Village Water Supply and Sanitation Programme covers the whole population of the LHWP catchments, not only the directly affected households. By 2002 in the Katse and 'Muela Local Catchment areas 1 472 households were provided with ventilated improved pit (VIP) latrines and 65 villages with improved water supply systems. The programme is ongoing with the objective of covering all 3 770 households and 133 villages in Phase 1A (TCTA-LHDA, 2003).

Artisans and construction workers on the LHWP received pre-construction training in Thaba Tseka from 1990 to 1992. Some 1 000 Basotho were trained in skills ranging from construction to laundry services and catering. On completion of the initial training requirements the Center was converted into the Rural Development Center to train individuals from the affected communities in new skills. Although, between 1994 to 2000, some 1 400 people were trained free of charge in skills ranging from welding, basic leatherwork, and bricklaying to dressmaking, the training courses did not lead to large scale income generation endeavours and was thus closed in 2000 (TCTA-LHDA, 2003).

The RDP, through its agriculture and forestry component, intended to intensify agricultural use of the remaining lands to maintain and enhance income by educating local farmers in improved livestock grazing and farming techniques to help retard extensive erosion which has created deep dongas in low-lying areas; by providing seedlings for those who lost trees due to the project; and by assisting farmers in seed multiplication, irrigated vegetable and fruit tree production programmes (LHDA, 1996). It is, however, claimed that the programmes designed to provide long-term indirect compensation to households directly affected by Phase 1A of the LHWP, achieved limited success (TCTA-LHDA, 2003).

Compensation

The LHWP has inevitably caused a loss of houses as well as arable and grazing land. The EAP, however, ensured that both individuals and communities who lost houses, commercial premises, and grazing or arable land were compensated. During the construction of Phase 1A infrastructure, 118 houses, a church and a school were relocated. Inundation of the Katse reservoir required the relocation of 143 houses and two schools. Furthermore an additional 110 households were resettled due to the development of advanced infrastructure and possible hazardous location (TCTA-LHDA, 2003).

Where possible, relocated residents were settled in the same community so that they remained under the same chieftainship. All Phase 1A resettles were relocated to villages in the Highlands, but Phase 1B offered the choice of the rural Lowlands as well as towns (Maseru). The relocated residents could choose the design of the replacement houses equal in surface area to their original homes.

Since subsistence farming is prevalent in the Highlands, loss of arable land for maize production and rangeland impacts heavily on household food security. Some 2 900 households lost 1 540ha of arable land as a result of the development of Phase 1A while

almost 2 800ha of rangeland was lost. Households were compensated for the loss of arable land at 1 000kg/ha per annum maize. After revising the policy for Phase 1B where cash compensation became an additional option, it was also introduced for Phase 1A (TCTA-LHDA, 2003). Fodder was provided for a period of five years to compensate for the loss of grazing land. Areas smaller than 1 000 square metres were compensated in cash as were the loss of fruit trees and firewood (TCTA-LHDA, 2002).

Natural Environment and Heritage Plan (NEHP)

The NEHP focuses on the natural environment, including biological monitoring, water quality monitoring, erosion and sedimentation, environmental awareness and compliance contract monitoring.

The NEHP has a multi-faceted programme for biodiversity and habitat conservation consisting of the following:

- Nature reserves: the LHWP has been responsible for the establishment of two nature reserves, Bokong and 'Muela Local Area and a national park of 6 500ha, Ts'ehlanyane. Furthermore, the reserves have been developed by installing tourist and management facilities and by training the staff for tourism and reserve management. The basis for income generation has thus been established.
- Plant rescue and the Katse Botanical Garden: LHDA horticultural staff has been responsible for the development of the Katse Botanical Garden. Some 10 000 plants, representing more than 500 species, including plants gathered from the Katse and Mohale Dam basins are planted in the Botanical Gardens. The Botanical Gardens feature only species of the Afro-montane and Afro-alpine plant biogeographic regions.
- Medicinal plant and communal nurseries: medicinal plants have been cultivated at the Katse Botanical Gardens in close cooperation with traditional healers. Village or communal nurseries have also been developed and are used to grow species collected from inundated areas, as well as medicinal plants for use in the communities and for income generation. In 2002 five nurseries were established in the Mohale local catchment area.
- Species conservation: the LHWP has played a seminal role in raising awareness among local inhabitants of the importance of the Highlands's unique species and has also undertaken activities targeted at the survival of particular species, including the spiral aloe and the Maloti minnow (TCTA-LHDA, 2003).

Other natural heritage plans include the documentation of dinosaur fossils found in the sedimentary rocks in the northern work area and the preservation of ancient rock-art found in rock cliffs (Wallis, 1993).

Public Health

Basic health care facilities were provided for the workforce including first aid clinics for emergencies, well-equipped clinics, a referral hospital at Leribe with 24-hour emergency service and intensive care facilities, extensive health facilities for all primary and secondary schools and health and sanitation education for all communities. Local communities could also utilize the clinics at a nominal fee (LHDA, 1996).

The influx of a large construction labour force into the previously isolated Highland areas exposed local inhabitants to a greatly increased threat from transmittable diseases, particularly STIs and HIV/AIDS. LHDA therefore established Public Health Teams (PHTs) of trained nurses at Katse, Lejone, 'Muela and Mohale to work with and support the local health infrastructure. The PHTs provided education in sexual and reproductive health, distributed condoms through local clinics and village health workers, provided education on nutrition and support the local implementation of national vaccination campaigns (TCTA-LHDA, 2003).

Environmental Action Plan: Phase 1B⁷

Many lessons were learned in Phase 1A of the LHWP regarding environmental and social issues. For Phase 1B timely baseline studies were undertaken which culminated in a comprehensive impact study and an accompanying environmental action plan to mitigate the impacts of the Project. The studies were implemented by the Hunting-Consult 4 Joint Venture and received commendations from the World Bank as a model for future Environmental Impact Assessment (EIA) studies for similar large projects in developing countries (Wallis, 2000).

The Phase 1B EIA strongly recommended the need to also investigate the impacts on people living downstream of the dams. Furthermore, the World Bank's conditions for disbursement of the loan for Phase 1B required that a policy for the management of or compensation for impacts on downstream affected communities, and for the release of water for downstream aquatic ecosystem maintenance, called instream flow requirements, be developed and implemented. Instream Flow Requirement Studies were thus conducted and an Instream Flow Requirement Policy developed (TCTA-LHDA, 2003).

Due to the EIA studies, mitigation of the environmental and social impacts of the project started well ahead of construction including early consultation with the local affected communities to inform and prepare them for the construction activities and consulting with them on matters of resettlement and compensation.

Phase 1B supervision and construction contracts differed from the contracts for Phase 1A in the sense that the Phase 1B contracts included detailed specifications regarding the obligations of the contractors and supervision teams towards the welfare and accommodation of the local communities. For example, contractors had to recruit and train workers directly from local communities and both contractors and supervising consulting engineers had to employ full-time industrial relations, health and safety, and community liaison officers and environmental monitors (Wallis, 2003).

LHDA decentralized the decision-making process to the construction sites via field operations branches. These branches consisted of multi-disciplinary teams who could effectively attend to social and environmental issues (Wallis, 2003).

The need to include the NGOs (non-governmental organizations) in Lesotho in the design and implementation of the EAP of the LHWP led to the signing of a Memorandum of Understanding between LHDA and the Lesotho Council of NGOs in June 1999. Areas of cooperation included monitoring and evaluation, advocacy, community empowerment, service provision and delivery. In October 2000 eight NGOs were contracted with regard to the implementation of EAPs (TCTA-LHDA, 2003).

Compensation, Resettlement and Development

After consultations with affected communities, stakeholders, NGOs and government institutions, a revised Resettlement and Development Action Plan (RDAP) was formulated in 1997 consisting of Resettlement, Compensation and Development Plans. The RDAP aimed at:

- compensating households and communities for lost productive assets;
- resettling households that lost houses due to construction or inundation or that were deemed isolated or too close to the reservoirs; and
- sponsoring and facilitating the development of alternative sustainable livelihoods for affected communities and households.

After requests from the World Bank and the Environmental and Social Services Group within LHDA for a revised EAP incorporating substantial revisions, the Compensation, Resettlement and Development Plan was implemented in 2001. This policy linked resettlement, compensation and development more closely than before. Since households' indefinite dependency on compensation payments is neither socially or economically sustainable the Compensation, Resettlement and Development Plan embodied a two-pronged approach.

Firstly, the Food Security programme ensures that affected households are restored to the level of self-sufficiency they had before the Project was implemented. This is done through compensation payments based on the previous level of production from land lost to the Project (calculated over a period of 50 years) with payment either in cash or grain, and strengthening of the subsistence crop and livestock production systems. Secondly, the Opportunity Enhancement Programme seeks to assist households to achieve sustainable alternative livelihoods. Households thus have the option to have their annual compensation payments paid as a lump sum that could be invested in an income-generating enterprise. LHDA provides training and business planning support to households that have chosen this option (TCTA-LHDA, 2003).

The Phase 1B Resettlement Programme was undertaken in three stages. Stage 1 (pre-construction) resettlement of 99 households, Stage 2 (pre-inundation) resettlement of 226 households and Stage 3 (post-inundation) resettlement of approximately 150 households. People were offered the choice of resettlement in the rural Lowlands or in the capital, Maseru (LHDA, 2004a). A total of 3 353ha of arable land and 3 434ha of rangeland were lost due to the construction of phase 1B (TCTA-LHDA, 2003).

The Development Programme should be regarded as an integral part of the total compensation package and is intended to benefit, in order of priority, the affected households and villages, the host communities and those remaining in the Scheme Area, and the whole population of the region in which Phase 1B is located. Development was aimed in four main sectors: infrastructure, agriculture (including crop and livestock, forestry and fisheries), tourism and training and income restoration (Hunting – Consult 4 Joint Venture, 1997).

Public Health

The Public Health Section was established to improve and maintain the health of the workforce and the affected communities in the Mohale local catchment area. This section works in collaboration with the Mantsonyane and Roma hospitals and various clinics and is

responsible for the implementation of the public health programme, introduced by LHDA and to run until March 2006, to improve the health of the affected communities. The programme includes, amongst others, the development and distribution of materials dealing with STIs and malnutrition; provision of nutritional supplements to vulnerable groups (e.g. HIV and tuberculosis patients and the elderly), provision of contraceptives, immunization, VIP latrines, protected water supplies and refuse disposal systems and the establishment of community gardens to improve the nutrition of children aged five years and younger. A health monitoring system was also introduced (TCTA-LHDA, 2003; LHDA, 2004a).

Monitoring and evaluation

In compliance with the Treaty LHDA has to ensure 'the maintenance of the welfare of persons and communities immediately affected by the Project' (Kingdom of Lesotho, 1986: 71). Various institutions, including the World Bank, the European Union, DBSA, independent panels of experts, local and international NGOs and private consultancies were involved in the monitoring and evaluation of the Project to provide information on the financial, economic, physical and social impacts of the Project on affected households in both Phases 1A and 1B.

LABOUR RELATIONS

For each contract within the LHWP workers were, wherever possible, recruited from local villages. This ensured that the maximum possible number of Basotho from the areas directly affected by the construction of the LHWP benefited from the training and income on offer (LHDA & TCTA, 2001). Phase 1B contracts, however, aimed to increase Basotho employment in management positions. In 2000 Mohale Dam Contractors (MDC), responsible for the construction, were employing 900 local Basotho labourers and 90 management staff, 27 of whom were Basotho. On the engineering and construction supervision side, Mohale Consultants Group had a total staff of 51 in 2000 of whom 28 were Basotho. This was a major improvement from the position in the Katse contract when 170 expatriate management staff and 2 500 local Basotho labourers were employed (Wallis, 2000).

From the outset of the LHWP the contractors in both Lesotho and South Africa were concerned about potential labour disruption. Since the start of the project significant political changes have taken place in both countries with new democratically elected governments taking office in Lesotho in April 1993 and in South Africa in April 1994. Despite some civil disorder in Lesotho in 1994, both events passed with relatively minor impact on project progress. There were, however, some claims for a number of production days lost due to politically motivated strikes and labour stay-aways in both countries as well as for days lost during the elections themselves (Wallis, 1995). In September 1998 civil unrest broke out in Lesotho accompanied by SADC (Southern African Development Community) intervention and seven work days were lost with regard to the construction of Phase 1B (Wallis, 2000).

In September 1996 a serious labour relations dispute associated with the Transfer Tunnel and 'Muela power station contracts in Lesotho escalated into violent confrontation and resulted in the dismissal of 2 300 labourers. Workers of the 'Muela dam organized a series of strikes to protest, amongst others, the unequal treatment of workers from Lesotho compared to those from other countries (eg. Lesotho workers earned less than workers from South Africa), police harassment of workers and the contractor's dismantling of negotiating structures set up with the local construction workers' union, the Construction and Allied Workers Union of Lesotho (Tricarico, 2000). According to Wallis (1996:7) the fast approaching retrenchment of

the workers as the Transfer Tunnel and the 'Muela contracts neared completion had a negative influence on the workers and was a contributing factor to the strike. On 14 September 1996 the consortium of contractors building 'Muela called the police to evict workers from the construction camp, shortly after firing 2 300 Lesotho workers for 'illegally striking'. Five workers were shot dead and more than 30 were injured (Tricarico, 2000). After reaching a settlement, work resumed on 7 October 1996 with 1700 of the previously dismissed workers being re-employed (Wallis, 1996:7).

The Lesotho government responded to these events by appointing a commission of enquiry. However, no representatives of the affected local communities were included in the committee to undertake the investigation (Pottinger, 1998). According to Tricarico (2000:4) the commission's report was never released and neither the World Bank, nor the other funding agencies have ever commented on the events in the project construction camp.

According to the 2003/4 LHDA Annual Report (2004b: 18) 'the implementation of the LHWP Phase 1B contracts enjoyed much improved labour relations than Phase 1A contracts. Although there were several industrial relations incidents, all disputes were short-lived and none of Phase 1B contracts experienced any cost overruns from the consequent work stoppages throughout the five-year phase 1B construction period.'

To conclude, it seems that generally, apart from the strike in 1996, labour relations were well managed in the contracts of Phase 1 of the LHWP.

LESOTHO HIGHLANDS WATER REVENUE FUND

In 1991 the Government of Lesotho established the Lesotho Highlands Water Revenue Fund to ensure that the royalties paid to Lesotho by South Africa for the LHWP water were used effectively for the development of Lesotho. Under this Fund labour-intensive infrastructure projects have been carried out in all areas of Lesotho. By 1996 1 040 km of rural roads, three road bridges, 30 foot-bridges, 208 small dams (for water supply and irrigation), 10 diversion furrows, two clinics and a market place in rural or peri-urban areas had been built. In addition twenty soil conservation programmes were established and 32 328 trees planted. The Revenue Fund activities have generated much needed income for local communities as well as providing improved infrastructure services. Although the Lesotho Government manages these activities they are considered fringe benefits of the project (LHDA, 1996).

One of the key conditions of the World Bank loan to the LHWP was for the Lesotho Highlands Water Revenue Fund to be reformulated. In 1997-1998 consultations were held with relevant stakeholders to develop new rules and regulations as to how the Fund could be operated. It was also recommended that the Revenue Fund's name be changed to the Lesotho Fund for Community Development (LHDA, 1998) and in June 2000 the new name became operational. Some 1 400 individuals from affected communities were trained in rural livelihood skills that included masonry, sheet metal work, welding, basketry, knitting, sewing and poultry and vegetable production (TCTA-LHDA, 2003).

AWARDS TO THE LHWP

A number of awards have been bestowed upon Phase 1 of the LHWP including a most prestigious award when the Project was awarded the Project of the Century by the South African Institute of Civil Engineering (SAICE) in 2003 (LHDA, 2004b).

In 1990 the road to Katse (the Northern Access Road) won the award of the SAICE for the most outstanding engineering achievement and in 1991 the Malibamatso Bridge won the Fulton Award for Outstanding Civil Engineering in Southern Africa (LHDA, 1996). The Katse Dam was awarded the Most Outstanding Civil Engineering Achievement by the South African Institute of Civil Engineering in 1997 and won the Fulton Award for Excellence in Concrete Construction in 1998 (Wallis, 2000). In 1998 the Katse Dam also received a Special Recognition Award from the SA Association of Consulting Engineers (LHDA & TCTA, 2001).

The Delivery Tunnel North in South Africa has won several awards including runner-up in the Fulton National Awards for Excellence in Concrete Construction in 1995; winner of the Cement Manufacturers Association's award for Excellence in Commercial and Community Paving in 1998; awarded the National Premium Award for Integrated Environmental Management by the Environmental Planning Professions Interdisciplinary Committee in 1998; and awarded the annual National Award for Project Management Excellence by the Project Management Institute in 1999. Also in 1999 the SA Association of Consulting Engineers awarded an Excellence in Consulting Engineering award to the consultants of the Tunnel. The Tunnel also received an award for the Most Outstanding Civil Engineering Achievement in the international category by the SAICE (Wallis, 2000; LHDA & TCTA, 2000). In June 2005 the Concrete Society of Southern Africa awarded the Fulton Award for Civil Engineering and Construction Techniques to the Mohale Dam.

CONCLUDING REMARKS

The LHWP has, since its inception, been one of the major factors influencing economic activity in Lesotho. Lesotho's economy is based on limited agricultural and pastoral production and light manufacturing (clothing, textiles and leather) supplemented by royalties from the LHWP and the declining remittances from the mineworkers (TCTA-LHDA, 2003). Royalty revenues from the Project are critical for Lesotho to compensate for the declining remittances from migrant mineworkers. The project royalties paid to Lesotho, which will amount to US\$55 million per year for Phase 1, will account for 25% of Lesotho's total annual export revenues, and 14% of the Government's public revenues over a period of 50 years (LHDA, 1996). The total amount of royalties paid at 31 January 2004 to the Government of Lesotho is R1 220 million (TCTA, 2004). In 1998 the Project accounted for 14% of Lesotho's GDP and 28% in government revenues (TCTA-LHDA, 2003).

Lesotho has benefitted from the taxes and duties on the imports of various goods and services for the LHWP. Increased revenues from the cross-border trade have bolstered the Lesotho economy since the project started.

In a country with high levels of unemployment, the LHWP provided work for almost 14 300 Basotho's. After completion of the LHWP the trained construction workers will be able to work on similar projects in Lesotho or in neighbouring countries. Apart from direct jobs available on the construction sites, entrepreneurs involved in various trades have gained from the LHWP. For example, people became involved in pony trekking for tourists, entrepreneurs started roadside cement block plants to supply the large demand for bricks as towns along the new arteries expanded while other persons provide food at roadside footstalls.

The provision of infrastructure (roads and bridges) for the LHWP has opened up many parts of the country (mainly in the Highlands) that were previously inaccessible. Rural

communities have thus benefited from the infrastructure which makes remote areas within the project area more accessible. Following the construction of the northern access road between the Lowlands and Katse, minibux taxis started operating on the route offering entrepreneurs access to markets that were previously relatively inaccessible while rural people could access goods and services much easier. Water and electricity were supplied to remote areas and newly built clinics in the project area were accessible for locals. The Leribe Trauma Unit at the Matebang government hospital in Leribe, with high quality 24-hour intensive care facilities, is a valuable addition to Lesotho's medical resources and will be utilized by the general public after completion of Phase 1 of the LHWP.

The infrastructure set up in Lesotho for the construction of the LHWP will thus remain long after the project is completed. This offers great possibilities for further development. Tourism can increase as tourists visit the LHWP itself as well as the nature reserves, the Katse Botanical Garden, the cultural heritage site, Liphofung Cave, etc.

Programmes that formed part of the Rural Development Plans of Phase 1 provided training in various skills and income generation to the people. The agriculture and forestry component of the RDP intended to intensify agricultural use of the remaining lands to maintain and enhance income by educating local farmers in improved livestock grazing and farming techniques and by assisting farmers in seed multiplication and irrigated vegetable and fruit tree production.

'Muela hydropower plant was commissioned during 1998 and operated by LHDA to achieve energy self-sufficiency in Lesotho. Prior to the commissioning of the plant, Lesotho imported all of its electricity from South Africa.

However, the transfer of the benefits to the poor through various programmes has been slower. A 2002 World Bank evaluation of the project noted that the LHWP was a 'successful project that has met its major goals, although it is not yet close to meeting its social goals' (quoted in Mail & Guardian Online, 15 June 2004).

South Africa benefits from the LHWP since the water supplied to Gauteng will meet the province's current and future industrial and domestic water supply needs. Since water from the LHWP has very little silt, no dissolved nutrients and is unpolluted it increases the quality of the water in the Vaal River system, which has suffered deterioration from continued re-use and industrial effluent.

The economy of the eastern Free State province has benefitted from cross-border trade and transport of goods to Lesotho. During the construction of the Delivery Tunnel North in the Clarens area more than 1 500 jobs were provided to inhabitants of the Eastern Free State. The infrastructure in Clarens, Fouriesburg, Ficksburg and Ladybrand improved through the construction of new border crossings and improved amenities, community halls, clinics, houses, and improved water supply and sanitation systems. After completion of the Tunnel, TCTA transferred the infrastructure to the local district council and the Free State Department of Education. Tourism has developed within the newly created Maloti Route, providing opportunities for entrepreneurs in the travel, hospitality and transport industry (TCTA, 2004).

Having completed Phase 1 of the LHWP, discussion now centers on the many factors that will determine the feasibility of Phase II of the project. Many of the criteria used initially to plan the LHWP have changed since the Treaty was signed in 1986. Consequently, feasibility

and viability of future phases of the original plan have to be re-evaluated. Prefeasibility studies of Phase II are currently underway.

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Endnotes

- ¹ The Katse Dam is a double curvature concrete arch dam, 185m high and 710m along the crest, has 1 950 million cubic meter storage capacity and 38,5 square km surface area.
- ² The Mohale Dam is a 145m high concrete face rock-fill dam, 620m long at the crest and has 950 million cubic metre storage capacity.
- ³ The proposed OVTS would pump water across the Free State Province from a dam in the Orange River, just outside Lesotho, to the Vaal River.
- ⁴ These include the difference in the estimated capital costs of building each scheme; the cost of electricity saved by eliminating the pumping requirement on the original South African scheme; and the projected maintenance and operating cost savings between the two schemes (Wallis, 2000).
- ⁵ The Maluti, the currency of Lesotho, is equal in value to the South African Rand.
- ⁶ DBSA funded the feeder roads project of Phase 1B.
- ⁷ Chapter 2 of this review covers this aspect in more detail. Only an overview is provided in this chapter..

CHAPTER 2

Dams and Development An International Review of Trends and Issues in Policies and Practice

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INTRODUCTION AND BACKGROUND

Large dams have become one of the most hotly contested issues in sustainable development today.¹ Most of the contemporary issues in these debates are the result of a considerable widening of a global discussion concerning 'dams and development.'

The purpose of this background chapter is to provide some international trends and context regarding the many issues associated with the construction and impacts of large dams.²

The overall objective is to present some history and context to the changing range of positions and criteria adopted by the major players – including civil society, governments, International Dam Commission, the World Bank and the international financial institutions – on the investment in, and impacts of, large dams internationally. These issues are then related back into the specific experiences and progression of the Lesotho Highlands Water Project, especially with regard to resettlement, relocation, compensation and the environment.

The chapter will therefore cover the following major elements:

- the major questions and debates around large dams in an international context;
- more recent perspectives and positions emerging from the pro and anti dam lobbies;
- the changing perspectives and roles of the World Bank over time;
- current thinking regarding dams and development, especially after the 2000 World Commission on Dams (WCD), and how competing positions are being resolved; and
- how the Lesotho Highlands Water Project is affected by, and fits into, all of these issues.

This coverage is intended to enable researchers to more effectively contextualise and interpret the design, undertaking, reporting and interpretation of their respective work programmes, and consequently to enhance the outputs and results of the study in the best interests of all interested and affected parties.

TRICKLES OR TORRENTS: THE MAJOR QUESTIONS AND DEBATES SURROUNDING LARGE DAMS INTERNATIONALLY

For over 5 000 years water retaining facilities have been built to facilitate human development. The principal purposes have been for water supply, managing flood waters, storing water in times of plenty and distributing it in times of scarcity, thereby making water

available for domestic, agricultural and industrial use, and for harnessing hydropower, while often promoting inland navigation and providing recreation.^{3,4,5}

This last century, especially the period over the 1930's to the 1970s, saw most major rivers dammed for these purposes. Worldwide, the latter decade witnessed an average of two to three new large dams commissioned each day. By 1975 the United States, Canada, and the Western European countries had essentially completed their programme of construction of large dams, with the focus thereafter shifting to developing countries.⁶ At least 45,000 large dams (defined as higher than 15 m or with a reservoir capacity of over 3 million cubic metres)⁷ have been built to date, with nearly half of the world's rivers having at least one large dam. While some dams are more than 2 000 years old, most (around 73%) have been built over the last 55 years.⁸

Building Walls: Key Considerations in the Investment in Large Dams

Over this early era, the major supply side considerations underpinning the investments in large dams have generally been political, economic and technical. Large dams came to be considered as heightened symbols for (and a major component of) an emergent nationalism associated with particular models for modernisation – with this symbolic significance underpinning much of post colonial independence in the developing world.

Political imperatives are best exemplified by the super-power tussles over support for Egypt's Aswan Dam during the Cold War era – which saw the United States withdraw support following the creation of the developing world's Non Aligned Movement (NAM), to be replaced by Soviet assistance – the latter intended to 'drown' capitalism in Africa.⁹ Another example has been the rapid growth in centrally planned dam building during China's 1958–1960 Great Leap Forward and throughout the 1966–76 Cultural Revolution, the period witnessing the construction of 300 large dams and 340 reservoirs.¹⁰

Economic considerations in national planning worldwide have promoted dams for water and energy supply, and the simultaneous stimulation of regional economic development and job creation due to the demand created from rapid population growth and an associated urbanisation. In addition, large dams were invariably viewed as central instruments in creating export income from the sale of electricity, crops and through support for electricity intensive industries. These primary considerations remain a strong justification for much investment today.

During this period the main challenges addressed in the practice of dam development have been technical and financial (as well as partly distributional), dominated by the engineering and contracting professions who have continually refined knowledge in design and structure, and by the classical economists predominantly concerned with the aggregate returns and overall costs and benefits of the investments. Cross national collaboration and support internationally was generally spread along similar lines. Large international institutes located in the developed world research, collate and distribute technical and financial information and support regarding large dams to some 82 member countries.

At present two-thirds of the world's existing dams are in developing countries, with the five leading dam building countries accounting for more than three quarters of all large dams (China: 22 000 (46%) the U.S: 6 575 (14%), India: 4 291 (9%), Japan: 2 875 (6%) and

Spain: 1 196 (3%). The balance have built the remaining 23%, with Canada and South Korea leading with 2% or around 790 dams each¹¹

In many countries, large dams constituted the largest single investment project.

By 2000 large dams generated 19% of all electricity, with one third of all countries relying on hydropower for more than half of their electricity supply. In 24 countries, hydropower accounts for over 90% of power supply (such as in Brazil and Norway). Of an estimated 271 million hectares of land irrigated worldwide, between 30-40 % rely on dams.¹² Half the world's large dams have been built exclusively for irrigation.

Despite a growing social action over the past few decades, and an increasing body of research evidence emerging to the contrary, proponents of large dams have held the view that the advantages of most projects tend to outweigh the disadvantages. The aggregate justifications for the construction of large dams have tended to become conventional wisdom, unchallenged by their proponents and by beneficiary countries alike. Accordingly, large dams are viewed as capable of delivering multiple benefits.

As the World Commission on Dams notes: 'the hydropower, irrigation, water supply and flood control services were widely seen as sufficient to justify the significant investments made in dams, with other benefits cited as well. These included the impact of economic prosperity in a region due to multiple cropping, rural electrification, and the expansion of physical and social infrastructure such as roads and schools. The benefits were seen as self evident. When balanced with the construction and operational costs – in economic and financial terms – these benefits were seen to justify dams as the most competitive option.'¹³

Leaks in the Wall: The Local and Global Challenges to Large Dams

Many – if not most – of the conventional benefits flowing from the continued investment in large dams globally are now being met with increasingly vociferous, well informed and organised lobbies both locally and internationally. Beginning in the 1980s, dam performance – in both developed and developing economies – has come to be critically measured by many leading water resource organisations and more recently by large locally and internationally organized NGOs and social movements representing a strong emerging civil society perspective.

Growth in national and international agencies such as the Global Water Partnership, World Watch Institute, the Third World Water Forum, a Fourth World Water Forum, and the World Water Council¹⁴ ensures considerable resources available for researching, modifying and promoting a wide range of alternatives to conventional dams, associated water management practices and water use. Alongside these developments many consumer groups and the small NGOs representing dam affected people have grown to either form, or participate in, regional and national and international organisations. Some notables include the Narmada Bachao Andolan in India, the Transformation Resource Centre in Lesotho, Rivers Watch East and Southeast Asia, the Meso-american Forum against Dam Construction, the Brazilian Movement for Dam Affected People, and the Rivers for Life and the International Rivers Networks.¹⁵ Extensive North-South and South-South collaboration is becoming the norm.

In the main, these new water resource, environmental and social lobbies have begun to seriously contest the historical and more contemporary investment in large dams with respect to the following major issues:

- the escalating costs over the construction phases and the full life cycle of dams, leading to increasing country indebtedness;
- the transformation of water from a free, natural good to a limited natural resource, and its commodification as an economic good;
- an associated partial or full privatisation of water services, with an inequitable distribution of costs and in benefits internationally, nationally and locally;
- the redirection, break up and destruction of the world's natural river systems, with the associated negative environmental effects on complex ecosystems both upstream and downstream, such as the fisheries resource;
- the inequitable social and economic impacts resulting from these changes on indigenous communities whose historical resource use patterns and livelihoods are negatively affected; and
- the major consequences resulting from the extent and manner of relocation and resettlement, where women particularly have had little voice in expressing and controlling the changes in their status and roles in ensuring overall household health and security in livelihoods. Major issues of mitigation, compensation and reparation have come to the fore globally.

The contours of these contestations resonate differently across the developed and developing countries.

Many organisations now criticise the former for 'mistakes of the past',¹⁶ and for the export of expensive planning principles which can fail in different country and climatic contexts (such as the short-term spread of rainfall and associated differences in soils, sediment and salinity).¹⁷ Dams are held up as invariably failing to meet planned growth and especially distribution targets. Recipient countries are viewed as uncritically accepting many of the conventional development and growth paradigms associated with the building of large dams, especially given invidious local resource and capital constraints. The proportional (opportunity) costs of these major investments, especially in the smaller countries, are seen as limiting alternative, more socially productive investments. Adding to this, certain costs, such as those associated with silting and with decommissioning, have never been factored into dam economics, adding to host country burdens.¹⁸

The promises in the delivery of locally relevant and affordable infrastructure, energy and water reticulation are held to seldom materialise. Inappropriate large scale technology is held to promote a skewed, and high, consumption at high cost in the context of largely low income environments where affordability is a key constraint in accessing any resources becoming available (including irrigation and energy).

Technology choices for power, and the impacts of these on water resources are now a large part of the debate. 'Clean' solar and wind energy is viewed as a proven, viable and cheaper substitute for hydropower (into national and regional grids, as well as into local settings). This growing range of efficient, alternative technologies are now often considered more appropriate than large scale schemes for enhancing local energy supply, agricultural production and irrigation for livelihoods in and adjacent to the delicate wetlands and ecosystems that large dams affect.

The multi-cropping and dual harvest options often associated with the introduction of large scale irrigation – intended to enhance local and national food security and exports – are seen as overly costly, potentially destructive of the livelihoods of ‘targeted communities’, and capable of destroying the intricate production and social systems of villagers built up over generations and sometimes centuries. While the negative and positive contexts and consequences of these changes may vary by continent, region or crop, many have been accompanied by other macro-economic reforms in agriculture (such as policies linked to structural adjustment programmes) which have held to be disadvantageous to so many small producers.¹⁹

Given widespread settlement of indigenous people in (to be) affected areas in many developing countries, the local ecological, social and economic surveys of these circumstances and relationships undertaken in the planning and preparation phases for large dams – often by well resourced and externally based consultants – are held to more often simply justify the investments in dams than to establish appropriate short, medium and long term interpretations of the intricately interlocking positive and negative impacts.

Accordingly, the induced urbanisation and relocation that many large dams engender (and the rapid and large scale urbanisation that many large dams are intended to serve) is viewed as neither desirable nor inevitable. ‘Local is good’ is universally promoted as a viable alternative to the insecure, sometimes violent and expensive culture of production, consumption and exchange associated with a globalising ‘neo-liberalism’ coming to define the conventional urban-led growth models that most large dams serve. The support and promotion of the rural poor within a resourceful ‘civil society’ – composed of competent citizens controlling and developing their local resource, services, livelihood and lifestyle options – is argued as a preferred alternative to the accommodation of dubious, inequitable and disruptive consequences of large dams which inevitably focus on the urban middle classes.

Predominant supply side solutions to water management issues are also contested, and placed in contrast to alternative demand side (or demand led) strategies. These include a more effective water demand management, combining the rehabilitation of old infrastructure (especially both bulk and internal reticulation) with the education and tariff based incentivisation of industry, agriculture and residential areas in less wasteful water consumption (often with cross subsidisation). Along with water treatment and recycling, these options are held up as cheaper, more sustainable and less environmentally destructive alternatives to the further construction of large dams. In this regard, large lobbies in the OECD countries now successfully promote and ensure alternative demand led water resource development strategies in post-modern economies exhibiting low growth. As just one example, when cities and industries in northern France found water supply dropping due to an over-extraction of groundwater, the conventional options developed for a dam on a river some 50 km away or for a desalinisation plant – costing US\$ 1 billion – were rejected in favour of a simple tax on consumption, resulting in acceptable reductions and therefore sustainable groundwater supply.

These options are emerging in a context where many developed countries are now witnessing the decommissioning of dams (some 150 in the United States alone to date – where the rate far exceeds the building of new dams). There is now a large public investment, often driven by civil society, in attempts to restore original flow levels in river systems and to rehabilitate local ecologies while enhancing natural navigation and the migration routes of the fisheries

resource, for example. In the main, all are aimed at enhancing local livelihoods, directly or indirectly via tourism and recreation and through increasing the local resource, often within innovative forms of public-private-community partnerships.

Finally, there is what can only be described as a 'double paradox' in some developing country governments to many of these issues covered above. On the one hand, there is a critical reluctance to accept many of the alternative prescriptions and 'new ideas' emerging from the think tanks and social movements, seen as an imposition from the 'resource rich North'. On the other hand, there is equal reluctance to accept many of the more recent policies and prescriptions now becoming associated with the planning and construction of large dams. These 'create resentment in developing countries which see hypocrisy in societies that built huge, often destructive dams in their own countries but want poorer countries to adhere to environmental and social safeguards'.²⁰

Increasingly, the consequence of these latter positions is a trend for many poor countries to bypass, or ignore, both the 'alternative' and more conventional prescriptions, and to turn to those countries whose own experience in dam building has generally excluded both. China and reportedly Vietnam, are now 'in the market' for large dam building in South-East Asia and in Africa.

In sum, the major questions in the dams and development debate concern the determination of 'winners and losers'. Key to the debates is the gap between promised benefits and actual outcomes.

DAM BUSTERS AND DAM BUILDERS: RECENT PERSPECTIVES AND POSITIONS EMERGING FROM THE 'ANTI' AND 'PRO' DAM LOBBIES

Given these critical debates then, this section attempts to summarise the more recent positions of the many international social movements and to contrast these against the contemporary perspectives of those major organisations which continue to present large dam construction as a necessary and viable activity for the control and management of water resources – in support of growth and development.

Let the Water Speak: Civil Society Perspectives

Civil society movements are now receiving considerable support from the large donors. As noted members from local, regional or continental sub-organizations have mobilised to provide forums for activists, academics and affected people to exchange experiences, evaluate progress and to devise ongoing strategies to protect their rivers, cultures and livelihoods from the impacts of large dams. By 2002 this momentum resulted in the celebration of the 5th year of the 'Annual International day of Action against Dams and for Rivers, Water and Life.'

Some of the major organising principles and demands of this lobby were formally codified in 1997, at the 'First International Meeting of People Affected by Dams in Curitiba, Brazil', later to become known as the Curitiba Declaration.

These principles were strongly reaffirmed at the 2003 'Second International Meeting of Dam Affected People and their Allies', in a small village in Rasi Salai District, Thailand. More than 300 people from 62 countries met at the site of a successful struggle undertaken over more than a decade ago to reopen the gates of the Pak Mun and Rasi Salai dams, and to

rehabilitate floodplains previously submerged by the reservoirs. The Curitiba Declaration was expanded into The Rasi Salai Declaration. The text of the latter declaration is reproduced in full.

- We oppose the construction of all socially and environmentally destructive dams. We oppose the construction of any dam which has not been approved by the affected peoples after an informed and participatory decision making process, and that does not meet community prioritised needs;
- We demand full respect for indigenous people's knowledge, customary resource management and territories and their collective right to self determination and free prior and informed consent in water and energy planning and decision making;
- Gender equity must be upheld in all water and energy policies, programmes and projects;
- There must be a halt to the use of all forms of violence, intimidation and military intervention against peoples affected and threatened by dams and organisations opposing dams;
- Reparations must be made through negotiations, to the millions who have suffered because of dams, including through the provision of funds, adequate land, housing and social infrastructure. Dam funders and developers and those who profit from dams should bear the cost of reparations;
- Actions, including decommissioning must be taken to restore ecosystems and livelihoods damaged by dams, and to safeguard riverine ecological diversity;
- We reject the privatisation of the power and water sectors. We demand democratic accountable, and effective public control and appropriate regulation of electricity and water utilities;
- Governments, funding institutions, export credit agencies and corporations must comply with the recommendations of the World Commission on Dams (see next section), in particular those on public acceptance and informed consent, reparations and existing dams, ecosystems and needs and options assessments. These recommendations should be incorporated into national policies and laws and into regional initiatives;
- Governments must ensure investments in research and the application of just and sustainable energy technologies and water management. Governments must implement policies which discourage waste and over consumption, and guarantee an equitable distribution of wealth;
- The construction of inter- basin transfer schemes, river interlinking and other water mega projects must halt;
- The international carbon market must be eliminated;
- Waterways for navigation should follow the principle 'adapt the boat to the river –not the river to the boat'.²¹

The Rasi Salai Declaration further committed dam affected peoples' organisations to:

- Intensifying their struggles and campaigns against destructive dams and for reparations and river and watershed restoration;

- Working to implement worldwide sustainable and appropriate methods of water and energy management such as rainwater harvesting and community managed renewable energy schemes;
- The continuous renewal and revitalisation of diverse water knowledge and traditions through practical learning especially for children and youth;
- Intensifying exchanges between activists and movements working on dams, water and energy through reciprocal visits of affected people from different countries;
- Strengthening the movements by joining with others struggling against the neo- liberal development model and for global social and ecological justice; and to
- Celebrate annually the International Day of Action against Dams and for Rivers, Water and Life.

Moving Mountains to Maintain Rivers – Some Claims of Recent Gains

Dam affected people and their networks have adopted a wide range of strategies and interventions in support of their interests and rights. Much of this is regionalised and it is worth reporting on claims to date. Taking just two regions, Africa and South Asia, the following actions have been recorded recently.

For Africa, the Rasi Selai Convention gave birth to resolutions to form a continent wide African Rivers Network (ARN). In Southern Africa, a Network for Advocacy on Water Issues in Southern Africa (NAWISA) has been formed, which recently involved dam affected people in the regional follow-up processes of the World Commission on Dams (covered below).

In Zambia and Zimbabwe some 57,000 Tonga are uniting into dam affected peoples groups around the Kariba Dam, seeking reparations from inadequate compensation, to be done through the preparation of their own socio-economic study detailing the project's impacts, as well as the Government's and the World Bank's remaining obligations. At the Gariep and Vanderkloof dams in South Africa, affected groups are reportedly staging sophisticated campaigns demanding reparations for the negative impacts experienced from these dams.

Within the umbrella of the National Association of Professional Environmentalists, Ugandan NGO's have reportedly waged a high profile campaign to stop the Bujagali dam on the Nile, while promoting more appropriate energy options. They argued that the project would have destroyed the Bujagali Falls and produce power unaffordable to most Ugandans. Funding was from the World Bank and various export credit agencies. They successfully petitioned the Bank's independent investigative arm to examine various project problems, which subsequently validated their many concerns. This apparently pressurised the Bank to warn other funders about outstanding problems. Using the Ugandan legal system they reportedly obtained access to the project contract between the energy authority and a power company, AES. When scrutinised by independent reviews, it apparently revealed massive overcharging of Uganda for a risky project. The campaign is said to have led to AES, the project's Norwegian partners and its Swedish partner all withdrawing in 2003.²²

There are reports of strong NGO instrumentality in the postponement of the Epupa dam in Namibia and the Sondo Ondu-Miriu dam in Kenya. Nepad is also a target for attention from the international and continental networks, given plans to fast track 13 large dams in various countries, some encompassing large cross-boundary transfer schemes. The Chinese

government is also targeted, given that they are reportedly active in supporting large dam construction in Sudan (the Merowe dam), in the Congo (Imboulo) and in Ethiopia (Tekezze), following the reluctance or withdrawal of the International Financial Institutions (IFI's) who have maintained that the potential projects were too destructive.

In India, the famous Narmada Bachao Andolan led a strong non violent struggle using marches, occupations, hunger strikes, lobbying and the courts to stop dam construction in the Narmada Valley, apparently forcing the Japanese government and World Bank to withdraw from the Sardar Sarovar Project (covered below). A result was the formation of the aforementioned Inspection Mechanism in the Bank's procedures. In Nepal, civil society opposition against the Arun 3 Hydroelectric Project has reportedly exposed faulty planning and appraisal procedures in the World Bank system, leading to the Bank subsequently refusing funding for the dam.

Activist organisations, academics and affected people are reportedly joining together to form the South East Asian Solidarity for Rivers and People Network (SARP), which aims to fight India's proposed River Linking Project (RLP). This is being designed to link over 37 rivers from north to south and to construct 150 or so large dams at an estimated cost of \$122 billion. They are arguing that the RLP would disrupt rivers flowing from China, Nepal and Bhutan through India to Bangladesh, and that the plan lacks a comprehensive policy addressing human rights, environmental consequences and other trans-boundary concerns, which will lead to the devastation of livelihoods, cultures, ecology and socio-economic well being of millions of people. International linkages are being formed following the development of formal declarations and programmes of action, which include the use of national and international legal recourse.²³

Perspectives on the International Financial Institutions and Dams

Rasi Sali workshops also covered a thematic area called 'Financing River Destruction.'²⁴ Workshops reflecting on this theme covered the World Bank, the Asian Development Bank (ADB) the Japan Bank for International Cooperation (JBIC) and the export credit agencies, and considered, *inter alia*, how securing finance is often the weakest link in a dam project. In covering the record to date of social movements and NGOs in waging successful campaigns to 'stop projects and to change the policies of the financial institutions,' they assessed how campaigns highlighting the poor economics of large dams have proved most successful and prioritised new challenges to what they view as old problems, such as that of financial institutions often not complying with their own environmental and social policies.

