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## APPENDICES

## APPENDIX A - SAM MULTIPLIER ANALYSES

### A1 Single country multiplier analysis

Table A.1 presents a simplified general SAM framework. The simplified SAM presents the five groups of endogenous accounts represented by the general SAM in Table 4.1 (in Chapter IV), the consolidated account for the 3 groups of exogenous accounts, and the corresponding leakages.

**TABLE A.1: Simplified schematic SAM**

		EXPENDITURES						
		Endogenous Accounts					Sum of Exogenous Accounts	
RECEIPTS		Activities	Commodities	Factors	Enterprises	Households		Total
Endogenous accounts		1	2	3	4	5	6	
Activities	1		$T_{12}$				$F_1$	$Y_1$
Comm.	2	$T_{21}$				$T_{25}$	$F_2$	$Y_2$
Factors	3	$T_{31}$					$F_3$	$Y_3$
Enterprises	4			$T_{43}$			$F_4$	$Y_4$
Households	5			$T_{53}$	$T_{34}$		$F_5$	$Y_5$
Sum of Exogenous accounts	6	$L_1$	$L_2$	$L_3$	$L_4$	$L_5$	$R$	
Total		$Y_1$	$Y_2$	$Y_3$	$Y_4$	$Y_5$		

Source: Adapted from Thorbecke (2000) and Shiferaw and Holden (2000).

In Table A.1 the  $T_{ij}$  represents endogenous accounts. The exogenous injections from government expenditures, investment and exports, respectively are represented by vectors  $F_i$  and the corresponding leakages from taxation, imports and savings are represented by vectors  $L_i$  in the row of consolidated exogenous accounts. Through income and expenditure linkages within the SAM, changes in exogenous accounts

given in the F vectors will determine the level of income of endogenous accounts ( $Y_i$  for  $i$  endogenous accounts). R represents the consolidated payment between exogenous accounts.

For analytical purposes, the endogenous part of the SAM accounts is converted into the corresponding matrix of average expenditure propensities or coefficients. This is obtained by dividing each element in a given column of endogenous accounts by the sum total of that column. Thus

$$A_n = T_{ij} Y_n^{-1}$$

From Table A.1, this will result in the SAM coefficient matrix of endogenous accounts given by:

$$A_n = \begin{bmatrix} 0 & A_{12} & 0 & 0 & 0 \\ A_{21} & 0 & 0 & 0 & A_{25} \\ A_{31} & 0 & 0 & 0 & 0 \\ 0 & 0 & A_{43} & 0 & 0 \\ 0 & 0 & A_{53} & A_{54} & 0 \end{bmatrix} \quad (A1)$$

For endogenous accounts, the total income  $Y_n$  can therefore be computed as

$$Y_n = A_n Y_n + F \quad (A2)$$

which implies that row totals of endogenous accounts can be obtained by multiplying the average expenditure propensities for each row by the corresponding column sum and adding exogenous income F. Equation (A2) can be rewritten as

$$Y_n = (I - A_n)^{-1} F = M_a F \quad (A3)$$

and the corresponding leakages can be derived as

$$L_i = A_i Y_n, \text{ and thus}$$

$$L_i = A_i(I - A_n)^{-1}F = A_iM_aF \quad (A4)$$

provided that  $(I - A_n)^{-1}$  exists, where  $A_i$  is the vector of aggregate average propensities to leak obtained by dividing the elements of  $L_i$  by the column totals  $Y_n$  (Pyatt and Round, 1979; Shiferaw and Holden, 2000).

This inverse  $(I - A_n)^{-1}$  is the accounting multiplier matrix  $M_a$  which relates endogenous incomes  $Y_n$  to injections,  $F$ . Thus, endogenous incomes  $Y_n$  can be derived by pre-multiplying injection  $F$  by a multiplier matrix. Changes in endogenous incomes ( $dY_n$ ) resulting from changes in injections ( $dF$ ) can be expressed as

$$dY_n = (I - A)^{-1}dF = M_a dF \quad (A5)$$

To determine the overall impact of exogenous changes on the leakages in terms of induced demand for imports, increased government revenue and general savings, we use the equation

$$dL = A_iM_a dF \quad (A6)$$

The accounting multiplier matrix  $M_a$  has a limitation. It implies unitary expenditure elasticities, i.e. the average expenditure propensities  $A_n$  are assumed to equal marginal expenditure propensities. While this assumption may be easily rationalised for all other elements of  $A_n$ , e.g. (e.g. labour payments where the economy is working below capacity in all sectors and labour incomes are proportional to employment levels), it is certainly unrealistic for the expenditure pattern of households. A better alternative is the fixed-price SAM-based models (Thorbecke,

2000; Shiferaw et al., 2000; Defourny and Thorbecke, 1984, Pyatt and Round 1979). Fixed-price models are based on the assumption that activity levels may vary while prices are fixed. This assumption is justified in the presence of excess capacity and unused resources in production sectors. The multiplier matrix is derived from marginal expenditure propensities, which we shall call  $C_n$ <sup>25</sup>. The propensities correspond to observed income and expenditure elasticities of different agents under the assumption that prices remain fixed. Based on fixed price multipliers, equation (A3) becomes

$$Y_n = (I - C_n)^{-1}F = M_c F \quad (A7)$$

and changes in incomes ( $dY_n$ ) resulting from changes in injections ( $dF$ ) can be expressed as

$$dY_n = C_n dY_n + dF = (I - C_n)^{-1}dF = M_c dF \quad (A8)$$

The advantage of the fixed-price multiplier matrix is that it allows any non-negative income and expenditure elasticities to be reflected in  $M_c$  (Thorbecke, 2000).

The accounting and fixed-price multiplier models comprise traditional SAM models that emphasize quantity and income effects of injections. They are based on neoclassical assumption of excess capacity and unused resources in production activities, implying that prices are not responsive to activity level. This implies that a classical dichotomy between prices and quantities holds true and prices can be computed independently of activity levels. Nevertheless, SAM-based models can also be used to examine price formation. In this case SAM approach is used to analyze price formation and cost transmission mechanisms in economies with institutional rigidities (Roland-Host and Sancho, 1995; Panethimitakis et al., 2000).

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<sup>25</sup> If unitary income elasticity is assumed, average and marginal expenditure propensities are equal.

Price-based models depart from the neoclassical assumptions of excess capacity and consider cases where there are institutional rigidities, with effects on price formation and cost transmission mechanisms. Price-based models are therefore suitable for cases where prices are implicitly indexed to commodity prices or cost-of-living effects (Roland-Host et al., 1995). Notwithstanding, the two approaches work in a similar manner. In the fixed-price model, prices are independent of activity level changes and are constant. In price-based models, activity levels are independent of price changes and are constant. For illustration let  $p_n$  be price index for endogenous accounts and substitute it for  $y_n$  in equation (A7) above. Then,

$$p_n = (I - A_n)^{-1}v = M_a v \quad (A9)$$

where  $v$  is a row vector of sums of exogenous costs. Therefore, price changes resulting from changes in exogenous costs can be expressed as

$$dp_n = A_n dp_n + dv = (I - A_n)^{-1}dv = M_a dv \quad (A10)$$

Fixed-price and price-based models work the same way except the former assumes excess capacity while the latter assumes institutional rigidities. Since the emphasis of this analysis is on income distributional impacts emanating from quantity/expenditures effects, accounting multipliers are employed and the guiding assumption of excess production capacity is adopted.

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## A2 Multi-country SAM multiplier analysis

The SAM analytical framework developed in Appendix A1 is also applicable here. However, the multiplier decomposition differs a little in this case because of the multi-country case. This Appendix expands the framework developed in Appendix A1 to briefly explain how the multiplier analysis works in the case of three countries.

For analytical purposes the accounts in Table 4.2 are grouped into endogenous and exogenous accounts in the simplified multi-country SAM in Table B.1 below. Endogenous accounts comprise commodities, activities, factors, households and enterprises accounts for both countries. Exogenous accounts consist of government, capital and the ROW accounts for both countries. In Table B.1

- i)  $T_{ii}$  represents endogenous accounts within Lesotho or SA
- ii)  $T_{ij}$  are the endogenous accounts between Lesotho and SA
- iii)  $F_i$  refer to injections from exogenous into endogenous accounts of Lesotho or SA,
- iv)  $L_i$  refer to leakages from endogenous into exogenous accounts of Lesotho or SA,
- v)  $R$  are transactions between exogenous accounts of both Lesotho and SA, and
- vi)  $Y_i$  is total income in Lesotho or SA (where  $i,j = \text{Lesotho or SA}$ ).

From Table B.1 we derive the matrix of average expenditure propensities from the endogenous part of the matrix as follows:

$$A_{ij} = T_{ij} Y_j^{-1} \quad (A11)$$

**TABLE B1: Simplified multi-country SAM schematic**

Payments	Receipts	Endogenous Accounts		Exogenous Accounts	Total
Endogenous Accounts		Lesotho	South Africa		
	Lesotho	$T_{11}$	$T_{12}$	$F_1$	$Y_1$
	South Africa	$T_{21}$	$T_{22}$	$F_2$	$Y_2$
Exogenous Accounts		$L_1$	$L_2$	R	
Total		$Y_1$	$Y_2$		

For endogenous accounts, the total income  $Y_i$  in each country can therefore be computed as

$$Y_1 = A_{11}Y_1 + A_{12}Y_2 + F_1 \quad (\text{A12})$$

$$Y_2 = A_{21}Y_1 + A_{22}Y_2 + F_2 \quad (\text{A13})$$

Following Round (1985) and Reint and Roland-Holst (1998 and 2001), equations (A12) and (A13) may be written as

$$\begin{bmatrix} Y_1 \\ Y_2 \end{bmatrix} = \begin{bmatrix} A_{11} & A_{12} \\ A_{21} & A_{22} \end{bmatrix} \begin{bmatrix} Y_1 \\ Y_2 \end{bmatrix} + \begin{bmatrix} F_1 \\ F_2 \end{bmatrix} \quad (\text{A14})$$

which is solved as

$$\begin{bmatrix} Y_1 \\ Y_2 \end{bmatrix} = \begin{bmatrix} (I - A_{11})^{-1} & 0 \\ 0 & (I - A_{22})^{-1} \end{bmatrix} \left\{ \begin{bmatrix} 0 & A_{12} \\ A_{21} & 0 \end{bmatrix} \begin{bmatrix} Y_1 \\ Y_2 \end{bmatrix} + \begin{bmatrix} F_1 \\ F_2 \end{bmatrix} \right\} \quad (\text{A15})$$

Equation (A15) then becomes

$$\begin{bmatrix} Y_1 \\ Y_2 \end{bmatrix} = \begin{bmatrix} 0 & D_{12} \\ D_{21} & 0 \end{bmatrix} \begin{bmatrix} Y_1 \\ Y_2 \end{bmatrix} + \begin{bmatrix} (I - A_{11})^{-1} & 0 \\ 0 & (I - A_{22})^{-1} \end{bmatrix} \begin{bmatrix} F_1 \\ F_2 \end{bmatrix} \quad (\text{A16})$$

Where  $D_{12} = (I - A_{11})^{-1}A_{12}$  and  $D_{21} = (I - A_{22})^{-1}A_{21}$

Therefore,

$$\begin{bmatrix} Y_1 \\ Y_2 \end{bmatrix} = \begin{bmatrix} I & -D_{12} \\ -D_{21} & I \end{bmatrix}^{-1} \begin{bmatrix} (I - A_{11})^{-1} & 0 \\ 0 & (I - A_{22})^{-1} \end{bmatrix} \begin{bmatrix} F_1 \\ F_2 \end{bmatrix} \quad (\text{A17})$$

or  $Y = M_2 M_1 F$  (A18)

Where  $Y$  and  $F$  are stacked vectors of endogenous account incomes and exogenous expenditures, respectively, and  $M_1$  and  $M_2$  are multiplier matrices.  $M_1$  is the intra-country multiplier matrix. It shows the multiplier effects that result from linkages wholly within each country taken separately.  $M_2$  is the inter-country matrix. It captures all of the repercussions between the accounts of one country and those of the other, but excludes all of the within country effects.