Suggested campaign strategies for the future are ambitious, and likely to comprise of community based research on dam impacts, shaming financial institutions for violations, and providing innovative alternatives while challenging destructive projects through the World Bank Inspection Panel and other available appeal mechanisms. In addition, they intend to 'educate the media, governments and the public about the impacts of dams.'

Developing New Walls: The Contemporary Justification for Large Dams

In contrast to these positions, established international organisations and governments continue to look at the challenges of water and energy development from within an 'aggregate' supply side perspective informed by the contemporary requirements of nation building and by competing demands in resource allocation. They maintain that dams have generally performed well as an integral part of water and energy resource development

strategies in over 140 nations, and with exceptions have provided an indispensable range of water and energy services. They also argue that at an aggregate level, these investments provide indispensable support to many smaller countries in generating the resources which allow for large increases in social spending.²⁵

Most contemporary positions within this view also now formally acknowledge the growing influence over the last three decades of the UN Declarations. These include that on the Environment, the Club of Rome's 'Limits to Growth' manifesto in 1972, the UN Brundtland report on Sustainable Development of 1987 and the 1992 Rio Declarations and its Agenda 21 Programme. The impetus for new Water Resources Management (WRM) policies in the multi-laterals, leading to the present expansion of Integrated Water Resource Management (IWRM) as a key tool in water infrastructure planning, has been acknowledged to have been a result, particularly, of the Rio Summit.

All have contributed to the incorporation of basic social and environmental and distributional principles and guidelines into present planning precepts regarding dams and development.²⁶ Comprehensive environmental, socio-economic, equity and gender planning is now a contemporary *sine qua non*.

Present justifications for large dams are now qualified by their major role in contributing to an overall 'poverty alleviation' and to 'sustainable development'. Taking the International Commission on Large Dams (ICOLD) as a leading proponent of this 'school',²⁷ this organisation has moved over the past few decades from an initial narrow advancement of the art and science of water resource development through technologies for dam construction, to a 'mid point' recognition of the risks of dams to third parties and to the environment for example, and then towards a present justification for large dams now being conditional on the assessment of the 'new' environmental and social criteria covered above.

In summarising current thinking, the overall perspective emerging is that the interrelated global concerns arising from:

- a growing water scarcity and increasing competition between the three predominant uses (agriculture consuming 67%, industry 19% and municipal/residential users some 9%),
- persistent pockets of 'regionalised' poverty and the unprecedented changes in many countries economic growth patterns and urban development demands (vide contemporary India and China),

together justify a continued role for large dams, especially in the developing countries. For example, ICOLD's current mission statement includes the promotion of technically safe, ecologically and economically sustainable dam projects.²⁸ As the leading international organisation promoting large dams, their particular justifications also warrant covering in more detail.

ICOLD now justifies the primary benefits of large dams as follows;^{29,30}

Water Supply for Domestic and Industrial use

Since the availability of clean water of appropriate quality remains one of the fundamental requirements for socio-economic development and given a past overuse of aquifers (with current recharge rates much lower than extraction regimes), their position is that water supply

has to be augmented with storage from precipitation in large reservoirs. They argue that the world's growing cities will continue to depend on water stored in reservoirs in high flows, and used during periods of low rainfall, especially critical in the world's arid regions targeted by the Commission, most of which are poor. They note that water extraction from freshwater sources has increased by a factor of 35, and world population by a factor of 8 over the past 3 centuries, with global water demand expected to rise by further 2-3 % annually,³¹ placing new demands and challenges on the management of water resources. Their estimates used indicate that by 2025, a total of 3.5 billion people will be living in water stressed countries, with more than a billion people in 1999 accessing less than 50 litres a day.

Water for Agriculture and Food Production

ICOLD uses estimates that 80% of future additional food production will come from irrigated land. In 2000, agricultural irrigation was held to account for 1174 litres per capita per day. Presently less than 20% of the land suitable for irrigation is under such use, and it contributes about 33% of world food production. They quote the United Nations Development Programme (UNDP), which aims for a 3 percent compound growth rate in irrigated agriculture to meet the needs of an extra 1 billion people over the next 10 years, and related estimates which suggest the requirement of an increase in water supplies of between 20-25 % by 2025. Again, arid regions in developing countries are targeted as areas most in need. Despite improvements in irrigation technology and efficiency, they maintain that more reservoir projects will be required.

Flood Control

Regulating river levels and downstream flooding through temporary storage and subsequent release is the major role of many large dams historically – and the present major purpose of many dams under construction. Some 40 percent of all fatalities from natural catastrophes worldwide (about 100,000 annually) are flood related and the most effective control method is held to be accomplished by a number of multi- purpose dams strategically located in a river basin, capable of also providing the multiple benefits of water supply, irrigation and hydropower.

Hydropower

At present hydropower – as a clean, efficient, dependable and renewable source of energy – accounts for 20% of electricity production and about 7% of total energy production worldwide. ICOLD holds that for countries with a large developmental agenda, these attributes offer the technically most advanced and most economical source of renewable energy. Only 20% of the world's estimable hydropower has been developed, the areas with the greatest potential being Asia, South America and Africa. This view is bolstered by the estimate that some 2 billion people have no access to electricity, within the obvious context of an increasing demand.³²

They note the recognition given to the role of hydropower as one of the renewable and clean energy resources at both the 2002 Johannesburg World Summit on Sustainable Development (WSSD) and at the 2003 Bonn Renewables Ministerial Conference. This endorsement is also welcomed given the current global discussion of the future of oil and the implications and potentials of the end of cheap oil. They also maintain that most 'alternative' energy sources are more expensive than hydropower, incapable of providing large amounts of power, with many requiring back up systems for the periods when their wind and rain sources are weak.

As alternative options to large scale power production, nuclear and coal fired plants are also viewed as having much more serious environmental concerns than dams.³³

Taken together, these views reinforce the positive aspects of a continued investment in large dams.

WHO MOVED THE BRICKS? THE CHANGING PERSPECTIVES AND ROLES OF THE WORLD BANK

As the major multi-lateral financial institution tasked with supporting developing countries, the World Bank's perspectives on large dams comprise a significant contribution to the debates. Despite the various points that the Bank's role in financing large dams in developing countries is not as significant as might be expected, its role in driving, designing and attempting to refine global and national policies and practice in member countries is considerable.

During the 1970s, of an estimated 5500 dams built, Bank financing was provided for some 3.5% or about 192 of these dams. Over the next decade, its rate of involvement fell to about 2 percent while in the 1990s, it dropped to 1.5 % (60) of the approximately 4000 large dams constructed. Current World Bank loans comprise just 0.6% of financing for new dams.³⁴ Its involvement has therefore been declining, with a greater focus on financing dam rehabilitation and safety than on new dams. Most recently however, the Bank is re-engaging in some significantly large ventures in different regions, within the context of a range of new policy principles and criteria for engagement, covered below.

Its complimentary role over the period covered has been in the development of summative (globally and regionally derived) research perspectives and policy. For the purposes of this chapter, the development of lessons, perspective and policy on the two most significant themes associated with large dams are covered. Both Resettlement and Relocation (R+R) and Water Resource Management have received extensive attention. With regard to the former the Bank has noted;

‘together with damage to the environment, some of which is caused by the projects requiring resettlement, the allegations about mishandling of resettlement are among the more formidable challenges facing the Bank in demonstrating that it is a responsible and caring development agency.’³⁵

Much of the resulting knowledge base has been aimed at refining practice –given the growing body of findings internationally which revealed alarming track records within many national agencies in managing these aspects of both large hydropower and irrigation schemes. More recently, new policy is currently being introduced ‘ex ante’ – in revised operational policy guidelines and best practice safeguards in project appraisal and preparation stages globally.

Policy Waves: The Ongoing Development of Policy and Perspective on Resettlement and Relocation

Despite being the first multilateral agency to issues guidelines for involuntary resettlement as early as 1980, persisting problems on numerous projects over the next two decades became one of it's most critical issues. An early 1986 operations evaluation confirmed very uneven performance in its portfolio regarding resettlement and relocation, as well as with compliance, resulting in the strengthening of Resettlement Guidelines in 1986.

Notwithstanding these guidelines, the Bank continued to face increasing problems on involuntary resettlement in numerous projects, one of the most volatile being the raging controversy over India's multi-dam project on the Narmada river, which is held as sacred by Hindus. Numerous complaints about the Narmada Sardar Sarover Dam and Power Project from India's urban elite and rural poor alike covered allegations that the Bank was violating its own policies – especially in relation to involuntary resettlement. These warranted the unprecedented initiation of an independent review by a former Congressman and UNDP Administrator.

This project had been designed to irrigate 2 million hectares and to bring drinking water and electricity to 30 million people. Achieving these laudable goals however would have displaced and deprived some 41,000 families of already poor people of their lands, and canals would affect the land of an additional 68,000 people. Arrangements for compensation and resettlement of these project affected people were widely regarded as inadequate.³⁶

The negative outcomes in the review raised bells within the Bank, leading to a further full review of the entire portfolio of Bank projects to determine the level of compliance with resettlement policy beginning in 1993, just when the emerging lessons from the "Early Experience with Involuntary Resettlement" – covering 4 completed dam projects on 3 continents and initiated in 1980, was published.

The main conclusions of this early work were that three of the projects failed to provide fair eligibility and entitlement criteria for resettlement and relocation, that the processes failed to maintain pre-project family incomes and that the majority of resettlers were dissatisfied with both compensation and for lost assets in resettlement to new homes, farms and into other occupations.³⁷

This set the scene for a continuous and rigorous engagement by the Bank with these essential elements of resettlement. Many subsequent reports emerging from the Environmental Department for example were;

'unable to confirm any significant progress with results on the ground, especially towards what the Bank's then resettlement policy defined as the acid test of all programmes- the *restoration of incomes and standards of living* of project affected people.'³⁸

During the preparation of the aforementioned 1994 'Bankwide Review of Projects Involving Involuntary Resettlement', the internal supervision of resettlement had apparently tripled (presumably in terms of resources and manpower allocated), with Bank attention reaching 'unprecedented heights'. The results of this review revealed improving trends in the planning for projects since 1990, but were severe in showing that for completed projects '*the weight of available evidence pointed to unsatisfactory income restoration more frequently than to satisfactory outcomes*'.³⁹ These limits led to a 'crackdown', with senior management giving its operating regions 6 months to produce Regional Remediation Action Plans (RRAP's) aimed at correcting project specific problems and devising processes to improve future preparation and implementation for resettlement operations.

Subsequent internal reporting showed that this 'mainstreaming' of resettlement had led to a marked reduction in projects with problems in resettlement, although many concerns remained, particularly regarding the lack of supervision on larger resettlement projects and

limited data and knowledge around the key thematic in resettlement, namely *income restoration* which was to be defined as the;

*'key outcome question – which remains to be fully demonstrated in the projects designed after the major revision of the relevant operational directive in 1990'*⁴⁰

The balance of Bank research in the 1990's covered anthropological, sociological and economic investigations⁴¹ into many contemporary aspects of resettlement, the impacts of which now resonate strongly across the globe. The first, 'Recent Experience with Involuntary Resettlement'⁴² covered the comparative experience and record regarding the *standards of compensation, physical relocation and restoration* of incomes across 8 major large dams in 4 continents.

Two were in China – with a combined total of 29,000 families affected, two in India (47,650 families affected), and one in each of Brazil (9 200 families), Indonesia (5 400 families), Thailand (1 700 families) and Togo (1 800 families). This sample – representing 8 of the largest of 141 Bank assisted projects involving resettlement – was chosen since dam projects, while making up only 27% of Bank resettlement projects, accounted for 63% of all displaced people. Dams were also held to displace more than 3 times as many people as non dam projects, the size of these impacts therefore making them the critical test case for implementing the Bank's resettlement policy.⁴³

The evaluations found that the many and widespread failings in the projects 'were not so much due to a lack of attention, but more to do with difficulties in achieving Bank objectives.' Some emerging lessons and recommendations from this process are summarised below;

In Planning

Findings showed that planning had received disproportionately more attention in comparison with results – the latter held as the 'appropriate touchstone for quality management'. Resettlement itself continued to receive inadequate attention from executing agencies and from Bank supervision. Furthermore, the public sector agencies were found to be – in the main – limited in their capacity to handle resettlement, with some ignoring it.

The *economic rehabilitation* of resettlers was found to be the weakest aspect of resettlement planning. Planners either failed to address the operating constraints adequately or avoided the issue until it was too late to implement an optimal strategy – and were forced into second best or no solutions at all. Intelligent planning did not necessarily imply micro-planning – findings showed that 'a general structure of plausible economic options were enough to establish a basis for budgeting and initiating interactive implementation with resettlers – in a regional context- after which real lessons about feasible and popular options can be absorbed and fed back into the cycle.'

It found that relying on the regional economy to 'take up the slack is risky, especially where economic prospects are uncertain and where the regional economy cannot quickly absorb excess displaces. Plans with a combination of land and non land options, flexible models and fall back positions are necessary.' (The Thailand and Indonesia projects had demonstrated how resettlers were 'picked up and carried along by the tidal changes in the regional economy even without planning.')

In Implementation

Here it was found that an 'excessive reliance on paper plans is dangerous' and in terms of the need for action and results 'on the ground', Bank portfolio improvement could be best effected where 'the point of attack was clearly shifted from policy and planning – to procedures and practice.'

In Compensation

Results showed that compensation in land required early management – since it is the most difficult component of the dam related compensation package to get right. The studies indicated that 'land prices spiral beyond all reasonable budget limits when large numbers of resettlers take unrestricted cash packages and compete for a limited land pool – and that by counting heads, identifying opportunities for land based employment and broadening the search to take up the excess' (as done in China), this can be managed effectively.

Findings endorsed the need for cash options however, given that the most enterprising settlers tend to do best on their own and reduce the economic and management burden of the resettlement operation, but cautioned that such instruments do not work everywhere.

Rehabilitation: Income Restoration and Improvement

In planning for land based as well as non-land based occupations, it was found that it is essential to be realistic about the resource base, the activities it can support and especially the skills and traditions of the displacees. Attaining a diversity of income streams was found to be important – to avoid market saturation and exhaustion of the resource base – with proper identification of assured market channels before venturing into new crops, products or services.

Most successful resettlement experiences in the study were either non-land based or very land intensive, with almost all self-resettled households moving to non-land based economies. Recreating existing production systems – while sounding culturally superior – was held as often not feasible in dam resettlement.

The study findings contributed to the following summative view at the time;

'Diversification after displacement almost always implies greater risks, harder work and the loosening of family and community bonds. Those interruptions to the previous lifestyle along the river – while they can and should be mitigated – are usually inevitable and characteristic of a modernising economy. They do not mean the resettlement programme has failed. Conversely, fairness and equity require that the disruption in the quality of life of affected communities should not only be compensated but also be managed to their advantage. The emphases should shift from restoring income levels, which can suggest recovery to – but stagnation at – pre dam lifestyles, to improving income levels, which brings the displacees into the development process along with the projects primary beneficiaries. Restoration must be treated as the minimal acceptable outcome, even though for some programmes that target will be difficult to achieve.'

Participation by Resettlers

Earlier lessons on resettler participation appear to have been absorbed, with surprisingly high participation rates. Yet the findings suggested that the Bank should focus even more on

strengthening local organisations, since the 'impact of aggressive interventions by representative self-help authorities can be astonishing.' It also noted that resettler organisations can however guide their membership into inappropriate packages – misjudging their interests into unrealistic and faulty solutions.

Participation by NGO's – viewed as insufficient in the sample – was endorsed as the logical choice, especially in doing baseline socio-economic surveys, organising resettler participation and generally intervening at grass roots level.

Monitoring and Evaluation (M+E)

M+E was viewed as essential for verifying income restoration and resolving unexpected problems of implementation and rehabilitation – yet was inadequate at the beginning of most projects – but improved after the late 1980's. They found that M+E was often closed down at the completion of civil works when donor funding for projects tended to end.

On Bank Performance

While the study showed limits or no improvement in certain areas, most notably in 'assisting borrowers to avoid unnecessary resettlement operations or reducing the scale of unavoidable displacements', it provided excellent results in the extent to which the Bank was actually capable of influencing the resettlement policies of borrowing countries, with generally a broad acceptance of its resettlement policy. However, it noted that there was no evidence that the attention to resettlement during implementation was being as yet mainstreamed. Where there was success, task managers – usually engineers – were aggressive in supporting the resettlement component. The commitment of task managers was found to be the crucial component – alongside specialist settlement support. Generally the anthropologists and sociologists have had to persevere without such support – and the study found that 'much harm could have been avoided by paying more attention to them than in the past'.

The work also showed that the Bank had not used suitable instruments or displayed perseverance to support its policy, and that it needed to be more involved upstream and downstream of the engineering project cycle. In other words, the initial plans for resettlement should be on the table by the time the engineering plans are appraised, with the agencies responsible for resettlement tested in the field. The view was that the Bank should take responsibility for ensuring that these preliminary conditions are met before construction.

Borrower Performance

Findings clearly indicated that a genuine borrower commitment to doing resettlement well was the key to success – since many bland assurances, conveniently forgotten, tended to guarantee failure. In two cases of the six countries, borrowers were held to exceed Bank standards and were actually leading and teaching the Bank! They noted that where some borrowers had made major progress, this cannot be assumed to continue since new administrations or personnel may have different convictions. In all cases, adequate resource allocations were considered essential in creating an enabling environment – and one which should outlast the construction period.

Major recommendations arising were

That the Bank adjust its paradigm for involuntary resettlement caused by large dams if it is to achieve its overarching *income* objectives for this subset of projects, and should dismiss the

NGO derived demand that it choose between land for land or no dam, and rather look at a mixture of land based and non-land based strategies. *At the same time it was held that the Bank should begin to shift its emphasis from restoration – to improvement – of incomes and living standards –thus opening the way for those displacees who are motivated and capable of moving from their valleys to take a new place in the regional or national economy – as an integral part of the projects development objectives.*

In other words ‘the design of the infrastructure project must not only provide water, power and other conventional benefits below the dam, but also be part of regional development plans shaped to support the affected families.’

The study emphasised that the Bank clarify what it means by income restoration and income improvement. A clearer specification of objectives, alternatives and time horizons were needed in planning and for monitoring and evaluation. Many issues arising from this were raised, including:

- what are adequate incomes if the entire region is booming- or is in decline?
- what percentage of resettlers can be expected/permitted to fail, given that there existed a spectrum of household circumstances prior to the dam?
- similarly, what percentage of farmers can remain below the threshold if the average has already moved up?
- do short term fixes such as monthly supplements, ever count? and
- does a resettlement option succeed if the plans do not work, but incomes are lifted anyway by co-incidental developments in the regional economy?

The study held that in most instances the upheaval associated with relocation should be managed as a development opportunity, and be funded accordingly. While restoration is an appropriate short term objective, improvement in the productivity, living standards and lifestyles of the displacees is as valid a long term objective of the projects as are the improvements planned for the project's primary beneficiaries.

Final recommendations were for the Bank to adopt a new institutional approach to reservoir resettlement, given limits in public sector capacity (except in China's command economy), to creatively design income generating options well suited to settler capabilities and needs, with the NGO's and private sector called on to make greater contributions. Although resettler participation was noted as growing, often it improved only after governments and the Bank reacted to resettler resistance, correcting earlier shortcomings in resettler participation in establishing compensation rates, resettlement options and rehabilitation plans. *The message of this work was that the Bank should support its resettlement strategy by sending strong signals to the Borrower of the Bank's unwillingness to participate unless the essential elements are in place, including demonstrable borrower commitment.* The adjusted paradigm should be configured to private as well as public sector sponsors, with the policy offering to the private sector the same clear standards for compensation, flexible tools for generating employment and independent arrangements for monitoring and evaluation.

Some Synthesis and Integration

Much of this emerging model for resettlement was explored more fully in the Bank's 1999 'The Economics of Involuntary Resettlement'.⁴⁴ This magnum opus sought to create a

theoretical and methodological integration between economic and social knowledge in resettlement overall – and was aimed at promoting policy perspectives for a more inclusive development and wider economic recovery for resettlers, increasingly held to be at the heart of a local growth oriented perspective in resettlement overall.

In summary, this work:

Built up the argument for more specialised economic enquiry as well as for cross disciplinary knowledge development, highlighting the limitations of cost benefit analysis and the risks of impoverishment through displacement. *It assembled evidence which showed that the under financing of resettlement was pervasive, undercutting project outcomes as well as the improvement of resettlers lives. It noted the challenges to the economics of 'projectising' resettlement was to shift from the shortsighted economics of merely compensating the displacees to an economics of support for resettlers full recovery and for growth enhancement.*

In examining existing economic methods and practices it drew parallels with environmental economics, discussed the unsatisfactory treatment of externalities and made important recommendations for improving the economic and financial foundations for resettlement.

In moving to the practicalities of resettlement planning, a major comparative analysis was made between voluntary and involuntary resettlement programmes, which revealed unjustified disparities between the two categories. It pointed to recurrent under-treatment of forced resettlement, noting the large potentials for improving forced resettlement by adopting the methods used in voluntary resettlement.

This was followed by a focus on poverty reduction in resettlement in India, testing the adequacy of the 'risks and reconstruction model of resettlement', and discussing each of the major risks of impoverishment through displacement. It shows how these risks convert into real impoverishment – outlining the counter actions necessary for avoiding or mitigating economic and social risks.

The final chapter explored the critical issue of benefit sharing in projects entailing forced resettlement – demonstrating that 'financing settlers recovery can be accomplished not only through up front pre-project budgetary allocations, but also through explicit provisions for channeling some of the project benefits to people adversely affected. They should not be excluded from the benefits of the developments that they make possible, and should instead be explicitly included. In short, they should share in the gains and not in just the pains, of development.'

Options for benefit sharing were explored- and were recommended as one key strategy for increasing the financial feasibility of a '*resettlement with development.*'⁴⁵

The Far Side of the Wall : Water Resources Management

Dam and development debates are irreconcilable without a discussion of policy and perspective in the water resources sector overall.⁴⁶ Dams, as infrastructure for water management, now fall squarely within the context of more contemporary integrated water resource management and development strategies. Much of the shifts in current thinking within this school are contained in recent World Bank Strategic Directions regarding their

engagement in the water resources sector. These serve to continue to promote the financing of large dams within a wider set of water resource criteria and conditions.⁴⁷⁴⁸

The most comprehensive contemporary development of thinking in integrated water resource management (IWRM) overall is contained in the work of the Global Water Partnership. Their definition encompasses 'a process which aims to ensure the coordinated development and management of water, land and related resources to maximise social and economic welfare without compromising the sustainability of vital ecosystems.'⁴⁹

However, progression in the World Bank with water resource management (WRM) is the key to interpreting the many changes underway in relation to the investment in, and impacts of, large dams. For the Bank, water resource management generally encompasses all of the institutional frameworks (legal, regulatory and organisational roles), management instruments (regulatory and financial) and the development, maintenance and operation of infrastructure (including water storage, structures and conveyance, waste water treatment and watershed protection). As noted elsewhere in this chapter, an earlier 1993 Bank WRM policy paper reflected the broad consensus forged during the Rio Earth Summit process and was innovative in incorporating three fundamental principles (namely the Dublin Principles) into an emerging and more comprehensive interpretation of the underlying requirements for a wider water resources management.

The first of these Dublin principles is the *ecological* principle – which argues that the independent management of water by different water using sectors is inappropriate. It is the *river basin which should be the ideal unit of analysis, and that both land and water needs to be managed together*, with much greater attention to the environment. The second is the *institutional* principle – which argues that WRM is best done when all stakeholders – including the state, the private sector and civil society, and particularly women – participate within the context of a respect for the principle of *subsidiarity*, with its implications for actions taken at the 'lowest' appropriate level. The third is the *instrument* principle, which argues that water is a scarce resource and that greater use needs to be made of *incentives and economic principles in improving allocation and enhancing quality*.

Accumulated Bank experience with WRM internationally over the past decade recognises the many significant national, regional and local gains from the introduction of major water resource projects in both developed and developing areas. This record has however also shown how the growth and poverty reduction potential in large water infrastructure projects has often been undermined by the tendency for 'the means to become the ends' in the rush to build the major works, without a suitable assessment of different options for meeting human needs – and for considering both structural and non-structural alternatives. A result has been the construction of too many dams and other infrastructure that have been economically, socially and environmentally destructive, with insufficient attention in such projects to those who had to be resettled and those adversely affected by changes in river flows. *There is now broad consensus that those directly affected must be made the first beneficiaries of such infrastructure, and growing experience that with commitment and ingenuity, this is usually possible.*

The present World Bank view is that an effective water resources management and development is central to sustainable growth and poverty reduction (and to the Bank's mission). Therefore its fundamental role in WRM is to be realised through four different mechanisms, or instruments.

The first comprises a suite of broad based policies and investments that affect the development and management of water *resources* (including major infrastructure such as dams and inter basin transfers) which provide those national, regional and local benefits from which all people, including the poor, can gain. The second are poverty targeted policies and investments designed to improve catchment quality and provide livelihoods for the poor (since it is usually the poor who inhabit degraded landscapes). These are assuming an increasing major significance within the Bank portfolio. The third are broad based policies and investments in water *service* interventions (aimed at improving the performance of utilities, user associations and irrigation departments), which benefit everyone, including the poor. The fourth are poverty targeted water service interventions (such as water, sanitation and irrigation services for the under-served poor), which are held to play a major role in reaching some of the Millenium Development Goals.

The decade also provided the basis for the Bank view that the potentials in the international co-operation on waters are capable of providing broad based economic development and regional security (with projects such as the Indus Treaty, Lesotho Highlands and regional initiatives for the Nile and the Mekong quoted). The Bank argument is therefore that all citizens in the riparian countries can reap the direct economic benefits, along with a 'security dividend' which under certain circumstances can be a powerful catalyst for broader co-operation, growth and security and which does not bypass the poor.

For the Bank, the main management challenge is to now achieve 'a pragmatic and principled approach' which respects the principles of efficiency, equity and sustainability, but recognises that water resources management is intensely political and that reform requires the '*articulation of prioritised, sequenced, practical and patient interventions.*' They maintain that there remains a very real need to assist countries in developing and maintaining appropriate stocks of well performing hydraulic infrastructure such as dams and canals and inter-basin transfer schemes -since many developing countries have as little as 1% of the infrastructure developed countries with comparable climatic variability – and with most harnessing a small fraction of hydropower potential.

Patterns in Bank engagement to date have been marked by concerns over its tendency to disengage from 'difficult, complex' issues, and there is an internal view that it has been losing it's credibility as a full service investment and knowledge partner. At the same time outside perceptions are that it is still one of the few institutions that can provide integrated support on all of the macro-economic, financial, technical and social and environmental dimensions in water resource management. Therefore their current position is that it should 'up' its engagement in the full range of water infrastructure and management issues in countries which have investment choices, if it is to remain a credible knowledge institution.

In the main, Bank WRM strategy is intended as a broad set of principles for engagement, not as an inflexible set of prescriptions. Its appropriateness to any country or region at any particular time will necessarily involve general adaptations to specific economic, political, social or cultural and historical circumstances, while attempting to simultaneously be consistent with the Bank's overarching Country Assistance Strategies (CAS) as well as with the specific Poverty Reduction Strategy Papers (PRSPs). The approach being adopted is to develop new instruments in the form of Country Water Resource Assistance Strategies (CWRAS) aimed at defining the specific water resource challenges and development opportunities, to integrate these into the normal three year planning and lending frameworks

for that particular government, and then to disaggregate specific activities from the broad Water Resource Management Strategy into explicit programmes of Bank lending and non lending support in the water sector.

THE WORLD COMMISSION ON DAMS AND THE CURRENT STATE OF THINKING ON DAMS AND DEVELOPMENT. HOW THESE COMPETING PERSPECTIVES AND POSITIONS ARE BEING RESOLVED.

It was international NGO criticism (especially from the International Rivers Network) to a World Bank study of its experience with large dams, which inadvertently led to the establishment of the World Commission on Dams (WCD). The ensuing outcry to this report led some 35 Bank, NGO, industry, academic and other experts to meet in Switzerland (with financial support from the Bank and the International Union for the Conservation of Nature among many others), where agreement was reached on the need for a Commission.

This 1997-2000 World Commission on Dams has been a watershed process in the chronology of the debates. Its brief was to review the developmental effectiveness of large dams and to assess alternatives for water resources and energy development, as well as to develop internationally acceptable criteria, guidelines and standards (where appropriate) for the planning and design, appraisal, construction, operation, monitoring and decommissioning of dams. As such, it was the first independent global review of the performance and impacts of large dams, with public consultation and access key components of the process. Sixty-eight members representing a cross section of interests in the public, private and civil society spheres came into the WCD forum. Its work included eight detailed case studies of large dams (in developed and developing countries),⁵⁰ country reviews for India and China, Russia and the newly independent states, a cross check survey of 125 existing dams, 17 Thematic Review papers and reviews of more than 900 submissions to the Commission.

This section covers the main findings and the subsequent principles developed by the WCD. The approach was normative, testing the extent to which large dams had met their targets set by their proponents, and aimed at understanding the 'why, how and where' many large dams had failed to achieve their intended outcomes – or produced unintended consequences. This scope of work was 'not about dams as such, but about options for water and energy development – especially in light of one the challenges facing this new century – the need to rethink the management of water resources.'⁵¹

Before documenting the main findings however, the summative findings and emergent principles of the thematic studies most relevant to the Socio-Economic investigations of the LHDA projects are covered. These were contained in the Social Reviews covering Equity and Distributional Issues, and the Review concerning Displacement, Resettlement, Rehabilitation, Reparation and Development.⁵²

Thematic Review: Social Impacts of Large Dams: Equity and Distributional Issues

This unprecedented review of international experience in social impacts defined the debate as revolving primarily around whether the positive economic benefits of dams (flood control, electricity, irrigation, water) outweigh the costs (disrupted downstream economies, full costs of settlement). It sought to assess the way in which the positive and negative impacts are distributed between people (between evacuees and electricity consumers, or between men and women of either group) and whether this distribution is equitable.

It defined social impacts as 'impacts on the lives of individuals and people or groups or categories of people, or forms of social organisation'. These were viewed as distinct from environmental or economic impacts, while at the same time both are closely linked. The assessment of these impacts was held to be problematic, since they can be both positive or negative and can be direct, or the result of a 'cascade', where environmental impacts generate economic impacts, which in turn generate social impacts in a complex, interlocking pattern of effects. Positive and negative impacts can both flow from the same environmental change, are not evenly spread since they produce significant disparities, particularly between more and less wealthy groups and individuals. Livelihoods are central to social impacts and assessments of gender relations are important (but in general omitted in the global experience), since dams affect men and women in different ways.

The review defined the equity debate as revolving on three main axes. The first is the general balance sheet approach – where the basic question is whether positive impacts of dams outweigh the negative impacts. As covered elsewhere above, proponents hold that if all the social and economic implications of most projects are taken into consideration, with clear descriptions of all benefits accruing to regions and nations as a whole, the advantages outweigh the disadvantages. For opponents, if all the social and environmental costs of large dams were taken into account, particularly how land and livelihoods have been affected, the magnitude of the disadvantages of such projects would appear clearly and call such interventions into question.

The second axis concerns the extent to which those who bear the costs reap the benefits, or have access to the wealth generated by the project and vice-versa. Those who receive more than they lose would be the gainers (winners), and the others would be the losers. Opponents to large dams claim that displaced populations and riverine communities (losing their traditional sources of livelihoods and exposed to water borne diseases) tend to be net losers since they are generally denied access to the benefits generated. Proponents point to the trickle down effects of dams and the fact that they ultimately benefit society at large, including locally affected groups.

The third axis compares the way the costs (taken separately) or benefits (considered in isolation) of the project are distributed between selected groups, spatially (upstream and downstream or among provinces or riparian communities) or temporally (between current and future generations) or units or administrative entities.

Based on numerous case studies, the review offers a framework for the analysis of the positive and negative impacts of dams, setting out at each stage in the cycle of investments and actions the first and second order positive and negative impacts, as well as the relevant interested and affected party or parties.

Impacts during Planning and Construction

At this first stage the positive and negative impacts are held to be relatively minor compared with later stages. Positive impacts accrue through planning, design and construction and the interested and affected parties are the contractors, consultants and bankers as well as the workers employed on all aspects of construction – and those sustained by the businesses generated at this stage. Negative impacts include the fear and uncertainty induced in possible project areas and problems of either land speculation or an induced lack of investment (in land that may be flooded), potentially affecting small landholders or women who may have restricted access to legal mechanisms – depending on country situations.

Impacts During Building a Large Dam

Here the most serious negative impacts (covered in more detail in the second thematic review below) are held to be from the trauma of resettlement – or the socio-economic and cultural costs to displaced people who are not resettled. Evacuees face the greatest cost in the relocation stage and are brought to question their own values, with women often forced to shoulder the ordeal of displacement more intensely. Negative impacts of resettlement are held to linger long after relocation (especially in regard to integrating within the host communities they find themselves in), with positive impacts felt long after the initial trauma, usually by the second generation of displaced communities who are, better placed to use the resources available to them.

Impacts at the Dam Site

Those positive impacts lie in the demand for a large amount of unskilled labour, some of which is provided locally and in the demand for more skilled labour, usually drawn from elsewhere, often outside the country. Associated with these impacts is the extent to which a proportion of this investment is paid locally and retained and circulated within the local economy. Large construction forces create a demand for a wide range of other goods and services delivered locally – with towns often built at the site. The down side is that economic life of such towns (as in the mining sector) is often short-lived, with many reverting to ghost towns once the dam construction is complete, resulting in serious problems of a subsequent unemployment for example. Such settlements experience secondary negative impacts due to poor environmental regulations and social service provision. Living conditions can be poor, with sexually transmitted diseases rife. Such ‘boom economy’ conditions in dam construction towns – and the associated ‘honey pot’ effect in attracting people from afar – can present significant challenges to socio-cultural identities, and intangible effects such as the loss of a sense of place and loss of non-monetised dimensions of livelihood strategies. Women are particularly exposed to such impacts.

Impacts in the Catchments

Construction can negatively impact on land use in the catchment far above the reservoir, where land use controls are imposed to reduce soil erosion or maintain water yield (such as a ban on agricultural activity or the creation of a national park). The latter may create certain benefit streams – such as from wildlife tourism – while however imposing severe costs on subsistence resource users, particularly indigenous people.

Building Power Lines, Transfer Canals and Roads

The positive impacts are work creation over the construction periods and in ensuring access to previously inaccessible areas for ‘pioneer farmers, hunters and holidaymakers’. However these may be counter balanced by the negative impacts when local people lose land or resource rights, or where there is speculation in land and resources. In-migrants, whether peasant cultivators or itinerant hunters can bring a range of threats such as economic competition, disease and challenges to established cultural norms and practices.

Impacts of Managing the Reservoir and Managing Floods

The review’s summary of direct positive impacts of reservoir management include the possibility of new open water fisheries, and those downstream impacts which can occur if

dams control damaging floods and therefore protect infrastructure and property, or allow a successful agricultural investment and urban development in the flood plain.

Globally, the negative impacts in downstream environments result from the loss of a dependence by communities along rivers and within floodplains on the social and economic activity determined by the natural patterns of river flows. Agriculture, fishing and grazing all depend on annual flood cycles, and the complex social organisation of mostly indigenous people is invariably closely adapted around this changing environment of the river. So, dam construction changes patterns in river flows which can seriously disrupt agricultural, grazing and fishing economies downstream. Flood plains no longer flood and require irrigation, while floodplain pastures no longer flood and can become the subject of disputed tenure; also floodplain fish populations fall and so do fish catches, resulting in increased out-migration to find work, reduced land values, changed gender roles and many other impacts. Again, women can be particularly vulnerable to negative impacts in downstream areas.

Impacts of the Supply of Electricity from Hydropower

The main positive impact of hydroelectric power generation is the increase in power availability, relatively clean in comparison to fossil fuels, and which avoids the long term costs and risks of radio active fuel storage. It is also relatively cheap over long periods of time. Secondary positive impacts include increased economic activity (in industry, commerce and in households) and, of course, reduced domestic drudgery.

The negative effects can include any impacts on non-hydropower electricity producers, the problem of methane emissions from flooded vegetation, and the sometimes very major impacts of hydro-dams on downstream people, covered above. The need for continuous releases for hydropower and the possibility of unseasonal floods to meet peak power surges, can give hydroelectric dams distinct downstream impacts.

Impacts of the Supply of Water for Irrigation

The review notes that in many parts of the world irrigation remains a vital and effective element in national food production strategies, in regional and local economies and in household livelihoods strategies. Benefits are usually found in increased food production and availability, stability in production between years, increased labour demand with more labour stability and the related demand this creates for technology and crop inputs. It can also lead to an increase in household incomes from irrigation, domestic water supply, and lower commodity and food prices.

The negative impacts include problems of inequality (due to unreliable or unequal water supply in space and time), poor returns to irrigating farmers due to high fixed costs and low yields) the associated debt costs, high maintenance costs, waterlogging and salinity, high crop protection costs, water borne diseases and poor public health. Invariably there are also problems regarding the social distribution of the economic benefits of large scale irrigation schemes and the occurrence of serious distributional problems between 'top-enders and tail-enders' in the physical supply system, between landlords and tenants, between farmers and labourers and at household level, between men and women.

Moving from this typology, the review then develops principles for addressing these issues of equity in large dams. Six key principles are outlined in the report.

- Equity principles should be a fundamental element of the process of assessing development options. Planning should compare the equity implications of dams and alternate development options. Dams should not be built unless they yield clear net social benefits at the national scale. Dams should not increase inequality. The existence of an overall balance between positive and negative impacts should not be taken as the only criteria of a project's acceptability. The distribution of costs and benefits is important, and heavily impacted groups should not bear uncompensated costs without balancing benefits. The doctrine of the right of the State to impose changes in the public good should be balanced by recognition of other rights (such as rights of access to resources, and customary and community use of land). Equity should be considered across all spatial and temporal scales, and across different social groupings (including men, women, urban and rural citizens, and the powerful and the powerless). Dam projects should not exacerbate existing gender or other social inequalities, but should address them.
- No large dam should be constructed with the use of violence, harassment, intimidation or undue force. Developmental processes that infringe upon the human rights of any section of society should not be accepted – and dam projects should not violate internationally agreed standards of human rights.
- Analysis of the impacts of dams and other alternatives should consider the totality of impacts including cumulative, off site (downstream and upstream) over time. The existing individual and community rights of riverine populations to natural resources that would be affected by planned dams should be recognized in assessing potential losses and in devising mitigation measures. The precautionary principle should be the foundation for the evaluation of all dam projects.
- Dams should not be considered as projects isolated from their broader basin contexts. Assessments of the impacts of dams should include specific consideration of all affected people. Trans-boundary impacts should be recognised and affected people in other jurisdictions should be explicitly considered as legitimate, interested and affected parties.
- In project evaluation, the negative impacts of dams should be minimised and the positive impacts maximised. Dam construction should maximize the number of beneficiaries and minimise the number of those suffering negative impacts, while planning should seek to turn losers into winners. All people who depend on the annual flow of a river and its associated natural resources for their subsistence should receive fair and just compensation and appropriate and acceptable compensation from any loss or injury resulting from dam construction – or be among the primary beneficiaries of benefits generated by a dam.
- Planning should ensure that those that face the negative impacts of a dam should be the first beneficiaries of the benefits that flow from it. Resettlement should be minimised or avoided where possible. Participation by interested and affected parties should be integral to all stages of project planning. Dams should be planned, designed and built with 'real participatory procedures'. Cost benefit analysis should be balanced by involving all actors in having a say in determining and assessing the nature of costs and benefits and the effects on their lives, livelihoods and the environment, as well as the nature of mitigation. Dams should only be built with prior and informed consent expressed through local/ community/customary democratic processes, and should include institution building as an element of project development, to enable affected communities to engage effectively with planners.

- A programme to monitor and periodically re-examine the impacts of dams development (particularly in downstream communities) should be an integral element of the planning process. Monitoring studies should be based on pre project benchmarks (demographic, socio-economic and epidemiological), and be integrated into the project process. In addition to monitoring, there should be a periodic, mandatory re-examination of impacts. Resources to mitigate impacts not addressed fully by the planning process should match monitoring. Human rights and key socio-economic parameters should be disaggregated enough in order to capture and address imbalances in the distribution of costs and benefits of dams. Special financial, human and institutional resources should be built in the dam project design to address unanticipated social and economic problems emerging from the monitoring activities. Finally, the review notes that there should be a procedure for any residual grievances to be heard and to compensate from such re-examination.

Thematic Review: Displacement, Resettlement, Rehabilitation, Reparation and Development

This ambitious review drew on the WCD country papers, case studies and numerous submissions from all regions in its assessment of recent practices relating to displacement, resettlement, rehabilitation and development. It aimed to locate the global experience in dam induced displacement and to understand the socio-political context of displacement and involuntary resettlement. It further sought to assess how the legal and regulatory instruments facilitating displacement and involuntary resettlement have performed in safeguarding the rights of affected people and to elaborate the constraints to a successful resettlement programmed in 'development mode.'

It aimed to draw from these experiences the essential principles of good practice that would constitute a 'successful' displacement, resettlement, rehabilitation and development programme; to suggest a framework that would facilitate a process of negotiation between the State and displaced people, and to suggest legal instruments and remedial action to ensure accountability on part of governments and facilitating agencies for accomplishing negotiated resettlement goals.

Its key findings were that:

- In general, displacement as a result of acquisition is legally sanctioned, while there is no legal framework that governs the process of displacement itself. The land acquisition law protects the sanctity of what causes displacement (the dam) but not the displaced. In the absence of legal safeguards to ensure accountability on the part of the State, the resettlement and rehabilitation entitlements promised often by executive order have rarely been implemented in their entirety covering all affected people.
- For the dams funded by the multilateral development institutions, the nature and extent of compliance with 'mutually agreed criteria and guidelines' have been mixed. Frequently, monitoring missions were either inconsistent in their appraisal of compliance standards or accepted with delays and deviations.
- A theme common in almost all countries was that funds for relocation and resettlement programmes were inadequate. Under financing or outright abandonment have been the most common problems in most R+R programmes. There is evidence that those organisations with legislative sanction and with adequate funds and human resources

have done well in implementing a well defined and clearly operationalised resettlement and rehabilitation programme.

- The concept of programming resettlement in a 'development programme mode' is gaining currency, though practice is limited. 'Good practices' in this respect are those that:
 - focus on means of livelihood rather than on assets,
 - assume an inclusive relationship between people and assets, and
 - admit to a negotiated definition of 'just' compensation .

The record indicates that in those cases in which compensation packages are negotiated with Project Affected People (PAP's) and other stakeholders, the process has resulted in better outcomes for the resettlement process as a whole. Even when, for whatever reason, the negotiated form of compensation proves not to be the most appropriate or effective option, PAP's tend to feel more satisfied as a result of the negotiation processes.