Changes in endogenous incomes ( $dY$ ) (e.g. production activity and factor incomes, and resultant incomes accruing to different socio-economic groups in each country) resulting from changes in injections ( $dF$ ), (e.g. change in water exports from Lesotho to South Africa), can therefore be expressed as

$$dY = M_2 M_1 dF \quad (\text{A19})$$

Analyzing the impact of the LHWP using single country SAM analysis would only depend on  $M_1$ , and would thus underestimate the impact of the scheme as it would ignore the inter-linkages and trade flows between Lesotho and SA. It would also ignore important issues of welfare distribution between different socio-economic

household groups in the two countries.

**APPENDIX B – GLOSSARY OF ESAM NOTATIONS**

<b>Notation</b>	<b>Explanation</b>
<b>1. Ecological production (N) block</b>	
$Y_N$	Gross value of ecological production
$X_{QN}$	Value of streamflow input in ecological production
$R_N$ and, $R_{CN}$ and $R_{EN}$	Total ecological goods and services rent, rent dissipating directly to households and business sector, respectively
$W_N$	The value of labor used in harvesting ecological resources
$C_N$	The value of ecological resources and services directly harvested by households for consumption
$X_{NE}$	The value of ecological resources and services directly used as intermediate inputs in economic production
<b>2. Stream flow (Q) block</b>	
$Y_Q$	Total value of natural water available for direct consumption by households
$R_Q$ and, $R_{QC}$ and $R_{QE}$	Total streamflow rent absorbed from provisioning services of streamflow and streamflow rent dissipating to households and business sector, respectively.
$W_Q$	Value of labor used in collecting streamflow water
$C_Q$	Gross value of streamflow output for direct human consumption
<b>3. Economic(E) block</b>	
$X_{QE}$	Total value of streamflow used in economic production
$X_{QEW}$	Value of streamflow used by water supply activity
$X_{QEE}$	Value of streamflow used by other economic activities
$EW_W$	Payments by water supply activity to economic production factors
$EW_E$	Payments by other economic activities to economic production factors
$C$	Value of economic goods and services consumed by households
$G$	Value of economic goods and services consumed by government
$I$	Value of economic goods and services consumed for investment purposes

## APPENDIX C – MULTI-COUNTRY ESAM MULTIPLIER ANALYSIS

To accommodate changes brought about integration of ecological/streamflow values in the analytical framework developed in Chapter IV, both endogenous and exogenous matrices of the conventional SAM have changed as follows (see Chapter IV and Appendix A for details on derivation of the equations that follow in the case of a conventional SAM):

- (i) Ecologically adjusted matrix of endogenous accounts

$$EA_n = E(T_{ij}Y_n^{-1}) \quad (C1)$$

Where  $EA_n$  = ecologically adjusted marginal expenditure propensities

$ET_{ij}$  = ecologically adjusted endogenous incomes, and

$EY_n^{-1}$  = ecologically adjusted total endogenous incomes

- (ii) While the exogenous accounts matrix was represented by (F) in Appendix A1, the ecologically adjusted matrix of exogenous accounts is now represented by (EF).

Therefore, for the endogenous accounts, the total ecologically adjusted income  $EY_i$  can be computed as

$$EY_n = E(A_n Y_n) + EF \quad (C2)$$

Thus,

$$EY_n = (I - EA_n)^{-1} EF = EM_a F \quad (C3)$$

In the multi-country case, equation (A11)

$$EA_{ij} = E(T_{ij}Y_j^{-1}) \quad (C4)$$

Where  $i,j =$  Lesotho or SA, and the endogenous incomes in each country are calculated as

$$\begin{bmatrix} EY_1 \\ EY_2 \end{bmatrix} = \begin{bmatrix} (I - EA_{11})^{-1} & 0 \\ 0 & (I - EA_{22})^{-1} \end{bmatrix} \left\{ \begin{bmatrix} 0 & EA_{12} \\ EA_{21} & 0 \end{bmatrix} + \begin{bmatrix} EF_1 \\ EF_2 \end{bmatrix} \right\} \quad (C5)$$

Thus,

$$\begin{bmatrix} EY_1 \\ EY_2 \end{bmatrix} = \begin{bmatrix} 0 & ED_{12} \\ ED_{21} & 0 \end{bmatrix} \begin{bmatrix} EY_1 \\ EY_2 \end{bmatrix} + \begin{bmatrix} (I - EA_{11})^{-1} & 0 \\ 0 & (I - EA_{22})^{-1} \end{bmatrix} \begin{bmatrix} EF_1 \\ EF_2 \end{bmatrix} \quad (C6)$$

Where  $ED_{12} = (I - EA_{11})^{-1}EA_{12}$  and  $ED_{21} = (I - EA_{22})^{-1}EA_{21}$

Therefore,

$$\begin{bmatrix} EY_1 \\ EY_2 \end{bmatrix} = \begin{bmatrix} I & -ED_{12} \\ -ED_{21} & I \end{bmatrix}^{-1} \begin{bmatrix} (I - EA_{11})^{-1} & 0 \\ 0 & (I - EA_{22})^{-1} \end{bmatrix} \begin{bmatrix} F_1 \\ F_2 \end{bmatrix} \quad (C7)$$

or  $EY = EM_2M_1F \quad (C8)$

Change in the endogenous income ( $dY$ ) resulting from changes in exogenous injections ( $dF$ ) can therefore be expressed as

$$dEY = EM_2M_1dF \quad (C9)$$

Where (E) in all the equations denotes ecologically adjusted values.

## APPENDIX D – LHWP STREAMFLOW VALUATION ANALYSIS

### D1 Data used in evaluating streamflow services of the Lesotho

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#### Highlands Rivers

The data used to measure impacts of modification of streamflows downstream the LHWP dams came from the instream flow requirements (IFR) studies: biophysical, socio-economic and economic consequences (LHDA 2002a, 2002b and 2002c). These studies were backed by 22 relevant technical/specialist assessments (see LHDA 2002 (b) for details). The three studies, including the hydrological study, were synthesised into one, final report: Summary of main findings for Phase 1 development (LHDA 2002a).

The main objective of the IFR studies was to identify and value the biophysical, social, and economic consequences of modifying the river flows downstream the LHWP dams in Lesotho through the Phase 1 of the project, and provide guidance on suitable mitigation and compensation measures for possible losses to be incurred by downstream riparians.

Therefore, the IFR study was designed to determine possible changes to downstream ecosystems as a result of modified streamflows, and consequences for wellbeing of downstream communities. The study assessed four possible streamflow scenarios:

- (i) Minimum degradation, representing flow releases that would result in the minimum degradation of riverine ecosystems,
- (ii) Treaty, where flow releases are based on the treaty requirements, i.e. 0.5 and 0.3 m<sup>3</sup>s<sup>-1</sup> for Katse and Mohale dams, respectively and a constant release of 0.6 m<sup>3</sup>s<sup>-1</sup> through Matsoku weir,
- (iii) Design limitation, where flow releases would be restricted by capacities of the outlet devices in the LHWP structures, and

- (iv) The fourth scenario which was designed as a mid-point between the design limitation and treaty scenarios, with the the volumes of water allocated for river maintenance between those allocated in the other scenarios (for details on the four scenarios readers are referred to IFR study reports).

This study focuses on the Treaty Scenario, which is the current scenario guiding flow of releases downstream the LHWP structures (i.e. dams and weirs).

## D2 Study area

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The study area was confined to rivers within Lesotho. It included the Malibamatso River downstream of Katse Dam, the Matsoku River downstream of the Matsoku Weir, the Senqunyane River downstream of Mohale Dam, and the mid- and lower-reaches of the Senqu River downstream of the confluence with the Malibamatso River. Study rivers were divided into eight IFR reaches<sup>26</sup> (Figure 2.5) based on hydrological and geomorphological criteria. Reaches extend from the LHWP structure (dam/weir) to a major confluence, or between mafor confluences, or from a major confluence to the national border. Specific sites<sup>27</sup> were selected for data collection within these eight reaches. These sites were delineated according to the needs of the social and biophysical aspects of the study. The following Sites and Reaches were included in the study:

IFR 1 IFR Reach 1 - comprises the Matsoku River from the site of the Matsoku Weir to the confluence with the Malibamats'o River; length is ~30 km; IFR Site 1 is near the village of Seshote (29°15'21"S, 28°33'51"E);

IFR 2 IFR Reach 2 - is the Malibamats'o River from Katse Bridge to the confluence with the Matsoku River; length is ~17.5 km; IFR Site 2 is a short distance below Katse Bridge (29°21'08"S, 28°31'32"E);

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<sup>26</sup> lengths of river represented by each IFR site. Reaches are defined by the locations of major confluences, geomorphology and degrees of habitat integrity (LHDA 2002 (b)).

<sup>27</sup> IFR sites are defined as ~1 km long sections of rivers that are representative of the river reach on which they are situated. They extend to the 1:100 year flood line on either side of the river (LHDA, 2002 (b)).

- IFR 3 IFR Reach 3 - is the Malibamats'o River between the confluences of the Matsoku and Senqu rivers; length is ~35 km; IFR Site 3 is at Paray (29°29'52"S, 28°39'04"E);
- IFR 4 IFR Reach 4 - is the Senqu River between the confluences of the Malibamats'o and Tsoelike rivers; length is ~115 km; IFR Site 4 is at Sehonghong (29°44'20"S, 28°45'19"E);
- IFR 5 IFR Reach 5 - is the Senqu River between the confluences of the Tsoelike and Senqunyane rivers; length is ~90 km; IFR Site 5 is at Whitehills (30°03'56"S, 28°24'28"E);
- IFR 6 IFR Reach 6 - is the Senqu River from the confluence with the Senqunyane River to the Lesotho/South Africa border; length is ~150 km; IFR Site 6 is at Seaka Bridge (30°21'48"S, 28°11'30"E);
- IFR 7 IFR Reach 7 - is the Senqunyane River from the site of the Mohale Dam to the confluence with the Lesobeng River; length is ~90 km; IFR Site 7 is at Marakabei (29°32'09"S, 28°09'15"E);
- IFR 8 IFR Reach 8 - is the Senqunyane River between the confluences of the Lesobeng River and the Senqu rivers; length is ~40 km; IFR Site 8 is upstream of the Senqunyane-Senqu confluence (30°02'11"S, 28°13'21"E) (LHDA, 2002b)

The socio-economic data was collected in eight villages in these reaches from 1, 680 households distributed over 32 clusters, 4 in each one of the eight IFR river reaches (See Figure 2.5 for the location of these Sites and Reaches).

### ***D3 The identified Streamflow services and necessary data for value impacts***

Sociological study identified populations at risk (PAR) and benefits they derive from concerned rivers. These benefits were grouped into three broad classifications:

- (i) General social benefits, including cultural and subsistence use of affected rivers
- (ii) Public health
- (iii) Animal (livestock) health

Livestock were specifically included as they are a key feature of the economy and culture of rural communities in Lesotho (LHDA 2002c). General social benefits comprise of ecological resources supported by streamflow ecosystem. These resources are crucial for maintenance of livelihoods of PAR. They also include cultural and religious uses/services of instream flows. Table 6.2 in Chapter VI gives a list of these resources and services (LHDA 2002c).