- There is an inverse relationship between the scale of displacement and the extent of achieving successful resettlement outcomes, even in countries with best policy, institutional capacity and political commitment to do proper resettlement. There are few good examples of minimising displacement.
- Generally participation of the affected people has been superficial or treated as unimportant by those responsible for the project. Real participation implies the capacity to influence or even modify decisions. Good practices emerge from Brazil, Canada and a few other countries.

Some of the dominant themes emerging from this review were:

- The displaced and affected people rarely received complete and authentic information on the dam project, the nature and extent of displacement and other negative aspects and the R+R provisions.
- There is an absence of baseline surveys and an inability to determine the number of people displaced and affected, with the displaced and affected people normally not having any role in generating baseline information, the development of resettlement plans, their implementing or monitoring, and that
- Traumatic, forced and delayed relocation leads to the denial of development opportunity for years, and often decades, due to the long displacement processes that invariably occur.

Dam Disappointing Delivery: The Main WCD Findings

In summarising the major findings of 4 years of intensive work, the WCD found *inter alia*, that:

- Large dams display a high degree of variability in delivering predicted water, electricity and related social benefits, with many falling short of physical and economic targets;
- Large hydropower dams perform closer to targets, yet still fall short, do not recover their costs and have been less profitable in economic terms than expected;

- There is a marked tendency in large dams towards schedule delays and significant cost overruns;
- Shortfalls occur in the delivery of irrigation services, which don't recover costs, and are less profitable in economic terms than expected;
- The range of extensive impacts on rivers, watersheds and aquatic ecosystems are more negative than positive;
- Pervasive and systematic failures occur in assessing the range of potential negative impacts and to implement adequate mitigation, resettlement and development programmes for the displaced;
- There has been a failure to account for the consequences of large dams for downstream livelihoods; and
- The WCD notes that perhaps the most significant of the findings is the 'fact that social groups bearing the social and environmental costs and risk of large dams – especially the poor vulnerable and future generations, are not the same groups that receive the water and electricity services, nor the social and economic benefits from these'.⁵³

Given this summary of outcomes against intentions, the Commission moved to establishing expanded criteria – or core values – for improving developmental outcomes in deciding on future/proposed water and energy projects, aimed at reflecting the knowledge achieved of the benefits, impacts and risks of large dams to all parties.

These five key WCD values are equity, efficiency, participatory decision-making, sustainability and accountability. Based on these principles the WCD developed recommendations for a new 'Policy Framework', based on 7 strategic priorities and related policy principles, and building on the international recognition of human rights, the right to development, and the right to a healthy environment.⁵⁴ These were:

- **Gaining public access:** public acceptance of key decisions, based on recognising rights, addressing risks and safeguarding the entitlements of all groups of affected people – is essential for all equitable and sustainable water and energy resources development.
- **Comprehensive options assessments** need to explore all alternatives for water, food and energy, and require a comprehensive and participatory assessment of the full range of policy, institutional and technical options.
- **Addressing existing dams** requires that all opportunities to optimise the benefits from existing dams while addressing outstanding social issues and strengthening environmental mitigation and restoration measures. Benefits and impacts may be transformed by changes in water use priorities, physical and land use changes in the river basins, technological developments and changes in public policy expressed in any of environmental, safety, economic and technical regulations.
- **Sustaining rivers and livelihoods** requires understanding, protecting, and restoring ecosystems at river basin level as an essential component in fostering equitable human development.
- **Recognising entitlements and sharing benefits** are principles that underpin successful mitigation, resettlement and development and are the fundamental responsibilities of the state and developer. Accountability of responsible parties to agreed mitigation,

resettlement and development provisions are ensured through legal means and accessible legal recourse at national and international level.

- **Ensuring compliance** promotes public trust and confidence and requires that governments, developers, regulators and operators meet all commitments made for the planning, implementation and operation of the dams. A set of mutually reinforcing incentives and mechanisms is required for social, environmental, and technical measures.
- **Sharing rivers for peace, development and security** requires constructive co-operation to avoid tensions between and within countries over storage and diversion of water in trans boundary rivers, while the use and management of resources requires agreements between states to promote mutual self interest for regional co-operation and peaceful collaboration.

These major principles then, both prescriptive and mitigatory in intent and effect, became the WCD benchmark criteria for the planning and performance of large dams.

In keeping with the consultative nature of their formulation, most regions are engaging in a round of consultative stakeholder forums to assess the extent to which their own policies are compliant with these requirements. The multi-lateral response particularly that of the World Bank, is covered below.

The South African response to the WCD Guidelines

In South Africa (where there are more than 500 large dams, and 50 with a storage capacity of over 100 million m³), a large Multi Stakeholder Initiative – comprised of traditionally polarised stakeholder groupings – came together for 3 years of extensive negotiations. This resulted in an unprecedented consensus on the applicability of South African policy and practice against the WCD principles. It has received international recognition for both the process adopted and its work, presenting its methods to the WCD at many international fora such as the WSSD, the 3rd World Water Forum, the World Social Forum, the Stockholm Water Week, and the Renewables 2004 Conference. The United Nations Environmental Programme (UNEP) views it as a model and they intend to promote it in other countries.

In essence it recognised the many roles various interests in South Africa have in dam initiatives in the African continent. It uses these as the basis for a wider commitment to the King 11 Report on Corporate Governance for South Africa regarding best practice in environmental relations -which states that 'where a company has an operation in a foreign jurisdiction, the higher legislative standard between South Africa and that country's standard be adopted.'⁵⁵

It also interrogated in detail each of the 7 principles, and their specific sub components in terms of its relevance against the current state of national environmental, water and social policies and legislation, before abstracting what limits exist in such current legislation against the WCD principles, what adjustments need to be made, and delineating who was to be responsible for taking actions to mitigate these going forward.

The South African Development Community Response

Presently the consultative process is being taken forward in SADC, based on a decision by a July 2002 Ministerial Meeting to make the development of a regional position on the WCD

report a priority. Water is viewed as one of the major areas of co-operation and integration in the region, which has a protocol on Shared Water Course Systems and a Five Year Regional Strategic Action Plan on Integrated water Resource Development and Management.

The SADC Water Directorate initiated three phases of deliberations, with donor support, which have led to a framework for discussions on key WCD issues in each member country, as well as to a draft SADC Regional Policy on 'Dams and Development', and a draft SADC position on the WCD report. Phase 3 is busy incorporating crosscutting WCD issues in dams and development into the regional water policy. Key points emerging are the priority now attached to poverty alleviation and economic integration, (where about 70% of all water courses are trans-boundary with a large potential for future dam projects to be multinational in character), that dams are to be considered an integral part of water resource management, and that the WCD process is to be used to assist in identifying gaps and strengths in dam development practice.⁵⁶

The NGO Response

WCD principles have been very strongly endorsed by the larger social movements. Rivers for Life recognizes the WCD as the key achievement of the debates over the past six years, and that it constitutes a framework for democratic, transparent and accountable decision-making. However they strongly maintain that it fails to question the fundamental flaws of a neo-liberal development model embedded in the predominant discourse on dams and development. Notwithstanding this endorsement, they continue to commit themselves to intensifying their struggles for reparations, for river and watershed restoration, sustainable and appropriate methods of water and energy management, and a continuous renewal and revitalisation of diverse water knowledge and traditions, amongst other things. They argue that all governments should adopt WCD principles, guidelines and criteria.

Similarly, the International Rivers Network (IRN) has endorsed the WCD principles and criteria, and is beginning to benchmark its critical assessments of large dams globally against the WCD guidelines, using it as a lobbying tool in its various campaigns.

SOME WEIRS IN THE WCD FLOW: DECIPHERING THE WORLD BANK RESPONSE

While Southern Africa debates represent a significant progression with the WCD findings, other institutions have responded more cautiously. The World Bank initiated a wide consultation process with its member governments themselves, with the major NGO's and International Finance Institutions (IFI's) and with professional associations and private financiers. The results were ambiguous, with almost universal agreement among it's borrowers that dams have and must continue to play a central role in water and energy management, economic growth and poverty reduction. All governments expressed concerns that the WCD report:

- understates the benefits,
- does not address the counter-factual, and
- does not deal even-handedly with alternatives.

Apparently the initial reaction was to 'shoot the messenger.'

This reaction was apparently softened during ongoing discussions to realise a more universal acceptance of the importance of the environmental and social issues addressed in the WCD, with most governments making a strong commitment to 'continue to learn and improve' in the key areas of technical, economic, environmental and social practice. These consultations saw governments endorsing the Bank's role in their countries as having made a positive difference in bringing about a 'best practice', and showing concern at the apparent withdrawal – prior to the WCD – of the Bank from the business of dams.^{57,58}

In a very real sense, these consultations over the WCD have provided the political and institutional space for the Bank to leverage many of the major emerging issues in the dams and development debate with member governments, and to provide the platform for a more comprehensive and revitalised engagement along the lines of their own experiences, research based findings, new policies and guiding principles.

The main message – both within the Bank and among borrower governments – was that while there was abroad acceptance of the WCD core values, of the rights and risk approach to identifying stakeholders in negotiating choices and agreements, and the seven strategic priorities, there has been controversy over the 26 Guidelines.

This conundrum, described as an 'elephant in the room', has been about whether the Guidelines comprise a blueprint, requiring further compliance and larger 'conditionalities' for governments in building new dams and, if so, member countries would remain strongly opposed to the report. If such conditionality were to be removed, it would open up a range of ways in which countries would engage with the WCD report and to work with the Bank and others in improving practices. In resolving this the Bank has followed the principles of the Chair of the WCD, Kadar Asmal, who had to subsequently explain:

'our guidelines offer guidance – not a regulatory framework. They are not laws to be obeyed rigidly – they are guidelines with a small g.'

The Bank itself conducted a detailed comparison of the 26 WCD Guidelines in relation to its own Safeguard Policies. Their summative evaluation indicated no major differences in these *vis-a-vis* the WCD recommendations of environmental assessment, natural habitats, the safety of dams or cultural property – but showed limited differences on issues regarding projects on international waterways, some difference in issues related to involuntary resettlement and indigenous people, and that the WCD report proposes a different framework for project preparation.

However there were major differences in approach with respect to the following;

On Project Preparation and Consultation processes, the WCD requirements of:

- a multi stage process which warrants the location, scope and design of projects to be determined by an agreement amongst all stakeholders, after stakeholder forums assess alternatives for the detailed layout of dams;
- the cumulative and interactive aspects of existing infrastructure on the river are addressed in the design of the dam through an agreement with stakeholders and operator;
- that final design includes provisions for emergency preparedness and decommissioning;

- that mitigation, resettlement, monitoring and development plans are agreed with affected groups and signed as contracts with them;
- that performance bonds are secured, trust funds established and integrity pacts signed before project implementation starts; and
- that licensing to construct and operate is conditional on satisfactory implementation of agreed mitigation and development plans, are, taken together, held by the Bank to be too onerous.

While the Bank maintains a commitment – through the implementation of its operational policies – to ensure that:

- stakeholders are systematically identified and involved in project planning and implementation;
- meaningful upstream consultations are held with affected groups to guide project decision making and their views are reflected in plans developed as an integral part of the project; and
- the implementation of mitigation and development plans is funded as an integral part of project budget and is regularly monitored by both the Borrower and the Bank;
- the overall adoption of the principle of 'prior and informed consent' would actually amount to a 'veto right that would undermine the fundamental right of the State to make decisions which the State regards as being in the best interests of the community as whole- and to determine the use of natural resources based on national priorities.' ⁵⁹

On Involuntary Settlement the WCD recommendations for:

- all adversely affected people to be enabled to negotiate formal and legally enforceable mitigation plans;
- any outstanding resettlement issues associated with existing large dams on the same river to be identified and remedied before new infrastructure is built;
- diversely affected people be recognised as first among the beneficiaries of the project;
- mutually agreed and legally protected benefit sharing mechanisms are negotiated to ensure implementation;
- a clear agreement with the affected people be reached in the sequence and stages of resettlement before construction;
- compliance plans be enforced before independent review; and
- that the license to construct and operate the dam include conditions related to successful completion of resettlement, mitigation and development plans, while having many commonalities, were similarly held to be too elaborate and onerous on the Bank and it's Borrowers.

The WB's positions are predicated on its own Resettlement Policy which - while built on the principle of informed participation – does not require the negotiation of development and mitigation plans, and is aimed at ensuring that affected people are assisted in their efforts to improve – or at least restore – their standards of living in a manner that is consistent with their cultural preferences, while retaining the right of the State to exercise 'eminent domain' for the larger public interests as appropriate in the circumstances.

Within this framework, the Bank remains committed to a range of its own instruments and support arrangements. It ensures thorough baseline studies are conducted to identify affected people and the extent of impacts – and its operational policies require that affected people are provided opportunities to participate in resettlement planning and implementation. Such implementation of agreed settlement and development plans is reflected in the legal agreements between the World Bank and a Borrower. The Borrower and the Bank monitor resettlement implementation, and 'independent panels' are increasingly engaged in projects with major resettlement impacts. Recent policy also requires an early review of resettlement implementation to use the lessons learned for subsequent implementation.

World Bank financed projects are not considered complete until agreed plans are fully implemented – and follow up surveys are conducted at project completion to document the extent to which incomes and standards of living of affected people have been restored. In the past the Bank has supported actions to resolve outstanding resettlement and other social and environmental issues from past projects, and is willing to assist borrowers in developing their national, regional or sectoral social and environmental policies and legal frameworks.

Projects on International Waterways

While the WCD recommends that where a government agency plans or facilitates the construction of a dam on a shared river in contravention of the principle of good faith negotiations between riparians, external bodies withdraw their support for projects promoted by that agency.

For the World Bank, the scope of their policies for projects on international waterways is not as broad as the WCD. The Bank will not allow financing of a project on an international waterway until all the riparians are notified of the project, and voice no objection; if there are objections the Bank will assess and confirm whether the project will cause irreparable harm to the interests of the other riparians. They consider the blanket prohibition on an agency that has built a dam in breach of good faith negotiations to be too broad and to foreclose too many opportunities to productive collaboration, maintaining committed to taking a pro-active role in supporting riparians to make appropriate arrangements or agreements for sharing and managing the entire waterway, or part thereof.

In sum, the World Bank and member government reactions to the WCD strategic priorities, criteria and guidelines have been cautious, creating the 'space' for an approach:

'consistent with the WCD recommendations, (where) the World Bank will support strategic planning processes conducted by borrowers to enhance the evaluation of options and alternatives for energy and water management. The Bank will also support borrowers in financing sound priority investments emerging from such processes, and will continue to apply its existing policies to these and other projects.'⁶⁰

To this end it has recently initiated a 'Dams Planning and Management Action Plan', to strengthen its work and to improve the evaluation, implementation and operation of dams where they are the appropriate development option.

The Return to Large Dam Funding: Current World Bank Projects

These conditions then, taken together with those attached to Water Resource Management and Development, now underpin the World Bank financing of large dams in a 'new' period of engagement with developing countries. The first commitment in this era has been to the government of Laos (and Thailand). The ICOLD announcement of the project is quoted in full;

'In March 2004, World Bank Directors voted to approve the Nam Theun 2 Dam Project in Laos – the first major dam to be supported since it announced its intention to renew lending for large dams in 2003, on the basis of its new Water Resources Sector Strategy.

The Nam Theun 2 Hydroelectric (NT2) Project seeks to generate revenues for poverty reduction from the environmentally and socially sustainable development of the Nam Theun 2 dam. Revenues from the sale of power to Thailand will enable spending on basic health and education to rise by as much as 25 to 30 percent in the projects first year of operation. The project includes the construction of a dam that will provide 9995 MW power for export to Thailand, and an additional 75 MW for domestic use; management of environmental and social impacts on the Nakai plateau, in the NT2 watershed and in the downstream areas of the Nam Theun and Xe Bang Fai (XBF) rivers; and monitoring and evaluation arrangements designed to meet sound engineering practices, fiduciary responsibilities, and the respective oversight requirements of the various financial institutions.

Along with the NT2 hydroelectric project (\$50mill, grace period of 10years, maturity 40years), two other related projects have been voted: \$10mill for a Poverty Reduction Support Credit (\$5 mill grant and \$4.5 mill credit) and \$20 mill for a Nam Theun 2 Social and Environment Project (NTSEP).

The project will finance a portion of the Lao government's equity in the Nam Theun 2 power Company to fund specific environmental and social mitigation activities for environmental and social protection as well as for conservation, and would support continued independent project monitoring. The environmental and social programs funded by the project are spelled out in the projects safeguard documents and include support for the resettlement of affected communities and the restoration of their livelihoods; wildlife management on the plateau and the building of the governments environmental management capacity; enforcement of laws and regulations on the wildlife trade and non sustainable resource use in the NT2 watershed, as well as support for the Dam Safety Review Panel and the Environmental and Social Panel of Experts to monitor impacts and mitigation measures under the project. The Asian Development Bank's Board of Directors will vote on the project, and the European Investment Bank will take a decision shortly thereafter. Construction on the \$1.3 billion project has already begun but will be stepped up after financial close in May 2005. The project is supposed to be completed by 2009.⁶¹

HOW THE LESOTHO HIGHLANDS WATER PROJECT IS AFFECTED BY AND FITS INTO ALL OF THE ISSUES IN THE DAMS AND DEVELOPMENT DEBATES

The Lesotho Highlands Water Project (LHWP) is the largest infrastructure project on the African continent. It is a major international collaboration project and inter-basin transfer scheme where the distributional issues, both between and within countries have been heavily contested. It is therefore both politically sensitive and economically significant, representing the single largest investment ever undertaken in Lesotho's relatively small, dependent and underdeveloped economy. It also thus has very large economic, social and environmental impacts with a resettlement and relocation component which affects, proportionally, a large population. As such, it continues to receive widespread and detailed support and attention. The project has not been excluded from the many controversies and issues associated with the debates and prescriptions for 'dams and development'. Indeed, it tends to exemplify all of them.

Early Diversions

The earliest political and economic conception of a project to dam the south- westward flow of Lesotho's Senqu river for the northwards diversion and export of water to South Africa originated in the late 1950's and early 1960's. British economists had recommended the then Basotholand exploit its high average rainfall in exchange for valuable foreign currency. The major impediments to an early project were reportedly due to strong disagreements on issues of payment for water between South Africa and Basotholand. In a post independent Kingdom of Lesotho, new 1978 feasibility studies strongly recommended that the water transfer scheme as well as a hydropower generation component aimed at replacing electricity imports proceed. A final 1983 feasibility study concluded that there were no irresolvable environmental, socio-economic or legal difficulties.⁶²

As in many other international inter-basin transfer and cooperation schemes, this planning was politically clouded – by a range of competing regional positions in South Africa's pre-independence anti-apartheid struggle. Following an economic blockade of Lesotho by South Africa, Prime Minister Leboa Jonathan's Basutho National Party government (highly reluctant to approve a scheme that limited the source country's right to regulate water flows), was challenged by a military takeover in 1983. The victorious General Lekhanya and his Council, in contravention of strong negative sentiment in the then Frontline States on the desirability of any new economic co-operation with South Africa at the time, gave his agreement to the scheme going ahead. Agreements were signed that year for the project to begin in 1986 – on the signing of a Treaty – with an expectation then that it would take some 22 years until final completion.

The Social and Environmental Provisions

In total the Lesotho Highlands Water Project (the project) is designed to finally comprise five large interconnected dams for the storage and transfer of water to tributaries of the Vaal river which constitute the Vaal River Supply Area in South Africa. A 63 megawatt power plant will supply Lesotho with its own electricity.

The first Phase 1A has consisted of the construction of the Katse dam (at 186 metres high and completed in 1998), the 'Muela dam and hydropower station, as well as 82 km of transfer and delivery tunnels through the Maluti mountains. Phase 1 B is centred on the Mohale dam on the Senqunyana river (some 140m high), a 30km transfer tunnel connecting the Mohale and Katse reservoirs, access roads and the upgrading of the Maseru-Thaba Tseka road, the

Mohale new town for construction workers and a weir at the Matsoku. In total, water delivery will require over 260km of tunnels and canals.

The 1986 LHWP Treaty between the Government of the Kingdom of Lesotho and that of the Republic of South Africa contains 19 Articles of Agreement establishing the rights and responsibilities of each party. They cover *inter alia* the establishment of the Lesotho Highlands Development Authority (LHDA) and the Trans Caledon Tunnel Authority, issues of cost related payments and financing, royalties, the prevention and settlement of disputes, and – of relevance to this chapter – those relating to social and environmental considerations. Article 15 of the Treaty states:

‘that the parties agree to take reasonable measures to ensure that the implementation, operation and maintenance of the project are compatible with the protection of the existing quality of the environment and in particular, shall pay due regard to the maintenance of the welfare of the persons and communities immediately affected by the dam.’⁶³

Article 7, covering the establishment and roles of the LHDA tasks the LHDA in sub-section 18 to:

‘effect all measures to ensure that members of local communities in the Kingdom of Lesotho who will be affected by flooding, construction works or other similar project related causes will be enabled to maintain a standard of living not inferior to that obtaining at the time of the first disturbance. Provide that such Authority shall effect compensation for any loss to such member as a result of such project related causes not adequately met by such measures.’

In addition, the legal order creating the LHDA in 1986 reaffirmed that the Authority shall ‘ensure that as far is reasonably possible, the standard of living and incomes of persons displaced by construction of an approved scheme shall not be reduced from the standard of living and the income existing prior to the displacement of such persons.’

Some Aggregate Impacts and Overall Justifications

Given the scale of the project in global terms, high poverty levels in Lesotho and its extreme inequality (with a gini co-efficient one of 10 highest in the world), the World Bank has prioritised the project – both as a means to encourage private sector development – and to give effect to poverty alleviation.

Its commitments to the project have been commensurately extensive, reportedly increasing substantially over the 1990’s with average net annual transfers of over US\$ 10 million across the decade. This has been described in part due to the recognition of the need for revenues, customs and taxes from the project to compensate for the major loss to state revenues from the increasing decline in mine worker opportunities for Basotho in South Africa. Over the decade, mine worker remittances dropped from a 62% contribution towards GNP in 1989 to 18% in 1999.

Unsurprisingly, its aggregate socio-economic impacts are extensive in a small country like Lesotho. Annual royalties (\$60m equivalent at 1983 prices) and associated investments account for approximately 14% of Lesotho’s GDP. Royalties reportedly make up 28% of all the Lesotho Government’s annual revenues. Donors and financiers include the World Bank, the Development Bank of Southern Africa, the African Development Bank, the European

Development Bank, as well as various export credit agencies and commercial banks. Its final total estimated cost is huge, reported to reach around US\$8 billion (ZAR 48 bn) by a planned completion date of 2020.^{64,65}

By 2002 a World Bank/African Development Bank study argued that the LHWP had made it possible to turn the budget deficit of the late 1980's into a surplus in the 1990's – and to allow greater social spending. The World Bank's Country Director has stated that the project provides the only source of development for Lesotho, with the Bank view being that it represents the lowest cost alternative for water supply to Gauteng province and an excellent example of regional collaboration for mutual benefit, resulting in win-win solutions to urgent issues facing both countries.⁶⁶

Social and Environmental Development in the LHDA

Given these macro perspectives then, World Bank support for LHDA spending and attention on the developmental, social and environmental components of the respective phases has been considerable. It represents the highest in the world to date on some significant aspects of resettlement and compensation, with the associated issues in many senses coming to be a test case for a 'best practice' policy and implementation internationally. There have been recent claims that these aspects of the project actually represent a 'global best practice – in Africa's biggest ongoing success story.'⁶⁷

The processes covered below clearly reflect a significant test for emergent policy, with deep learning curves for all involved. The objective in the following sections is to constructively cover the many challenges and difficulties encountered by all parties, providing a base from which the HSRC teams can develop the required evaluations and studies.

Sharing the Pains and Gains in a Resettlement for Development

Beginning in 1990, an ambitious initiative was to support the creation of an overall regional/sub-regional development framework and structure for the economic and social promotion of affected people in resettlement areas. A Rural Development Plan (RDP) was developed, aimed at combining specific strategies and development projects to assist project affected people to restore their livelihoods, especially through the creation of income generating projects via the use of compensation from relocation. In attempting to conform with much of emerging best practice in this arena, the RDP had an initial planning horizon of 12 years of investment and support, and comprised a diverse range of both productive and consumptive projects which included range management and restoration, horticulture and field crops, community forestry, commercial trout rearing, as well as village water supply, sanitation and rural electrification.

Many of these programmes and projects have proved difficult to implement successfully.

The original RDP was closely linked to the objectives and instruments of the first 1990 Phase 1 (Katse) Environmental Action Plan (EAP) covering resettlement and compensation. This linkage aimed at providing a two-pronged approach to the mandated responsibility of the LHDA – *the restoration of living standards of affected communities*. Compensation in various forms was provided for the loss of property and of resources, with the anticipation that resettlers would use these aspects of a package to successfully engage (in a demand-led response to the effects of resettlement and relocation) with the opportunities emerging from the stimulatory activities of the supply-side led RDP.

Some seven years after the initiation of Phase 1A, the 1997 construction of the Mohale dam (Phase 1 B) warranted the incorporation of many of the lessons learned from the Katse experience. Extensive and contradictory reviews of the progress achieved in Phase 1 were incorporated into the formulation of a revised Resettlement and Development Action Plan (RDAP), covered in detail below. This RDAP was designed in a more careful accordance with the precepts of 1990 World Bank Resettlement Policy – particularly Operational Directive 4.30.^{68,69}

In ongoing reviews by the Bank and consultants, the RDP's diverse components have been subjected to severe scrutiny. In 1995 the World Bank's Panel of Environmental Experts reportedly noted that it was 'hard to detect any economical effects', and in 1996 the Bank noted that the LHDA had only spent 18 percent of its total budget.⁷⁰ Later evaluations of the dual nature and impacts of the strategies adopted for restoring living standards found that while compensation had been 'largely successful as a short term stop gap measure', there were questions regarding its 'long term impacts on communities and the creation of a dependency culture.' Much of this 'dependency' may well be due to associated findings that delays in the RDP have led to the programme having 'largely insignificant impacts on the communities concerned.'⁷¹

The twin notions of a 'dependency' in resettlement and relocation and the failure of the RDP to economically stimulate resettlers have become an enduring theme throughout the respective phases of the LHDA. In another more recent review (covered below) it was noted how the 'continued separate implementation of compensation activities from those of development has resulted in the communities in the affected project areas exhibiting signs of extreme dependency on these compensation flows. This dependency syndrome has made the communities to be non responsive to development interventions.'⁷²

Highlands and Lowlands and Upstream and Downstream: Resettlement, Relocation and Compensation

Financial resources have not been the problem in the LHDA. The resulting heavy expenditure on the resettlement of households affected by Katse dam has been reported to be among the highest in the world. At a reported total US\$ 5m, or approximately US\$ 62,500 per household, it represents more than twice that of the highest of 17 Bank funded resettlement projects surveyed in the study on the Economics of Involuntary Resettlement, covered above. Budgets for the Phase 1B Mohale dam resettlement programme were reported to be about US\$16 million, or approximately US\$ 31,200 per household – around 3 times larger than the average resettlement spend per household surveyed internationally.⁷³ Official budget estimates for the three phases of the Phase 1b RDAP alone were of the order of M 295, 204, 000.00, with the Resettlement Component costed at M174, 977,000.00, Compensation at M63,369,000.00 and the third Development Component at M295,204,000.00.⁷⁴

Estimates vary regarding the total numbers of people affected in varying ways. Assimilating diverse reports on the matter has lead one researcher to total 15,000 from the two major dams in both Phase 1 and 2, while another holds that Katse and 'Muela alone dispossessed almost 20,000 people of land or resources, with Mohale affecting approximately 7000. However, it should be noted that these represent the total population living in the catchment areas, whereas only a proportion of the total population experienced direct asset losses as a result of the LHWP. It is probable that a highly accurate figure is unattainable. Official estimates for Phase 1B are contained in the following section.

The Phase 1 B Resettlement and Development Action Plan

The Scheme Area – comprising some 150,000 hectares spanning the 3 districts of Berea, Maseru and Thaba Tseka – is characterised by a typically dispersed settlement pattern and generally inadequate infrastructure and services. Of a total of 83 villages and 1215 households within it, the commissioning of the reservoir was officially estimated to at least partly affect a total of 580 households living in 44 villages (in terms of both inundation of land and buildings and either the denial or restriction of access to services and amenities).

The critical evaluations of Phase 1 had developed some priority areas for more detailed attention in the RDAP.

The main institutional learnings highlighted the need for a restructuring of the LHDA, the creation of a more responsive culture within it and a much more rigorous management selection process. An emphasis for the future was on the improvement of the management skills and training of staff within the responsible units in the LHDA. In resettlement and in compensation, the identified need was for a revised set of strategies and packages to be based on a more comprehensive analysis of the entire household production system to be impacted (such as fuel and other common property resources). A wider range of compensation and relocation options was also recommended, with the flexibility to allow more choice by those affected in determining the instruments to adopt in the process of restoring their living standards and livelihoods. Moreover the review identified the need for households to be more effectively targeted for *income restoration planning, which in future needed to be combined with an annuity type of 'safety net' compensation.*

Other lessons highlighted the need for a more responsive complaint management process, for conflict resolution mechanisms and local project offices and operational field teams, as well as for more partnerships with communities to enhance local unskilled employment. The most significant adjustment recommended for Phase 1 B was the need for continuous and in-depth consultation with affected communities in the design of resettlement and of social mitigation strategies – with a related role for project – affected people in implementation and in monitoring. Closer ties were also required between the scheduling of construction activities and the completion of key resettlement activities.⁷⁵

In pursuit of these requirements and in accordance with Bank policies, the LHDA and its consultants initiated a far more elaborate, three-pronged programme comprising of a resettlement plan, a compensation plan and a development plan, with the following main activities and instruments:

RDAP Planning

The 'original' socio-economic status of the affected households had been established in a 1993 census by the LHDA. Together with subsequent socio-economic and income and expenditure surveys done in a 1995 Resettlement and Development Study (RDS), a comprehensive baseline picture of villager status emerged. This was to be supplemented with an ongoing recording of income and expenditure, intended to continue well into dam implementation stages. Cadastral surveys captured accurate inventories of individual and communal assets that were collated with a Geographical Information System and a Relational Database Management System, creating a single integrated database predicated on individual household identification. This database was later used to capture the individual household

record emerging from preference surveys undertaken to assess preferred resettlement locations and the choices made with regard to the compensation packages negotiated.

The criteria used in planning *eligibility* for resettlement were complex – given the nature of the regional settlement pattern overall, land tenure and land use practice and rights. With valley bottom areas in the Scheme Area described as some of the most productive in Lesotho, it has attracted a high incidence of poorer households adopting sharecropping and renting as survival strategies – without their own land and thus reliant on access to work from those with land.

Those criteria adopted for involuntary resettlement (called relocation) were therefore:

- villages to be wholly or partially inundated and within the overall Full Supply Level (FSL) demarcation line;
- villages severely affected by construction work and;
- villages located in a place regarded by the LHDA as dangerously situated in relation to the reservoir or the construction works.

Those eligible for voluntary resettlement were:

- villages whose access to important facilities and resources is severely impaired by the reservoir, and where access is not restored by the construction of roads and bridges, or the provision of ferries.

Other criteria adopted in pre-planning (subsumed in the above summary) were:

- the proportion and quality of arable land lost (less or more than 50%);
- the proportion and quality of residual land available to the household and village in post inundation phases, where it was situated and whether this could sustain the household and community;
- the extent to which physical access to residual arable land would be restricted;
- the potential for future share cropping and renting in the existing location-to be determined by the extent of land losses incurred by the village as a whole; and
- whether land left behind by resettler families can be made available or is accessible to households remaining behind-but who still use a significant proportion of their land.⁷⁶

Planning also placed special emphasis on the likely risks and vulnerability of the elderly and disabled and those with no land or very small land holdings, potentially capable of being stranded in the dispersal of their support group to various destinations.

Based on these overall criteria, resettlement was made a mandatory relocation exercise for 13 villages (comprising 219 households), and a further nine villages in which 67 households would be seriously affected by the loss of more than 50% of their land.

Planning for this aspect also entailed an evaluation of land resources – those to be lost by inundation and as well as of residual land – undertaken and classified according to the Food and Agriculture Organisation's (FAO) soils and land suitability classification. The quantity, quality and location of land were logged, along with the actual utilisation of land in the inundated and residual areas. The evaluation also assessed the potential of available land

immediately adjacent to the affected areas for future use in resettlement, and calculated what was the most suitable land in the more distant proposed resettlement areas.

The former studies revealed that some 2306 ha was to be inundated by the FSL of the reservoir. In total 700 ha was arable, 1,635 ha grazing, 25 ha comprised of settlements and 575 ha was of residual arable land. The latter evaluations supported detailed processes covered in identifying five potential resettlement options, vis:

- for relocation within the Scheme Area;
- for resettlement – either in other highland areas or in the foothills of the Ha Ratua area;
- in Maseru, Teyateyaneng or in other urban areas; and
- in other lowland areas.

RDAP Participation

Based on the lessons from Phase 1, and in order to better facilitate a more structured and collective participation of project-affected people in the actual resettlement and development planning, an elaborate Peoples Involvement Programme (PIP) was promoted. Project affected people actually argued for an independent representative structure outside of the then discredited statutory Village Development Committees (VDCs). This came to comprise a layer of Community Liaison Assistants (CLAs) recruited from the Scheme Area and serving an institutional framework of Area Liaison Committees (ALCs) – each representing areas and villages within Development Zones – designated as the primary planning unit in the RDAP. These planning zones were used in the scheme receiving areas, as well as in external receiving areas. A Combined Area Liaison Committee (CALC) incorporated and represented the ALCs, and included the VDC representatives and an NGO supported Development for Peace and Education (DPE) committee via a framework of Project Information Offices (PIO). The latter was intended to provide data, put forward queries and lodge complaints to the LHDA's public relations officers.

Through these PIP structures, the above range of resettlement options was further tested and more finally determined in discussion with communities. Household preferences were tested in the aforementioned two-phased system of surveys, aimed at allowing people to more fully determine and indicate their preferred destinations, as more information was made available to them. This 'preference led' aspect was accompanied by an extensive and organised 'participatory appraisal' of the merits or otherwise of the above options – done through a system of visits to, and local consultations in the potential future resettlement areas.

RDAP Resettlement

Preferences

An important aspect (more relevant in the first three locational options for resettlement) was the need to develop priorities about the merits of concentrating resettlers into small 'enclaves' within host communities in the highlands areas particularly, or to negotiate a dispersed settlement pattern. Hosts (the VDCs in consultation with their own villagers) were apparently keen to gain from the overall benefits of the resettler's compensation packages and the restitution of housing and utilities immediately within their own areas, while the potential resettlers were also generally in favour of the former option. This resulted in a LHDA policy for the settlement of the incoming PAP's either into small groups or individually in host communities: this was believed as likely to result in smoother integration while avoiding the

social discord and mistrust potentially associated with resettlers living in highly concentrated settlements with housing and services of a higher standard than those of the adjacent, pre-existing community.

Available survey data on these preferences indicates that the most popular destinations were in the Foothills, where the Ha Ratau area enjoyed the support of 44 percent of affected households, followed by the Scheme Area itself, where the villages of Ha Koporale, Ha Rapokoloane and Ha Ts'iu were supported by 37 percent, together accounting for over 80 % of preferences. General explanations for these trends at the time held that most choices were predicated on social reasons, with people wishing to remain within the realm of close social ties and kinship obligations, and potentially realising the possibility of accessing arable and grazing lands.⁷⁷

RDAP Phasing of Resettlement Stages

To give affect to these preferences, and in response to the timing and phasing of the Construction and Inundation Programme for the Dam and Tunnels, the RDAP developed a three phased approach to the demands of resettlement. This was in compliance with much of 'best practice' policy internationally, and also aimed to meet the demands of those who wanted to move early while establishing a well developed institutional capacity to manage the process from an early stage.

Due to Impacts during Planning

The first, pre-construction phase aimed to support the relocation of villages too close to the tunnel and dam construction sites for their own safety as well as those who expressed preferences for an early resettlement. Many were the young and therefore landless who saw potential opportunities in improving their economic circumstances through the move. Many elderly persons also wished to move closer to relatives and better health facilities.

Planning included a total of 85 households, with 44 preferring relocation into the Scheme Area, 27 into the Foothills, six into Maseru and eight into 'other'. The phasing was originally planned for the period September 1996-1998.

Due to Impacts at the Dam Site

The second, pre-inundation Phase supported the movement of all those villages accepted as eligible and which chose to move, and therefore comprised those severely affected villages wholly or partially inundated – or hazardously close to the water at FSL and liable for extensive land losses (April 1998-December 2000).

Those wanting to remain as long as possible due to the employment or enterprise opportunities in construction would move towards the end of that stage. One hundred and thirty four households were included in planning, with 43 preferring the Scheme Area as a destination, 80 preferring the Foothills, 52 wanting to go to Maseru, while nine wanted 'other' options.

Due to Impacts in the Catchment

The third, post- inundation phase was designed for those who wanted to remain in the project area, but who may find life after filling of the reservoir seriously impaired. These people could then qualify for resettlement. It eventually comprised the nine worst affected of the

remaining villages, with 71 households wanting this option, of which 24 wanted the Scheme Area, 23 the Foothills and five liking Maseru, while 19 sought 'other' options. (January 2001 to August 2003).⁷⁸

RDAP Compensation

The Peoples Involvement Programme also allowed for the more consultative development of the recommended wider range of alternative compensation options. As noted, compensation in the generic 1990 Phase 1 EAP had aimed to replace lost properties and resources where possible, to substitute new income generating capacity to make up for the loss of arable and grazing land and to reverse the downward economic productivity trend realised in the project area, *with an original objective of the restoration of the standard of living of affected communities.*

Various problems had been reported regarding the original compensation rates, criticised by NGO's (apparently local and internationally) and by project affected people as grossly undervalued, not delivered in time, and more especially, that the 15 years time horizon attached to payments should be extended 'until livelihoods had been restored', in order to prevent households being left without a source of subsistence after the expiry of the 15 year period. A 1993 Environmental Panel of Experts is also reported to have criticised the original 'maize only' compensation package for not 'replicating completely the diet of the people residing in the highlands', given that many farmers grow wheat, beans, peas and sorghum.⁷⁹

As noted elsewhere, subsequent official evaluations identified some overall limits concerning the separation of direct compensation from the supply side implementation of development projects, as well as a resulting emergence of a culture of dependency in relation to compensation.⁸⁰ In attempting to address these and other issues, the revised criteria for compensation in this RDAP phase were to be made retroactive to Phase 1.

The main compensation *principle*, similar to the first phase, has been described as aiming 'to ensure that their standard of living is maintained and is not inferior to that enjoyed at the time of first disturbance'.⁸¹ Its *objectives* were cast more widely, aiming to:

- satisfy legal obligations;
- reduce the element of risk to compensation recipients as far as practically possible;
- to share the benefits emanating from the project; and to
- protect the environment.⁸²

To give effect to these requirements, a field-based Compensation and Resettlement Task Team (CRTT) working in the scheme Areas was established as the RDAP's main institutional vehicle, and tasked with working out both an integrated compensation and resettlement package as well as individual household options. Comprising of 2 representatives of the Community (from the Scheme Area) and 2 officials from the Resettlement and Compensation Division within the LHDA and a data-recording specialist, all reported to a Principal Compensation Officer in the LHDA. A Compensation Ombudsman was also appointed as the first point of appeal, to be activated after the more local mechanisms were exhausted.

The CRTT task was to review each individual affected household's circumstances and agree on a plan incorporating a site for relocation or resettlement, the extent of household losses,

the compensation package, including a housing re-establishment grant and the compensation for individual losses, *as well as an income restoration plan*. CRTT processes of consultation with affected families aimed throughout at ensuring that decisions were acceptable to the family as a whole and not only to the arbitrariness of the head of household – or a nominated head if someone was working away from home.⁸³ In the main *receiving areas*, Resettlement Infrastructure Teams (RITs) were proposed and tasked with the responsibility for building new houses, roads, water, supplies, school extensions, and community centres – and for ensuring that the incoming households were to be successfully resettled.⁸⁴

Eligibility criteria for compensation by affected households included:

- direct losses incurred as a consequence of project construction activities, including individually fixed assets such as buildings and trees;
- secondary rights to housing or land from which they derive actual benefits;
- the production from arable land and garden land, as well as
- losses from rights and access to communal assets including grazing, brushwood, fuel, usefull grasses and medicinal plants.

It also covered sources of income from work opportunities in the Scheme Area that existed before the project – and which may not be available on completion of the project.⁸⁵ Eligible losses to a wider community were to include access, schools, clinics, churches and services (the latter to be addressed through a later, linked, compensation and development policy).

Given the sensitivities emerging from Phase one, three major issues crucial to policy development concerned:⁸⁶

- the forms which compensation should take;
- the value which should be placed on the major categories of loss and
- the range of options most suitable to resettlers and capable of giving effect to the principles, objectives and strategies for resettlement and relocation.

With regard to arable land, a number of options (some extending from Phase 1 A), were considered in consultation and subsequently selected and tested. Those emerging were for:

- a 'land for land' based exchange representing land of similar quality and equal size;
- an annuity with equal annual sums paid on a regular basis;
- a capital sum to be invested in an approved enterprise such as rows of rental housing (called Malaene); and
- grain as a substitute for the return on crops foregone.

The table below sets out the agreed RDAP compensation classes, options and their associated values.

Table 1: RDAP Compensation Classes, Options and Values

Type of Resource or Asset compensated/	Compensation Rate: RDAP Phase 1B.	Remarks
	Allocated on a Per Household Basis	
Arable Land Options		
Land For Land	One hectare lost to be replaced with one 'equivalent' hectare in the area of choice	
Cash Annuity	M1,800 per hectare lost for 15/50 years??	Discrepancies in reports cited below
Cash lump sum	M30,000 per hectare (M1,800 capitalised at an assumed 6% for investment in an approved income generating asset). Business plans required to access lump sums.	Key is the Income restoration/business plan. Pro rata for parts of a hectare and – conditional on use for investment in a secure income generating assets in the RDP or in Ma-line flats)
	Malaene housing/ Flats to rent.	Income from two flats @ building costs of M1000/ sq m would equal the value of the annuity /or an equivalent income from an average 2.2ha landholding.
Grain: In kind compensation for arable land >1 ha	970kg and 30kg beans per hectare lost for 50 years	Previously 15 years
Gardens	A new site where possible; if not; an Annuity of M0.90 per Sq M/ obtained from M300 p.a production equivalent	
Trees		
Timber and Fuel	Annuity of M9.30/ Obtained from M 25 per tree p.a.	
Thickets	Annuity of M0.12 per Sq M/or M1217 per ha p.a	
Fruit	Annuity of M16.80 per tree/from annual compensation loss of M70	
Common Property Resources	A fixed annuity-with 50% of the annuity going to the development budget of designated villages	
Fodder/grazing	Annuity of M 1906/1000	Discrepancies in various LHDA reports cited below.
Wild Vegetables	Annuity of M200.	
Brushwood Fuel	Annuity of M250	
Medicinal plants	Annuity of M110	
Useful Grasses	Annuity of M 110	
Disturbance Allowance		
	M6,000 disbursed over 3 years – to cover the initial costs of settling in and of rehabilitation	
Structures		
Houses	New house/s with same internal floor area at site of recipients choice- option to self build or contractor build. Any savings on owner build into approved income generating investment.	
Kraals	M30 /m of wall length paid as a lump sum.	