***D4 Procedures followed in valuing ecological resources and services' value impacts***

To value impacts of streamflows on the availability of resources and services supplied thereof, it is imperative to first have information on the biophysical changes in resources and services concerned. The biophysical study of the IFR reports estimated how modification of the flows of rivers downstream the LHWP structures would impact the streamflow resources and services identified in Table 6.2 at optimum, found to be the 16<sup>th</sup> year of the project's operation beginning 1996 (LHDA, 2002b). Biophysical data was combined with information collected from sociological surveys and animal and human health experts to measure the direction and magnitude of changes in the availability of ecological resources and changes in both public and animal health. Social data was also used in calculating monetary values of these changes. Mitigation costs for diseases were used to calculate public and animal health impacts. Table 6.4 in Chapter VI shows how availability of the resources identified will change as a result of modification of streamflows of rivers downstream the LHWP structures. The Table also shows values of these changes. The next sections provide detailed explanation on how values and value impacts of ecological resources and services of relevance to the PAR were derived.

#### D4.1 Value impacts of ecological resources

To assist in the measurement of value impacts of ecological resources, the following information was collected with respect to resources importance through detailed socio-economic surveys:

- Critical nature of usage, signifying the importance of the resource for the livelihoods of the affected populations
- Number of households harvesting the resource within the particular IFR reach
- Annual amounts harvested per household and local prices where available
- Frequency of use, signifying how often the resource is harvested or utilized within the annual cycle
- Availability of alternative resources , signifying that other alternative resources can be found in other accessible areas

First, the baseline values of the resources were derived (i.e. resources 1-18 in Table 6.2, Chapter VI). To do this, quantities of ecological resources harvested were multiplied by their local prices as given by the PAR. These were resource prices prevailing in the informal markets and the derived values are reported in column 4 of Table 6.3. Given the baseline values of the ecological resources, the next step was to derive the value impacts of the LHWP with respect to the availability of the identified ecological resources and services. To achieve this, the following steps were followed:

1. Historical hydrological data for each site and reach were analysed and estimations made on how the project will affect the flow in all the identified sites. Table D1 below gives the historical mean annual requirements (MAR) of the rivers in the selected sites and how the MAR will be affected by the LHWP.

**Table D1: Hydrological summary of Sites downstream the LHWP structures  
(millions of cubic meters per annum (MCM a<sup>-1</sup>))**

IFR Site	Historical MAR	Treaty Scenario	
	MCM a <sup>-1</sup>	MCM a <sup>-1</sup>	As % of MAR
1	87	35	40
2	554	22	4
3	774	128	17
4	1572	831	53
5	1924	1194	62
6	3330	2171	65
7	355	48	13
8	592	158	27

Source: LHDA (2002e)

2. Given the above hydrological information, biophysical specialists conducted field studies at each site to determine biophysical components, including geomorphology, water quality, aquatic biota, riparian vegetation and riverine wildlife.
3. The corresponding biophysical consequences of reductions in flow levels at each site were then assessed by specialists relative to the present day condition of the rivers and flows and assigned as a range of expected changes in ecological resources and services, based of field data and on specialist knowledge of the biotic communities and/or species. The ranges were used to circumvent uncertainty inherent in predicting flow requirements and the consequent levels of resource loss.
4. For the impact value calculations, the mid-point of these ranges was used as the ultimate reduction in the ecological resource as a result of the project. This percentage was assumed to translate into the percentage value reduction of the particular resource. Therefore the losses associated with

the LHWP were derived by multiplying the likely percentage reduction in resource availability (column 3 of Table D2) with the currently used value of that resource (column 6 of Table D2).

The biophysical data provided percentage changes in resource supply, but not the current stock of natural resources. As a result, indicated losses could not be translated into actual losses unless it was assumed that a percentage loss in an ecological resource or service translates directly into a similar percentage loss to the households (LHDA, 2002d). Therefore, The IFR economic assessment made a critical assumption that any reduction in availability of a resource will reduce the resource use by the same percentage. This can only be true if the resource in question is currently scarce and therefore controlled through some rationing mechanism. Notwithstanding, the economic assessment demonstrated that such rationing exists for most resources except for sand. Hence sand is not included in impact values. Table D2 below illustrates how impact values were derived using Reach 1 as an example.

Table D2 was compiled for each of the eight Reaches and thus resource value impacts were calculated for each reach. To get total value impact for each resource, value impacts for that particular resource were aggregated across all the eight reaches. Since the value estimations done by the IFR studies were based on 1999 prices, for this study the values were converted to 2000 prices.

**Table D2: Value impact of ecological resources loss due to the LHWP, Treaty scenario, Reach 1 (1999 Prices)**

Riparian Resource	Reduction (%)	Mean Reduction (%)	Annual Quantity used	Unit Price (Maloti )	Annual Direct Use Value (Maloti)	Value Losses (Maloti )
Veg wetbank (bags)*	0-5	3	65,272	2.31	150,778	3769
Veg drybank (bags)*	20-40	30	105,095	2.05	215,449	64633
Shrubs (bundles)	20-60	40	238,632	6.96	1,660,879	664351
Willow trees (number)	25-50	38	4,163	49.50	206,069	77276
Poplar trees (number)	0-40	20	6,539	37.41	244,624	48925
Medicinal plants Dry **	20-40	30			18,826	5648
Medicinal plants Wet**	0-5	3			2,580	65
Yellowfish (kgs)	80-100	90	6,172	10	77,150	69435
Catfish (kgs)	80-100	90	1,806	12.5	18,060	16254
Trout (kgs)	80-100	90	3,432	15	52,480	16332
Forage (tonnes)	0-5	3	1,160***	380	440,678	11,017

Source: LHDA (2002e)

\*Wetbank and drybank refer to different zones where uncultivated vegetables are found.

\*\*Medicinal plants did not have a standard unit of measurement, some were measured in terms of number of roots while some in number of handfuls per year. In the estimation, the plants were separated into dry- and wet-bank and also those harvested as handfuls or as roots. Their values were calculated separately for plants extracted as roots or in handfuls and individual totals aggregated for each reach.

\*\*Quantity in this case refers to annual production of forage

#### D4.2 Valuation of Cultural, spiritual and recreational use of the LHWP Rivers

For Baptism and Leisure use of pools downstream the LHDA dams, baseline information on pool depth , number and water quality was compared with biophysical

changes in these components. Biophysical studies indicated that the project will severely affect the availability and quality of water available for baptism and leisure purposes in most reaches. The transport-cost method was used to value this impact. It was assumed that loss of leisure and baptism services from the LHWP Rivers will force affected communities to revert to alternative sites.

Using information on the number of affected households and alternative sites to recreational and religious services obtained from detailed socio-economic surveys, transportation cost to the alternative sites per household per reach was calculated. The costs for all households in a reach were aggregated to get total transportation cost. Table D3 below shows how baptism and leisure impact values were derived.

**Table D3: Value impact of baptism and leisure services loss due to the LHWP (1999 prices)**

Reach	BAPTISM			LEISURE		
	No. of households using the service	Household transportation cost to alternative site (Maloti)	Total cost (Maloti)	No. of households using the service	Household transportation cost to alternative site (Maloti)	Total cost (Maloti)
1	-	-	-	-	-	-
2	62	11.00	682	770	9.20	7084
3	273	11.00	3003	3,372	9.20	31,022
4	497	11.00	5467	686	11.00	755
5	-	-	-	-	-	-
6	-	-	-	-	-	-
7	242	11.00	2662	686	11.00	7,546
8	50	11.00	550	183	11.00	2,013
Total			12364			55,211

Source: calculated from data in LHDA (2002c)

For Reaches 1, 5 and 6, the biophysical experts found that there will be negligible effects on baptism and leisure services. Hence they were not included in value impact analysis. Total value impact of baptism and leisure services of streamflows are

reported in Table 6.5 in the year 2000 prices. It is notable that the same household transportation costs to alternative sites were assumed. This is clearly not plausible but does not affect the impact results greatly because their value contribute a fairly small percentage to the total impact value of the LHWP (i.e. 0.8%).

#### D4.3 Valuation of Public health

To value public health impact, the following information was taken into consideration:

- Diseases that can potentially be caused by modified river flows to the PAR
- Data on extent of river use by members in the PAR
- Predicted biophysical changes that could influence people's health

Health experts identified the following water-borne and water-washed diseases as health risks for the PAR: diarrhoea, skin and eye, anthrax, malaria, schistosomiasis, nutritional changes. Nutritional changes impact value was not included in this analysis because it is already included in ecological resource losses/value impacts. A baseline severity level was decided upon for each health risk in each social reach taking the above factors into consideration. A future severity level was then decided upon for each health risk, in each social reach and for each scenario based on relevant biophysical changes. Diarrhoeal diseases were found to be the only risk that the PAR were likely to suffer from in all the reaches. Therefore, value impact of changed streamflows on human health was assessed on the cost of programs necessary to mitigate diarrhoeal diseases.

The mitigation strategy proposed by human health experts comprised:

- Immunisation of children against all diseases to increase their resistance to infections
- Construction of ventilated-improved pit latrines (VIPs)

- Provision of safe drinking water; and
- Education that deals with the health risks associated with drinking from the river and unsafe sanitation.

A distinction was made between present and future health risks and the difference between the two, identified as the incremental risk, was used in the computation of mitigation costs. The costs of mitigating diarrhoeal diseases comprised of costs of immunising children, construction of pit latrines and an educational program aimed at reducing direct drinking of river water and adopting safe sanitation methods. The steps followed in estimation of mitigation costs were:

1. Calculation of total costs for each mitigation component
2. Calculation of costs attributable to the project by weighting each component total by the associated incremental risk
3. Aggregation of weighted costs across all mitigation components to derive the total attributable mitigation cost for each reach; and finally
4. Reducing the attributable mitigation cost to an annual basis using appropriate assumptions.

Health specialists found that 67% of children in the affected areas were already immunised, meaning that immunisation had to be increased by 33% to bring it to 100%. This cost was first estimated and then weighted by the incremental risk for each reach. This approach was also followed for the other mitigation components. For illustration, consider Reach 2 and immunisation program for 374 children which cost M760.00 and incremental health risk of 30%. Multiplying the two gives M591.00 (at 1999 prices), which is the immunisation costs attributable to the LHWP. This calculation was repeated for all mitigation programs and a total derived for each reach. The cost of public health associated with the LHWP is reported in Table 6.5 at the year 2000 prices.

#### D4.4 Valuation of Animal health

The biophysical components of the IFR study provided information on the main changes in key species, communities and features in the study rivers as represented by the eight IFR sites. The collected information was used to predict the likely impacts on domestic animal health and productivity. Biophysical components of relevance to animal health and production were:

- Geomorphology
- Water quality
- Vegetation, and,
- Macroinvertebrates

On the basis of changes in these factors, animal health specialists identified pulpy kidney infections, internal parasites, bluetongue, African horse sickness and anthrax as possible health risks for the animals in the affected areas. The cost of programs necessary to mitigate against these diseases was used to estimate the animal health value impact of the LHWP. First, the present-day probability that an animal will contract the disease or face the health risk was identified. Then the level of predicted future risk was identified based on the relevant biophysical changes. Then, the cost of programs necessary for preventing and mitigating against the identified health risks were used to value streamflows in maintaining animal health in all the reaches. The mitigation method used was vaccination against the identified diseases while the preventative method used included vaccines, staff costs, transport and subsistence. The costs were weighted by incremental animal health risk, which is the difference between the present and predicted future risk.