Type of Resource or Asset compensated/	Compensation Rate: RDAP Phase 1B.	Remarks
Shed	Replacement with same floor area, or a lump sum cash of M250/M200 Sq M	Discrepancies in reports
Graves	LHDA to meet actual costs of relocation	
		ZAR 1=Maluti 1

Sources:

LHDA Resettlement and Development Study: Synopsis of Studies and Proposed Programmes pp12-14.1997.

LHDA Resettlement and Development Study, Vol. 5. Compensation Manual. P1-7.1997.

LHDA. Environmental and Social Services Group. Revised Environmental Action Plan for Phase 1A.2001

The major changes from Phase 1 were the creation of a wider range of options and choices, the discontinuation of annual fodder deliveries to villages, its replacement with the compensation of communal assets to villages, the extension of the compensation period to 50 years and large increases in the value of the cash/annuity compensation rates for arable land.

Compensation Preferences and the Potential for Income Restoration

The two staged surveys undertaken over 1996 covering some 847 households in the designated affected villages realised some important anomalies. The majority of preferences expressed were for the annuity (340 households or 40.1%), followed by the cash lump sum (177 or 20.9%), the Malaene options (single story flats for renting) - (150 or 17.7 %), and grain (68 or 8.0 %), with the 'land for land' option attracting only 11 or 1.3 % and another 99 undecided (11.7%).

In response to questions as to how households expected to survive in their new areas, more than 57% indicated that they would return to small scale agriculture and livestock activities or resort to selling produce locally as part of their household survival strategy. This apparent discrepancy – between these compensation preferences and anticipated new forms of livelihoods – has been explained as having two dimensions.⁸⁷

The first concerns the experience of most households in the Scheme Area (and throughout the rural periphery in Southern Africa in general), which centres on the necessary reliance on a number of interrelated survival mechanisms – on multi faceted household survival strategies often garnered in different spatial and economic settings – and which may include access to the natural resource base (as rights holder or as sharecropper/tenant). Land access, however important relatively, is nevertheless not a sufficient condition for survival, especially in the context of the introduction of other resources. Therefore the expressed preferences for compensation in forms other than 'land for land' do not necessarily reflect a desire for a move away from a household's original status in semi-subsistence or subsistence agriculture, but rather that the other options represent less risk, especially given the 'backstop' in the potential that any available agricultural land in the resettlement areas – however marginal – might be activated through kinship links or via sharecropping.

The choices are held to thus represent a genuine attempt by households to spread the risks of resettlement, while maximising the range of available survival strategies.

The RDAP Development Plan

This third component of the RDAP was designed to complement the resettlement action plan and regarded as an integral part of the total compensation package. Ambitious in scope, it aimed at benefiting – in order of priority – the affected households and villages, the host communities, those remaining in the Scheme Area, as well as the whole population of the region in which the scheme area is located. Much of its design reflects, with variations and refinement, the range of supply side projects of the original Phase 1 RDP.

Support was directed into four main sectors, viz:

- Infrastructure, aimed primarily at improving access (new and upgraded roads, bridle paths and systems of transport across the reservoirs) and at enhancing communal infrastructure such as water and sanitation (including potable water, spring protection, weirs, and wetland wells), multi-purpose community and development centres which were to become the physical focus for other support below, as well as the upgrading of schools.
- Agriculture (enhancing the base of community services such as information and extension in agriculture), with a suite of agricultural projects aimed at increasing crop production (especially in potatoes and asparagus), modifying the cropping pattern towards wheat and pulses, enhancing homestead garden production, food security, commercial egg and broiler production, trout culture and commercial milk production, and the improvement of range management through the establishment of range management associations (RMA's). The latter assumed increased significance given that inundation implied the loss of the most valuable, and irreplaceable, winter grazing areas.

A planned forestry sub component intended to strengthen inputs and outputs due to the multiple use of trees locally through a system of nursery production and subsequent distribution via holding centres, extension and planting around homesteads, introducing agro-forestry on contours and for windbreaks as well as micro and village woodlots.

Another sub component supported household energy requirements, and aimed at providing advice through energy information centres, improving the availability of coals and paraffin, exploiting local peat resources in the (to be) inundated areas, and implementing energy research projects.

- Tourism proposals included an employment intensive adventure resort (at Ha Mohale), five satellite lodges, trail developments, camping site developments and the provision of associated guide services through a training programme – together creating 165 full time positions and 30 short terms opportunities.
- Income restoration efforts were to be strengthened via a more consistent engagement with the private sector and the Lesotho National Development Corporation (LNDC) in order to develop specific opportunities as alternatives to a reliance on agriculture.^{88 89}

The Original Area Liaison Committees were to remain active in the development of the receiving areas, with all projects to be closely monitored for their impacts on communal resources, with appropriate compensation for any losses.

RDAP Monitoring and Evaluation

As with most major investments in dams internationally, monitoring and evaluation was required to provide reliable information on the financial, economic, physical and social impacts of Phase 1 B Resettlement and Development on affected households in compliance with LHDA Treaty obligations to ensure *the sustained restoration of incomes of affected households*.

The original plans established a 15 year programme. In light of the revision of compensation proposal in the RDAP for Phase 1 A, the monitoring and evaluation methods and criteria were made retroactive to this first phase.

Evaluation Design

Early design principles were predicated on the LHDA legal obligation to 'maintain affected households income and standards of living at levels not lower than that they enjoyed before project induced disruptions – with the LHDA obliged to make good losses due to project impacts only', without a corresponding obligation to maintain affected households in the face of all subsequent adverse circumstances. The LHDA was not obliged to maintain incomes of project affected peoples in the event of future national disasters such as recession or drought – where the government could not provide equivalent support to the rest of the population. This interpretation had implications for the design of monitoring and evaluation design – requiring that project induced fluctuations in affected households be separated from fluctuations due to non-project causes.

The monitoring and evaluation measurement problem was defined as 'verifying the absence of change over time' – by reference to a baseline in the pre-disruption period. There was anticipation of losses during the period of disruption, but the view was that successful implementation of the three phase RDAP should – ideally – restore income and living standards to levels which can be statistically demonstrated to be no lower than the baseline. However, to determine whether 'fluctuations' may be due either to an ineffective plan, or are in line with trends affecting the general population, the design was informed by a cross sectional comparison with a control group – a sample of unaffected households matching the conditions of those affected households.

Baseline data was to be the existing socio-economic surveys of 1988 and 1995/6, as well as baseline data from other subject areas conducted by various LHDA contractors. In order to avoid sampling error, and given the relatively small size of the total affected households in Phase 1 B, complete coverage was preferred. Control observations were to be on samples of approximately 60 households, drawn separately from the Highland and Foothills area. An ideal interview frequency defined at the time was annually, reduced after three years to once in every three years in order to 'avoid a build up of informant resistance in affected communities.' It was also intended to cover or capture all households, at whatever stage of the three-phase resettlement programme they were involved in at the time of the surveys.

Another recommendation was *Participatory Monitoring and Evaluation (PME)* – to be conducted by affected communities and subject to process monitoring by the NGO community. One aim was to 'extend the principle of community as well as NGO participation into the monitoring and evaluation sphere, providing the LHDA with more sensitive feedback on areas of community concern than questionnaire surveys can give'.⁹⁰

PME was seen as especially effective in enabling project affected people to develop their own criteria for an acceptable standard of living, as well as to assess their own pre project standards in terms of their own criteria. Its use was therefore to complement the hard socio-economic data gathering. Richer interpretations of wider processual issues in the monitoring of household strategies and techniques in the recovery of living standards were anticipated, while more intricate and subtle matters such as gender equity and distributional issues in compensation could emerge. More nuanced interpretations of the impact of lost community assets, interpretations of the impacts of 'intangible losses' as well as perceptions about the performance of the LHDA were anticipated from the complimentary adoption of PME.

Livestock and range monitoring was also accorded a special focus, given the centrality of these assets in the store of wealth and as a readily available source of income in times of need. Increased grazing pressure in a reduced rangeland was anticipated as a likely consequence of inundation, implying that higher mortality rates, reduced reproductive rates, smaller herd sizes and an associated lower off-take, consumption and production would reflect quickly in incomes and standards of living – with all implying a loss of accumulated capital and a reduced long term coping ability among households. The monitoring and evaluation task was to assess whether the compensation for lost grazing awarded would adequately offset losses actually incurred, requiring detailed technical data collected regarding sale weights and values per animal, reproduction and mortality rates and stocking rates. Livestock specialists were to undertake this aspect, instead of it forming part of the socio-economic survey, to be implemented through Grazing Associations (as adopted by the Department of Livestock Services as part of Phase 1A monitoring but still to be formed in the Senqunyane Basin of Phase 1B).

Indicators

The early indicators developed were those required to match the original baseline indicators of the early surveys. These included standard demography, occupations and employment, crop output and production costs, livestock numbers, outputs and costs, household assets and energy use and income and expenditure and so on. Early Epidemiological surveys had also covered the knowledge, attitude and practice regarding family planning and sexually transmitted diseases, mental health and substance abuse, the prevalence and intensity of human and communicable diseases and occupational health and industrial hygiene. These were to be used in the longitudinal comparisons.

Additional variables were added to the cross sectional comparisons, and included crop yields (as opposed to production), the consumption of own crop and livestock produce and of wild produce, public health indicators and physical impact indicators (such as access, noise, dust, and other hazards)⁹¹.

Endnotes

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CHAPTER 3

Livelihoods in Lesotho

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THE CONCEPT OF LIVELIHOODS

The concept of livelihoods goes to the heart of the question posed by this study, namely whether communities affected by the LHWP "have actually suffered deterioration in their standard of living and whether the compensation payments have succeeded in redressing their standard of living" (Scope of Services: Contract 1204: 6). On the most basic level, there is considerable overlap in the meanings of the terms 'standard of living' and 'livelihoods', except that 'livelihoods' is a broader or more inclusive term than 'standard of living' and has, particularly in recent years, been subjected to greater conceptual development and scrutiny.

While the concept of livelihoods has been in common usage for many years, it is only within recent years, and especially since the formative work of Robert Chambers in the mid-1980s, that it has attracted widespread attention from development agencies and analysts and been developed into an approach for analysis and intervention in development. These efforts have given rise to a variety of approaches and frameworks that address the issue of livelihoods, and that often go by the name *sustainable livelihoods*. The sustainable livelihoods approach was developed to provide a way of improving "the identification, appraisal, implementation and evaluation of development programmes so that they better address the priorities of poor people, both directly and at a policy level" (DFID, 2001).

Within this context, livelihoods have been defined as "people's capacity, including their capabilities, assets and activities, to generate their means of living and to enhance their well-being and that of future generations" (Gill-Watson, 2004: ii). The emphasis in this definition and others like it¹ is not just on current standards of living, but on the *capability* or capacity to generate and maintain the means (standard) of living. Furthermore, the concept makes provision not only for the present generation, but also for future generations, bringing into play the idea of *sustainability* that has come to be closely associated with livelihoods. According to Murray (2001: 6) "a livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base." Other exponents of the approach, like Singh & Wanmali, 1998, for example, have also emphasized the importance of economic effectiveness, ("the use of minimal inputs to generate a given amount of outputs") and social equity ("that promotion of livelihood opportunities for one group should not foreclose options for other groups, either now or in the future") as important components of sustainability.

In addition to sustainability, economic effectiveness and social equity, the livelihoods approach has a number of other identifiable features some of which it shares with other approaches to poverty and development, but which in combination distinguish it as a unique tool of analysis and implementation. Among the major characteristics of the approach as the following:

- An emphasis that puts *people at the centre* of development and that encourages respect for the views and priorities of the beneficiaries of development.
- An *holistic* approach that transcends sector-specific analyses and recognizes the multiple influences, livelihood strategies and livelihood outcomes that impact upon people and their well-being.
- A *positive* approach to the strengths, capabilities and resources that people have and an attempt to build on these strengths rather than focus on weaknesses and needs.
- Counterposed to the emphasis on strengths, is recognition of the *vulnerability* of the poor and the shocks and stresses that poor people face.
- An acknowledgement of the *dynamic* character of livelihoods and to the constantly changing contexts and conditions within which the poor create and adjust their livelihood strategies.
- An attempt to bridge the gap between *micro and macro* levels of analysis, and to locate detailed local analyses within their broader political and socio-economic contexts. (DFID, 2001; Turner et al., 2001; Murray, 2001)

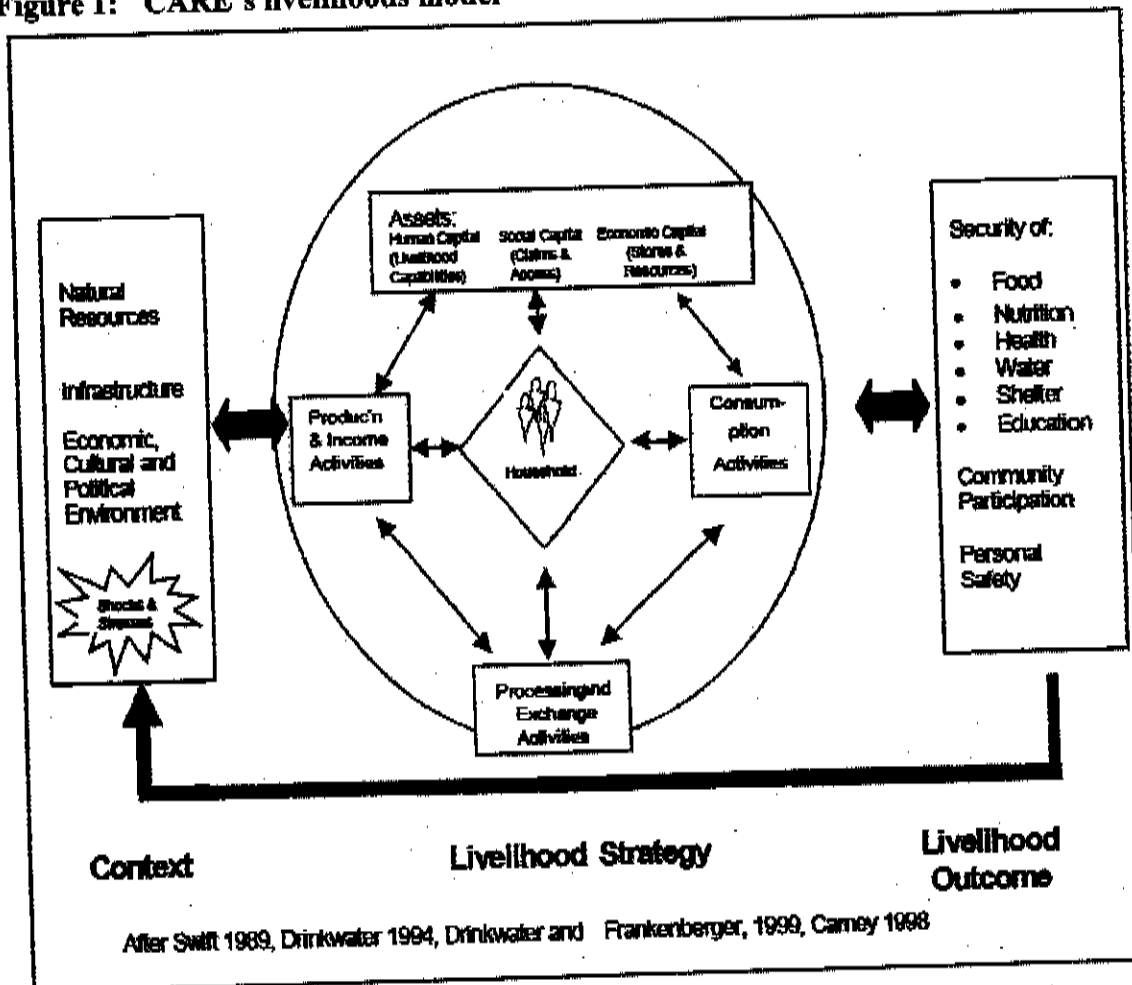
In spite of its strengths, the livelihoods approach is not without weaknesses. For example, as Turner et al. (2001: 5) point out "the holism and the participatory character of livelihoods work can easily generate such a vast mass of ideas and concerns that purposeful action becomes hard to prioritise and deliver." For the same reason, the livelihoods approach also presents a "formidable management challenge". It has also been criticized for not taking sufficient account of inequalities and conflicts of interests between different social groups, and for conceptual confusions relating to the ways in which the term 'capital' is used (see, for example, Murray, 2001).

Approaches to livelihoods take a broad range of assets into account, focusing not only on *economic or financial* resources that enable people to pursue their livelihoods, but also on *physical* assets (such as roads, markets, clinics, schools, bridges) on *human* assets or human capital (e.g. skills, knowledge, ability to labour and good health), *natural* assets (e.g. land, water, common-property resources, flora, fauna), and *social* assets (e.g. membership in groups, social relations, networks, and access to the institutions in society). In an early paper on livelihoods, Singh & Wanmali (1998) drew attention to "the integrative power of the concept" in that it addresses the gap between macro policies and micro realities and integrates environmental, social and economic issues into a holistic and conceptually coherent framework. Over the years a variety of different models and frameworks have been developed to link together the concepts and variables that constitute the livelihoods/sustainable livelihoods approach. Figure 1 presents the model developed by the NGO, Care.

A further dimension that the livelihoods approach brings to conventional approaches to impact assessment is its emphasis on vulnerability. Rather than simply measure the quantities of resources or assets controlled by households, the livelihoods approach locates such resources within a vulnerability context, an external environment in which people exist and over which they may have little or no control. The vulnerability context (which may be broken down into trends, shocks and seasonal shifts) can critically influence people's asset status and the options that are open to them to pursue specific livelihood outcomes. Shocks, such as floods, severe droughts, the loss of employment or a death in the family) can destroy assets directly or force people to dispose of productive assets in order to meet immediate

needs. While they may be more predictable, trends (for example, a steady increase in population or escalating inflation) can increase pressures on poor households by, for example, increasing competition for communal resources, or pushing up rates of unemployment and therefore economic dependency on households. Seasonal shifts could involve, for example, fluctuations in prices, changes in the availability of employment, or seasonal expenses such as school fees, uniforms and books at the beginning of the school year, and place additional pressures on poor households (DFID, 2001b).

Figure 1: CARE's livelihoods model



Source: Turner et al., 2001: 4

The livelihoods framework as set out by CARE consists of three major components, namely strategies, context and outcomes. At the centre of the model are livelihood strategies made up of an interaction between livelihood assets, production and income activities, consumption activities, and processing and exchange activities, centred on the household as the main unit of analysis. Livelihood strategies are in turn located within the context of natural resources, infrastructure and the economic, political and cultural environments. These contextual factors play a major role in determining the vulnerability of households and their livelihood strategies through the shocks and stresses they impose on livelihoods. Livelihood strategies and contexts create the basis for livelihood outcomes, such as food security, levels of health, education, basic infrastructure, personal safety, and social and community interaction. Finally, livelihood outcomes become part of the context within which livelihood strategies are adjusted to meet new contingencies and respond to opportunities.

Within the context of this study therefore, the livelihoods approach offers a means of conceptually integrating the various strands and themes of the project, as well as contributing to the more specific components of the study such as the literature review, development of indicators, research design and methods of data collection. The wealth of material on Lesotho livelihoods also has the potential to inform the analysis and interpretation of data for this study, and to flesh out issues that cannot, or can only partially, be addressed in the survey.

LIVELIHOODS IN LESOTHO

An extensive and rich literature on livelihoods in Lesotho has developed over the past decade. This evolving literature not only provides essential background to the central issues of this study, but is also useful in helping to disentangle the specific impacts of the LHWS from other impacts on Lesotho livelihoods such as HIV/AIDS, retrenchments of Basotho workers from South African mines, changes in currency exchange rates, fluctuations of climate, etc. A central feature of livelihoods research (which is both a strength and weakness of the approach) is the emphasis it places on the diversity of livelihoods and on the dynamic nature of change over time.

The diversity and interdependence of livelihood strategies in Lesotho has been clear to analysts since the 1970s, although Basotho have been pursuing multiple livelihood strategies for at least the last century (Turner et al. 2001: viii). Two major studies that examined trends in Lesotho livelihoods in the past two decades (Turner, 2003 and Gill-Wason, 2004) found clear signs of greater diversification of Lesotho livelihoods in recent times. As Turner (2003: iv) remarks: "While such diversity may spread risk, it imposes new burdens and exacerbates the perpetual stress of having to keep several strategies going at the same time."

Livelihoods in Lesotho have not only been characterized by diversity, but also by interdependence. Such interdependence has two aspects. Firstly, the livelihoods of individuals and households are closely linked to one another through institutions of reciprocity that allow Basotho to rely on the economic and social support of their kin and neighbours (Turner, 2003: 17-18). These social and economic networks to this day play a key role in Lesotho livelihoods, and in particular in preventing impoverished households from falling into complete destitution.

A second aspect of the interdependence of livelihoods in Lesotho relates to the ways in which livelihood strategies *within* households rely upon one another, and in particular on injections of cash from wage labour, casual work, gifts and loans. As Turner et al. (2001: viii) point out, the only way to farm economically in Lesotho is "with minimum external inputs", although net returns from agricultural production also play a role. This applies also to other forms of income such as informal sector activities, gifts and casual work. A major concern therefore is that should existing cash injections into the community from wage earners dry up, many of the other livelihoods upon which Lesotho households depend, may also fall away (Gill-Wason, 2004: 53).

Studies of livelihoods in Lesotho also challenge the centrality that has been accorded to agriculture in the Lesotho economy. While these studies acknowledge the importance of agriculture within the broad range of livelihood strategies, especially of the poor, they argue that "it is a long time since agriculture was truly the (economic) backbone of Lesotho" (Turner et al., 2001: viii). The data on livelihoods also suggests that agriculture has played a dwindling role in most Lesotho households in the last few decades. Rather than agriculture,

migrant labour has "remained the backbone of the Lesotho economy and of Basotho livelihoods through almost all of the 20th century" (Turner, 2003: 13).

However, the decline of migrant labour opportunities on the South African mines since the early 1990s has dealt a heavy blow to livelihoods in Lesotho. While, as Turner (2003) points out, migrant labour did little to alleviate poverty through most of the 20th century, it supported a degree of capital accumulation among young households, as well as providing an economic basis for other economic activities such as agriculture.

With the decline of mine labour opportunities, Basotho households have had to resort to a broader range of strategies, including seeking employment in other sectors of the South African economy, engaging to a great degree in casual labour, and involvement in a variety of informal sector activities. The growth of employment opportunities in both manufacturing and the service sector in Lesotho has also helped to offset the negative impacts of large numbers of Lesotho mine workers, as well as consolidate the role of migratory labour in livelihood strategies. As Turner, (2003: iii) argues, "the nature of migration in Basotho livelihoods has changed, but not its centrality. Migration to Lesotho towns and migration within rural areas are now key strategies for many households."

Overall, however, the past two decades have seen an increase in both the incidence and severity of poverty, as well as a growth in inequality. Against the background of the HIV/AIDS pandemic, the full impact of which has not yet been felt in Lesotho, and questions around the sustainability of the textile industry, these negative trends seem likely to persist into at least the first part of the 21st century.

The broad trends sketched above are explored in greater detail below.

LIVELIHOOD STRATEGIES

The diversity of livelihood strategies is illustrated by Table 1, which presents a summary of livelihood strategies in the mountain zone of Lesotho disaggregated by four socio-economic categories of the population. The table is based on data collected by means of participatory livelihoods methods by Turner et al. (2001: 82-84). Strategies that were mentioned at more than one site in the zone are printed in bold.

It is noteworthy that the range of strategies is more limited for poorer households than for 'average' households, suggesting that because of more constrained access to resources and capabilities, poorer households have more limited opportunities for engaging in economic activities. That 'better-off' households also named fewer strategies may have been a product of their greater freedom to choose strategies that were more profitable, such as wage labour in Lesotho and the RSA and the sale of crops and livestock products. Turner et al. (2001: 82) report that for all the zones (i.e. low lands/foothills, urban areas and mountains), wage work has increasing prominence as a livelihood strategy as one moves from poorer to better off households. "For the poorest households, the only sort of wage work that can usually be procured is piece jobs or the government's *fato-fato* short term labour intensive public works programme. Work in South Africa is still mentioned frequently. But – in marked contrast to the situation a couple of decades ago – it is now a strategy more common among the average to better off households" (Turner et al., 2001: 82).

In the rural areas, agriculture remains a prominent livelihood strategy across all economic strata. But the strategies of the very poor reflect their inadequate means of agricultural production, so that many of them must

engage in sharecropping their own or others' land, or (typically in the case of old widows) rent out their land to economically stronger households. At the other end of the scale, we find the better off households commonly involved in the sale of crops, wool and mohair. Some are also able to make money by renting out their agricultural equipment. The most lucrative cash crop of all, dagga (marijuana) shows up in the livelihood strategies of the whole spectrum of rural households. Legalisation of the herb in South Africa could be catastrophic for Lesotho livelihoods (Turner et al., 2001: 82-83).

Table 1: Livelihood strategies in Lesotho's mountain areas by socio-economic category

Very poor	Poor	Average	Better-off
Fato-fato Brewing joala (also hired as beer brewers by others) Begging Renting out houses Piece jobs, e.g. weeding/washing/harvesting/smearing houses Help from relatives/reliance on gifts Subsistence farming Sharecropping Begging Sale of dagga Hiring out donkeys Sale of firewood	Brewing joala Piece jobs, e.g. weeding/harvesting/LHDA Shoe and radio repair Small-scale wool/mohair sale Sale of wood/shrubs/fruits/vegetables Begging for food Catch and sell fish locally Weave and sell grass mats/hats/ tables Sell own chickens/small stock (esp. in crisis) Sell dagga Hire out horses/donkeys/carts Fato-fato Renting out houses Renting land in or out Remittances Sharecropping Subsistence farming Sewing clothes for sale Reliance on gifts	Brewing joala Sale of wool/mohair Sale of pigs, chickens, livestock and livestock products (in crisis) Spazas Selling tobacco/snuff/matches/ second hand clothes Grow and sell vegetables Piece jobs, e.g. weeding/harvesting/LHDA Paid employment, e.g. mines Remittances Sale of crops Sharecropping Rent land in or out Catching and selling fish Hire out livestock and farm implements (incl. horses, donkeys, carts) Work for livestock owners in return for having land ploughed Sale of dagga Sale of wood from wood lots Sale of commercial beer Building Fato-fato Traditional healers Farming Teaching and civil service Renting out rooms Sewing clothes for sale Gifts	Sale of commercial beer Wage work in Lesotho and RSA Sewing clothes for sale Sale of surplus crops Sharecropping Sale of wool/mohair Brewing joala Sale of dagga Hire out draught power and implements (donkeys, horses, carts) Sale of crops Sale of vegetables Sale of livestock and livestock products Remittances Shops Milling machine Sharecropping Sale of meat Block making

Source: Turner et al., 2001: 84

In common with other rural areas in Lesotho, brewing of *joala* (beer) is a common livelihood strategy among all socio-economic categories in the mountains, although better off households are also involved in the sale of commercial beer. Begging and reliance on gifts appear also to be more commonly used by poorer households.

Because of the qualitative nature of the data presented in Table 1, it is not possible to assess the relative importance of these strategies to livelihoods in Lesotho. Data on the relative financial contribution of different sources of income towards livelihoods in Lesotho were obtained from a panel study of the same 328 households in 1993 and 2002 (Gill-Watson, 2004). These data (presented in Table 2 below) not only allow one to assess the relative importance of different sources of income to the same households in 1993 and 2002, but also to track changes in livelihood strategies over this crucial period in the economic history of Lesotho.

Perhaps the most prominent feature to emerge from the data in Table 2 is the heavy dependence of Lesotho households on wage labour and especially mine labour in 1993. Mine labour, predominantly, if not exclusively, on the South African mines, accounted for more than half (53.3%) of the cash income of the sample, while wage labour as a whole, i.e. including wage labour in Lesotho (26.4%) and non-mine labour in South Africa (1.9%), accounted for a total of 81.6% of the sample's income. In contrast, 'farming' (presumably the cultivation of crops) and livestock production accounted for only 2.6% and 1.9% of cash earnings, respectively, while gifts made up 3.6% of total income.

A degree of caution is necessary, however, in assessing these data. In terms of this study, 'income' refers only to "cash or money which comes into the household either in the form of wages, gifts, casual earnings or self-employment. It does not include income in kind such as food or clothing, or income in kind based on reciprocal arrangements such as sharecropping. For the purposes of this report it is strictly defined as cash which comes into the household to be spent as the household deem(s) fit" (Gill-Watson, 2004: ii). It is clear from this definition that subsistence production, which constitutes a crucial part of Lesotho livelihoods, has not been included in the data. As Gill-Watson (2004: 26) points out, there may also be a problem of definition relating to wage labour in that "what in 1993 may have been categorised as wage work might in 2002 have been ranked by the respondents as casual.

Table 2: Relative contributions of sources of cash income in Lesotho, 1993 and 2002

Source of income	1993		2002	
	Maloti	%	Maloti	%
Lesotho wages	405006	26.4	200056	13.4
RSA wages	29431	1.9	100020	6.7
Casual work ²	49324	3.2	76225	5.1
Farming	39269	2.6	29581	2.0
Livestock	28715	1.9	58771	3.9
Informal work	57783	3.8	325107	21.8
Pensions and disability grants	11100	0.7	60150	4.0
Gifts	55239	3.6	111065	7.5
Other	41436	2.7	93965	6.3
Mines	818107	53.3	433600	29.1
Total	1535410	100.0	1488540	100.0

Source: Compiled from data presented by Gill-Watson, 2001: 27-29

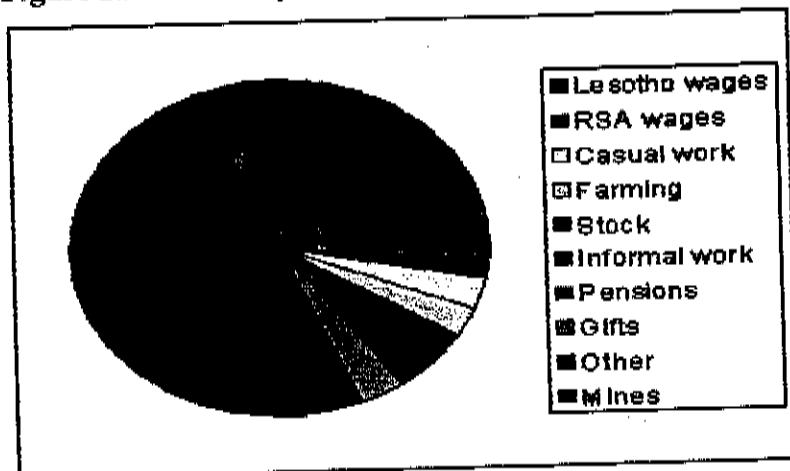
More likely is the fact that previously secure jobs are now seen as being much less secure and therefore casual in nature." Two other limitations need to be borne in mind: Besides the relatively small sample, the data is also limited in that only two years, 1993 and 2002, are taken into account and may therefore reflect special circumstances associated with these two years.

In spite of these limitations, the trends in the data remain clear and are supported by other analyses and evidence that will be examined later. Even if adjustments were made for subsistence agriculture and income in kind from sharecropping and gifts, this would be unlikely to challenge the dominant role of wage labour, especially in 1993. Comparisons of the relative contributions of sources of income in 1993 and 2002 provide further support for the centrality of wage labour to Lesotho livelihoods. The sharp drop in the contribution of mine labour to incomes between 1993 and 2002 is consistent with the documented reductions of Basuto mineworkers over this period (see Table 5 below).

Attempts to compensate for this massive loss of employment and income have not resulted in significant increases in the marketing of agricultural products. Instead, the percentage of cash income from crop production fell slightly from 2.6% to 2.0%, while the sale of livestock and livestock products rose from 1.9% to 3.9%. While the proportion of income from livestock production doubled between 1993 and 2002, the relative contribution of livestock production in 2002 was about half of the contribution of gifts to cash income in the same year.

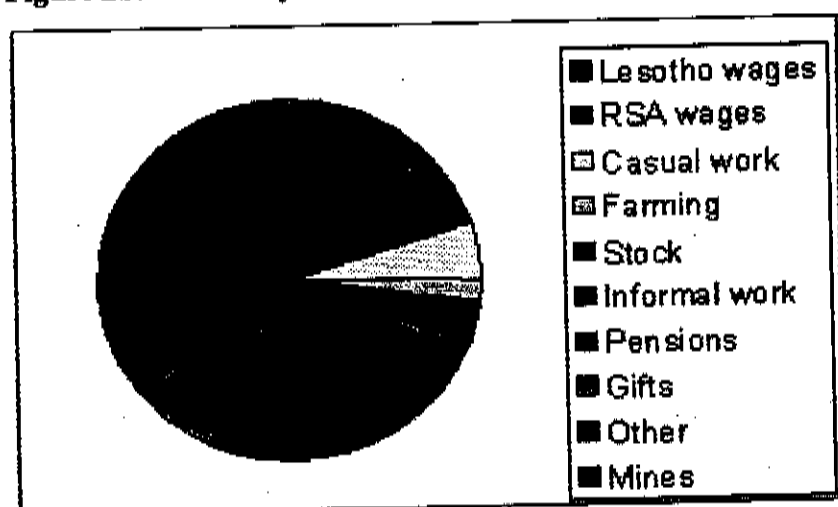
The most dramatic increase during the period, however, was in informal sector activity, which rose from 3.8% in 1993 to 21.8% in 2002, making informal sector activity the second largest contributor to cash incomes after mine labour and a larger contributor than wage labour in Lesotho, which had fallen from 26.4% in 1993 to only 13.4% in 2002. The contribution of non-mine wage labour in South Africa also increased, although far less dramatically, from 1.9% to 6.7%, as did casual labour from 3.2% to 5.1%. The changes in the relative contributions of the different sources of income are represented graphically in Figures 2a and 2b.

Figure 2a: Income by source for sample, 1993 (including mine income)



Source: Gill-Watson, 2004:26

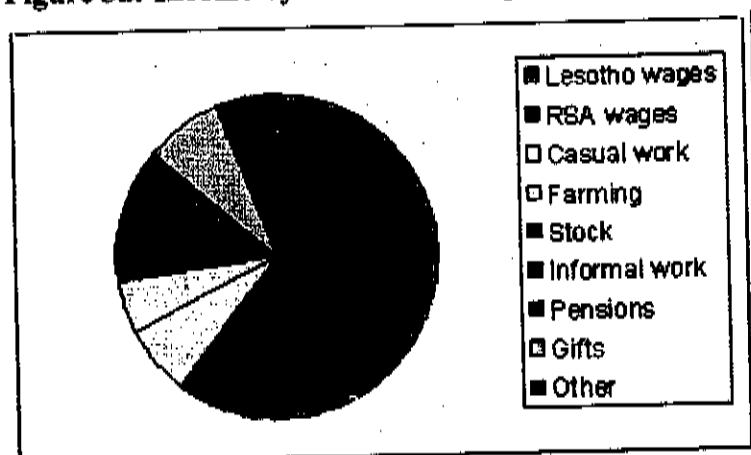
Figure 2b: Income by source for sample 2002, (including mine income)



Source: Gill-Watson, 2004:28

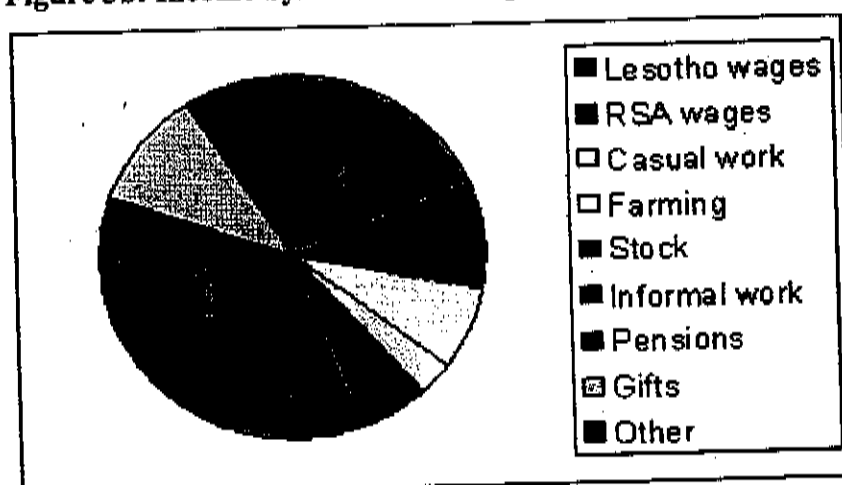
The trends are even more vivid when mine labour is excluded as in Figures 3a and 3b.

Figure 3a: Income by source for sample 1993 (excluding mine income)



Source: Gill-Watson, 2004:27

Figure 3b: Income by source for sample 2002 (excluding mine income)



Source: Gill-Watson, 2004:27

The growth in the contribution of informal work to income in the sample between 1993 and 2002 is all the more remarkable when one takes into account the relatively low incomes generated by informal sector activity. Table 3 provides a breakdown of the mean incomes per household of the different sources of income based on those households that received income from a particular source. In spite of a possible improvement in the mean income from informal work between 1993 and 2002 (and here inflation would have to be taken into account), the mean income from this source in 2002 compares unfavourably with all sources of wage income and even with pensions and disability grants. For example, the mean income from wages in Lesotho is 4.8 times higher than that of informal work. It should also be noted that the mean cash income from crops dropped steeply from M2 310 in 1993 to M740 in 2002. This might be an indication that households were consuming a larger proportion of their agricultural produce due to losses of cash income associated with reductions in mine labour. In this regard, it is noteworthy that in both 1993 and 2002 the mean income from employment on South African mines exceeded that of any other source of income.

Table 3: Mean income per household from various sources (in Maloti)

Source of income	1993	2002
Mines in South Africa	6 761	9 226
Wages in Lesotho	5 956	6 453
Non-mine wages in South Africa	2 102	7 694
Casual work	1 541	1 210
Farming (crops)	2 310	740
Livestock (products and sales)	990	1 631
Informal work	850	1 338
Pensions/disability payments	5 550	6 683
Gifts	952	1 145
Other income	1 428	1 999

Source: Gill-Watson, 2004: 30

The shrinkage of employment opportunities on the South African mines appears also to have resulted in greater diversification of livelihoods in Lesotho. As Table 4 shows, between 1993 and 2002 the mean number of sources of income in Gill-Watson's longitudinal survey increased from 1.3 to 1.4. It should be borne in mind that sources of cash income (rather than livelihood strategies) are being measured here. Livelihood strategies such as subsistence agriculture, the collection of natural resources like firewood, and the receipt of gifts in kind were therefore not included in the data. As Turner (2003: iv) points out, greater diversity of livelihood strategies may spread risk, but "imposes new burdens and exacerbates the perpetual stress of having to keep several strategies going at the same time."

Table 4: Households with varying sources of income (in percent)

	1993	2002
No source of income	6	6
One source	62	54
Two sources	28	31
Three sources	4	8
Four sources	0.3	1
Mean number of sources	1.3	1.4

Source: Gill-Watson, 2004: 29

Before proceeding to a discussion of the context of livelihoods in Lesotho, and in particular the shocks and stresses with which these livelihoods have to contend, it is necessary to consider the major livelihood strategies in greater detail.

Wage labour

The central role of formal sector wage employment, and especially migrant labour to the South African mines, has already been highlighted above. As Table 5 illustrates, migration of Basotho men to the South African mines was already well-established by the beginning of the 20th century, with 15% of men between the ages of 16 and 64 years employed as mineworkers in 1904. From 1904 the numbers of Basotho men employed on the mines increased steadily from 14 000 to 127 000 in 1990 when 29% of men between the ages of 16 and 65 years were employed as mineworkers. The remainder of the 1990s, however, witnessed a steady decrease in the numbers of Basotho employed on the South African mines so that by 2000 only about 64 000 Basotho were working as mineworkers in South Africa. This represented just over 12% of males between the ages of 16 and 64 years, a smaller than that of 1904. Between 1989 and 1999 the contribution of mineworker remittances to GNP fell from 62% to 18%.

Table 5. Basotho men in South African mines, 1904 – 2000

Year	<i>De jure</i> population	Total males	Males 16-64 years	Miners	Miners as % of males 16-64 years
1904.....	384 000	180 000.....	93 000	14 000.....	15.1
1911.....	444 000	202 000.....	104 000	23 000.....	22.1
1921.....	549 000	246 000.....	127 000	23 000.....	18.1
1936.....	618 000	264 000.....	136 000	40 000.....	29.4
1946.....	620 000	273 000.....	141 000	36 000.....	25.5
1956.....	706 000	299 000.....	154 000	38 000.....	24.7
1966.....	969 000	466 000.....	240 000	57 000.....	23.8
1976.....	1 216 000	587 000.....	303 000	83 000.....	27.4
1986.....	1 597 000	785 000.....	405 000	100 000.....	24.7
1988.....	1 673 000	811 000.....	418 000	120 000.....	28.7
1990.....	1 753 000	850 000.....	438 000	127 000.....	29.0
1992.....	1 837 000	891 000.....	459 000	120 000.....	26.1
1994.....	1 971 000	956 000.....	493 000	103 000.....	20.9
1996.....	2 010 000	975 000.....	503 000	97 000.....	19.3
1998.....	2 054 000	996 000.....	513 000	69 000.....	13.5
2000.....	2 096 000	1 017 000.....	524 000	64 000.....	12.2

Source: Turner et al., 2001: 50

The loss of mine jobs had a considerable impact on Lesotho livelihoods. As Turner (2003: 11) points out, the “traditional Lesotho livelihood cycle normally included a phase of some 20 years when the head of the household was remitting a substantial part of his mine wages to the household at home, building up the assets (notably shelter, livestock and equipment) that would sustain it for the rest of its days. That cycle now only functions for a minority of Basotho households.”

To some extent, the impact of large-scale losses of mine employment was offset by the rapid growth of manufacturing in the late 1980s and early 1990s, as well as construction associated with the LHWP. In particular, the growth of the textile industry in Maseru, which took advantage of preferential trade arrangements with the United States, contributed to growth of

the economy in the 1990s, although as Turner (2003:11) points out, wages in the industry were "notoriously low". Some of the retrenched Basotho mineworkers settled across the border in South Africa, and greater numbers of women migrated to other kinds of employment in South Africa (Turner et al, 2001:25).

However, by the late 1990s, the cumulative impact of job losses on the South African mines, the slowing down of activities and imports on the LHWP, and inflation, especially of food prices, were beginning to take their toll. The rioting and looting in Maseru and other towns in September 1998 led to military intervention by South Africa and Botswana and also resulted in widespread job losses.

Crop production

Although crop production may make only a small contribution to cash incomes in Lesotho, farming continues to play an important role in livelihoods, particularly in relation to subsistence production. While estimates of the number of households that have access to arable land tend to differ from one another, overall trends suggest that numbers are declining. For example, in 1970 it was estimated that 13% of Basotho households had no fields. However, in 2000 Sechaba Consultants estimated that the proportion of all Basotho households (including Maseru) without fields had risen from 30% in 1990 to 41% in 1999, while the Lesotho Agricultural Census of 1999/2000 found that a third of *rural* households had no fields. (Turner, 2003: 26-27)

While these estimates suggest a steady decline in the number of households with access to fields, it is noteworthy that about two-thirds of rural households have fields. Access to fields tends to be higher in the mountains than in the foothills and lowlands. For example, the 1988 LHWP census showed that only 14% of households in the Katse catchment area and 8% in the Muela area had no fields (Turner, 2003: 26).

Of course, not all fields are utilised. The 1999/2000 Agricultural Census, for example, found that 81% of fields were planted in that season. Data from the agricultural censuses also suggest that there has been a decline in agricultural production. In 1989/90 agricultural census data recorded 53% of households as saying that 'subsistence farming' was their main source of income. The equivalent figure from the 1999/2000 Agricultural Census showed a decline to 46% (Turner, 2003: 32).

As Gill-Wason (2004) points out, the returns on fields have not held up over the years. While caution needs to be exercised in generalizing from a two-wave study, comparison of data on the same households in 1993 and 2002 showed that agricultural production had dropped from an average harvest of 59kg per person (of those who owned fields) to 30kg per person in spite of 2001 being a relatively good year for cereal crops. Gill-Wason also found that while the proportion of households selling crops had not changed significantly between 1993 and 2002, the average annual income from the sale of crops dropped from M2, 310 in 1993 (at 2002 prices) to M740 in 2002. These trends were also reflected in a decrease in the proportion of households paying for inputs, particularly for ploughing. Gill-Wason maintains that in spite of these negative trends crop and livestock production are "an increasingly important *source* of income for the poor although yielding *less income*."

Data on home garden production are more difficult to find. However, the 1988 LHWP census showed that 64% of households in the Katse catchment area and 72% of households in the foothills

area of Muela had vegetable gardens of which between 80% and 83% had been cultivated in the previous season (Turner, 2003: 33).

Livestock production

Livestock plays a central role in the economic and social life of the Basotho, with about 70% of households in Lesotho owning livestock of some kind, including 35% of urban households. Turner (2003: 29-30) suggests that obtaining accurate information on livestock ownership is "notoriously difficult", and advises caution in the use and interpretation of available statistics. However, available data suggest that livestock production may be declining. For example, in their poverty assessments, Sechaba Consultants (cited by Turner, 2003: 29) showed a decline in cattle ownership in the mountain and Senqu valley areas from 59% of households in 1993 to 49% in 1999. The lowlands and foothills experienced a similar decline from 51% to 42% over the same period.

The data also suggest decreases in small stock ownership, with ownership of sheep and goats among mountain and Senqu valley households declining from 50.3% in 1993 to 40.4% in 1999. In the lowlands and foothills, small stock ownership dropped from 30.2% of households to 25.7% over the same period. Sechaba Consultants also found that the percentage of households owning pigs had increased in all parts of the country. Agricultural census data also showed reductions in the percentages of households owning cattle and small stock between 1989/1990 and 1999/2000 (Turner, 2003: 29-30).

On the basis of available data, Turner (2003: 37) concludes that while "cattle are retaining their importance in Basotho livelihoods, ... (the) role of sheep and goats is becoming smaller." His conclusion is supported by Gill-Watson (2004:53) who found an overall decrease in livestock production, but with bovine and fowl staying the same, pigs increasing, and small stock (i.e. sheep and goats) decreasing. Turner attributes the reduction in small stock to stock theft and the disintegration of the wool and mohair marketing system. Statistics on exports of wool and mohair show substantial annual variations, but steady and substantial declines of both products (Turner, 2003: 36). Dzimba & Matooane (2005:19 & 43) also believe that while cattle numbers have remained stable, small stock has been substantially reduced, and that stock theft is a primary cause for the reduction in small stock numbers.

In spite of the large proportion of Basotho households that own livestock, available data suggest that livestock production is rarely a principal livelihood strategy. For example, in the Katse catchment area of the LHWP in 1988 only 3.2% of household heads said that livestock was their principal source of subsistence. This was in contrast to 42.8% of household heads who said that crop production was their main source of subsistence (Turner, 2003: 35).

Small businesses and informal sector activities

As in the case of livestock production, informal sector activities and small businesses are more likely to be supplementary, rather than principal, livelihood strategies. Surveys conducted in the Maseru district in 1982-84 found that on average 11.9% of households reported one or more members whose primary subsistence strategy was in the 'local informal sector'. The study argued that "research to date has not fully uncovered the complexity and increasingly significant contribution of the local off-farm sector, not all of whose facets are likely to be reported by a household in a single interview ..." (Senaoana *et al*, 1985, cited by Turner, 2003: 44) In the mountain areas of Maseru district, the study found that 8.8% of households had one or more members who had their principal source of subsistence in the

'local informal sector', and that 72.5% had one or more members who said that it was a subsidiary source of subsistence.

In the 1988 census of the Katse catchment area, only 2.9% of household heads reported having their principal source of subsistence in the local informal sector while 13.6% reported this sector as a subsidiary source of subsistence. (Tshabalala and Turner, 1989, cited by Turner, 2003: 45). In a more recent survey in 1999, Sechaba Consultants (2000, cited by Turner, 2003: 45) found that 26.5% of the households that had an informal business depended totally on that business. About two-thirds of these households brewed and sold *joala* (beer) as their only means of livelihood.

Involvement in the informal sector tends to be concentrated among poor households because of the generally low and insecure levels of income they generate.

Social and economic networks

Turner (2003:24-25) distinguishes between two kinds of social support or social capital in Lesotho, namely rights to social support that are exercised through kinship networks and roles and membership of community organisations. In relation to the first, practices range from support from children or parents, to livestock loans (*mafias*) and payments of food for working in neighbours' fields (*lijo tsa meelela*), to weddings, funerals and feasts through which the poor are provided with food and drink. Community organisations include burial societies, *stokvels*, and grocery associations, some of which have the important function of providing small-scale loans that might not otherwise be accessible. Gill-Wason (2004: 44) found in 2002 that 45% of households had sought a loan from outside the family during the preceding 12 months. Of these, 91% were successful in obtaining loans. While 'formal' community structures like burial societies and savings groups made significant contributions to the provision of credit, informal relationships with friends and neighbours were more important as the table below illustrates.

Table 6: Source of loans outside of family by percentage, 2002

Source of loans	Percentage
Friends and neighbours	53
Union.....	17
Burial society.....	11
Savings group.....	9
Other.....	10

Source: Gill-Wason, 2004: 44

Another very common strategy that has long been an essential part of farming in Lesotho is sharecropping. According to the 1999/2000 Agricultural Census (cited by Turner, 2003: 47) 71% of all fields in Lesotho involved some form of sharecropping arrangement, with only 22% operated solely by their owners. In contrast the 1970 Agricultural Census found that 14% of farming households had been involved in sharecropping. While the difference between the 1970 and 1999/2000 figures may in part be due to increasing economic pressures on households, a more likely explanation is that different definitions of sharecropping were used in the two censuses. For example, in the 1972/73 season Murray found that 18% of 88 fields that were cultivated in one village area were sharecropped. The remainder was farmed "by the holding household under a variety of other contractual and cooperative arrangements", ranging from informal pooling and sharing arrangements to more formal

hiring of wage labour (Murray, 1981, cited by Turner: 47).³ Data collected in the mid-1970s and early 1980s, while showing small increases in sharecropping, produced estimates of sharecropping that were more in line with the 1970 census.

Besides demonstrating the importance of sharecropping in Lesotho livelihoods, the above discussion highlights the complexity of sharecropping and other cooperative arrangements in agriculture, and the difficulties this poses for measurement in surveys. This issue will be taken up again below.

While there is agreement that gifts from family and community play an important role in livelihoods in Lesotho, systematic data are difficult to come by and existing data provide only a partial picture of the complexity of sharing and cooperative systems. For example, Gill-Wason (2004: v, 44) found that in 2002 about a quarter of households gave food to neighbours in the month before the survey and nearly a quarter (22%) received it.

Based on their poverty survey of 1993, Sechaba Consultants (cited by Turner, 2003: 48) demonstrated the importance of assistance from families, neighbours and institutions for the livelihoods of destitute households. Table 7 shows that for food and furniture destitute families were dependent upon assistance from outside the household for the larger part of their needs. Relatives played the major role in providing assistance, but neighbours and institutions were also important. Sechaba Consultants calculated that in 2000 there was a ratio of 1.79 helpers to one poor person. However, with the impact of the AIDS pandemic and diminishing opportunities for wage labour, this ratio may change and relationships of dependence and support may increasingly come under threat.

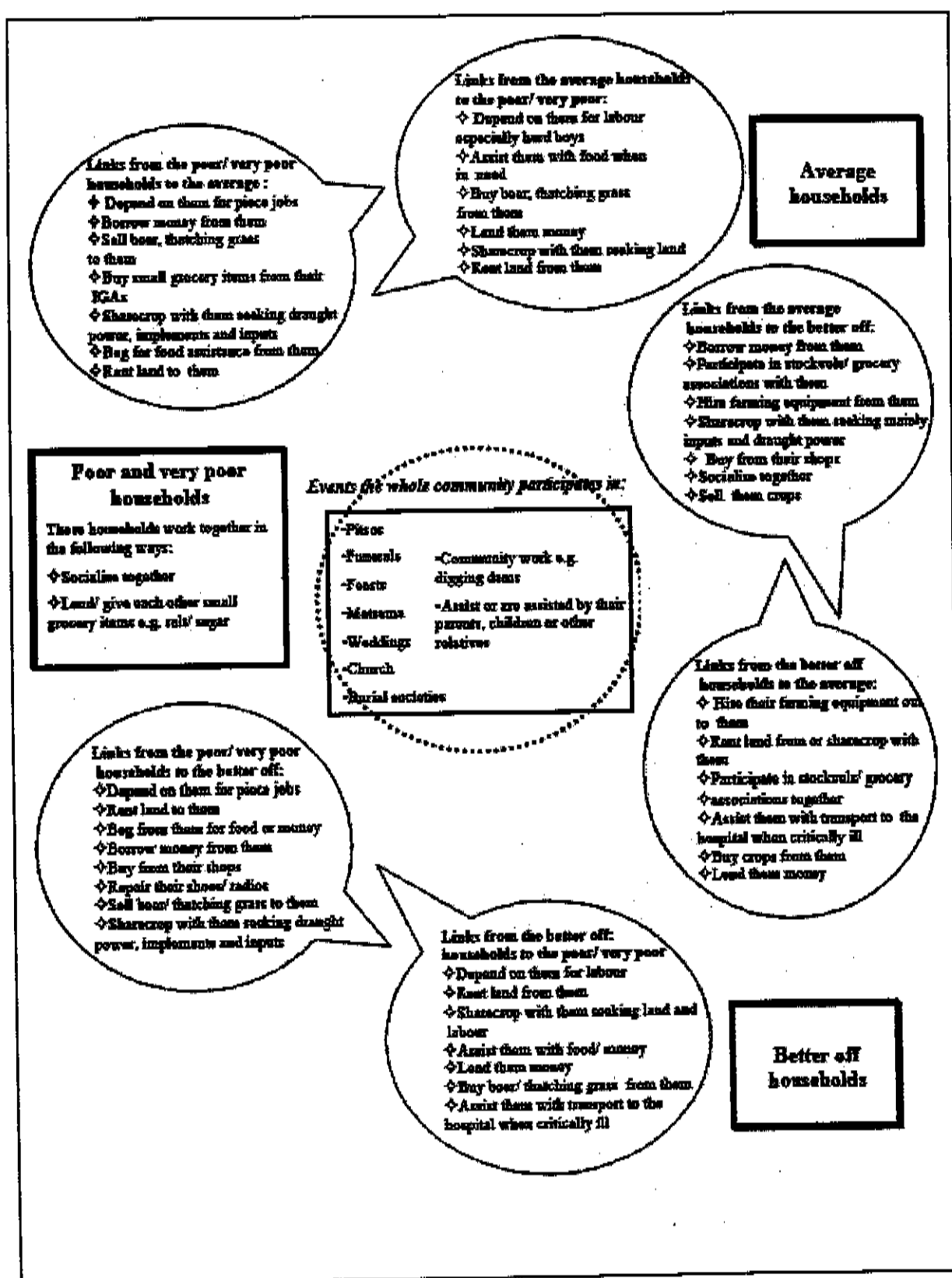
Table 7: Sources of assistance to destitute households by percentage

Type of help	Relatives	Neighbours	Self	Institutions
Food in house	23.4	11.7	48.3	16.7
Clothing	40.0	6.2	53.8	0.0
Furniture	47.3	5.3	47.3	0.0
House	43.1	1.4	55.5	0.0
Money to buy	13.0	0.0	87.0	0.0
Money for food	24.6	9.8	60.7	4.9
Yesterday's food	18.6	22.3	48.1	11.2
Gifts	62.1	13.5	0.0	24.3

Source: Sechaba Consultants, 1994, cited by Turner, 2003: 48

Some of the complexities of sharing and dependence between different economic categories Lesotho households is demonstrated in Figure 4 below.

Figure 4: Relationships of dependence and support in rural Lesotho



Source: Turner et al., 2001: 78

Utilization of natural resources

The use of natural resources plays a significant role in rural livelihoods in Lesotho and has been important in the calculation of compensation in the LHWP. For example, in the 1988 census 12% of households in the Katse catchment area reported sales of collected wood, while 10.3% of households in the 'Muela area reported selling thatch grass. While the proportions of households involved in the sale of natural products are relatively small, as Turner (2003) points out these livelihood strategies are of particular importance to very poor households, and in particular female-headed households. It is also possible that with the loss of wage labour opportunities and the growth of informal sector activities, dependence on natural resources may increase.

Wild vegetables and medicinal plants also play an important role in the subsistence of poor households. Moeti et al. (2003, cited by Turner, 2003: 8) estimated that 40% of Lesotho households used wild foods, with poorer households (45%) making greater use of such foods than better-off households (22%).

Illicit strategies

Turner (2003: 45) identifies three kinds of illicit strategies that have played an important role in Lesotho livelihoods for a long time: Theft, and in particular stock theft, the production and marketing of dagga, and prostitution.

While stock theft has existed for many years in Lesotho, its increase into epidemic proportions in recent years has resulted in it being widely perceived as a national crisis (Turner, 2003: Dzimba & Matooane, 2005). In their recent study, Dzimba & Matooane, (2005: xi) see stock theft as representing "a challenge to the consolidation of the fragile democracy in the Kingdom of Lesotho as it impoverishes people and causes conflicts within and between villages that in turn threaten stability."

In a study of ten villages in southern Lesotho, Kynoch & Ulicki (1999, cited by Dzimba & Matooane, 2005: 20-21) found that while stock theft was not new to the border area with South Africa, it had become more widespread, organised and violent in the 1990s. About 71% of the Basotho stockowners interviewed reported having had stock stolen between 1990 and 1999, many more than once. Non-stockowners frequently cited stock theft as a reason for not keeping livestock. Stock theft appears to be more prevalent in border villages than further inland, and shepherds from border villages reported higher rates of victimisation.

Although stock theft increased rapidly during the 1990s, there are signs that it may have declined in recent years as Table 8 attests. The recovery rates of stolen livestock also appear to be increasing and may in part be responsible for lower rates of stock theft.

Table 8: Livestock theft and recovery of stolen animals in Lesotho, 2000-2004

Year	Number of animals stolen	Number of animals recovered	Percentage recovery
2000/01	33 950	11 150	33
2001/02	30 105	11 074	36
2002/03	26 678	13 369	50
2003/04	18 442	7 847	43
Total	109 268	41 862	38

Source: Dzimba & Matooane, 2005: 20

For obvious reasons little data exists on stock theft as a livelihood strategy or source of income, and livelihood analysts have largely focused on the impact of stock theft on the livelihoods of its victims. The discussion of stock theft will therefore be taken up again in the following section on shocks and stresses.

Statistics on the production of dagga are also difficult to find. The 1993 socio-economic census of the LHWP Phase 1B area, however, reported that "a very high proportion of households" categorized land-based sources of income as 'Other sources of income', and that these sources accounted for 35% of total reported cash income. Turner (2003: 46) implies that a substantial part of this income could be attributed to dagga production, and consultants of the LHDA estimated dagga production to be M750 out of a total M1783.50 per hectare per year.

Turner (2003: 46) also reports that anecdotal information suggests that prostitution has become more common in recent years, a trend that is consistent with increasing urbanization, growth in crime rates, and the diversification of livelihoods. According to Sechaba Consultants (2000, cited by Turner, 2003: 46) prostitution has become an established practice even in the remote rural areas.

SHOCKS AND STRESSES

Vulnerability to shocks and stresses is a central issue within the livelihoods framework. While livelihood analysts often attempt to differentiate between shocks, stresses, and sometimes also trends, there is generally a great deal of overlap between these categories. Trends can become stresses and stresses shocks, and it is often difficult to determine the cut-off point between categories. Rather than attempt to differentiate between shocks, stresses and trends, this discussion will focus on different types of shocks and stress (such as climate, lack of employment/loss of jobs, crime, inflation, etc), and especially on the relationships between different types of shocks and stresses.

A broad range of shocks and stresses has relevance for livelihoods in Lesotho. These include drought and other climatic variations, loss of income through job loss, retrenchment, dismissal or illness and death of a wage earner, illness and death of other members of the household, shortages of domestic water or complete supply failures, food price inflation, stock thefts, violence (external and domestic) and other crimes, crop failure and losses of livestock, political unrest, such as occurred with the *Qomatsi* emergency in 1970 and the riots in September 1998, etc.

While the above could largely be regarded as shocks, other longer-term and less acute stresses might include long-term debt, lack of employment opportunities, uncertainty of farming unsuitable crops and/or using farming practices inadequate for climatic and other conditions, soil and pasture degradation, declining availability of wood, wild foods and medicines lack of clean water, inflation, especially of food prices, lack of credit, dysfunctional local government, gender inequality, insecurity, and HIV/AIDS.⁴

Climatic variability

Climatic variability (including drought, storms, hail, unseasonable frosts and even snowfalls) can acutely impact on rural livelihoods and agricultural productivity. These impacts can be both direct and indirect. For example, delayed onset of rain has the potential not only to affect crops but education, nutrition and social networks (Ziervogel & Calder, 2003: 409). In Table

9, Ziervogel & Calder (2003: 410) set out the potential impacts of variations in rainfall on the economic, human, natural and social assets and strategies of households in Lesotho.

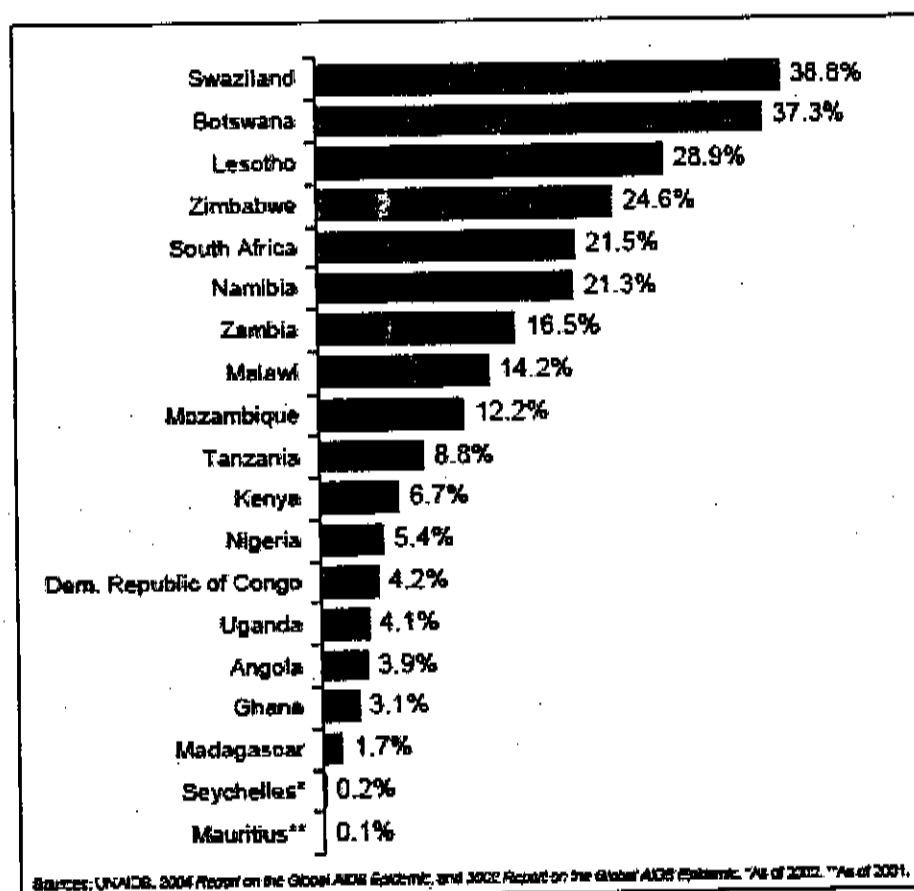
Table 9: Potential impact of climatic variation on household assets and strategies

Source of livelihood (assets and strategies)	Prolonged drought	Delayed onset of rains	Normal rains	Above-normal rains
Economic	Crop failure, livestock death, deterioration of dwellings (due to diminished thatch grass), erosion of savings, depletion of seed resources in granaries, trees cut down for income generation, wealth and productive resources liquidated, reduced animal feed	Shortage of water resources, delayed planting leads to short maturing and lower yielding varieties and less sale, animals get weak and sick, vegetation suffers, resources not as plentiful for crafts such as weaving or thatching, wealth resources liquidated	Potential good harvest improves food security and excess for sale, good grazing conditions, adequate water supplies, housing can be repaired, nearby sources of firewood, animals strengthen	Water logging and increased pests destroy crops, increased diseases affect humans and livestock, water damages housing and grain stores, increased pests in grain stores, small animals drown or washed away, disrupted transport reduces sale of goods
Human	Increased labour migration, malnutrition, undernutrition, disease epidemics (cholera, dysentery, AIDS) due to poor sanitary conditions and increased unsafe sex as income generation activity, morbidity and mortality of income earners	Malnutrition, undernutrition, education suffers as children can't concentrate and sometimes have to stop school until money is acquired to pay school fees	Clinics function more efficiently as not overloaded with epidemics, education is readily available, fewer epidemics and less undernutrition	Disease epidemics, schools and clinics might be structurally damaged or closed because of restricted access
Natural	Firewood depleted, poor pastures, limited water supply, dry soils, increased erosion, gathering of wild food	Firewood depleted, poor pastures, limited water supply, dry soils, increased erosion, gathering of wild food	More firewood available, improved pastures, moist soils, increased pests	Abundant pastures, areas of flooding and waterlogging, increased pests
Social	Kinship networks weaken as resources depleted (claims not met) and increased migration, exploitation of common property resources, increased conflict	Temporary exploitation of communal resources, minor claims not met	Kinship networks able to support poorest households, personal resources used so communal resources can improve, increased competition as many households try to sell goods	Kinship networks weaken as resources are depleted (claims not being met), increased conflict, safety nets destroyed, employment opportunities decrease, increased migration for work

Source: Ziervogel & Calder, 2003: 410

HIV/AIDS

At a workshop organised by the Lesotho Institute of Public Administration and Management (LIPAM) in Maseru in June 2004, participants identified HIV/AIDS and stock theft as the greatest threats to human security in Lesotho. Commentators commonly refer to the HIV/AIDS pandemic as the beginning of an unprecedented national crisis, disaster or catastrophe, the full impact of which has still to be felt. With an adult (15-49 years) HIV prevalence rate of 28.9%, Lesotho has the third highest rate in the world (UNAIDS, 2004 & undated; Kaiser Family Foundation, 2005).

Figure 5: Percentage of adults estimated to be living with HIV/AIDS, 2003

Source: Kaiser Family Foundation, 2005

As in the case of climatic variability, HIV/AIDS has had a broad range of interrelated impacts on livelihoods in Lesotho. The first impact of a disease like HIV/AIDS is of course on human capital, on the health and lives of those infected. Illness and mortality in turn lead to losses of both financial and physical capital. As Mphahle et al. (2002 & 2003) point out, HIV/AIDS has begun to impact on the financial resources of households in Lesotho both through losses of wage and other incomes due to illness, and through medical and funeral expenses. In order to deal with losses of income and additional expenses, households have had to use savings and/or sell livestock to pay for medical expenses and other recurrent costs such as school fees.

Moreover, HIV/AIDS has also had an impact on the utilization of and access to natural resources such as land. From in-depth interviews conducted by Mphahle et al. (2002: v), it has been shown that illness has "had a substantial impact on agricultural yields", with farming activities having to be postponed or abandoned. Households reported declining productivity in both their agricultural fields and their home gardens. In addition to the constraints of failing health, households who sold livestock in order to cover medical and other expenses were sometimes deprived of draught power for their fields and were dependent on other stockowners for the loan of draught animals.

Being unable to use agricultural fields also holds the threat of a loss of land in that fields that are left fallow for two successive years can be reallocated (Mphahle et al., 2002: 18). To avoid reallocation of their fields, HIV/AIDS affected households have therefore increasingly

resorted to sharecropping arrangements, which assure continued access to agricultural land as well as securing a part of the harvest.

A further threat to access to agricultural land relates to the retention of fields by members of households following the death of household heads. As Mphahle et al. (2002: iv) point out, "agricultural land was a highly valued asset that HIV/AIDS infected individuals and households see as an ultimate source of security for their children if they die." The study showed that while widows were generally allowed to retain their late husbands' fields, women's land rights were not always protected. There were also cases of AIDS orphans been cheated of their inheritance by unscrupulous relatives. Abandoned orphans who grew up in institutional contexts or with maternal kin also lost their rights to land.

HIV/AIDS has also impacted on social assets and on aspects of human capital other than health. For example, children are sometimes withdrawn from school as a coping strategy to reduce household expenses. Shortages of financial capital and lower agricultural yields have also had implications for food security in HIV/AIDS affected households, threatening the health and well-being of members of household who are not infected as well as worsening the condition of those who are infected.

In relation to social assets, the stigma of HIV/AIDS has weakened the position of HIV/AIDS affected households within community structures. However, perhaps even more serious is the existing and potential impact that the HIV/AIDS pandemic can have on family and community support systems in the long-term. Social and economic networks that have played such an important role in Basotho livelihoods and as safety nets for the poor and destitute, are under threat of being eroded by the heavy demands placed on them by HIV/AIDS and increasing poverty. One example relates to funerals, which have in the past been a source of food for the very poor. However, with the enormous increase in funerals due to HIV/AIDS, communities may now longer be able to afford this practice. (Mphahle et al., 2002; Turner, 2003)

Impacts have not been restricted to households and communities, but also to formal institutions whose human resources are being depleted by the pandemic. The resulting deterioration in government services (such as education, health and agricultural extension) have the potential to impact negatively on all kinds of livelihoods.

As Turner (2003: 21) points out, while HIV/AIDS may not as yet become a major cause of livelihood vulnerability and crisis in Lesotho, "it is set to be the predominant cause of much deeper vulnerability and crisis over the coming two decades than at any time since the nation first emerged from the crisis of the *lifaqane* wars almost two centuries ago."

Stock theft

While stock theft is counted among the major illicit livelihood strategies in Lesotho, it is also a major cause of shocks and stresses on the livelihoods of those households that fall victim to it. For example, Dzimba & Matooane (2005: 24) maintain that stock theft may have negatively affected the economic status of up to 90% of households in the rural areas of Lesotho. There were reports of "the entire wealth and livelihood of a household being wiped out in one stock theft operation." Besides the loss of the value of the animals themselves, stock theft results in losses of income from the sale of milk, wool, mohair and hides. A further aspect of the losses associated with stock theft relates to household sources of energy. As Dzimba & Matooane, (2005:23) point out, cow dung is commonly used for fuel in the

rural areas and stock theft has resulted in households resorting to wood as an alternative source of energy. "It is not uncommon for women to spend up to six hours a day collecting firewood, in addition to other duties. Deforestation has caused major soil erosion problems."

Stock theft needs to be seen within the broader context of social and cultural practices in Lesotho and the changes that have taken place in livelihoods over the past two decades. For example, Dzimba & Matooane, (2005: 15) maintain that many retrenched mine workers bought livestock with their retrenchment packages because of economic and cultural importance of livestock in Lesotho: "Animals are...used to engage in agriculture and are a tool for accessing other goods and services. For Basotho and other Africans, stock is used for paying for education, as a means of transport, and for paying lobola (bride-price). They also slaughter their animals for traditional feasts. There is a notion that the more stock one has, the wealthier one is, and that creates a source of pride and the recognition one enjoys in the community."

Stock theft therefore represents major losses in financial resources, including savings, and the ability of households to withstand other shocks and stresses to their livelihoods, such as HIV/AIDS, drought, losses of employment and other sources of income. Dzimba & Matooane, (2005: 66) estimate that cattle sell for between M1 200 and M5 000. Even when livestock are consumed for their meat, money can be earned from the sale of hides and other by-products. Dzimba & Matooane (2005: 23) maintain that women generally prefer to sell livestock to secure scarce resources and meet their basic needs rather than risk the theft of animals and exposure of their families to the violence that often accompanies stock theft. They argue that this has resulted in serious conflicts between spouses over whether to sell or retain their stock holdings. Dzimba & Matooane (2005) found that more than 40% of non-stockowners cited stock theft as a reason for not keeping stock.

In addition, stock theft has imposed major constraints on the physical mobility of Basotho households. Because of the lack of roads in many areas, animals are the most important form of transport for a majority of Basotho. For example, Dzimba & Matooane, (2005: 66) found that more than 70% of the respondents in their survey relied on animals for transport, either for pulling carts or for riding. Households that have had stock (in particular equines and oxen) stolen are therefore severely restricted in the distances they can travel and the time taken to cover distances.

Stock theft has also impacted on natural assets by altering grazing patterns and leading to the degradation of pastures. In order to protect themselves against stock theft, stockowners have resorted to moving animals from areas that are most vulnerable to theft (such as the border areas) to areas that are less vulnerable (such as the hinterland). This has resulted in even higher stock densities in areas that are already overstocked and has in turn led to deterioration in the condition of animals and to severe land degradation (Dzimba & Matooane, 2005: 24).

One of the more disturbing aspects of stock theft has been its negative effect on social capital and the economic and social networks of Lesotho. Stock theft has bred suspicion and mistrust among the inhabitants of different villages, with one village suspecting that another village has assisted thieves in stealing stock. "People are no longer free to visit other villages. Any unknown person is regarded with suspicion" (Dzimba & Matooane, 2005: 23). Because of the prevalence of stock theft in border areas, "cross-border cooperation, activities and initiatives have collapsed and there is considerable animosity and hatred between the communities on

either side of the border. Even casual visiting and shopping have all but ceased" (Dzimba & Matooane, 2005: 25).

Even within communities, relationships have become fraught with tension and suspicion. Dzimba & Matooane (2005: 25) report that nearly half of the stockowners interviewed suspected that certain people in their villages were involved in the theft of animals or had assisted external thieves by providing them with information. Under these circumstances, it is often the poor who are blamed. It is also claimed that *Mafisa*, the loaning of animals for ploughing or transportation, is in decline, as are cultural activities and celebrations that involve the slaughter of animals: "Donkeys and horses are no longer readily lent for transportation to those who do not have animals. Furthermore, some farmers who do not have animals are unable to plough their fields" (Dzimba & Matooane, 2005: 25).

In addition to these losses of social capital, there have been losses of human capital. Primary among these losses has been the loss of life associated with the escalating violence related to stock theft. The majority of these deaths have been of young men, who are the primary providers of their families. Dzimba & Matooane (2005: 66) also maintain that more and more children are leaving school early because their parents are unable to pay for their schooling. Green (2000: 22-23) maintains that stock theft has made a major contribution to changes in livelihoods and livelihood strategies in the mountains and southern lowlands districts of Lesotho.

Hoover (2001: 13) has claimed that the escalation of stock thefts in the vicinity of the LHWP have been encouraged by the building of roads associated with the Project. While there is some support for this claim in that in some cases trucks have been involved in moving stolen animals (Dzimba & Matooane, 2005: 24), the use of motor vehicles to remove stolen livestock appears to be a relatively uncommon occurrence. In general, however, the evidence does not support claims that LHWP roads allow stock thieves easier access to the areas.

Firstly, data on stock theft in Lesotho show that theft of livestock is more prevalent in the border areas with South Africa than in the hinterland where the LHWP dams are located. Since 1990, for example, 85% of stockowners in the border villages have lost animals to stock theft compared with 49% from non-border villages (Dzimba & Matooane, 2005: 20). Secondly, stock thieves commonly herded stolen stock into "inhospitable terrain" to make them more difficult to track, even by off-road vehicles (Dzimba & Matooane, 2005: 65). Furthermore, if LHWP roads allow thieves easier access to and movement within areas in the vicinity of the LHWP, they should also allow the police greater freedom to pursue and apprehend stock thieves.

The causes of the increase in stock theft over the last decade would appear to have less to do with the access afforded by new roads than with socio-economic conditions in both Lesotho and South Africa, and with the general increase in crime and violence in both countries. Kynoch and Ulicki (1999, cited by Turner, 2003: 45-46) argue that stock is stolen "because there is very little else to steal in the mountain districts. The ease with which stolen animals can be exchanged for cash, dagga... and guns, or simply slaughtered and eaten, makes stock an attractive commodity and the rugged terrain and mobility of livestock make it relatively easy to steal. It is clear that the overriding cause of stock theft is poverty." The writers also cite unemployment, particularly among youth, as a major cause of stock theft, and maintain that stock theft increases following poor harvests.

Dzimba & Matooane (2005: 65) argue that unemployment, rather than poverty, is the main cause of stock theft: "Stock theft is committed by unemployed young men, not because they are poor and have nothing to eat, but because they do not have much to do. Their pride as the traditional providers for their families is being eroded as they are not able to obtain jobs and the number of animals that was traditionally used as a measure of their status is on the decline. Consequently they try to regain their status through stock theft."

Rather than trying to cover the full range of shocks and stresses to which households may be subjected, this discussion has focused on three major threats to the livelihoods of households in Lesotho. In all of the three cases – climatic variations, HIV/AIDS and stock thefts – the impacts have been shown to be diffuse, affecting all the dimensions of livelihoods, including financial, natural, human and social assets.

LIVELIHOOD OUTCOMES

Overall, existing data on livelihoods suggest that in the past two decades poverty and inequality have grown in Lesotho. For example, the poverty studies conducted by Sechaba Consultants in the 1990s show that "the poor in Lesotho have not benefited from recent periods of economic growth and are as poor now as they were six years ago. The proportion of households defined as poor has increased significantly since 1990 and now includes 68% of the population. Two thirds of the poor live in destitution with barely enough cash income to satisfy basic food needs. By contrast, there is evidence to suggest that the relatively small proportions of the population who still have access to waged employment have benefited from the economic growth, which averaged 5.2% between 1990 and 1997". (Sechaba Consultants, 2000, cited by Turner, 2003: 62). These studies also showed that the worst poverty in Lesotho was located in the mountains.

The Sechaba poverty surveys showed a massive increase in poverty in Lesotho as a whole from 49% in 1990 to 68% in 1999. However, changes in methodology between surveys and misgivings that the surveys may have underestimated actual income levels, have cast doubts on the reliability of the data. Consequently, in 1995 the World Bank adjusted the 1993 Sechaba poverty estimate of 71% to 49% (Lesotho Ministry of Development Planning, 2000: 6). More recently, interim estimates of the Poverty Reduction Strategy Paper (PSRP) have set the 2000 poverty rate in Lesotho at 58%. This estimate is based on the 1994/1995 poverty estimate of May *et al.* discussed below.

The study by May *et al.* (undated; cited by Turner, 2003: 60) measured poverty trends between 1986/87 and 1994/95 using a poverty line of Maloti 124 per person per month at 2001 prices. The study showed that while the national incidence of poverty remained much the same during the period, the proportion of the population that was 'ultra-poor' (i.e. those with incomes equivalent to or lower than half the poverty line) increased. The study also found that both the depth and severity of poverty had increased. Furthermore, this study showed that income inequality had increased for Lesotho as a whole. As Table 10 shows, while inequality in Maseru and other urban areas had decreased, inequality had increased in the rural areas, contributing to a wider gap between urban and rural areas.

Table 10: Gini coefficients by locale, Lesotho 1986/87 and 1994/95

Locale	1986/87	1994/95
	Gini (per capita expenditure)	Gini (per capita expenditure)
Rural	0.58	0.62
Urban Maseru	0.59	0.55
Other urban	0.63	0.59
Total (All of Lesotho)	0.60	0.66

Source: May et al., undated, cited by Turner, 2003: 60

Patterns of inequality are also echoed in poverty trends, with the highest incidence of poverty found in the predominantly rural and especially the mountainous regions (see Table 11 – See also Omole, 2003: 5). Even more significant for this study is that while the national poverty rate remained largely unchanged between 1986/87 and 1994/95, there were significant increases in poverty in the predominantly rural and mountain regions. Mokhotlong, showed the largest increase in poverty (more than 18%), followed by Quthing (10.5%), and Mohale's Hoek and Butha Buthe both of which experienced an eight percent increase in poverty. Poverty rates also increased in Thaba Tseka (5.2%) and Mafateng (3.2%). Conversely, the incidence of poverty was considerably lower in the Maseru district and decreased by more than 8% during the period. Decreases in poverty also took place in the predominantly lowlands and foothills districts of Leribe and Berea. The largest decrease in poverty, however, took place in the Qacha's Nek district where the poverty rate fell from 70% in 1986/87 to 59% in 1994/95.

Table 11: Absolute poverty measures for Lesotho by district, 1986/87 – 1994/95

Districts	1986/87			1994/95		
	Incidence	Depth	Severity	Incidence	Depth	Severity
Butha Buthe	62.63	32.45	22.09	70.63	41.77	29.67
Leribe	58.5	32.18	21.99	52.29	28.83	20.1
Berea	58.08	32.85	22.75	55.11	32.67	23.32
Maseru	47.53	25.83	17.77	39.09	21.09	14.56
Mafeteng	61.49	35.09	24.42	64.73	40.25	29.74
Mohale's Hoek	66.91	39.28	28.19	74.94	51.61	40.51
Quthing	62.21	35.99	25.90	72.73	46.11	34.85
Qaccha's Nek	70.28	39.28	26.86	58.96	36.35	26.83
Mokhotlong	57.17	28.14	18.83	75.38	50.31	38.59
Thaba Tseka	67.2	38.15	26.62	72.3	46.57	35.46
National	58.84	32.75	22.75	58.27	35.37	25.95

Source: May et al., undated, cited by Roberts, 2003: 8

Using data from the same rural households in 1993 and 2002, Gill-Wason (2004: iv) found that overall these households had grown poorer. While in 1993 60% of households were above the poverty line (M153 per person per year), only 46% were above an equivalent poverty line in 2002. Taking the 6th income decile at 1993 prices as a poverty line and updating it for inflation, Gill-Wason tracked the movement of households as they moved above or below the poverty line or maintained their positions in relation to the line. Those households that were above the poverty line in both 1993 and 2002 were termed the '*never poor*'. Those who started above the poverty line in 1993 but in 2002 had dropped below it, were called the '*descending poor*', while those who in 1993 were below the poverty line but in 2002 were above it were described as the '*ascending poor*'. Finally, those who were below the poverty line in 1993 and 2002 were termed the '*chronically poor*'.

Using this method, Gill-Wason (2004: 6) found that 26% of the sample households were 'chronically poor'; 14% 'ascending poor'; 28% 'descending poor'; and 32% 'never poor'. This meant that 42% of the households had crossed the poverty line between 1993 and 2002, with twice as many descending into poverty as those who rose above the poverty line. Moreover, even the 'never poor' experienced various reductions in their standard of living over the nine-year period. While mean household incomes and mean per capita incomes remained relatively stable, "inequality grew dramatically to the extent that many Basotho families are poorer and the wealthy richer. In fact, only the top two quintiles in 2002 had seen an increase in their incomes in real terms since 1993. It was the topmost quintile that far outstripped inflation, leading to this widening of inequality." (Gill-Wason, 2004: iv)

Analysis of data relating to these four categories shows clear trends that are consistent with the trends in Lesotho livelihoods discussed above. For example, the importance of wage labour in determining livelihoods is clearly illustrated in Table 12. In 1993 the *chronically poor* had the lowest percentage of households with one or more wage earners and although they had both lost and gained wage earners, their position remained the same in 2002 at 14%. The *ascending poor* were the only group to have gained wage earners in this period, increasing their percentage from 23% in 1993 to 30% in 2002. In sharp contrast, the *descending poor* showed the highest losses of wage earners, dropping from 70% of households to only 13%. This category most vividly illustrates the role that the loss of wage labour plays in pulling households below the poverty line. Although the *never poor* also lost wage earners between 1993 and 2002, they had the highest percentage of households with wage earners in 2002. This category also had the highest proportion of mineworkers, accounting for 70% of mineworkers in the sample.

Table 12: Percentage of households with at least one wage earner by poverty category

Poverty category	1993	2002
Chronically poor.....	14.....	14
Ascending poor.....	23.....	30
Descending poor.....	70.....	13
Never poor.....	82.....	51

Source: Wason-Smith, 2004: 25

While access to wage employment is clearly important in keeping households above the poverty line, it is clearly not the only determining factor in that 49% of *never poor* and 70% of *ascending poor* households did not have wage earners. A number of other factors appear to have played a role in the relative performances of the different categories. One of these may be the degree of diversification in livelihoods. As Table 13 shows, the *never poor* had the highest average number of sources of income in both 1993 and 2002. In contrast, *descending poor* had the lowest diversity of sources of income in 2002 and was the only group who underwent a decrease in diversity over the period.

Table 13: Average number of sources of income by poverty category

Poverty category	1993	2002
Chronically poor.....	1.1.....	1.4
Ascending poor.....	1.1.....	1.4
Descending poor.....	1.4.....	1.2
Never poor.....	1.5.....	1.6

Source: Wason-Smith, 2004: 30

Agriculture and livestock holdings also appear to play a role although a considerably smaller one than wage employment. Table 14 shows that mean cereal harvests declined for all groups between 1993 and 2002, but in both years cereal production was highest for the *ascending poor*, suggesting that agricultural production may have played some role in their escape from poverty.