For illustration, consider IFR Reach 2 where vaccine costs for internal parasites cost M11, 552.00, technician M2, 962.00, Veterinary Surgeon M1, 481.00, transport M1, 111.00 and subsistence M3, 456.00, all of which total M20, 562.00. Given the health

incremental risk of 17.5%, the cost attributable to the LHWP is M3, 598 (at 1999 prices). This calculation was repeated for all diseases and a total derived for each reach. Aggregating the reach value impacts derived the total impact. Animal health impact value of the LHWP is reported in Table 6.4 at the year 2000 prices.

## APPENDIX E – MACROSAM CELL DESCRIPTION

### Cell Code<sup>28</sup> Description

C1:R2	Intermediate demand in Lesotho
C1:R3	Remuneration of labor in Lesotho
C1:R4	Remuneration of capital in Lesotho
C1:R7	Activity subsidies in Lesotho
C2:R1	Domestic supply in Lesotho
C2:R7	Indirect taxes on products in Lesotho
C2:R10	Commodity imports by Lesotho from RSA
C2:R20	Commodity imports by Lesotho from the rest of the world
C3:R6	Labor payments distributed to households in Lesotho
C3:R12	Remuneration of RSA labor working in Lesotho
C3:R19	Remuneration of foreign labor other than RSA working in Lesotho
C4:R5	Dividends and interests to enterprises in Lesotho
C4:R7	Property income for Lesotho government
C4:R8	Consumption of capital for Lesotho government
C4:R9	Consumption of capital for Lesotho private sector
C4:R13	Property income payable to RSA
C4:R19	Property income payable to ROW
C5:R6	Enterprise profits distributed to households in Lesotho
C5:R7	Corporate taxes collected by Lesotho government
C5:R9	Enterprise savings in Lesotho
C6:R2	Lesotho households consumption expenditure
C6:R6	Transfers between households in Lesotho
C6:R7	Households transfers and income tax collected Lesotho government
C6:R9	Households savings in Lesotho
C6:R15	Lesotho households transfers to RSA households
C6:R19	Lesotho households transfers to ROW households
C7:R2	Lesotho Government consumption expenditure
C7:R3	Labor remuneration by Lesotho government
C7:R4	Capital remuneration by Lesotho government
C7:R6	Transfers to households by Lesotho government
C7:R7	Total subsidies by Lesotho government
C7:R8	Lesotho government savings
C7:R12	Labor payments by Lesotho government to RSA labor working in Lesotho
C7:R19	Factor payments by Lesotho government to ROW factors working in Lesotho
C8:R2	Lesotho Government investment expenditure
C8:R17	Lesotho government borrowing from RSA
C8:R21	Lesotho government borrowing from ROW

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<sup>28</sup> C and R stand for column and row, respectively.

C9:R2	Lesotho private sector's investment expenditure
C9:R18	Lesotho private sector's borrowing from RSA
C9:R21	Lesotho private sector's borrowing from ROW
C10:R11	Intermediate demand in RSA
C10:R12	Labor remuneration in RSA
C10:13	Capital remuneration in RSA
C10:R16	Indirect taxes on activities collected by RSA government
C11:R1	Commodity imports by RSA from Lesotho
C11:R10	RSA domestic supply
C11:R16	Indirect taxes on products collected by RSA government
C11:20	Commodity imports by RSA from ROW
C12:R3	Remuneration of Lesotho labor by RSA activities
C12:R15	Distribution of labor payments to RSA households
C12:R19	Remuneration of foreign labor other than Lesotho's by RSA activities
C13:R4	Property income in RSA payable to Lesotho
C13:R14	Dividends and interests to enterprises in RSA
C13:R16	Property income for RSA government
C13:R17	Consumption of capital for RSA government
C13:R18	Consumption of capital for other sectors in RSA
C13:R19	Property income in RSA payable to ROW
C14:R15	Enterprise profits distributed to households in RSA
C14:R16	Corporate taxes collected by RSA government
C14:R18	Enterprise savings in RSA
C14:R19	Enterprise profits distributed to ROW households
C15:R6	Transfers from RSA households to Lesotho households
C15:R11	RSA households consumption expenditure
C15:R15	Household transfers in RSA
C15:R16	Transfers and Income tax paid by RSA households to RSA government
C15:R18	Households savings in RSA
C15:R19	Households transfers to ROW households
C16:R7	Transfers from RSA government to Lesotho government
C16:R11	Consumption expenditure by RSA government
C16:R12	Labor remuneration by RSA government
C16:R14	RSA government transfers to RSA enterprises
C16:R15	Government transfers to RSA households
C16:R16	Total subsidies paid by RSA government
C16:R17	RSA government recurrent deficit
C16:R19	RSA transfers and factor payments to ROW
C17:R11	RSA government investment expenditure
C17:R21	RSA government borrowing from the ROW
C18:R11	RSA private investment expenditure
C18:R21	RSA private savings in the ROW
C19:R4	Property income payable to Lesotho from ROW
C19:R6	ROW households transfers to Lesotho households
C19:R7	ROW transfers to Lesotho government

C19:R12	ROW remuneration to RSA labor
C19:13	Property income payable to RSA from ROW
C19:15	ROW households transfers to RSA households
C19:16	ROW transfers to RSA government
C20:R1	ROW Imports from Lesotho
C20:R10	ROW imports from RSA
C21:R17	ROW government savings in RSA
C21:R18	ROW private savings in RSA
C21:R21	Balance on ROW current account

## APPENDIX F - DERIVATION OF THE MULTI-COUNTRY MICROSAM

The 2000 RSA and Lesotho SAMs were used to derive the multi-country MICROSAM. In some cases, the data was either highly aggregated or split in a form not conducive for this analysis. In such cases data adjustments were performed using assumptions and information from other sources. The following paragraphs give details on how some of the data, not readily available from the two countries' SAMs, were derived. Major data derivations were done on inter-country flows. In the case of intra-country flows, major adjustments were carried out on RSA data to derive a split between electricity and water accounts.