Table 14: Mean harvest of cereal per person of those who owned fields in kilograms

Poverty category	1993	2002
Chronically poor.....	40.....	23
Ascending poor.....	75.....	44
Descending poor.....	69.....	31
Never poor.....	56.....	29
Overall.....	59.....	30

Source: Wason-Smith, 2004: 19

Some confirmation of the hypothesis that agriculture may have played a role in helping the *ascending poor* to improve their economic position is provided in Tables 15 and 16. Although a smaller proportion of households of the *ascending poor* were involved in the production of garden crops than the *descending poor*, the former had higher percentages of households who sold and gave away garden crops. The *descending poor*, on the other hand, had the lowest percentages of households that sold or gave away garden crops, suggesting that for this group the primary purpose of agricultural production was for subsistence rather than income generation.

Table 15: Percentage of households that produced garden crops and who sold or gave away garden crops

Poverty category	1993	2002	% HHs who gave away garden crops in 2002	% HHs who sold garden crops in 2002
Chronically poor.....	54.....	36.....	10.....	20
Ascending poor.....	59.....	44.....	25.....	35
Descending poor.....	53.....	52.....	19.....	11
Never poor.....	62.....	47.....	24.....	20
Overall.....	57.....	45.....	20.....	19

Source: Wason-Smith, 2004: 20 (Households who sold or gave away garden crops are presented as a percentage of those households that produced garden crops.)

A further indication of the importance of agriculture to the *ascending poor* is provided by Table 16 which shows that this group made the greatest use of their fields, with only 15% of households having fallow fields in 2002. The percentages of households with fallow fields of the *descending poor* and *never poor* were twice as large as those of the *ascending poor*.

Table 16: Percentage of households with fields that did not produce harvests

Poverty category	1993	2002
Chronically poor.....	24.....	29
Ascending poor.....	40.....	15
Descending poor.....	24.....	33
Never poor.....	33.....	34
Overall.....	30.....	30

Source: Wason-Smith, 2004: 19

Using a scoring system⁵ to assign values to different kinds of livestock, Gill-Wason (2004: 21) generated livestock scores for all stockholding households in her sample. In Table 17, the mean livestock scores for the four poverty categories are compared for 1993 and 2002. The Table shows that in both 1993 and 2002 the *ascending poor* had the highest mean livestock scores, as well as being the only group to decrease the percentage of households without cattle. According to Gill-Wason (2004: 51), the *ascending poor* were the only group to keep substantial numbers of small stock and had also diversified to include pigs among their livestock holdings.

Table 17: Household livestock holdings and percentage of households with no livestock

Poverty category	Mean livestock scores		% households with no livestock	
	1993	2002	1993	2002
Chronically poor.....	214.....	163.....	12.....	20
Ascending poor.....	578.....	433.....	20.....	15
Descending poor.....	266.....	170.....	9.....	12
Never poor.....	283.....	288.....	8.....	12
Overall.....	302.....	245.....	11.....	15

Source: Wason-Smith, 2004: 21

Overall, therefore the *ascending poor* appear to have successfully used farming to improve their economic position, although an increasing number of households in this group have divested themselves of fields. This group has produced more from its fields than any of the other groups and has maintained considerably higher (and more diverse) stockholdings than other groups. This was also the only group in the sample to have acquired tractors. Rather than save money (the *ascending poor* had the smallest mean amount of money in their bank accounts in 1993 and the second smallest, after the chronic poor, in 2002), this group appears rather 'to make money work for them' by investing in livestock, agriculture and other productive resources. In addition to their involvement in agriculture, the *ascending poor* showed increased involvement in casual and informal work (Gill-Wason, 2004: 50-51).

Moving beyond sources of income, mortality rates within households appear to be strongly associated with the movement of households in and out of poverty. As Table 18 demonstrates, the *descending poor* had the highest mortality rates of the four groups, and in terms of the percentage of households with one or more deaths, the mortality rate of the *descending poor* (53%) was 10 percentage points higher than even that of the *chronically poor* (43%). On the other hand, the *ascending poor* had considerably lower mortality rates that were very similar to those of the *never poor*. Gill-Wason (2004: 50) comments as follows on the high death rates of the *descending poor*:

Although it is hard to be certain which came first, death or poverty, it is likely that the deaths preceded the decline into poverty as many of these deaths were of wage earners and of heads of households. They are perhaps the clearest pointer to the impact that AIDS is having on the working population and their families in Lesotho.

Table 18: Mortality rates by poverty category, 2002

Poverty category	% of under-65s who died (within each group)	% of all deaths of under-65s	% of households with one or more deaths (all ages)
Chronically poor.....	7	28	43
Ascending poor.....	4	10	33
Descending poor.....	9	41	53
Never poor.....	4	20	31
Overall.....	6	100	40

Source: Wason-Smith, 2004: 13

A clear trend that has emerged in Lesotho since the beginning of the 1990s is the increasing reversion of Basotho households to natural or 'traditional' sources of energy such as wood, shrubs, weeds, crop residues and dung rather than 'modern' fuels such as electricity, coal, gas or paraffin. For example, Sechaba Consultants (2000, cited by Turner 2003: 8) found that between 1993 and 1999 the percentage of households without electricity, coal, gas or paraffin increased from 38% to 60%. As shown in Table 19 below, Gill-Wason (2004: 22) showed a similar decrease in the use of 'modern' fuels from 61% in 1993 to 43% in 2002 for her sample of households. There are, however, some interesting variations in the fuel consumption patterns of the different poverty categories. In particular, it is of interest that while all other groups, including the *never poor*, showed a decrease in the use of 'modern' fuels between 1993 and 2002, the *ascending poor* showed an increase from 52% to 57% in the same period.

Table 19: Percentage of households using electricity, gas, coal and paraffin

Poverty category	1993	2002
Chronically poor.....	36	14
Ascending poor.....	52	57
Descending poor.....	69	36
Never poor.....	78	65
Overall.....	61	43

Source: Wason-Smith, 2004: 22

Another indicator that appears to predict movements in and out of poverty is the mean educational levels of household members. Table 20 shows the mean educational levels of the four poverty categories in 1993 and 2002. As might be expected, the *never poor* had the highest average level of education and showed no change between 1993 and 2002. Both the *chronically poor* and the *descending poor* showed a decrease in their average educational levels in this period, while the *ascending poor* showed an increase in its average level of education.

Table 20: Average standard achieved at school by persons over 16 years

Poverty category	1993	2002
Chronically poor.....	4.....	3
Ascending poor.....	4.....	5
Descending poor.....	5.....	4
Never poor.....	6.....	6

Source: Wason-Smith, 2004: 15

In concluding this brief review of research on Lesotho livelihoods, it is important to focus briefly on LHWP compensation payments and how these and other interventions undertaken by the LHDA fit into the livelihoods framework. While the potential negative impacts of the LHWP on affected population may be seen as part of the livelihood context and in particular as an integral part of the shocks and stresses to which households are subjected, compensation forms part of the livelihood strategies and assets of compensated households. Compensation may therefore be seen as a resource or source of income that has the potential to assist households in establishing more sustainable livelihoods.

However, the matter goes further than this, in that it has been suggested that besides assisting households in establishing viable livelihoods, compensation might also impact negatively by encouraging dependency among compensated households. It has been suggested by some commentators that while compensation may have been successful as a short-term measure, there were concerns regarding its long-term impacts and in particular to its contribution to the creation of a dependency culture. If this can be shown to be true, then compensation would not only be an asset, but also a further stress on the livelihoods of affected households. There is clearly a need within this study understand the impacts of compensation. This issue will be taken up below.

APPLICATION OF THE LIVELIHOODS APPROACH

As suggested at the beginning of this section on livelihoods, the livelihoods approach has considerable potential to expand and deepen our understanding of the extent to which the LHWP and its compensation payments have impacted on the standard of living of affected populations. The concept of livelihoods focuses attention not only on current standards of living, but also on the *capability* or capacity of households to generate and maintain the means of living, both in the present and the future. Its emphasis is therefore on the long-term viability of livelihoods and on their *dynamic* nature as they are adjusted in response to constantly changing contexts and conditions.

Rather than simply concentrate attention on the outcomes of livelihoods, the livelihoods approach analyzes livelihood strategies and their effectiveness in maintaining households and communities, the assets upon which strategies are based, the contexts within which strategies operate, the vulnerabilities of livelihoods and the shocks and stresses that impact upon them. It therefore opens up a broad range of possibilities and issues that can be addressed within the context of this study to deepen our understanding of how the LHWP has affected the livelihoods of households and communities within the Project area, the role that compensation has played in mitigating these effects, and what can be done to address the broader development needs of affected populations.

More specifically, the livelihoods perspective allows us to raise questions about livelihood outcomes and to make finer differentiations between different categories of impacts (both

LHWP-related and non-LHWP-related) as well as between different categories of households and their respective capacities to adapt to impacts on their livelihoods and maintain a required standard of living. For example, we not only need to know what the current standards of living of affected households are and how these compare with their standards of living prior to the initiation of the Project, but also how and why they arrived at their current status. Furthermore, we need to understand why some of the affected households may be faring well in terms of reaching a required standard of living while others may be faring badly.

In assessing the relative performances of affected households, we need to take into account not only the impacts of external or non-LHWP-related influences, but also differences between households. These include:

- The different positions from which households started out, the extent of wealth or poverty of households, the composition of their asset bases, their degree of vulnerability to shocks and stresses and differences in their contextual circumstances.
- Affected households not only differ from one another in terms of their access to resources, but also in terms of the length of time that has passed since they were first exposed to the impacts of the LHWP and therefore the time that they have had to recover from these impacts – or possibly also in some cases, the length of exposure to impacts.
- Thirdly, one would also expect to find differences in the ways that affected households have responded to both LHWP and external impacts (e.g. job losses, deaths, illnesses, stock theft, etc.), and in particular to the strategies that they have adopted to deal with these impacts and create viable livelihoods.
- A related issue concerns the actual shocks and stresses to which households have been exposed. Some shocks and stresses (such as inflation and climatic changes) may be general to a population, although they may impact differently on different groups of people. Other shocks (such as job losses, deaths, especially of major breadwinners, and stock theft) may occur only in some households and are also likely to differ in the degree of severity of their impacts.
- A fifth issue revolves around compensation and how households have used, or not used, compensation payments to secure sustainable livelihoods. This issue also relates to whether compensation is creating dependency among affected households, and whether some households are using the opportunities created by compensation payments to invest in alternative livelihood strategies. Where compensation has been paid in grain, for example, households might sell part of this grain in order to invest in other livelihood assets such as livestock or use the time they would have spent on their fields to pursue other livelihood options.
- Finally, because of the reiterative nature of LHDA monitoring of affected populations, it is possible to track the progress of households and to classify them in terms of their progress. Households may be classified either in relation to the point from which they started out at the inception of the LHWP, or in terms of a fixed point such as a poverty line. In relation to the first of these alternatives, affected households may be assigned to categories depending on whether their standard of living has improved, deteriorated or remained stable in relation to their original standard of living. Alternatively, if a poverty line is utilized, household may be tracked in terms of their movements in and out of poverty and could be classified according to the typology used by Gill-Watson (2004) as 'chronically poor', 'ascending poor', 'descending poor' and 'never poor'.

While it may not be possible to obtain data to answer all of the questions posed above, the identified issues can at the very least be incorporated within an analytical framework to interpret the findings of the study. For example, the 1998/99 socio-economic survey for Phases 1A and 1B of the LHWP (LHDA Contract 669) did not attempt to differentiate households in terms of their economic status nor to track the progress of specific households or groups of households (SW-B&A Consult, 2000a&b). Where comparisons were made with the results of the 1988 census or the 1990/1991 Income, Consumption and Expenditure study, only aggregate results are provided. It is therefore not possible to determine whether some households were able to improve their situation while others experienced deterioration in their situation. The implicit assumption seems to be that all households fared in the same way, an assumption that is highly questionable in the light of growing inequality in Lesotho and the mixed fortunes of households in the Gill-Wason study.

The importance of locating trends in LHWP-affected populations within the context of trends within Lesotho as a whole is underlined by the income finding of the LHDA 669 study cited above. In comparing adjusted monthly household incomes from the 1990/1991 Income, Consumption and Expenditure study with its 1998/99 findings, the LHDA 669 found a decline in monthly income in both 'Muela and Katse. Although the control sample had very similar mean household incomes to those of 'Muela and Katse, the report was unable to settle on a single explanation for the differences in incomes between 1990/91 and 1998/99. (SW-B&A Consult, 2000a: 15-17). The report on the Phase 1B survey took a somewhat different and more detailed approach to the issues, and although it did not attempt to make longitudinal comparisons, found that household income distribution and mean incomes of the affected population were very similar to those of the control group (SW-B&A Consult, 2000b: 11).

While there is some controversy about whether there has been an increase in poverty in Lesotho as a whole, the most widely accepted estimates of May *et al.* (undated) show clear increases in poverty in the predominantly rural and mountain districts between 1986/87 and 1994/95, although the national poverty remained stable. Gill-Wason (2004) also found that while 40% of her exclusively rural sample was below the poverty line in 1993, 54% of the same households were below the poverty line in 2002.

Against this background, the most likely explanation for the decline in income of Phase 1A-affected populations between 1990/1991 and 1998/99 (of course, assuming that both datasets were reliable and comparable) is that poverty has increased in the mountain areas of Lesotho for both affected and control populations. This does not of course discount the possibility that the LHWP contributed to this decline, but the finding that the control sample in the LHDA 669 survey had very similar mean household incomes to those of the affected households, suggests that this may not be so. If longitudinal data had also been available for the control sample, a stronger case could have been made. The last point underlines the need to maintain continuity in control samples in as far as this is possible.

Because of the complexity of livelihoods and the difficulty, or more accurately impossibility, of capturing all or even most aspects of livelihood dynamics in a survey, some thought might be given to supplementing the survey with more detailed case studies of selected households. Such households might either be randomly selected prior to or during the survey, or selected from the sample after the data has been analyzed in order to highlight and illuminate certain trends in the data.

DEVELOPMENT OF INDICATORS

One of the difficulties of developing indicators for livelihoods is the very broad scope of the livelihood approach. The complexity of the livelihoods model and the considerable detail in which issues of livelihood are approached make it difficult to design a single set of indicators that will capture the essence of livelihoods. This is particularly a problem within the context of this project, because of the broad range of issues (other than livelihoods) that have to be covered and the precision required in the measurement of trends. Furthermore, there are considerable areas of overlap between issues of livelihood and other issues dealt with in this study, such as demography, health, nutrition and services. Under these circumstances, the livelihood approach would be best utilized as a perspective to inform the construction of questionnaire rather than as a discrete set of indicators.

The selection of 'livelihood indicators' from the very broad range of possible indicators would also depend on a number of other factors including:

- The overlap between 'livelihood indicators' and other indicators included in the questionnaire, and the implications this has for economy in questionnaire design
- Overlaps between the 'livelihood indicators' and the data of earlier surveys that will allow comparisons of trends, and
- Practical issues such as the need to limit the number of questions included in the questionnaire to avoid interviewee fatigue, and to ensure that only questions that will elicit reliable responses are included. For example, while 'gifts' undoubtedly play an important role in livelihoods in Lesotho, the practical difficulties of assessing the value of such 'gifts' would be an obstacle to the inclusion of this indicator.

In accordance with the main elements of the livelihoods framework and the structure followed in the literature review, livelihood indicators are discussed below under the three major sub-divisions of livelihood strategies, shock and stresses, and livelihood outcomes.

Livelihood strategies

Two general, but key, issues relating to livelihoods strategies in Lesotho are their diversity and interdependence. The research reviewed above, shows that as Basotho livelihoods have come under increasing pressure over the past decade and a half, so livelihood strategies have become increasingly diverse. Livelihood research also suggests that livelihoods are interdependent, particularly in terms of some livelihood strategies (such as the cultivation of crops, for example) being dependent upon the infusion of cash from other livelihood strategies such as wage labour.

In constructing questions relating to income therefore, it is important to make provision for the diversity of sources of income in Lesotho, as well as noting that particular combinations of income sources may have different outcomes. Furthermore, certain livelihood strategies and combinations of strategies tend to be associated with the general economic situation of households. For example, poorer households tend to rely more heavily on piece jobs, begging, gifts from relatives and friends, subsistence agriculture, collecting and selling natural resources, and the brewing of *joala* (beer), while better off households are more likely to have wage work, to sell agricultural products and livestock, to operate small businesses and to sell commercial beer (see Table 1, above). The literature reviewed above also suggests that the diversity of income sources of households may be associated with their poverty status (see, for example, Table 13, above).

It is therefore useful to know what sources of income households rely upon, even if one may not be able to attach a monetary value to all of these sources. At the very least, the following categories of cash income sources could be included:

- Wage work
 - In Lesotho
 - Local
 - Elsewhere in Lesotho (Remittances)
 - In South Africa (Remittances)
 - Mining
 - Non-mining/Other
- LHWP compensation payments
- Casual or piece work
- Sale of crops
- Sale of livestock and livestock products (including the hiring out of animals)
- Small businesses and informal sector activities
- Pensions and grants
- Gifts and begging
- Sale of natural resources (e.g. sale of firewood, catching and selling fish, selling of thatching grasses)
- Other (including illicit activities such as the growing and selling of dagga)

A number of issues may be raised about the above categories. In relation to wage income, differentiating between working in Lesotho and South Africa and between mining and non-mining jobs is important not only because of key role (historically and currently) of work on the South African mines for Lesotho livelihoods, but also because of the shift of migratory labour to jobs in Lesotho and non-mining jobs in South Africa. Furthermore there are a number differences between the three sub-categories of jobs, including differences in earnings and remittance patterns.

The grouping of *small businesses and informal sector activities*, on the one hand, and *gifts and begging*, on the other, is open to question. In part these categories have been grouped together for the sake of economy, but also because of the difficulty of defining a cutoff point between informal sector activities and small businesses. Illicit activities are included under 'other' sources of income as was done, to good effect, by the 1993 census of the LHWP Phase 1B area (see above).

The 1998/99 socio-economic survey for Phases 1A and 1B of the LHWP (LHDA Contract 669) used a far more comprehensive breakdown of income sources, categorized as Direct LHWP (i.e. LHWP compensation, salaries, and sale of compensation grain), Local Economic Activity, Local Agricultural Production, Wages and Cash Income, Windfall Monies and Other. If the intention is to make direct comparisons with this survey, then there would be benefits in using the 1998/99 breakdown of sources of income in the current survey.

There are, however, some problems with the 1998/99 breakdown that may need to be addressed. For example, both compensation payments and the sale of compensation grain are included. It is not clear whether compensation payments refer only to cash payments or include payments in grain. If the former, then grain that was consumed by the household is not taken into account. If the latter, then the value of grain sold is duplicated.

Although the breakdown of income sources is relatively comprehensive, it may not be comprehensive enough in terms of the sub-categories that are included. For example, under 'local economic activity' only 'local business', the 'sale of commercial beer' and the 'rental of houses' are included, with no provision for other income-generating activities. Although two further economic activities (the sale of home made beer and the sale of handicrafts⁶) are included under 'Local Agricultural Production', the numerous economic activities listed in Table 1, for example, suggest that some economic activities may have been omitted. As Senaoana *et al.* (1985, cited by Turner, 2003: 44) have pointed out, "research to date has not fully uncovered the complexity and increasingly significant contribution of the local off-farm sector, not all of whose facets are likely to be reported by a household in a single interview ..." The study by LHDA Contract 669 also made no provision for casual or piecework, although this may have been included under 'Local Wages/Salaries'. The inclusion of 'Borrowed Money' as a source of income can also be questioned.

As suggested above, the issue of compensation payments as a source of income raises questions around whether compensation is creating dependency among compensated households. While it may not be possible within the context of this study to find a definitive answer to this question, some indications of whether compensation is encouraging dependency may be obtained from data relating to how households have used their compensation payments, in particular whether they have simply 'consumed' the payments or used them as an investment opportunity. Other potential indicators that may cast light on the situation include whether households that have lost fields have (or have attempted) to acquire new fields, or whether the household has utilized the time gained as a result of not having to work on lost fields to pursue other sources of income.

A general issue that relates to several of the sources of income categories is whether to measure only cash income, or to include income in kind such as gifts of food and clothing or income derived from reciprocal arrangements like sharecropping and *mafisa*. In general, research on Lesotho livelihoods has only attempted to measure cash income from gifts because of the difficulties involved in assigning quantitative values to income in kind. Similar difficulties apply to reciprocal arrangements like sharecropping and *mafias*, although the LHDA 669 study did attempt to elicit information on the numbers of fields that households sharecropped and leased both in and out, but without attempting to calculate the value of these transactions. However, even under these circumstances care has to be taken to ensure that 'sharecropping' is clearly and consistently defined. As illustrated earlier, a great deal of confusion appears to exist around the concept of sharecropping, and estimates of the numbers of fields sharecropped have often differed radically from one another.

Agricultural production also presents problems of measurement. Although there are some sophisticated and supposedly 'objective' methods for measuring crop production, including harvesting and measuring total outputs, field measurement, crop cutting over samples of subplots, eye estimates, etc., these are generally "cumbersome" and often produce disappointing results (Casely & Kumar, 1988: 96). Under most circumstances, and particularly in the context of a general household survey, interviewing farmers to obtain

estimates is both the most convenient and appropriate method. Indeed, Casely & Kumar (1988: 102) argue that evidence is accumulating that under certain conditions estimates by farmers will not result in a larger total error ... than that obtained using the crop cutting method." A study to determine the best method for measuring subsistence crop production in surveys in KwaZulu-Natal also came to the conclusion that farmer estimates offered the most convenient and reliable means of obtaining data on subsistence production (Emmett et al., 1992).

Farmer estimates were used in the LHDA 669 study, which allowed farmers to make estimates in terms of bags, tins (presumably paraffin tins) and basins. In its 1993 and 2002 surveys, CARE (Gill-Wason, 2004: 18) also used bags to measure crop production, but in these surveys bags represented 50kgs, whereas in the LHDA 669 study represented 80kgs. If farmer estimates are used in the current survey, then care should be taken to standardize proxy measures, preferably using maize as this is the dominant crop grown in Lesotho.

Obtaining reliable data on livestock holdings would on the face of it appear to be easier than measuring crop production. However, Turner (2003: 29-30) warns that it is "notoriously difficult" to obtain accurate information on livestock ownership in Lesotho and questions the reliability of most of the available livestock data. With current rates of stock theft and it being in the interest of LHWP affected populations to conceal their assets from the LHDA, obtaining accurate information on livestock may be even more difficult. In collecting data on the number of livestock owned and managed by households, the LHDA 669 study also made provision for animals that were loaned in or out in terms of the *mafias* system.

The LHDA 669 study measured social support (social capital) by asking whether household members participated in a range of community organizations. It is perhaps unfortunate that burial societies and *stokvels* were included in a single category as these are usual distinct types of organizations. Nearly 77% of respondents from the affected population and 94% of those from the control sample said they belonged to burial societies/stokvels. Other organizations to which seven or more members of the affected population belonged were (in order of importance) church committees, Village Development Councils, school committees, and stock theft control groups. Organizational membership can provide some insight into the degree of social integration of households into their communities (e.g. have relocated households been able to reintegrate themselves into their communities), but does not tell us much about the second aspect of social support, namely the various reciprocal arrangements and rights to social support that are exercised through kinship groups.

In Table 21 a broad range of possible indicators on livelihood strategies is presented:

Table 21 Potential indicators of livelihood strategies

Sources of income over the past year
Average number of sources of income
Average cash income from the different income sources
How household that received compensation payments utilized these payments
How household that received retrenchment packages invested/ utilized their packages
Access to arable land/number of fields/households without fields
Whether households that have lost fields to the LHWP have
<ul style="list-style-type: none"> - Attempted to gain access to new fields - Have been successful in these attempts - Have used the time that they would have spent on their fields to pursue other economic activities
Number of fields planted in last season
Reasons for not planting fields
Number of fields sharecropped or leased
Whether the household sold crops in the last season
Agricultural implements possessed by household
Kinds of crops planted by household in last season
Quantities of crops produced
Whether the household paid for any agricultural inputs (e.g. ploughing, seed, fertilizer, pesticides, etc.) in the last season
Whether the household has a home or vegetable garden
Does the household own livestock
Percentage of households with no livestock
Numbers of cattle, equines, small stock, chickens and pigs
Number of livestock loaned in or out in terms of the <i>mafias</i> system
Number of livestock sold in past year
Percentage of households that produced garden crops
Percentage of households that sold garden crops
Whether the household considers farming (crop and/or livestock) as its main source of income/subsistence
Non-farm informal sector activity as
<ul style="list-style-type: none"> - Contribution to total household (cash) income - Number of household members involved in these activities - Number of household members primarily dependent upon these activities for household income
Percentage of households with membership in community organizations, such as burial societies, stokvels and grocery associations
Percentage of households that had
<ol style="list-style-type: none"> 1. Sought loans from outside their families i.e. from friends & neighbours, stokvels, burial societies, etc. in the past year 2. Been successful in securing the loans
Percentage of household that had received gifts of food or clothing in the past month
Percentage of household that had given gifts of food or clothing in the past month
Percentage of households selling and using/eating collected wood, thatch grass, wild vegetables, medicinal plants and fish caught by a member of the household

Shocks and stresses

While vulnerability to shocks and stresses constitutes a central issue within the livelihoods approach, the range of potential indicators is far more limited and manageable than that of livelihood strategies. There are also fewer potential overlaps with other issues in the survey, although there is likely to be a degree of overlap with issues relating to health and mortality.

Shocks such as job losses, death of household members or stock theft can play an important role in understanding standard of living/livelihood trends among both affected and unaffected households. Potential indicators of livelihood shocks and stresses presented in Table 22 focus largely on shocks that can impact on the livelihoods of specific households rather than on long-term stresses. However, one long-term stress on households that may be useful to include is the dependency ratio of households. Gill-Watson's (2004: 11) longitudinal study, for example, shows an association between dependency ratios and the poverty status of households in Lesotho. Other aspects of household structure may also be relevant. According to Turner (2003: 16), for example, "female-headed households with dependants are some of the poorest in Lesotho, a single woman with no dependants is likely to be twice as well off as her male counterpart. This must be because women's education is higher than men's and their access to certain types of waged employment is greater."

A related demographic issue concerns changes in the marital status of women over the past few decades. Recent research suggests that new types of household structures and household development cycles may be emerging in Lesotho. Retrenchment and male unemployment appear to be changing the basis of marriage, and leading both men and women to develop new livelihood strategies. Whereas in the 1980s 80% of Lesotho women were married by the age of 20, more recent research has shown that only 20% of women between the ages of 18 to 30 were married. There has also been a trend for young women to seek wage employment in urban areas because, as unmarried women, they are not entitled to land or a house in the rural areas (LRAP Brief 4, 2004).

Table 22: Potential indicators of livelihood shocks and stresses

Loss of a job (wage employment) by household member over last three years
Other losses of income over last three years
Death of a household member in the last five years
- Did this member contribute to the income of the household prior to death?
- Estimated monthly contribution of member to household income
Member of household who has been chronically ill for the last three months
Permanent departure of household members
Loss of crops harvested over the last three years
Death of livestock due to drought, disease, adverse weather conditions, etc.
Has the household been forced to sell livestock over the last three years?
Robbery within the last year
Violence within the last year
Murder within the last year
Rape within the last year
Burning of property or fields within the last year
Witchcraft within the last year
Stock theft within the last year
Land dispute within the last year
Denial of a requested loan within the last year
Household dependency ratio

Livelihood outcomes

Livelihood outcomes cover a broad range of potential indicators relating to poverty, food security, nutrition, health, water supply, housing, energy, education, community participation and personal safety. Many of these issues potentially overlap with non-livelihood issues in the survey.

Among the potentially numerous livelihood outcome indicators, income and poverty status are perhaps the most important. Income has already been dealt with in the sub-section on livelihood strategies. Attention has also been drawn to the possibility of tracking households as they move in and out of poverty or change their economic status by moving between income categories (e.g. quintiles). By categorizing households into static (e.g. very poor, poor, average, better-off) or dynamic (e.g. chronically, ascending, descending and never poor) categories, one is better able to understand how these categories differ from one another and to identify the factors that play a role in both changes and maintenance of poverty/non-poverty status.

This might appear to be a broader objective than the objective of the current project, which is to determine whether affected communities have actually suffered deterioration in their standard of living and whether compensation has helped to redress any decline in standard of living that might have taken place. In the context of increasing inequality in Lesotho, especially in the mountain areas, aggregate measures such as mean household incomes tell us little about the performance of individual households. The situation is further complicated by the impact of economic and other conditions external to the LHWP, which may have led to a general decline in livelihoods in both affected and unaffected areas.

Against this background, tracking the progress of households, or more accurately groups of households, will allow us to determine which households have maintained their standards of living and which have not. Livelihoods research suggests that substantial changes in economic status had taken place in Lesotho during the 1990s. The introduction of compensation to redress the loss of assets and potential declines in living standards of affected populations also suggests an interest not only in the extent to which affected communities *maintain* their standard of living, but also in their *movements* between different economic categories.

In assessments of poverty and income, it is important not to lose sight of the role of savings, investments and debts in the overall livelihoods of households. Indicators have therefore been included to assess the relative savings, debts and investments of households. The literature on Basotho livelihoods reviewed above indicates that livestock holdings constitute a central investment strategy in Lesotho, although stock theft has made this an increasingly risky option. Investments in agriculture have also played a role in Basotho livelihoods and therefore access to fields and purchases of agricultural inputs may also be viewed as investment strategies.

Because of the multi-dimensional nature of poverty (and by implication of 'standard of living'), a broad range of non-income indicators may be used to assess the status of both affected and control households. These include nutrition and food security, health and mortality, water supply and sanitation, housing, energy, education and skills levels, community participation and personal safety. Because issues of nutrition, health, and infrastructure and services are dealt with in some detail in other sections of this report, these outcome indicators will not be discussed here. Within the context of the livelihoods approach,

outcome indicators that are commonly used do not differ substantially from those of other approaches to poverty and development.

A number of indicators used to assess livelihood strategies and shocks and stresses may also be applied as outcome indicators. For example, indicators of community participation and social support can be seen as both assets to livelihood strategies and as livelihood outcomes. They are therefore repeated in the list of outcome indicators in Table 22 in italics in order to indicate duplication. Some of the indicators of shocks and stresses can also serve as outcome indicators of personal safety. A broad range of indicators dealing with perceptions of personal safety could also be included.

Table 22: Potential indicators of livelihood outcomes

Current and past poverty status
Movements in and out of poverty
Percentage of households with no adult wage earner
Percentage of households with no bank account
Percentage of households without a radio
Current household savings
Current household debt
Percentage of households with no livestock
Percentage of households with no fields
Investments in agricultural inputs
Mortality rates of households
Education and skills levels of households
Percentage of children of school-going age (6-15 years) not attending school
Percentage of adults with no schooling
Adult literacy rate
Percentage of households that use electricity, coal, gas or paraffin as their main source of energy
Size and quality of housing
Percentage of households with more than three persons per room
Perceptions by household members of changes in their economic situations over the past five years
<i>Percentage of households with membership in community organizations, such as burial societies, stokvels and grocery associations</i>
<i>Percentage of households that had</i>
1. <i>Sought loans from outside their families i.e. from friends & neighbours, stokvels, burial societies, etc. in the past year</i>
2. <i>Been successful in securing the loans</i>
<i>Percentage of household that had received gifts of food or clothing in the past month</i>
<i>Percentage of household that had given gifts of food or clothing in the past month⁷</i>
Percentage of households whose members have been subjected to robbery, violence, murder, rape or stock theft in the past year
Percentage of respondents who feel safer/less safe living in their communities than they did five years ago

Mortality rates can also serve as indicators of shocks and stresses and of outcomes, although it is often difficult to determine whether they are a cause or effect of changes in livelihoods. For example, Turner et al., 2001: 92) found that "*de jure* female headed households, which are usually among the poorest, experience substantially more deaths per household member

than other households." As discussed above, Gill-Wason (2004) found a strong association between mortality rates and the movement of households in and out of poverty, with households that were descending into poverty having the highest mortality rates.

One indicator that may be useful to include in the questionnaire, if not already covered in other sections, relates to the different kinds of energy used by households. Surveys show that between 1993 and 1999 the percentage of households in Lesotho without electricity, coal, gas or paraffin increased from 38% to 60% (Sechaba Consultants, 2000, cited by Turner, 2003: 8). As poorer households are more likely than better-off households to be without these 'modern' fuels (see, for example, Table 19 above), source of energy supply can serve as a general indicator of poverty. As Turner (2003: 10) argues, energy shortages within the context of cold Lesotho winters can result in considerable hardship and exacerbate health problems.

Educational levels have also been shown to be associated with general standards of living and with movements in and out of poverty.

In conclusion, the livelihoods approach reminds us in dealing with livelihoods, it is not sufficient simply to look at outcomes, but also at the contexts, resources, vulnerabilities and strategies that individuals and households employ to secure their livelihoods. It is within the context of a finer and more detailed understanding of the processes and dynamics of livelihoods and livelihood strategies that we can begin to approach an appreciation of what may be required to address negative impacts on Lesotho livelihoods, whether these are caused by the LHWP or other factors.

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Endnotes

- ¹ For example, the DFID definition stipulates that: "A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living." See also Murray, 2001 and Carney, 1998.
- ² The following definitions of sources of income are provided by Gill-Watson (2004: 30): "The term 'casual work' covers work carried out for someone else and being paid for it. This includes casual construction work, work on the roads, fato-fato, etc. 'Informal work' covers activities such as hawking, brewing beer, small informal businesses, sale of manufactured produce or 'value added' produce such as school uniforms or cooked food, etc. 'Farming' covers sales of crops, vegetables, marijuana and fruit. 'Stock' covers sales of animals, animal products and wool. 'Other' covers one-off payments such as brideprice or traditional fines, etc."
- ³ Turner appears to cast doubt on the accuracy of this percentage stating that "even if this is exaggerated, it would at a minimum suggest that sharecropping remains an important livelihood strategy for Basotho."
- ⁴ This list of shocks and stresses is loosely based on Turner, 2003: 22
- ⁵ In terms of this scoring system, chickens were assigned a value of 1, pigs 16, sheep and goats 20, and bovines and equines 40.
- ⁶ The inclusion of these two activities under agricultural production can also be questioned. In addition to the activities not being strictly 'agricultural', they are also important components of off-farm informal sector activity and should therefore be measured as such.
- ⁷ These indicators are in italics in order to draw attention to the fact that they are also included in Table 20 as indicators of livelihood strategies and the assets associated with these strategies.

CHAPTER 4

An analysis of infrastructure and services

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INTRODUCTION

Areas of the Lesotho Highlands were difficult to reach by vehicle before the construction of the Katse reservoir in 1986. General modes of transport were either airplane, foot, or by horseback. The lack of infrastructure, particularly roads, limited this region's access to the outside world and its wider economy until the inception of the Lesotho Highlands Water Project. Population densities in the mountainous highlands are relatively low. Most people live in small villages while a handful of larger settlements are scattered throughout the region. Stone rondavels with thatch roofs were the dominant form of housing in the mountains and Senqu valley with fewer found in the lowlands and foothills of Lesotho (Sechaba, 2000).

Before the construction of the Phase 1A and 1B reservoirs, the Katse and Mohale catchment areas lacked rudimentary infrastructure such as improved roads, communication networks, piped water, sanitation facilities and electrification due its remote location. Natural springs provided most local inhabitants with the bulk of their drinking water needs. An epidemiological survey carried out before the start of Phase 1A construction revealed that virtually all semi-protected and unprotected springs were contaminated with *E. coli* bacteria, which led to a common occurrence of ailments such as diarrhoea, and stomach aches. Regional differences between the mountainous Katse and lower-elevation Muela water samples were recorded where 58% of Katse population drew water from unimproved sources, compared with only 6.3% of the Muela population (Kravitz, 1999).

Energy sources in the project areas were primarily obtained from biomass and other non-commercial fuels (Hunting-Consult, 1997). Main sources of energy included dung, shrubs, firewood, crop residues, annual weeds, paraffin, and candles. Telecommunications were non-existent in the area.

The Lesotho Highlands Water Project and its attendant construction brought many changes to the affected area over a relatively short period of time. The construction of the Katse and Mohale reservoirs created the need for upgraded infrastructure that had to assist the transportation of vast quantities of building materials. New and upgraded infrastructure also had to accommodate workers that were offered housing, water, electricity and sanitation facilities. The introduction and upgrading of infrastructure such as roads, water and electricity and the provision of health and other services to contract workers opened up the possibility of supplying villages in the reservoir catchment areas with basic services and upgraded infrastructure.

Data from the early 1980's showed that, on average, only 11% of the rural population in Lesotho had access to reticulated water and sanitation facilities (Government of Lesotho, 1985). Tshabala (2001) points out that health related infrastructure in project areas improved substantially due to the efforts of the Lesotho Highlands Development Authority (LHDA). Access to potable water increased from 16% to 43% of the affected population in Katse; from

55% to 81% in 'Muela and from zero to 53% in Mohale. In Katse, the proportion of households with sanitation facilities increased from 0.8% in 1988 to 2% in 1990 and 21% in 1998 whereas sanitation in 'Muela improved from six percent to 46%. Drastic changes in 'Muela occurred because of the 'Muela Enhancement Project whereby every household were to be provided with toilet facilities. Significant increases in Mohale were achieved due to changes in compensation policy that dictated that all compensation housing should have a toilet facility.

People affected by Phase 1A and 1B were allowed to choose the design of replacement houses equal in surface area to their original homes. The new location was determined through negotiation with village chiefs in the desired host communities. Where large numbers of affected people moved to a host village, the infrastructure (access roads, schools, water supply and sanitation) was upgraded to cater for an enlarged population. Whereas all Phase 1A resettleses relocated to villages in the Highlands (within the same administration jurisdiction), Phase 1B offered the choice of the rural Lowlands as well as urban areas. People who decided to relocate to urban areas were offered support by social workers to cope with the challenges of urban life (TCTA, 2005).

A report by Sechaba Consultants (1996) draws attention to the fact that access to proper water, sanitation and other modern facilities has a significant effect on the general well-being households. Before the inception of construction in the Phase 1A and 1B project areas the majority of local inhabitants had very limited access to modern facilities. The number of secondary schools was small and there were few clinics in the area. Even shops were limited. Postal services were also limited to one post office in the Phase 1B area and four in the Phase 1A area.

Nevertheless, the rapid development spurred by the construction of the Katse did not keep pace with the demand for modern infrastructure and services by local people with new roads being the only exception. Roads had a particularly important influence on improving the socio-economic status of households. Census information for example revealed that the percentage households with wage earners were significantly higher, at 58.7% along roads in Mohale, compared with the average of 40.4% for the whole area (Sechaba, 1996). Although the new roads were set to disturb the tranquil life and seclusion of their mountain retreat to which communities were accustomed, it was also foreseen that the construction of new infrastructure such as roads, bridges and the Katse Reservoir, would lead to tourists coming to the area with positive spin-offs.

INFRASTRUCTURE AND SERVICES DEVELOPMENT ASSOCIATED WITH PHASE 1A

Infrastructure created during Phase 1A included two border crossings; one railhead for cement; 120km tarred roads over mountains; a 420m long bridge, 86m above the valley floor; three clinics and one trauma unit at an existing hospital; 145km of power lines; more than 200 houses in five construction villages and a microwave telecommunications system. Main contracts made provision for the construction of the Katse reservoir, Intake Tower, Transfer Tunnel, Hydropower station, Muela reservoir, Delivery Tunnels - North and South and the Ash River Outfall. Water delivery started in 1998 and the generation of hydropower in 1999.

Inundation of the Katse reservoir required the relocation of 143 houses and 2 schools. An additional 110 households were resettled due to the development of advanced infrastructure and their possible hazardous location.

Rural electrification was regarded as problematic and was viewed in the Lesotho Highlands Water Project (LHWP) Phase 1A compensation and redevelopment plan (LHDA, 1989) document as unlikely for the next decade (1989-1999). It was argued that rural incomes were too low to sustain the high costs of installing and paying monthly electricity bills. It was further argued that the opportunity nevertheless existed for extending electrification to communities with sufficient demand adjacent to new power lines. Despite acknowledging the limitations of providing electricity to communities in the Katse catchment area, targets were set to provide domestic and commercial electricity to ten villages in the Katse local catchment area.

The 1989 compensation and rural redevelopment plan also made provision for supplying 3770 households within the local catchment of Katse and 'Muela reservoirs with access to drinking water from public standpipes by the year 1995 (LHDA, 1989). It was then reported that only four of the 12 villages in the 'Muela area and one of the 121 villages in the Katse area had access to piped water. Water systems were planned to provide 30 liter of water per person per day.

As part of a National Rural Sanitation Program, plans were made to provide sanitation to 3770 households in the Katse and 'Muela areas. Plans also included the provision of latrines to all primary and secondary schools in both areas and to establish a health and sanitation education programme to improve hygiene practice and community health in all communities. The time estimation for completion of this project was six years.

It was also anticipated that construction activities of the LHWP would have a major impact on the existing rural communities in the Lower Bokong and Lejone areas. The inflow of a 'temporary' population comprising work seekers and traders from other areas were seen as problematic. Plans to mitigate this impact comprised the upgrading of local infrastructure. A project for providing site and service facilities for the expected population, together with upgraded infrastructure for the established villages, including upgraded water supplies and access roads were part of the mitigation plans. Other plans included extending existing schools at Katse to accommodate children from the influx of population who were not absorbed by a new school in the construction town; providing serviced business sites to accommodate small, private entrepreneurs; providing a bus stop and a hawkers market to develop informal trade as well as a community hall and sports ground (LHDA, 1990a & 1990b).

INFRASTRUCTURE AND SERVICES DEVELOPMENT ASSOCIATED WITH PHASE 1B

Construction activities of Phase 1B of the project began in 1998 and comprised the 145 metre high Mohale reservoir on the Senqunyane River, the 32 kilometer Mohale Tunnel linking the Mohale Dam to the Katse Dam, and the 6 kilometer Matsoku weir and tunnel, which diverts flood water from the Matsoku River into the Katse Dam. Other infrastructure included three mountain passes, 72km of tarred roads, more than 100 homes for construction workers and 75km of power lines. The Matsoku weir and tunnel was completed and officially inaugurated on 26 October 2001. Despite some delays due to a combination of geophysical and technical problems, the construction of Mohale reservoir and tunnel was completed in 2003.

The Mohale reservoir area (Phase 1B) made provision for similar types of infrastructure upgrades as in Phase 1A. The goal of the Phase 1B program was that "The standard of living

of all people affected by the implementation of Phase 1B should not be compromised and where possible improved." (LHDA, 1997). Similar to Phase 1A, compensation plans for Phase 1B included replacing infrastructure lost due to inundation such as houses and community infrastructure but also the upgrading of other infrastructure such as roads, schools, and providing social facilities such as community centers, clinics and local government offices. Less emphasis was placed on the provision of electricity services and more on improving the availability of fuels such as coal and paraffin. Certain villages were nevertheless provided with access to electricity where deemed feasible.

Two groups of beneficiaries were identified in the reports on development and compensation that related to infrastructure and service delivery in both Phases 1A and 1B. This included households directly affected and households indirectly affected (also referred to as 'host' communities). Households directly affected were to benefit from infrastructure and service improvements in a number of ways that included inter alia:

- improved housing;
- improved water supply and sanitation;
- improved communal facilities such as schools and clinics;
- improved transportation through the network of roads and reservoir crossings; as well as
- access to the services and amenities shown for indirectly affected households.

The host communities and those households that remained in the Scheme Area were to benefit from the overall development program, partly through the communal facilities mentioned above (water supplies, schools, clinics and transportation) but also from the Community Services Programme which provides facilities as:

- a multi-purpose community center incorporating accommodation for meetings, adult training sessions, clinics and agricultural inputs;
- a training programme for both skills development and adult literacy classes;
- a telephone communications point and in certain areas electricity; and
- an intensive agricultural extension programme including information on agriculture, livestock, forestry and energy.

The reservoirs had an impact on access by the local population to services (e.g. by inundating valleys). Special roads, bridges and even ferry services across reservoirs were planned to mitigate this impact.

The commitment of the rural development plan to rural electrification in particular did not materialize due to the high cost of installing and maintaining electrical supply to poor households. There were also reports that water supply for Phase 1A did not meet the objectives of supplying all 3770 households within the local catchments of Katse and 'Muela reservoirs with drinking water from standpipes by 2001. Five years after the target date, only three villages had working water systems and at least five primary schools did not have improved water supply. A high failure rate of water systems was also reported.

INFRASTRUCTURE DELIVERY AND SERVICES COMPLAINTS

A number of complaints were leveled against the LHDA for failing to deliver on various promises made relating to infrastructure and services. An Ombudsman appointed in terms of section 134 (1) of the Lesotho Constitution investigated these complaints (Mafisa, 2003). During the months of December 2002 and January 2003 the Ombudsman received complaints from people who resettled from areas of the Mohale reservoir to lowland areas. Due to the large number of complaints the Ombudsman decided to conduct a formal inquiry into allegations that ranged from defects in replacement housing to the failure of providing access roads.

The largest number of complaints related to replacement or compensation housing. Common complaints were that LHDA had built houses with fewer rooms than agreed and specified and that the areas of measurement of separate rondavels were in some instances added to main houses. There were also widespread complaints about structural defects in houses which included cracks in walls, leaking roofs, sagging and stained ceilings and cornices, windows and doors not closing properly, dampness in walls, loose tiles and fascia boards, VIP toilets not being in good working order and water tanks with dripping taps, non-fitting water tank lids and low platforms making it difficult to draw water (Mafisa, 2003).

Complaints listed with regard to public infrastructure included the non-delivery of roads, water supplies, schools, health facilities, electricity and footbridges. It was argued that the LHDA had promised to construct access roads to villages and that these promises had not been fulfilled. It was also alleged that in some villages such as Ha Mosuoe there was no potable water supply while in other villages the water sources were far from resettled households. Some communities also complained about the unreliability of their water supply. The complainants stated that the LHDA had promised to provide health facilities close to their home but had reneged on such promises. The promised building and upgrading of schools had not been done. It was also alleged that the LHDA did not supply households that settled in urban areas with electricity despite promises made. People relocated at Ha Thetsane claimed that they had requested the construction of a footbridge over what they refer to as the "Blue River". This request had not been responded to (Mafisa, 2003).

The inquiry found that most of the allegations had merit and that the LHDA itself conceded to most. Internal LHDA problems and inadequacies in legislation were presented as the reasons for most of the problems cited. The Ombudsman made a number of recommendations to rectify problems found to have merit. These recommendations included that the LHDA build and rehabilitate a number of roads as obligated by its own compensation procedures. It was also recommended that a bridge be built on the Liphiring River that runs between Ha Mosuoe and Ha Makhabane/Lesaoana. Water supplies were to be provided to the resettled communities that included Ha Mosuoe, Ha Seoehlane, Ha Ratau (Matebeleng), Thuathe, Ha Tsolo, Nazareth and Tsoapo-le-Bolila. The LHDA was advised to liaise with the Ministry of Health with a view to ascertain its plans with regard to the provision of Health facilities in areas where LHDA had resettled people. It was recommended that the LHDA build additional furnished classrooms at the Metolong Primary School and to take stock of other schools in the resettlement area to determine needs in view of its obligations and policy. The LHDA was advised to provide electricity to five households. The feasibility of installing street lighting was recommended for those resettled in Thetsane and in Ha Matala. It was also recommended that the LHDA consider constructing footbridges on the "Blue River" at Ha Thetsane and Ha Makotoko (Mafisa, 2003).

Regarding housing defects and sizes, it was recommended that the LHDA correct problems within 12 months from receipt of the report. It was also suggested that the LHDA explain to resettled persons their actual entitlements and what to expect under compensation policies. The LHDA was further asked to conform to construction specifications where separate rondavels had to be built or settlements be negotiated (Mafisa, 2003).

CONCLUSION

The inception and completion of Phase 1A and 1B of the LHWP had a major impact on the livelihoods of many people inhabiting areas earmarked for construction activities. Some of the documented impacts on people's livelihoods were negative while others enhanced the quality of life of those affected. Certainly the most significant of the positive contributions to people's lives were the provision of employment and infrastructure and the general upgrading of services that enhanced the lives of local inhabitants. The LHWP created more than 7,000 jobs (albeit temporary) and all of Lesotho's electricity, while providing new health clinics, schools, sanitation facilities, roads and upgraded water-supply systems for 150 villages. It has promised full compensation to residents affected by the dams, as well as training and aid to help them sustain themselves in the future.

By March 2005, in the Phase 1B area, 315 households were resettled by LHDA and schools were provided with improved facilities. In addition, 45 fully furnished classrooms were constructed for 16 schools, together with water supply and sanitation facilities while work was underway to provide all households in the catchment area with VIP toilets. To improve mobility in the project area, seventy six kilometers of gravel feeder roads were constructed alongside foot and road bridges. (Potloane, 2005).

Nonetheless, some critics of the LHWP claimed that the hardships of affected communities increased and that they have yet to see their quality of life improve (Hoover, 2001 & SAHIMS, 2003). The complaints listed relate to infrastructure delivery, e.g. structurally deficient housing and non-delivery of schools, clinics, clean water and water taps.

Tshabalala (2001) regarded communities' expectation of what the LHDA could do in terms of the development of their villages as too high. People perceived the responsibility of the LHDA to include the construction of new schools, offices for community or chiefs, churches, banks, sports grounds, electrification of villages and offering of veterinary services which in some instances went beyond the scope of the LHDA offer of fair compensation to communities and individuals for inconvenience as well as infrastructure and assets losses due to construction and inundation. Despite criticism against slow delivery and some perceptions of affected communities being worse off than before, it should be recognized that the LHDA has in many instances gone beyond their call of duty to compensate people that lost houses and other infrastructure, by providing them with services and infrastructure such as roads, water and sanitation that they previously did not have access to. This complex process proved to be problematic as is shown by the formal inquiry into complaints by an Ombudsman. The findings of the Ombudsman showed that most of the complaints registered had some merit. A number of recommendations were made with the purpose of rectifying the problems that communities experienced in their dealings with the LDHA.

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CHAPTER 5

Nutritional status and dietary intake: A review of studies in the LHWP areas

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INTRODUCTION

The important relationship between nutritional status and health is well documented. Good nutrition is critical for the well-being of any society and each individual within that society. The nutritional status of selected population groups can be assessed by means of cross-sectional surveys that can provide valuable information on both under- and over-nutrition. Surveys assessing nutritional status often target high-risk populations for under-nutrition, such as low-income mothers, children under five, and pregnant women. The role of nutrition as a risk factor for chronic diseases, however, justifies a wider target population.

Measurements collected in nutritional assessment surveys usually include anthropometric measurements, clinical signs of malnutrition, laboratory tests for nutritional deficiencies and dietary intake assessments. The measurements as such often have no meaning unless they are related to, for example, the age or sex of the individual. Construction of indices is therefore needed for the interpretation of these measurements. The indices are often evaluated at the population level by comparison with predetermined reference values. For example, the proportion of children at risk of acute malnutrition is based on a weight-for-height z-score below -2 SD of the median of the reference population. For meaningful interpretation of nutritional assessment indicators, factors such as socio-economic status, cultural practices, health statistics, food-related behaviours, and knowledge, attitudes and practices often need to be considered.

Anthropometric measurements are universally accepted as the most useful non-invasive tool for assessing the nutritional status and risk of poor health and survival of infants and young children, because disturbances in health and nutrition, regardless of the etiology, invariably affect child growth. Anthropometric measurements can provide useful information on past nutrition, but it cannot be used to identify specific nutrient deficiencies.

Clinical signs of malnutrition develop during the advanced stages of nutritional depletion. A qualified examiner can observe these signs, which are often non-specific. Observing clinical signs of malnutrition for nutritional assessment has several limitations and laboratory tests are needed to confirm the existence of specific nutrient deficiencies. Biochemical tests often can detect marginal nutrient deficiencies before clinical signs appear.

Laboratory methods include both static and functional tests. Static biochemical tests measure either a nutrient in biological fluids or tissue, or the urinary excretion rate of the nutrient or its

metabolites. The use of static biochemical indicators are often limited as the measurements indicate nutrient levels in a particular tissue or fluid, but often fail to reflect the total body content of the nutrient or the size of the tissue store that is most sensitive to depletion. Functional tests, which can be subdivided into either functional biochemical tests or functional physiological or behavioural tests, aim to measure the extent of the functional consequences of a specific nutrient deficiency. Functional physiological tests are often not suitable for large-scale nutrition surveys. In general, a combination of laboratory tests should be used, rather than a single test for each nutrient.

Dietary intake assessments can be done using a variety of methods, the choice depending primarily on the objectives of the study and the characteristics of the target population. Dietary intake can be assessed either quantitatively or qualitatively. Quantitative data on food intake are needed to calculate energy and nutrient intakes. The nutrient adequacy of the food intake is based on average daily nutrient intakes relative to nutrient reference values, and the proportion of the population "at risk" of inadequate intakes of a specific nutrient can be calculated. The qualitative approach focuses on foods rather than nutrients.

Studies Reviewed

In this chapter, nutritional aspects of the following LHDA-commissioned studies are reviewed:

- **Phase 1A baseline survey** that was done in 1992. This baseline survey was carried out in two sequential surveys, one in winter (July and August 1992) and one in summer (October and November 1992), on two separate but equivalent samples to determine seasonal differences (Consortium for International Development 1993a, 1993b).
- **Phase 1B baseline survey** that was done in 1995 (MRC 1996).
- **The first round of the socio-economic survey for Phase 1A- and Phase 1B-affected households** that was done in 1998/1999 (SW-B&A Consult 2000a, 2000b).
- **The second round of the socio-economic survey for Phase 1A- and Phase 1B-affected households** that was done in 2000 (SW-B&A Consult 2001).
- **The pilot study for the current contract** that was done in 2004, during November and December (LHDA 2005a, 2005b).

In the abovementioned studies, nutritional status was measured by various direct (e.g. anthropometric, clinical and biochemical indicators) and indirect (e.g. dietary intake, infant feeding and weaning practices, and household food security) measurements as summarised in **Box 1**.

Box 1. Measurements of nutritional status taken in previous LHDA-commissioned studies.

Phase 1A baseline survey

Anthropometric measurements

- length (children <2 y), height (children ≥2 y and adults), weight, MUAC, wrist circumference (adults ≥15 y), and skinfolds (biceps, triceps and subscapular)

Clinical signs of malnutrition

- children <5 y: kwashiorkor, marasmus, anemia, vitamin A deficiency, pellagra
- children ≥5 y and adults: anemia, vitamin A deficiency, pellagra, and goitre

Biochemical measurements

- capillary blood obtained by finger prick from children <5 y, children 5-14 y, pregnant women and adults, and analysed for hemoglobin; thin blood smear preparations were examined for red cell abnormalities indicative of the type of anemia

Dietary data

- 24-hr recall for children <5 y who were not currently breastfeeding; children 5-14 y; and mothers/primary caregivers of children <5 y.
- quantified food frequency for all adults and children who had not been administered the 24-hr recall.
- infant feeding and weaning practices
- illness practices for children <5 y

Household food security

- food shortages during the preceding year
- coping strategies during times of food shortage

Phase 1B baseline survey

Anthropometric measurements

- length (children <2 y), height (children ≥2 y and adults), weight and MUAC

Clinical signs of malnutrition

- children <5 y: kwashiorkor, marasmus, rickets, anemia, vitamin A deficiency, pellagra
- children ≥5 y and adults: anemia, vitamin A deficiency, pellagra, and goitre

Biochemical measurements

- venous blood samples were obtained from non-pregnant women aged 15-49 y and analysed for serum ferritin, iron, total iron binding capacity (TIBC), vitamin A, vitamin B₁₂, folate and albumin
- urine samples from children 10-14 y were collected for iodine analysis

Dietary data

- 24-hr recall for children 3-4 y
- meal frequency, meal food pattern and food frequency for children <5 y, children 12-14 y and women 15-49 y
- breastfeeding and complementary feeding for children <2 y

Household food security

- food shortages during the preceding year
- coping strategies during times of food shortage

Nutritional support through schools by interviewing the headmaster of 7 schools

Iodine levels of salt; ten 500 g bags of salt were purchased from shops near the main road and analysed for iodine level

LHDA compensation package for nutritional adequacy to meet the needs of the vulnerable groups (children and women)

Phase 1A & 1B 1998/1999 survey

Anthropometric measurements

- length (children <2 y), height (children 2-<5 y), and weight of children <5 y

Clinical signs of malnutrition

- children <5 y: kwashiorkor, marasmus, anemia, vitamin A deficiency, pellagra
- children ≥5 y and adults: anemia, vitamin A deficiency, pellagra, and goitre

Household food security

- food shortages during the preceding year
- coping strategies during times of food shortage

Phase 1A & 1B 2000 survey

Anthropometric measurements

- length (children <2 y), height (children ≥2 y) and weight of children <5 y

Clinical indicators of malnutrition

- children <5 y: kwashiorkor, marasmus, anemia, vitamin A deficiency, pellagra
- children ≥5 y and adults: anemia, vitamin A deficiency, pellagra, and goitre

Biochemical measurements

- blood samples were collected from adults ≥15 y for hemoglobin, hematocrit, ferritin (anemic females only), retinol, TSH and T4
- urine samples were collected from children aged 5-14 y and adults ≥15 y for iodine analysis

Dietary data

- unquantified 24-hr recall for children <5 y
- unquantified food frequency (7 days) for children 5-14 y and adults ≥15 y
- breastfeeding and complementary feeding for children <2 y

Household food security

- food shortages during the preceding year
- coping strategies during times of food shortage

2004 Pilot study

Anthropometric measurements

- length (children <2 y), height (children ≥2 y) and weight of children <5 y

Biochemical measurements

- blood samples were collected and analysed for hemoglobin, TSH, FT3 and FT4

Dietary data

- unquantified 24-hr recall for children <5 y and adults; foods were classified in three groups, namely, carbohydrates, vitamins and minerals
- food frequency; assessed as plentiful or scarce per season of the year
- breastfeeding and complementary feeding for children <2 y

Household food security

- food shortages during the preceding year
- coping strategies during times of food shortage

ANTHROPOMETRIC MEASUREMENTS

Anthropometry is a simple non-invasive approach to determine nutritional status of children and adults. Anthropometric measurements vary with age, and sometimes sex, and degree of nutrition. In children, three indices of malnutrition are usually computed, namely, height-for-

age, weight-for-age and weight-for-height. Each of these indices is expressed as z-scores (standard deviations of the median of the reference population). Children with height-for-age, weight-for-age and weight-for-height z-scores more than 2 SD below the reference median are classified as stunted, underweight and wasted, respectively. The severity of stunting, underweight and wasting of children <5 y in a population can be determined using the WHO classification as shown in Table 1.

Table 1: Classification for assessing the severity of malnutrition by prevalence ranges among children under 5 years of age

Indicator	Severity of malnutrition by prevalence ranges			
	Low	Medium	High	Very high
Stunting	<20	20-29	30-39	≥40
Underweight	<10	10-19	20-29	≥30
Wasting	<5	5-9	10-14	≥15

Source: Gorstein *et al.* 1994

Stunting is a measure of linear growth, which is measured as the recumbent length for children <24 mo, and the standing height for children ≥2 y and adults. Stunting is an indicator of chronic malnutrition and is associated with a number of long-term factors such as chronic insufficient protein and energy intake, frequent infection, sustained inappropriate feeding practices, certain micronutrient deficiencies (e.g. iron and zinc), and poverty. Stunting does not change rapidly, and in children >2 y of age stunting may be irreversible (Cogill 2003).

Underweight is a measure of both chronic and acute malnutrition, although it cannot distinguish between the two.

Wasting is a measure of acute malnutrition. Causes include inadequate food intake, incorrect feeding practices, disease and infection, or more frequently, a combination of these factors. Wasting in individual children and population groups can change rapidly with changes in the availability of food or disease prevalence.

The various anthropometric measurements taken in LHDA-commissioned surveys are shown in Table 2. Anthropometric measurements can be performed relatively quickly, easily, and reliably using portable equipment, provided standardized methods and calibrated equipment are used. The equipment that was used for the length/height and weight measurements in the LHDA-commissioned surveys is shown in Table 3. Body weight should preferably be obtained using a beam balance or an electronic scale. Compared with beam-balance scales, which tend to be heavy and bulky and therefore not suitable for field use, electronic scales are lighter in weight, more portable, and faster to read. They provide easy-to-read digital output and, when properly calibrated, are highly accurate (Lee & Nieman 2003). Bathroom scales were used to measure weight in the Phase 1A & 1B 2000 survey, as well as in the 2004 Pilot survey. Because spring-type bathroom scales may not provide the required accuracy after repeated use (Lee & Nieman 2003), the use of bathroom scales in nutritional status surveys is not recommended, especially not for children <5 y. When using electronic scales, there is no need to use separate scales (such as the Salter hanging scale) for infants, as the infant can be weighed while held by an adult. The weight of the infant can be derived by difference or, for

electronic scales that can be zeroed with an adult standing on the scale, can be read directly.

Measuring the length accurately for infants <6 mo is extremely difficult, and the value of including these measurements in large cross-sectional populations surveys can be questioned. Recumbent length for a child of approximately 2 y old is approximately 5 mm greater on average than standing height for the same child (Gibson, 2005). It is therefore important that all children <2 y are measured while laying down.

Table 2: Anthropometric measurements taken in previous LHDA-commissioned surveys

	Age group	n	Length / height	Weight	MUAC	Skinfolds	Wrist
Phase 1A baseline ^a	0-59 m	162 / 161 ^b	Y	Y	Y	Y	
	5-14 y	162 / 110	Y	Y	Y	Y	
	& ≥15 y	292 / 247	Y	Y	Y	Y	Y
	% ≥15 y	134 / 133	Y	Y	Y	Y	Y
Phase 1B baseline	0-59 m	304	Y	Y	Y		
	5-14 y	293	Y	Y	Y		
	& 15-49 y	300	Y	Y	Y		
	% 15-49 y	99	Y	Y	Y		
Phase 1A & 1B affected	<5 y	178	Y	Y			
2004 Pilot	<5 y	146	Y	Y			

^a Skinfolds were biceps, triceps, and subscapular.

^b Winter survey / summer survey

Children <5 y

The studies that were reviewed showed that undernutrition was already prevalent during infancy (<12 mo), suggesting a high rate of low birth weight (LBW). A birth weight <2 500 g is considered as LBW, which is an indicator of maternal malnutrition prior to and during pregnancy, as well as a lack of adequate ante-natal care. For interpretation of anthropometric data of young children, especially infants, it is important that birth weight is recorded.

Table 3: Equipment that was used for length/height and weight measurements in previous LHDA-commissioned surveys

	Length/height	Weight
Phase 1A baseline		
child <2 y	length board; manufactured by Basotho Enterprises Development Corporation ^a	hanging Salter scale, with 25 kg capacity marked in 100 g divisions
child ≥2 y	height board; manufactured by Basotho Enterprises Development Corporation	battery powered electronic scale, with 136 kg capacity and 200 g increments
adult	wall mount stadiometer modified to be portable and free standing	battery powered electronic scale, with 136 kg capacity and 200 g increments
Phase 1B baseline		
child <2 y	stadiometer in a recumbent position	electronic load cell scale (UC-300 Precision Health Scale), with 50g increments
child ≥2 y	metal tape stature metre attached to a rigid wooden rod	
adult		
Phase 1A & 1B affected		
child < 5y	tape measure	bathroom scale
2004 Pilot	measuring board / measuring tape ^b	Salter scale / bathroom scale

^a According to a design described in *Pust R. Portable stature device for child anthropometry, Journal of Tropical Pediatrics* 1991; 38: 276-277

^b It is not clear what equipment was used as the authors contradict themselves throughout the document.

The prevalence of LBW as recorded by various surveys is shown in Table 4. National data for Lesotho showed a prevalence of 6.4-7.2% for LBW. It is acknowledged that not all births are registered and that the birth weight is not always recorded. A prevalence of 17.8%-18.6% for LBW was recorded for affected households in the Phase 1B 1998/1999 survey, and the Phase 1A & 1B 2000 survey. In these surveys the birth weights were available for approximately half of the children (42-63%), and the numbers were small.

Table 4: Prevalence of low birth weight (<2 500 g) in Lesotho and Phase 1A & 1B areas

Year	Population	No of children	BW available	% LBW
National data				
1991 ^a	Lesotho	26 864		6.4
	catchment area	469		6.0
	non-catchment area	26 395		6.4
2000 ^b	Lesotho	815	73.2%	7.2
LHDA-commissioned surveys				
1998/1999 ^c	Phase 1A affected	278	140 (50.3%)	7.9
	Phase 1A control	59	30 (50.8%)	6.7
	Phase 1B affected	141	59 (41.8%)	18.6
	Phase 1B control	59	29 (49.1%)	3.4
2000 ^c	Affected	72	45 (62.5%)	17.8
	Control	104	55 (52.9%)	1.8

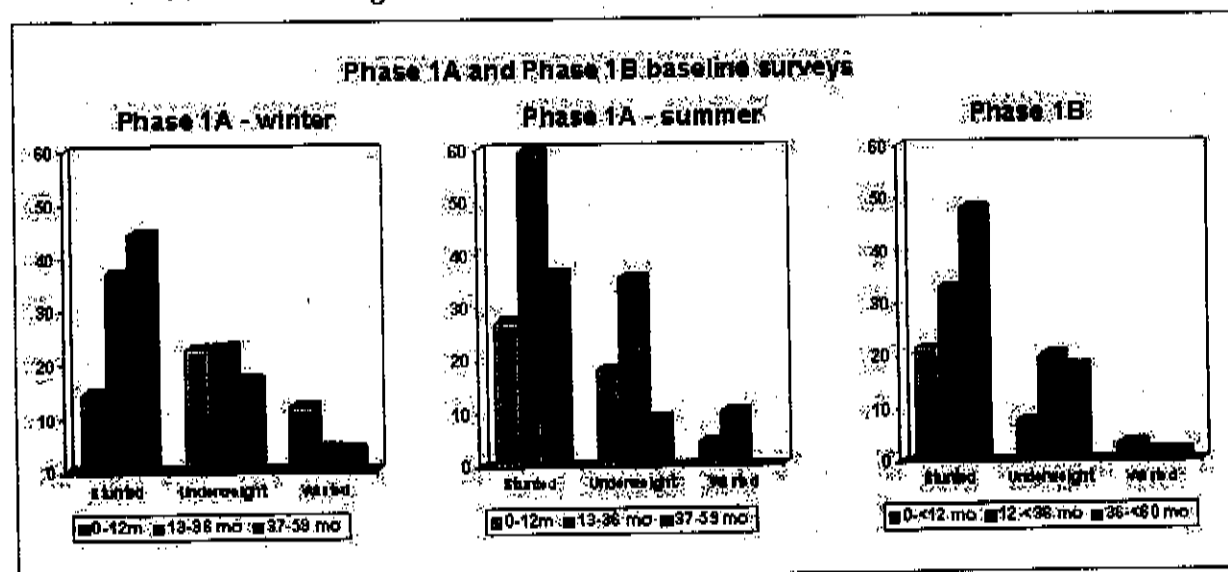
^a Source: Ministry of Health (1992).

^b Source: UNICEF (2000).

^c recorded for children <5 y

Anthropometric indices showed an approximate two-fold increase in the prevalence of undernutrition after the first year of life. For example, in the Phase 1B baseline survey the prevalence of stunting increased from 21.5% to 38.5% from the first to the second year of life. This reflects inadequate complementary feeding and/or infections. In Figure 1 the prevalence of stunting, underweight and wasting observed for infants (<12 mo), and 13-36-mo-old and 37-59-mo-old children in the Phase 1A and Phase 1B baseline surveys is shown.

Figure 1: The prevalence of stunting, underweight and wasting for children <5 y observed during the Phase 1A and Phase 1B baseline surveys



The prevalence of stunting, underweight and wasting for children <5 y observed in the various surveys is shown in Table 5. The prevalence of stunting among children <5 y ranged from 25-54%. The Phase 1A baseline survey showed that, for children <5 y, there were no statistical significant differences in the prevalence of undernutrition, either between the summer and winter surveys, or between boys and girls.

National data (UNICEF 2000) showed that children from the Mountains are more likely to be underweight and wasted than children from other regions in Lesotho. On district level, Mophale's Hoek showed a higher rate of stunting and underweight.

It should be noted that some of the studies reported the anthropometric data for various gender and age categories separately. The number of children per category was often very small and the conclusions drawn related to these categories were often not valid. For example, in the Phase 1A & 1B 2000 survey, it was stated that "the prevalence of stunting among males under 24 months of age was 100%" and that "the prevalence of stunting in the first year of life has increased tremendously". The sample, however, included only 3 boys <6 mo, 2 boys aged 6-11 mo, and 10 boys aged 12-23 mo.

Table 5: Prevalence of stunting, underweight and wasting in children younger than 5 years

Year	Study area	n	Stunted %	Underweight %	Wasted %
1992	Phase 1A baseline ^a				
	Winter survey	162	34.8	21.1	5.7
	Summer survey	161	42.4	21.7	5.1
1995	Phase 1B baseline ^b	304	36.2	16.4	2.0
2000	Phase 1A & 1B				
	Overall	178	53.9	16.3	5.1
	Affected	see ^c	40.7	13.8	4.0
	Control	see ^d	25.3	10.1	1.3
2000	EMICS				
	Leotho	2 938	45.4	17.9	5.4
	Mountains region	743	47.5	22.5	8.6
	Mophale's Hoek	254	51.6	24.0	5.5
2004	Pilot				
	Overall	134	38.1	13.0	4.7
	Katse	64	36.2	11.7	4.9
	Mophale	45	28.8	14.2	4.7
	Semonkong	25	39.5	13.2	4.5

^a Calculated from task 2.7.4 table 1 (Consortium for International Development 1993b)

^b Calculated from table 1 (MRC 1996)

^c stunting n=59; underweight n=65; wasting n=55

^d stunting n=83; underweight n=99; wasting n=78

In general the surveys showed that in children <5 y, stunting was high but the prevalence of wasting was low. This indicates that chronic malnutrition is a problem, rather than acute malnutrition.

Children 5-14 y

Anthropometric status of children aged 5-14 y was determined in the Phase 1A and Phase 1B baseline surveys (Table 6), but not in any of the other LHDA-commissioned surveys. Among school-aged children, stunting was prevalent at 30-40%, which is very similar to the prevalence observed among children <5 y. The Phase 1B baseline survey showed that adolescent boys were nutritionally vulnerable, with a high percentage being stunted and/or underweight (the sample size was small though).

Table 6: Prevalence of stunting and underweight in children 5-14 years old

Study area	Age	Stunted				Underweight			
		Boys		Girls		Boys & Girls ^b			
		n	%	n	%	n	%	n	%
Phase 1A baseline ^a 1992	5-9 y	55	30.9	71	35.2	128	14.1		
	10-14 y	67	44.8	79	34.2	150	14.0		
Phase 1B baseline 1995						Boys		Girls	
						n	%	n	%
	5-9 y	78	44.9	101	30.7	79	15.2	102	15.7
	10-11 y	26	38.5	27	37.0	26	26.9	28	10.7
	12-14 y	22	40.9	39	33.3	23	34.8	39	7.7

^a Winter and summer surveys combined.

^b Calculated from Task 2.7.4 Table 10 (Consortium for International Development 1993b)

Mid-upper arm circumference (MUAC) was measured in the Phase 1A and Phase 1B baseline surveys. Children with low MUAC were all <3 y in the Phase 1A baseline survey. A very small percentage of children <5 y (boys 1.2%; girls 0%) presented with low MUAC in the Phase 1B baseline survey. MUAC screens for acute malnutrition, which was low (<5%) using wasting as indicator. MUAC is therefore not an appropriate measurement to differentiate the undernourished children <5 y in this population. It should be noted that MUAC overestimates the rates of malnutrition for 6-12-mo-old children (Cogill 2003).

Adults

Anthropometric measurements expressed as body mass index (BMI) provide a good reflection of the nutritional status of adults.

$$BMI = \frac{\text{weight (kg)}}{\text{height (m)}^2}$$

Anthropometric measurements were taken for adults in the Phase 1A (Table 7) and Phase 1B (Table 8) baseline surveys. Different criteria were used to define overweight and obesity in

the two surveys. In the Phase 1A baseline survey, overweight was defined as a BMI > 30 and obesity as a BMI > 40. No reference for these criteria was given. In the Phase 1B baseline survey, the cut-off values of Bray (1978) were used, defining a BMI >30 as obese. Currently, the preferred criteria are the WHO (1998) reference values defining underweight as BMI <19; normal weight as 19 ≤ BMI <25; overweight as 25 ≤ BMI <30; and obesity as BMI ≥ 30.

Both the Phase 1A and Phase 1B baseline surveys showed that more men were underweight than women, and that more women were overweight/obese than men. In men, the prevalence of underweight was higher than the prevalence of overweight/obesity, probably reflecting chronic energy deficiency of a mild to moderate degree. In women, the prevalence of overweight/obesity was higher than the prevalence of underweight. In the Phase 1A baseline survey, the prevalence of underweight by age and gender was similar when BMI <19 or MUAC <23 cm (mid-upper arm circumference) were used as criteria.

The Phase 1B baseline survey showed that under- and overnutrition co-existed in the population, as a significant proportion of women were overweight/obese while the children suffered from undernutrition. This is not a unique finding: in many developing countries infants and young children suffer from undernutrition while adults content with overnutrition. In many populations under- and overnutrition co-exist not only at the population level, but also within the same household (Garrett & Ruel 2003). Public health interventions are therefore faced with the challenge to address both the causes of under- and overnutrition at both the population and household level.

Table 7: Anthropometric status of adults in the Phase 1A baseline survey

	Winter survey			Summer survey		
	15-29 y	30-45 y	>45 y	15-29 y	30-45 y	>45 y
Women						
n	100	89	103	89	77	86
BMI mean (SD)	24.9 (3.7)	26.5 (4.5)	25.8 (5.4)	24.6 (4.6)	26.5 (5.1)	26.7 (5.7)
BMI <19 (%) ^a	3.0	1.1	5.9	7.9	1.3	7.4
MUAC <23 cm (%) ^a	6.9	2.2	8.8	12.2	5.0	11.9
BMI >30 (%) ^b	5.0	21.1	19.6	5.6	20.5	23.5
Men						
n	47	27	51	39	36	50
BMI mean (SD)	22.5 (3.1)	23.3 (2.2)	23.2 (3.3)	21.6 (2.2)	22.2 (2.1)	22.9 (3.5)
BMI <19 (%)	6.3	0	10.0	12.8	5.4	12.2
MUAC <23 cm (%)	16.7	0	15.7	17.5	10.8	20.0
BMI >30 (%)	4.2	0	4.0	0	0	6.1

^a Indicator for underweight

^b Used as indicator for overweight in this study

Table 8: Anthropometric status of adults in the Phase 1B baseline survey

	Men		Women	
	15-<25 y	25-<50 y	15-<25 y	25-<50 y
n	54	45	97	203
BMI mean (SD)	20.7 (3.5)	22.1 (2.2)	22.8 (3.3)	25.0 (4.7)
Underweight (%) BMI <20 BMI <19	37.0	11.1	11.3	9.4
Normal weight (%) BMI 20-<25 BMI 19-<24	57.3	77.8	55.7	44.3
Overweight (%) BMI 25-30 BMI 24-30	1.9	11.1	29.9	31.5
Obese (%) BMI >30	3.8	0	3.1	14.8

Clinical indicators of malnutrition

In all the LHDA-commissioned surveys that were reviewed in this chapter the fieldworkers were asked to note signs of clinical nutritional deficiency. The prevalence of clinical indicators of malnutrition is summarized in Table 9 (protein-energy malnutrition; PEM), Table 10 (pellagra, anemia and vitamin A deficiency) and Table 11 (iodine deficiency).

Table 9: Prevalence of clinical signs of protein-energy malnutrition in children younger than 5 years

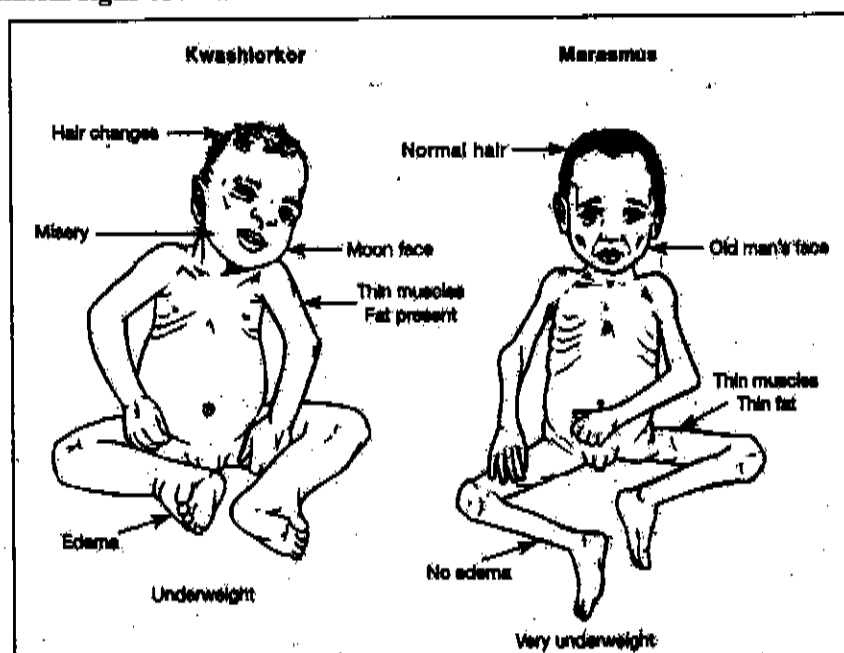
Year	Population	n	Kwashiorkor %	Marasmus %
1992	Phase 1A baseline ^a	355	0.6 ^b	-
1995	Phase 1B baseline	304	0	0
	Phase 1A affected	278	0	0.4
1998/1999	Phase 1A control	59	0	
	Phase 1B affected	141	2.2	0.7
	Phase 1B control	59	0	0
2000	Phase 1A & 1B	180	0	0

^a Winter and summer surveys combined

^b In addition, one child showed signs of moderate PEM.

Severe malnutrition presents as either marasmus, which is mainly an energy deficiency, or kwashiorkor, which is mainly a protein deficiency. WHO (2000) has recommended using three criteria as the best way to identify children with severe malnutrition, namely, edema of both feet, weight-for-height z-score <-3 SD, and visible severe wasting. It should be noted that the clinical assessment of severely malnourished children is difficult.

Figure 2: Clinical signs of kwashiorkor and marasmus



Source: Lee & Nieman 2003, p344.

Table 10: Prevalence of clinical signs of pellagra, anemia and vitamin A deficiency

Year	Population	Gender	Age	n	Pellagra %	Anemia %	Vitamin A %
1992	Phase 1A baseline ^a	boys & girls	<5 y	355	0.3	0	0
		boys & girls	5-14y	201	0	0	0
		females	>15 y	623	1.5-2.4 ^b	3.4	1.5 ^d
		males	>15 y	309	2.6 ^c	0.3	2.3 ^d
	Phase 1B baseline	boys & girls	<5 y	304	0	0	0
1995		boys & girls	5-14 y	293	0	0	0
		females	15-49 y	300	0.3	1.2	1.2
	Phase 1A affected	boys & girls	<5 y	278	-	1.4	0.4
	Phase 1A control			59	-	3.4	0
	Phase 1B affected	boys & girls	<5 y	141	-	0	1.4
	Phase 1B control			59	-	0	0
1998	Phase 1A affected	boys & girls	5-14 y	432	0	-	0.2 ^e
	Phase 1A control			69	0	-	0
1999	Phase 1B affected	boys & girls	5-14 y	177	0	-	0.3 ^f
	Phase 1B control			53	0	-	1.9 ^d
	Phase 1A affected	adults ^g	>15 y	635	0.3	0.3-1.3 ^h	0.2-9.6 ^j
	Phase 1A control			70	0	1.4% ⁱ	2.8 ^c
	Phase 1B affected	adults ^g	>15 y	274	0.4	-	0.4-5.1 ^k
	Phase 1B control			69	0	-	0
2000	Phase 1A & 1B	boys, girls & adults	>5 y	265	0.4	2.6-2.8% ^l	4.0-6.0 ^m

^a Winter and summer surveys combined

^b Rash on exposed skin 1.5%, tongue smooth and/or angular cheiloses 2.4%

^c Rash on exposed skin 2.6%, tongue smooth and/or angular cheiloses 2.6% ^d Bitot spot

^e Night blindness ^f Night blindness 0.3%; Bitot spot 0.3% ^g Females mostly

^h Pallor of tongue 0.3%; pallor of eyes 0.6%; pallor of nails 1.3% ⁱ Pallor of eyes 1.4%; pallor of nails 1.4%

^j Night blindness 9.6%; Bitot spot 0.2% ^k Night blindness 5.1%; Bitot spot 0.4%; corneal scars 0.4%

^l Pallor of eyes 2.6%; pallor of nails 2.8% ^m Adults (n=130); Night blindness 6%; Bitot spot 4%

Pellagra, which is caused by the nutritional deficiency of niacin as well as tryptophan (an essential amino acid and precursor of niacin), occurs mostly in areas where maize is a staple food. Meat (especially liver), poultry, and fish are rich sources of niacin, followed by dairy products, oilseeds, cereals (although the bioavailability is low), and legumes (Gibson 2005).

Table 11: Prevalence of clinical signs of iodine deficiency (goitre)

Year	Population	Gender	Age	n	Goitre %
1992	Phase 1A baseline ^a	boys & girls	<5 y	355	0.6
		boys & girls	5-14y	201	6.5
		females	≥15 y	623	18.5
		males	≥15 y	309	8.7
1995	Phase 1B baseline	boys & girls	5-14 y	286	17.5 ^b
		females	15-49 y	300	23.1
1998/1999	Phase 1A affected	boys & girls	5-14 y	432	1.8 ^c
	Phase 1A control			69	1.4 ^d
	Phase 1B affected	boys & girls	5-14 y	177	3.3 ^e
	Phase 1B control			53	0
	Phase 1A affected	adults ^f	≥15 y	635	8.7 ^g
	Phase 1A control			70	10.0 ^h
	Phase 1B affected	adults ^f	≥15 y	274	5.8 ⁱ
	Phase 1B control			69	7.2 ^j
2000	Phase 1A and 1B	boys, girls & adults	≥5 y	256	7.5

^a Winter and summer surveys combined

^b 16.8% palpable but not visible, 0.7% palpable and visible

^c 1.6% palpable but not visible, 0.2% palpable and visible

^d palpable but not visible

^e 2.2% palpable but not visible, 1.1% palpable and visible

^f females mostly

^g 3.9% palpable but not visible, 4.8% palpable and visible

^h 4.3% palpable but not visible, 5.7% palpable and visible

ⁱ 2.2% palpable but not visible, 3.6% palpable and visible

^j 4.3% palpable but not visible, 2.9% palpable and visible

In general, clinical signs of nutritional deficiencies were, according to the field workers' observations, either absent or very low in children, as well as adults, except for goitre, especially in the baseline surveys. The prevalence of goitre was higher in the Phase 1A and Phase 1B baseline surveys, compared to the Phase 1A & 1B surveys that were done in 1998/1999 and 2000.

Gibson (2005) listed several limitations when observing clinical signs of malnutrition for nutritional assessment, namely:

- non-specificity, meaning that some clinical signs can be caused by
 - more than one nutrient deficiency
 - non-nutritional factors
 - allergic manifestations

- the weather (e.g. Bitot's spots)
- multiple physical signs in people with coexisting nutrient deficiencies
- clinical signs may be two-directional, meaning that they may occur during the development of a deficiency or the recovery
- examiner inconsistencies, especially if the examiners have very limited experience (examiner bias can be minimized by standardising the criteria used to define clinical signs and by training the interviewers – standardisation of examiners will reduce inconsistencies in observations recorded).
- variations in the pattern of physical signs may arise because of genetic factors, activity level, environment, dietary patterns, age and the degree, duration, and speed of onset of malnutrition.

Because of these limitations, biochemical indicators are needed to confirm the existence of specific nutrient deficiencies.

Biochemical indicators of malnutrition

The prevalence of vitamin B₁₂ and folate deficiencies as determined by biochemical indicators is summarised in Table 12. Macrocytosis (indicator measured in the Phase 1A baseline survey) may result from conditions other than vitamin B₁₂ and folate deficiencies and is therefore a non-specific indicator of vitamin B₁₂ and folate deficiencies. Folate is present in a wide range of foods, such as liver, yeast, leafy vegetables, fruits, legumes and nuts. During food preparation or processing 50-95% of the folate in food can be lost, and as a result, diets that are based on thoroughly cooked foods are generally low in folate (Gibson 2005). Plant sources do not contain vitamin B₁₂, unless they are rich in bacteria (such as fermented foods). Liver and kidney are the best sources of vitamin B₁₂, followed by shellfish, red meat, fish and chicken, with lesser amounts in eggs and dairy products (Gibson 2005).

Table 12: Prevalence of vitamin B₁₂ and folate deficiency using biochemical indicators

Year	Population	Gender	Age	n	Indicator	%
1992	Phase 1A baseline ^a	boys & girls adults	0-14y ≥15 y	166	Macrocytosis ^b	4.2
				50	Macrocytosis	6.0
					Macrocytosis	2.0
1995	Phase 1B baseline	females	15-49 y	165	Vitamin B ₁₂ <100 pg/mL	1.2
				165	Folate <1.5 ng/mL	0

^a Winter and summer surveys combined

^b Indicator of possible anemia caused by vitamin B₁₂ and/or folate deficiencies.

The prevalence of iron deficiency as determined by biochemical indicators is summarised in Table 13. Iron deficiency may arise from inadequate dietary iron intake, poor iron absorption because inhibitors of iron absorption are present in the diet, excessive iron losses (e.g. because of intestinal parasites), or a combination of these factors. Foods that are rich sources of iron are liver, kidney and red meat, while chicken, processed meat, fish and legumes are medium sources (Gibson 2005).

Although finger prick capillary blood samples were taken for hemoglobin analysis during the Phase 1A baseline survey, too few hemoglobin values were available for meaningful analysis for a variety of logistical and technical reasons. The various surveys used different biochemical indicators for iron deficiency, hindering comparisons among the surveys.

Table 13: Prevalence of iron deficiency using biochemical indicators

Year	Population	Gender	Age	n	Indicator	%
1992	Phase 1A baseline ^a	boys & girls	0-14y	166	Microcytosis ^b Hypochromia ^b	rare 10
1995	Phase 1B baseline	females	15-49 y	199	serum ferritin <12 µg/L ^c	17.1
				119	TS <16%	27.7
				119	TIBC >71.6 µmol/L	59.7
2000	Phase 1A and 1B	males females	≥15 y	15	Hemoglobin <13.7 g/dL	40.0
				156	Hemoglobin <11.7 g/dL	7.7
2004	Pilot study	adults	≥15 y	128	& Hemoglobin <13.7 g/dL % Hemoglobin <11.7 g/dL	2.3

^a Winter and summer surveys combined

^b Indicators of iron deficiency anemia

^c Indicator of depleted iron stores

TS – transferrin saturation

TIBC – total iron binding capacity

Iron deficiency in adult females was estimated at one in five in the Phase 1B baseline survey, based on the finding that 21.8% had low TS and high TIBC simultaneously. Transferrin saturation measures the iron supply to the bone marrow, and levels <16% saturation indicate that the rate of iron delivery to the bone marrow is insufficient to maintain normal hemoglobin synthesis (Gibson 2005).

The Phase 1A & 1B 2000 survey and the 2004 Pilot survey both showed that the prevalence of anemia, using hemoglobin as biochemical indicator, was <10%. Iron is an essential component of hemoglobin and measuring hemoglobin concentration in whole blood is widely used to measure iron-deficiency anemia. Hemoglobin concentration is however a non-specific measure for iron deficiency, as certain other micronutrient deficiencies (e.g. vitamin B₁₂ and folic acid) are also associated with low hemoglobin concentrations. Hemoglobin concentration only falls during the late stage of iron deficiency when iron stores are exhausted and is therefore an insensitive measure of iron deficiency (Gibson 2005). The use of hemoglobin concentration as the only indicator for iron deficiency is therefore limited.

The Phase 1A & 1B 2000 survey and the 2004 Pilot survey both included females ≥15 y with no upper age limit, while the Phase 1B baseline survey was restricted to women of childbearing age (15-49 y). Women of childbearing age are more susceptible to iron deficiency than postmenopausal women. For comparison among surveys, the age range of the study population should be similar.

The prevalence of anemia did not differ between affected (6.8%) and control (8.5%) households in the Phase 1A & 1B 2000 survey. None of the anemic women in the control households had low ferritin concentrations (<10 µg/dL), while 38% of anemic women in

affected households had low ferritin concentrations, indicating depleted iron stores. Serum ferritin can reflect a deficient, excess, or normal iron status. Serum ferritin is an acute-phase reactant and is usually falsely elevated during infections and inflammation. The interpretation of ferritin concentrations in the absence of indicators of infection and inflammation is therefore difficult. Acute-phase proteins are often used as markers for infection. C-reactive protein (CRP) is a good measure of acute infection or inflammation but is less appropriate when these conditions are chronic (Gibson 2005).

No conclusion can be drawn from the high prevalence of anemia (40%) in men in the Phase 1A & 1B 2000 survey because of the small sample size (n=15).

The prevalence of vitamin A deficiency as determined by biochemical indicators is summarised in Table 14.

Table 14: The prevalence of vitamin A deficiency using biochemical indicators

Year	Population	Gender	Age	n	Indicator	%
1995	Phase 1B baseline	females	15-49 y	197	serum retinol <20 µg/dL	1.0
					serum retinol <30 µg/dL	15.7
2000	Phase 1A and 1B	adults	≥15 y	128	low serum retinol ^b	0

^a Winter and summer surveys combined

^b cut-off values are not given

The Phase 1A and Phase 1B baseline surveys used serum retinol concentration as indicator of vitamin A deficiency, which did not appear to be a significant health problem. It can be questioned whether adults are the ideal target population for biochemical indicators of vitamin A deficiency. Children, especially those <5 y, are more vulnerable in terms of vitamin A deficiency and could have been a more appropriate target population.

Many developing countries have implemented programs distributing high-dose vitamin A supplements to treat or prevent vitamin A deficiency and its consequences. In these programs, which are usually aimed at young children and lactating women, vitamin A is usually provided in an oil-based capsule (WHO 1997). In Lesotho, vitamin A capsules are distributed through health centres to children <5 y and mothers directly after birth. The EMICS showed that 17.1% of children aged 6-59 mo received a high dose vitamin A supplement within the 6 months prior to the survey, and an additional 7% received a vitamin A supplement more than 6 months prior to the survey. About 13.3% of the women who had delivered in the 12 months prior to the survey were sure of having received vitamin A supplementation (UNICEF 2000). Although vitamin A supplementation programs have been shown to be effective in the short term, they do not address the two primary factors that lead to vitamin A deficiency, that is, an inadequate dietary vitamin A intake and a high infection rate (Cervinkas & Houston 1996).

Urine samples for iodine analysis were collected in the Phase 1B baseline survey and the Phase 1A & 1B 2000 survey. In the Phase 1B baseline survey the median urinary iodine concentration in 10-14-y-old children (n=187) was 1.3 µg/dL, and in 60.3% of these children the urinary iodine concentration was less than 2 µg/dL, indicating severe iodine deficiency. In

the Phase 1A & 1B 2000 survey none of the urine samples that were collected from adults ≥ 15 y showed any evidence of iodine deficiency. Lesotho imports most of its salt from South Africa, where mandatory iodisation of salt was introduced in 1995. The legislation for universal salt iodisation in South Africa probably caused the improvement in urinary iodine concentration and the decline in the prevalence of goitre (a clinical sign of iodine deficiency) as shown in Table 11. The legislation for the universal iodisation of salt in Lesotho was promulgated in March 2000. A paper that was published recently concluded that urinary iodine measurements indicated that iodine deficiency has been eliminated as a public health problem in Lesotho (Sebotsa *et al.* 2005), probably as a result of iodisation of salt in both South African and Lesotho.

In the Phase 1B baseline survey, 20.8% of households had iodised salt and 58.2% had non-iodised salt in their homes. A national survey that was done in 2000 (UNICEF 2000) showed that approximately 60% of the households in Lesotho had adequately iodised salt, although fewer rural households had adequately iodised salt, compared to urban households (59.3% versus 89.1%).

Dietary intake

Dietary intake was quantified in the Phase 1A and Phase 1B baseline surveys, but not in any of the subsequent surveys. In the Phase 1A baseline survey, dietary intake was quantified for children <5 y who were not currently breastfeeding, children 5-14y, and mothers/caregivers of children <5 y. In the Phase 1B baseline survey quantified dietary intake was restricted to children 3-4 y to reduce fieldworker and respondent burden. Energy and nutrient intake can be calculated from quantified dietary data. Nutrient intake and requirements vary according to age and sex, and it is therefore not possible to compare the absolute nutrient intake observed in the two baseline surveys because of the age difference of the respondents.

Both baseline surveys used a single 24-hr recall to quantify food intake. In the 24-hr recall method, trained interviewers ask the respondents to recall their (or their children's) food intake during the previous day. A detailed description of all foods and beverages consumed, preparation methods and portion sizes are recorded. The amount of food consumed is usually recorded in household measures, which is then converted into grams. A food database is then used to calculate the nutrients supplied by the foods consumed. The two surveys did not use the same data base to calculate nutrient intake. The *Food Intake and Analysis System* (FIAS) (University of Texas and United States Department of Agriculture, 1991) was used in the Phase 1A baseline survey, while the MRC Food Composition Tables (1991) were used in the Phase 1B baseline survey.

The respondent in a variety of ways, can estimate portion sizes of food consumed, taking into account any leftovers. It is important that the interview protocol be standardised and adhered to. There was a methodological difference in the estimation of the portion sizes between the summer and winter surveys in the Phase 1A baseline survey, preventing a comparison of total energy intake between the two surveys.

A single 24-hr recall per person on a large group of individuals can give a valid mean nutrient intake of the group or population, provided that all days of the week are equally represented in the final sample. It is generally accepted that at least 50 respondents per group are needed when reporting nutrient intakes that were determined using a single 24-hr recall (Young *et al.*

1952). Nutrient intakes that were reported for groups with $n < 50$ in the Phase 1A baseline survey should therefore be treated cautiously.

The main outcomes in terms of nutrients of the quantified dietary surveys were as follows:

Phase 1A baseline survey

- Energy intake on the whole appeared adequate; however the coefficient of variation was 60% (2-3 times that expected), indicating either a systematic over-reporting of energy intake or a very large day-to-day variation in energy intake between individuals
- Fat intake averaged approximately 15% of energy, which is at the lower limit and can potentially limit the absorption of fat-soluble vitamins
- Vitamin B₁₂ and calcium intake was $< 60\%$ RDA for 33-75% across the age groups
- Riboflavin, vitamin C and vitamin E intake was $< 60\%$ RDA for 25-40% across the age groups
- Vitamin A was $< 60\%$ RDA for 40-75% across the age groups

Phase 1B baseline survey

- Energy intake was low ($< 67\%$ RDA for 64% of the children)
- Fat intake averaged 20% of energy
- Total protein intake was adequate
- Protein was mainly of plant protein (60% versus 40% animal protein)
- Calcium, iron and zinc intake was $< 67\%$ RDA for $\geq 70\%$ of the children
- Niacin, vitamin B₆ and vitamin C intake was $< 67\%$ for $\geq 90\%$ of the children
- Vitamin B₁₂ and vitamin A intake was $< 67\%$ RDA for 30-40% of the children

Different cut-off levels for defining inadequate intake were used. In the Phase 1A baseline survey, low intake was defined as $< 60\%$ RDA, while in the the Phase 1B baseline survey low intake was defined as $< 67\%$ RDA. In both studies the nutrient intakes were compared with the RDA, which was an acceptable approach at the time. However, the use of the RDA as reference for population groups is no longer encouraged. The current approach is to use the estimated average requirement (EAR) as reference, and to determine the proportion of the population with an intake below the EAR (Gibson 2004).

Dietary data are usually skewed and some of the micronutrients have very wide distributions, with large standard deviations. This indicates that a significant portion of the population has very low intakes even though the mean intakes appear to be adequate. For example, in the Phase 1B baseline survey, the mean intakes for vitamin B₁₂ and vitamin A were adequate, nonetheless 30-40% of the children had intakes $< 67\%$ RDA. It is therefore often misleading to report mean values for dietary data. Using the median is often more appropriate.

Both baseline surveys showed that dietary diversity was limited. Dietary diversity can be defined as the number of different foods or food groups consumed over a given reference

period (Ruel 2003). The modal number of foods reported per child for the 24-hr recall period excluding water was three or fewer in the Phase 1A baseline survey. In the Phase 1B baseline survey a total number of about 30 foods made up the 24-hr recall data, and the five foods contributing the greatest share of dietary energy supplied 80% of total energy intake. Similarly, the five foods contributing the greatest share of dietary energy in the Phase 1A baseline summer survey supplied 75-88% of total energy intake across the various age categories.

The diet of the studied population in Lesotho was mostly maize-based. Stiff maize-meal porridge was the major source of energy in both the Phase 1A and Phase 1B baseline surveys. In the Phase 1B baseline survey, food frequency data showed that stiff maize-meal porridge was eaten more than once per day by 83% of children younger <5 y. In the Phase 1A baseline survey, in women the five foods contributing the greatest share of dietary energy were all cereal-based. Lack of dietary diversity is a particularly severe problem among poor communities from the developing world because their diets are predominantly based on starchy staples and often include little or no animal products and few fruits and vegetables (Ruel 2003). Several studies have shown a positive association between dietary diversity and child nutritional status (Ruel 2003).

A positive association between dietary diversity and nutrient adequacy has been documented (Ruel 2002). Nutrient adequacy of the diet can be defined as the achievement of recommended intakes of energy and essential nutrients (Ruel 2003). In the Phase 1A baseline survey the average number of micronutrients for which intake was <60% RDA decreased with an increase in the number of food items that were reported for the 24-hr recall period.

The majority of adolescents and children reported no consumption of animal products in the Phase 1A baseline survey. Animal source foods can provide a variety of micronutrients that are difficult to obtain in adequate quantities from plant source foods. The bio-availability of micronutrients in animal source foods are generally higher than for plant source foods. Small amounts of animal source foods can thus compensate for many of the vitamin and mineral inadequacies of a plant-based diet (Murphy 2003).

The men's diet in the Phase 1A baseline survey differed from that of the women and children. Meat was the 2nd most important source of energy (20%) in men, and they derived a significantly higher proportion of nutrients, particularly micronutrients, from animal products, when compared to children and women. Factor analysis revealed that consumption of meat was the single most important factor accounting for variance of nutrient intake for women and children, while vegetables and fruit was the single most important factor accounting for variance of nutrient intake for men. Intake of animal foods and intake of vegetables and fruit are thus both important for nutritional adequacy, and their intake is probably subject to different determinants.

The population in both Phase 1A and Phase 1B areas were highly dependent on maize (either as stiff maize meal porridge, soft maize meal porridge, fermented maize meal porridge, boiled whole maize, home-brewed beer), which supplied on average 60-80% of total energy intake. The Phase 1A baseline survey suggested that the nutritional adequacy of the diet was related to the proportion of energy derived from maize. The nutritional adequacy of the diet was lowest if more than 80-90% of the energy was supplied by maize.

Phase 1A & 1B 2000 survey

Quantified dietary data were not collected. The frequency of consumption over the past seven days was recorded for specific food items. The number of times a food item was consumed was calculated, and this was summed for all households to determine the total frequency of consumption for the food item. The total frequency was used to define the frequency of consumption of the food item as very high, high, moderate or low.

Stiff porridge was the most frequently consumed food item, followed by green relish and milk, while bread and soft porridge were moderately consumed. All other food items in the list were in the low consumption category. The type of foods consumed by both the adults and the older child was similar – the only difference was that the adults had a higher frequency.

For the under-fives, 99% consumed soft porridge, 61% consumed cow's milk and about 57% consumed green relish. Very few children consumed fruits and not many consumed vegetables other than green relish. The only source of protein that was commonly consumed by the children was milk. Meat was consumed only by about 10% of the children.

2004 Pilot Survey

Quantified dietary data were not collected. An unquantified 24-hr recall (listing the foods eaten the previous day) and food frequency (indicating whether the intake was plentiful or scarce over the seasons) were used to collect dietary information.

The most commonly eaten foods by adult women were

- stiff maize meal porridge, maize meal porridge, corn, samp, and bread, followed by
- vegetables, milk, beans, peas, lentils and eggs, while
- fruits were the least consumed foods

For children <5 y the most commonly eaten foods were soft porridge, cow's milk and stiff porridge, while fruit and vegetable intake was low.

Consumption of some foods varied with season. For example, corn was consumed more in winter while wild vegetables were consumed more in summer and spring. The time of the year when the survey was done can affect the results. The 2004 pilot study was done during November and December when wild vegetables are widely available.

Breastfeeding

All the LHDA-commissioned surveys showed that breastfeeding was commonly practiced. In the Phase 1A baseline survey, all children <2 y were initially breastfed. Subsequent studies showed that for the majority of newborns, breastfeeding was initiated immediately after birth.

Infants should be exclusively breastfed for the first six months of life. Thereafter they should receive nutritionally adequate and safe complementary foods while breastfeeding continues for up to two years of age or beyond (WHO 2003). Nearly all the children <2 y were breastfeeding at the time when the various surveys were done (Phase 1B baseline survey

91%; Phase 1A & 1B 2000 survey 95%; 2004 Pilot survey 96%). A national survey (UNICEF 2000) showed that 85.7% children were still breastfeeding by the age of 12-15 mo, and that 58.1% of children were still breastfeeding by the age of 20-23 mo.

EMICS showed that 22.2 % children aged 0-3 mo were exclusively breastfed (breast milk only). The Phase 1A & 1B 2000 survey reported higher figures for exclusive breastfeeding, namely, 41% up to 4 months. The 2004 Pilot survey reported even higher figures for exclusive breastfeeding, namely, 65-70% up to six months. It is important to note that the national survey reported breastfeeding status in the 24 hr prior to the interview, which is more accurate than the retrospective data that was collected for children <2 y in the Phase 1A & 1B 2000 survey and the 2004 Pilot survey. When comparing data, it is also essential that "exclusive breastfeeding" is defined in the same way.

The time of weaning (i.e. the introduction of complementary feeds) is an important determinant of nutritional status in young children. The Phase 1B baseline survey showed that the median age for introducing liquid foods/drinks other than the milk feed was 4 mo and the median age for introducing solid foods was 4.5 mo. In the Phase 1A & 1B 2000 study 59% of the children <2 y had complementary feeds introduced before or by the age of 4 mo. All the studies showed that cow's milk, maize meal porridge and formula milk were the most popular complementary foods given. Thin maize meal porridge, fermented or unfermented, was often given as a complementary drink. The use of fresh, unheated and undiluted cow's milk prior to 12 mo of age is associated with fecal blood loss and low iron status (PAHO/WHO 2003) and should therefore not be encouraged.

Household food security

A household is considered food secure if it has sufficient safe and nutritious food throughout the year so that all members can meet their nutritional needs for an active and healthy life (FAO 1996). Based on the fact that household food insecurity relates to food shortages at household level resulting in a low intake of nutritious food, food shortages during the year preceding the survey were recorded in all the studies (Table 15). Between 41-79% of households had experienced food shortages the previous year. More than 20% of households in the Phase 1A baseline survey and 10% in the Phase 1B baseline survey reportedly did not have enough food for all of the previous 12 months. In the Phase 1B baseline study, food reportedly mainly came from two sources, namely, either own produce or bought.

In the Phase 1B baseline survey, more than half of the respondents reported harvesting their own maize (57-63%) and 1/3 of the respondents bought maize. When asked what foodstuffs they would buy if they had more money, 56.9% of the respondents in the Phase 1B 1998/1999 survey indicated that they would buy either maize or wheat meal. Maize production Per Capita was used as a measure for household food security in the Phase 1A and 1B 2000 survey. There was more maize production among the affected households. There was food security at household level using the Per Capita production of maize as indicator. However, 74% of affected households and 69% of control households reported having experienced food shortages the preceding 12 months.

The Phase 1A baseline survey showed that the main factors that lead to shortage of food were low food production and lack of purchasing power of household members. In the Phase 1B

baseline survey the climate/weather was given as the main reason (67%) for the shortage of food. Main coping strategies are listed in Table 15.

The Phase 1A baseline survey showed that the diets of women and children of food insecure households had had less diversity and contained less legumes. Low anthropometric indices for both preschool and school-aged children were more prevalent in food insecure households. There were no significant relationships between compensation for land lost and food insecurity.

Table 15: Prevalence of food insecure households, the most vulnerable months, as well as the most commonly reportedly coping strategies during times of food shortage

Year	Study	Food insecure ^a	Vulnerable months	Main coping strategies
1992	Phase 1A baseline Winter survey Summer survey	61 77	see ^b	-reduce number of meals -diversify income sources -ask family/relatives for help -sell livestock
1995	Phase 1B baseline	41	Nov-Jan	-additional source of income -ask relatives/neighbours for help -sell dagga, beer or home-brew -sell animals -work for payment in kind -borrow money/food
1998/1999	Phase 1A Katse Muela Lejone Control	72.3 68.2 74.3 78.6	Dec-Feb	not reported
1998/1999	Phase 1B Affected Control	63.1 53.8	late spring & summer	-work part time -ask relatives/neighbours for help -sell household assets -informal sector for income -look for donations
2000	Phase 1A & 1B Affected Control	74 69	not reported	- ask relatives for help - work part time - sell household assets
2004	Pilot Katse, affected Katse, control Mohale, affected Mohale, control Semonkong	68.1 72.3 58.9 62.6 79.6	not reported	-exchange food with other families -sell livestock -see land -field labour -share cropping

^a food insecure households are defined as those that reported insufficient food at household level one or more times in the preceding 12 months

^b months were recorded, but not reported

SUMMARY

People living in the Phase 1A and Phase 1B areas were nutritionally vulnerable, highly dependent on one staple (maize) and were food insecure. Dietary diversity and nutritional adequacy of the diet were low. Anthropometric measures showed that children suffered from chronic undernutrition, while a significant proportion of women were overweight/obese. Clinical signs of malnutrition, as observed by the fieldworkers, were either absent or very low in children as well as adults, except for goitre in the baseline surveys. The prevalence of goitre decreased over time, and urine analysis for iodine levels that were done in the Phase 1A & 1B 2000 survey showed that iodine deficiency was no longer a public health problem. Inclusion of biochemical indicators in the surveys was limited, and when measured, they did not consistently show extensive nutrient deficiencies.

Comparisons among surveys were hindered because of different measurement tools, different reference criteria, different target populations and, in some cases, small sample sizes. Standardising the methods of data collection and data reporting in future surveys will enhance monitoring changes over time in the area.

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CHAPTER 6

Literature Review of Health and Epidemiological Studies Undertaken in the Lesotho Highlands

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BACKGROUND

Although a key goal of development projects is to improve the standard of living of families and communities, such projects may also be associated with negative consequences. One concern that is increasingly being raised is the potential for development projects to exacerbate the transmission of HIV. In recent years, developers have recognized that some projects can lead to the unintentional increase in transmission of HIV because of activities related to the project. This is particularly the case when such projects are located within poor and so-called "vulnerable communities" (see Appendix 1 for a discussion on vulnerable communities),

For example, development projects can lead to problems such as increased mobility of people, separation of men from their families, gender-related income inequalities and the opening up of access to previously isolated communities. These factors may promote changes in patterns of human interactions with a possible increase risky sexual behaviour that can lead to increased transmission of HIV. It is in recognition of this risk that the bigger development agencies including GTZ, UNDP and the World Bank are increasingly requiring that HIV/AIDS is factored into any new projects.

It is likely that this resurgent interest has been prompted by the realization that, in the absence of a clear strategy, a development project may actually promote the transmission of HIV and hence undermine key developmental objectives (Box 1).

Box 1: Case Example: Akosombo River Dam, Ghana, West Africa

The Akosombo River Dam was designed to provide hydro-electric power for the Accra-Tema region in Ghana. The project met its primary objective as well as reduced malnutrition and river blindness in the area. However, recent evidence shows that the area surrounding the Dam has been hard hit by the HIV/AIDS epidemic.

The construction of the Dam necessitated the displacement of approximately 80 000 farmers. Many of the male farmers obtained jobs on the construction site. With limited options, many female farmers ended up working as service workers in the hotels and bars built to cater for the construction workers. A number resorted to commercial sex to meet economic needs. When the construction was completed, many women migrated to other countries in West Africa. Surveillance surveys in 1985 showed that in the town of Agomanya, the administrative center of the rural Many Krobo district which abuts the Akosombo dam, HIV infection rates were five to ten times above the level of average HIV prevalence in Ghana.

Source: Topouzis and de Guerny 1999

Within the Lesotho Highlands Development project there were already concerns about the impact of the development on the spread of HIV in the early 1990s. A study on the epidemiology of HIV in the Phase 1A area showed that the prevalence of HIV among the workforce was 5.3% (Consortium for International Development, 1993). These data contrasted with a 0.8% seroprevalence in a similar age group in nearby villages that surrounded the construction project. In a later study by the Medical Research Council conducted in 1995 in the Phase 1B area, it was reported that all 15 cases of HIV (n=238) in the area occurred along the new main road with no cases being detected in more remote villages (MRC, 1996).

Because of these startling statistics, both the above studies made detailed recommendations in regards to measures to be taken to prevent new infections and to mitigate the impact of the HIV/AIDS epidemic. However, it is not clear to what extent these recommendations were implemented.

LHDA Contract 1204 is to conduct a repeat survey to determine the impact of dam construction and relocation of residents on the HIV/AIDS epidemic. Because several baseline studies has already been conducted over the preceding 15 years, it was deemed appropriate that past literature be reviewed and to ensure (where possible) that the design of this planned study will allow comparability with previous studies.

PURPOSE OF THE LITERATURE REVIEW

- a) To review past studies in the project area, Lesotho and other more general sources in terms of the health of the target population as well as key epidemiological aspects to:
 - i) identify topics/areas that should be included in the planned survey of Contract 1204
 - ii) advise on questions that should be included in the questionnaire
 - iii) advise on the methodological approach (e.g. the SOP's of DBS testing)
 - iv) advise on indicative sample sizes needed to provide statistically valid data
 - v) identify trends from the past studies.
 - vi) compile a chapter/section of a chapter based on the review of the literature

Studies in the LHWP

Since the inception of LHDA activities in the Highlands there have been four epidemiological studies conducted in the various project areas of the LHWP.

- LHDA Contract 74: Baseline Epidemiology Survey. Phase 1A 1993. This study was conducted by the Consortium for International Development during 1992/1993.
- LHDA Contract 1010: Baseline Epidemiology and Medical Services Survey. Phase 1B 1996. This study was conducted by the Medical Research Council in 1995.
- LHDA Contract 669: A Socio-economic Monitoring Programme for Phases 1A and 1B Affected Households. A series of surveys was conducted by SW-B&A Consult during the period 1998-2001.
- LHDA Contract 1204: The Socio-economic and Epidemiology Impact Pilot Survey 2005. This small-scale survey was done by LHDA as a precursor to the main study of Contract 1204 and was done in 2004.

Each of the above surveys are described and discussed below. This is followed by a synthesis section that describes trends over time and highlights the strengths and weaknesses of studies conducted to date. Finally, the findings of the various studies are shown in Table 1. It should be noted that the findings of the 2004 Lesotho Demographic and Health Survey was published recently. According to this study, nearly a quarter of adult population in Lesotho was HIV positive.

LHDA Contract 74: Baseline Epidemiology Survey. Phase 1A 1993

This was the first of the surveys and was conducted by the "Consortium for International Development" in 1993. It focused on the Phase 1A area only.

Methods

Study design: A cross sectional study design was used. Two surveys were done, one in winter and one in summer.

Study population: Those living in the Katse and 'Muela catchment areas. This is smaller than the formal Phase 1A area.

Sampling: A three-level, stratified sampling approach was used based on planning areas, villages and households. After stratification, a random method was used to select households which were the unit of selection. Individuals within households were sampled as described for each disease as described below.

Diseases Investigated

Schistosomiasis: Only people over 5 years and who had travelled outside of Lesotho were sampled. Those with occult haematuria had microscopy for the detection of eggs.

Gonorrhoea: Only individuals presenting at a clinic with "symptoms compatible with an STD" were sampled. Diagnosis was based on culture of swabs from genitalia.

Syphilis: Individuals presenting with "symptoms compatible with an STD" were sampled. In addition, villagers over 5 years of age were also sampled. Positive results were defined as specimens that were RPR positive and confirmed by TPHA testing.

Hepatitis B: Three groups: 1) everyone over 5 years in villages, 2) Individuals presenting with "symptoms compatible with an STD", 3) Damn workers who attended the company clinic for any reason. Specimens tested using Abbott, laboratory-based ELISA test. Blood specimens tested using Hepatitis B surface antigen and Hepatitis B core antibody.

HIV: Three groups: 1) everyone over 5 years in villages, 2) Individuals presenting with "symptoms compatible with an STD", 3) Damn workers who attended the company clinic for any reason. Specimens tested using Abbott, laboratory-based ELISA test.

Tuberculosis: Individuals over age 5 years who had symptoms of TB on a questionnaire were asked to provide a sputum specimen. A diagnosis of active TB was made on microscopic examination. No cultures done.

LHDA Contract 1010: Baseline Epidemiology and Medical Services Survey. Phase 1B 1996

This study, was undertaken in the Phase 1B area during 1995 (hence a different area to LHDA Contract 74) by the South African Medical Research Council (MRC).

Methods

Study design: A single, cross sectional study design was used.

Study population: Those living in the Mophale catchment area which is the basin formed by the Senqunyane river and several tributaries. This consisted of about 7 500 individuals living in 83 villages.

Sampling: Villages were split into 3 levels depending on the anticipated level of impact. Within strata, a two stage, stratified sampling approach was used. The unit of randomisation was the household and 395 households were randomly selected for inclusion. Everyone present in the house was targeted for inclusion.

Diseases Investigated

Schistosomiasis: Not tested for on the grounds that the intermediate snail hosts do not exist in Lesotho nor is there evidence that local transmission has ever occurred.

Gonorrhoea: All adults between 15 to 49 years. Diagnosis was based on Ligase Chain Reaction (LCR) tests.

Chlamydia trachomatis: All adults between 15 to 49 years. Diagnosis was based on Ligase Chain Reaction (LCR) tests.

Syphilis: All adults between 15 to 49 years. Blood tested using RPR (Immutrep RPR Kit, ODA061, Omega Diagnostics) and TPHA (Cellognost Syphilis H, Behring Diagnostics)

Hepatitis B: All adults between 15 to 49 years. Blood specimens tested using Hepatitis B surface antigen and Hepatitis B surface antigen antibodies.

HIV: All adults between 15 to 49 years. Diagnosis was based on 2 positive laboratory-based ELISA tests done on serum. First ELISA was AxSYM System, 9A44-20, Abbott Diagnostics and the confirmatory ELISA was Access HIV 1/2, 34000, Sanofi Diagnostics Pasteur)

Tuberculosis: Children between 5 and 15 years. Diagnosis was based on a positive Mantoux test.

Pneumococcus: Children younger than 5 years. Diagnosis made by detecting the presence of pneumococcus from cultures done on nasal swabs obtained by the nurse.

LHDA Contract 669: VO 2 Socio-economic monitoring programme Phase 1A and B1-2000

This was a follow-up study to an earlier monitoring and evaluation survey carried out in 1998/99.

Methods

Study design: A single, cross sectional study design was used.

Study population: Phase 1A and 1B.

Sampling: Volunteers from the sampled households (N=109). An additional 19 individuals were tested in the Semongkong area.

Diseases investigated

HIV: Females and males. Anti-body blood tests. 'Voluntary' samples (N=109).

Thyroid function test: Males and females. (THS and FT3).

Anaemia: Males and females. Anaemia defined as haemoglobin of less than 13.7 g/dl among men (N=15) and less than 11.7 g/dl among women (N=156).

Syphilis: 128 volunteers. VDRI test.

LHDA Pilot survey Phase 1A and B. 2004

Planned as a pilot phase for Contract 1204 and done by LHDA.

Methods

Study design: A single, cross sectional study design was used.

Study population: Phase 1A and 1B.

Sampling: Sample frame for the public health and nutrition component was 145 households across the various project areas (Mohale 31, Katse 37, Lejone 58, and 'Muela 19 households). Villages were split into 3 levels depending on the level of impact. Within strata, a two stage, stratified sampling approach was used. The unit of randomisation was the household and 395 households were randomly selected for inclusion. Everyone present in the house was targeted for inclusion.

Diseases Investigated

HIV: Females and males. Type of blood tests not stated. Samples from males were apparently 'voluntary' with no real sampling strategy. (N=201).

Tyroxin (T4): Males and females. Anaemia defined as haemoglobin of less than 13.7 g/dl among men and less than 11.7 g/dl among women.

Anaemia: Males and females. Anaemia defined as haemoglobin of less than 13.7 g/dl among men (N=15) and less than 11.7 g/dl among women (N=156).

Ferritin: Done on women who had anaemia. (N=15).

Iodine deficiency: Adults and children older than 5 years. Urine iodine test. No iodine deficiencies found. In the survey done by Contract 669 in 1998/1999 the opposite was found.

DISCUSSION ON COMPARABILITY OF STUDY RESULTS

Ideally, repeated cross-sectional, epidemiological studies should be done according to the same protocols so that results are directly comparable. This is the strength of the Demographic and Health Surveys (DHS) because the same methods are used over time and across all countries.

In the case of the LHDA sponsored studies, different research groups undertook the various studies and did not use the same methods. The methods used in each study are compared and contrasted in the next section.

Study Populations

It is important to define clearly what constitutes the study population so that it may be determined how comparable the populations are between studies. Generally, the population is described in terms of the geography of the area. In the case of the Lesotho Highlands, this was usually done by either using "planning areas" or by a list of villages. Studies done on identical populations, or at least with significant overlap of populations, at different time points are directly comparable.

Note that the LHDA commissioned studies did not always cover the same population because of the vast extent of the project. In these cases, i.e. where the populations were not the same between studies, comparisons between populations are essentially "judgment calls" based on identified similarities and differences between populations. However, it must always be borne in mind that there may be differences in populations that are unknown and hence unmeasured.

Interpreting results in the absence of a control population against which to compare the results is difficult. In some studies there are internal control populations (e.g. those villages that are not impacted upon by the project) and in others, external control populations have been surveyed.

Recommendations

In all study ToRs and proposals, the study population must be clearly defined and stated. A list of the villages that are to be included along with appropriate maps of the study area should be sufficient for the purposes of LHDA studies. Repeat studies undertaken to determine changes over time should be done on the same population or at least with a substantial overlap between studies. The data from each study should be able to be disaggregated to village level so that sub-analyses can be undertaken.

Sampling Methods

In all studies, sampling was done using a three stage process. The first was to "stratify" the study population by various criteria. In some cases there were more than one strata used. The second stage was to sample households within the strata and the final stage was to sample individuals within the households.

The purpose of stratifying is to ensure that there is representation from sub-populations in which it is suspected there may be significant differences in either or both "risk" and "outcome" variables.

In LHDA 74 the population was stratified first on the basis of the "planning" areas so that all different areas were included. Then, within planning areas, the villages were stratified so that different but matching villages could be studied in winter and summer. The selection of households within selected villages comprised the sampling unit and households were selected using a random number approach. Within households, all individuals were eligible for inclusion depending on the criteria for each disease as outlined in the methods section above.

In LHDA 1010 the population was stratified on the basis of likely impact of the dam construction. Villages that were going to be flooded or near the new dam (and hence were going to bear the brunt of impacts) were in the minority and so were over-sampled to ensure that a reasonable sample size from these villages was obtained. The final unit of randomisation was the household. Within households, individuals were sampled according to age bands as described in the methods section above.

Where identical sampling procedures are not used, the crude or unweighted results of studies are not directly comparable. This is because in different studies, different sub-groups (e.g. villages near the dam, children, etc) are over or under-sampled and this impacts on crude, aggregated results.

Theoretically, if the results of the studies were weighted to take into account sampling methods, then the results between studies could be compared. However, in none of these studies were the results weighted and only crude results were reported on.

In practical terms any bias due to disproportionate sampling methods probably did not generate substantial bias because communities in the area are fairly homogenous.

Recommendations

1. In the future, levels of stratification and sampling methodology should be decided on and maintained for all further studies.
2. Deviations from strata definitions or sampling methodology should be well motivated and allow for appropriate weighting so that results may be compared between studies.

Seasonal Timing of the Study

The incidence of certain diseases, such as malaria, respiratory infections and diarrhoea, tend to vary substantially between seasons. However, other diseases, including STIs, HIV, Hepatitis B, are much less influenced by the season.

In the case of LHDA the emphasis was on STIs, HIV and Hepatitis B. This was for two reasons. Firstly, because these infections are related to the movement and interaction between people (e.g. the influx of construction workers into the project areas) Secondly, many of the diseases such as bilharzia and malaria that are seasonally dependent, do not occur in Lesotho because of the high altitude of the mountains.

Therefore it was only the LHDA 74 study that was done in both winter and summer with the rest being undertaken at only one period during the year.

Recommendations

It would be ideal if all studies were done at approximately the same time of year but unless seasonally dependent diseases are being looked for, this is not a very important methodological issue in the context of the Lesotho Highlands.

Participation Rates

If a significant proportion of the sampled population are either unavailable or refuse to participate in a study, then this may introduce bias into the results. This is because those that refuse may be systematically different in certain important characteristics from those that do participate. The problem is that it is difficult to measure or know what the differences are because, typically, there is very little information available on those that do not participate.

It is for this reason that it is important to have high participation rates (i.e. low refusal rates) in epidemiological studies. In order to achieve high participation rates a multi-level strategy needs to be implemented. For example, this includes having good community preparation that involves consultations with traditional leaders and community leaders to gain their trust and support. The same trust has to be obtained within households from the head of the household and individuals sampled. Assurances about confidentiality and anonymity assist in obtaining this trust.

Participation rates are also dependent on characteristics of the interviewers. Many issues arise here such as using the same sex interviewer as participant or using nurses in uniform to project a professional image. However, regardless of these criteria, all field workers must be carefully selected and well trained so that they come across as non-threatening to potential participants

A common source of bias in the Lesotho Highlands occurs because a high proportion of male household members are migrant workers and hence uncontactable. This results in women being overrepresented in the sample.

Making several repeat visits to a home assist in improving participation rates but in cases where people either refuse or are persistently not available, even this strategy does not work.

Unfortunately, many studies do not report on participation rates.

Recommendations

1. The study terms of references and proposals must make the reporting of participation rates a stated objective.
2. The exact manner in which participation is defined and documented must be made explicit. If necessary, there should be various levels of how participation is measured (e.g. village refusing vs individuals not being at home after 3 visits, etc).
3. Definitions of who is a household member must be agreed upon and standardised.
4. If there is substitution of villages, households or individuals who refuse or are not available, then this must be carefully documented. It is frequently simpler to have no substitution although this does lower the sample size.

Data Collection Methods

Because of low levels of literacy and the complexity of the questionnaires, all LHDA studies to date have used field workers to administer questionnaires to participants. In some cases the field workers have been nurses but not in all studies. In some cases there have been attempts to match the interviewee with the interviewer by gender but not in all cases.

Recommendations

1. The criteria for selection of field workers including minimum level of education required and their age and gender distribution must be clearly described in the methods section of any study report.
2. There must be SOPs that clearly describe how villages, household heads and individuals should be approached and interviewed.
3. The training provided to field workers should be described.
4. The method of remuneration, specifically whether or not they are paid per completed questionnaire or for time must be reported on.

Data Collection Tools / Questionnaires

There is a lack of a core set of indicators on which data should be obtained during each study. Studies use different questionnaires during each study which makes comparisons over time difficult.

Recommendations

1. LHDA needs to define a core set of indicators in which the indicator is defined along with the numerator and denominator. It should also include on whom the indicator is applicable to and how the data may be verified.
2. An optimal phrasing of the question for each indicator should be provided.

Biological Testing Technologies

Diagnosing specific diseases may be done by using a variety of testing technologies. In addition, interpretation of findings varies depending on the disease and what the test measures. For example, growing bacteria from a genital swab identifies someone with an active infection whereas a positive test for antibodies for the same disease may only indicate that at sometime in the person's life he/she was infected.

Recently there have been dramatic breakthroughs in diagnostic tests with the so-called polymerase chain reaction technology becoming the gold standard for diagnosing several diseases. This technology is highly specific and sensitive and is replacing culture methods. In the case of LHDA, the first baseline study made a diagnosis of gonorrhoea on the basis of specimen cultures. However, by the time of the MRC study, Ligase Chain Reaction (LCR) technology was available and hence used. Each approach has differences in sensitivity and specificity.

Recommendations

1. Ideally, the same or similar technologies should be used in subsequent studies. In cases where superior technologies become available, a switch to the new technology must be

motivated for and the sensitivity and specificity of the new test must be compared to the original one.

2. In all studies, there should be detailed standard operating procedures (SOPs) available that explain how specimens will be collected, transported, stored, tested and reported on. Any deviations from the SOP that occur in practice must be documented and reported on and any potential bias that might arise (e.g. decreased sensitivity because of breaks in a cold chain) must be reported.
3. The exact name of test kits including manufacturers name must be reported on.

Table 1: A comparison of the results of previous epidemiological surveys in the LHWP

Condition surveyed	LHDA 74 1993*	LHDA 1010 1996**	LHDA 669 1999 and 2001***	LHDA Pilot study 2004***
HIV – general population	n=808 prev=0.5%	n=238 prev=6.3%	prev = 21.1%(1999) n=201 prev = 28.9% (2001)	n=109 prev=11.9%
HIV – STD patients	n=250 prev=6%			
HIV – dam employees	N=486 prev=5.3%			
Gonorrhoea – general population		n=245 prev=6.9%		
Gonorrhoea – STD clinic attendees	n=253 prev=20.5%			
Chlamydia trachomatis – general population		n=245 prev=30.0%		
Syphilis – RPR general population	N=791 prev=15%	n=190 prev=11.6%	prev=11.9% (1999)	N=129 prev=3.9%
Syphilis – RPR; STD clinic attendees	N=249 prev=14%			
Syphilis – RPR; dam employees	N=469 prev=7.9%			
HepB – surface Ag general population	N=703 prev=12.9%	n=142 prev=13.4%		
Hep B – Anti-HBs general population		n=216 prev=26.9%		
Hep B – core Ab general population	N=697 prev=37.6%			

* Phase 1A area (Katse) ** Phase 1B area (Mohale) *** Phase 1A and B

APPENDIX 1

VULNERABLE COMMUNITIES

The impact that a development project will have on HIV transmission and response is not just a function of the type of project but also a function of the nature of the community where the project will be situated. A development project that establishes male worker camps in a poor and vulnerable community is likely to have a more severe impact than if the workcamp is established in a relatively wealthy and stable community.

Box 2: The concept of "vulnerability"

In most parts of the developing world an individual becomes infected with HIV as a result of unsafe sexual practices or from MTCT. Because of this simple fact, most prevention interventions focus on trying to modify individual behaviour, e.g. increase condom use, decrease number of partners, limit breastfeeding.

The result of this emphasis on individual behaviour, choice and responsibility has been that the societal context within which people function is often ignored. The reality is that individual behaviour is often not only a matter of free choice by the person. Instead, societal and cultural constraints frequently impact on free choice.

A poor woman in rural Mozambique who has malnourished children to feed may engage in transactional sex with a wealthy villager and is in a weak position to demand that a condom be used. Wealthy women face no such dilemmas.

The concept of "vulnerability" refers to the disempowerment of individuals or communities to fend off infection with HIV or to cope with its effects.

Recent literature on HIV/AIDS suggests that the following determinants contribute to such a risk environment and enhance people's vulnerability to HIV infection (from van Donk, 2004):

- Poverty, more specifically lack of income;
- Lack of food security;
- Unequal income distribution;
- Gender inequality;
- Inadequate or unequal access to basic public services, particularly health care and HIV prevention methodologies;
- Unequal distribution of political power and lack of political voice;
- Migration/mobility, displacement and urbanisation;
- Weak social cohesion;
- Levels of social instability, conflict and violence in society;

Many development projects have the capacity to address and improve certain of these determinants. For example, a project that has a strong poverty alleviation and gender equity

component will probably decrease the vulnerability of the community and thereby reduce HIV transmission levels to lower than in the absence of the project.

However, certain of the above determinants, particularly the promotion of migration and displacement, may be exacerbated by the project and appropriate mitigation plans need to be implemented. In addition, care must be taken to ensure that a project that seeks to alleviate poverty in a community does not exacerbate gender inequality and thereby increase the power differentials between the genders.

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