### F.1 Adjustments to inter-country flows:

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#### F.1.1 Household transfers

For the purpose of this analysis, Lesotho households in the multi-country SAM were split into four classifications according to geographic and income distribution: Mountain-low income, Mountain-high income, Other-low income and Other-high income households. The rationale for doing this is because the Mountain-low income riparians will be the hardest hit from the loss of ecological resources. In the case of RSA, the split is between the low and high-income households. This was mainly to ensure compatibility between households in both countries. Both Lesotho and RSA 2000 SAMs do not give any disaggregated data pertaining to inter-country household transfers. Only aggregate transfer values are given, e.g., total transfers from households in RSA to households in Lesotho vice versa are given as 13.61 and 1 million Rands, respectively. To disaggregate these values according to the above household classifications, a number of assumptions were made.

In the case of transfers from Lesotho to RSA, it was assumed that low income H/Hs in Lesotho do not transfer any money to H/Hs in RSA and that high income H/Hs in Lesotho transfer money to low income households in RSA (mainly to students). A split of transfers from H/Hs in RSA to H/Hs in Lesotho was done based on the assumptions summarized in Table F.1 below.

**TABLE F.1: Distribution of households transfers from RSA to Lesotho**

		South Africa		
		High income	Low income	Total (million Rands)
<b>Lesotho</b>	Urban high income	100%	-	8.87
	Urban low income	20%	80%	0.09
	Rural high income	80%	20%	3.06
	Rural low income	20%	80%	1.59
<b>Total</b>				13.61

### F1.2 Institutional transfers

Transfers from Lesotho to RSA were assumed to be transfers to educational institutions, i.e., payment by the Lesotho government for Lesotho students studying in RSA. This is a credible assumption since Lesotho government sponsors more than 95 % of Lesotho students studying in South Africa.

### F1.3 Factors

Factor payments by Lesotho to RSA and vice-versa, as well as payments by Lesotho to ROW and vice versa are given in the Lesotho 2000 SAM. Factor payments by South Africa to the ROW were derived from the Lesotho and RSA SAMs by deducting RSA payments to Lesotho in the Lesotho SAM from RSA payments to the ROW value in the RSA 2000 SAM, i.e.

RSA factor payments to ROW in the multi-country SAM

=  
RSA factor payments to ROW in RSA 2000 SAM  
Less  
RSA factor payments to Lesotho in Lesotho 2000 SAM

## **F2 Adjustment to Intra-country flows**

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### **F2.1 Split between water and electricity in the RSA SAM**

In the RSA 2000 SAM, the electricity and water accounts are aggregated. To split the two, 1999 Use and Supply Tables published by Statistics South Africa (Statssa) were used to derive income and expenditure shares in the case of income and expenditure accounts, respectively. These shares were then multiplied with the aggregate value in the SAM to split water and electricity values. The underlying assumption was that there were no substantial differences in use and supply of water and electricity between 1999 and 2000. The split was done for both commodity and activity accounts.

#### **F2.1.1 Electricity and water activity income accounts**

These comprise exports and supply accounts. Exports were derived from the 2000 Lesotho SAM. For supply accounts the derived shares are as follows (derived from Supply Table, Statssa 1999)

**TABLE F2: Supply Shares of electricity and water industries in SA**

<b>Products</b>	<b>Industry Supply shares</b>	
	Electricity	Water
Electricity	100%	-
Water	-	100%
Civil engineering	100%	-
Accommodation and catering	100%	-

**F2.1.2 Electricity and water Activity expenditure accounts**

Electricity and water expenditure accounts comprise (i) intermediate consumption, (ii) factor compensation, and (iii) net taxes. The split in all cases was derived from 1999 Use Table (Statssa). The derived expenditure shares are reported in respective Tables below.

## (i) Intermediate consumption

**TABLE F3: Intermediate expenditure shares for Electricity and Water Industries on different commodities in SA**

Commodities	Industries			Electricity expenditure share (%)	Water expenditure share (%)
	Electricity - 1999 million Rands	Water - 1999 million Rands	Total		
Agricultural products	9.71	-	9.71	1.00	-
Mining and quarrying	3,952.16	136.93	4,089.09	0.97	0.03
Processed food	29.75	-	29.75	1.00	-
Beverages and tobacco	-	-	-	-	-
Textiles and clothing	6.35	-	6.35	1.00	-
Leather and footwear	-	1.87	1.87	-	1.00
Wood, furniture, paper, printing and publishing	58.86	65.47	124.33	0.47	0.53
Chemical products	191.72	275.51	467.23	0.41	0.59
Bricks and other non-metallic mineral products	10.15	5.72	15.87	0.64	0.36
Steel, metal production and machinery	1,334.03	396.28	1,730.31	0.77	0.23
Other manufacturing	2.65	112.56	115.21	0.02	0.98
Electricity	1,374.15	427.29	1,801.44	0.76	0.24
Water	121.37	4,092.64	4,214.01	0.03	0.97
Building construction	661.37	-	661.37	1.00	-
Civil engineering	589.50	-	589.50	1.00	-
Trade	32.67	10.70	43.37	0.75	0.25
Accommodation and catering	54.28	7.71	61.99	0.88	0.12
Transport and communication	227.26	148.99	376.25	0.60	0.40
Real estate, business and financial services	1,031.67	374.44	1,406.11	0.73	0.27
Government, domestic and other community services	11.70	13.84	25.54	0.46	0.54

## (ii) Factor compensation

The Use Table only gives the aggregated value for employee compensation. The derived expenditure shares were applied across the board of employee classifications (skilled, semiskilled and unskilled), e.g., it was assumed that 90% of employee expenses were paid by the Electricity industry across the board (see Table F4 below).

**TABLE F4: Factor Expenditure shares for electricity and water in SA**

Factors	Electricity expenditures - 1999 million Rands	Water expenditures - 1999 million Rands	Total	Electricity expenditure share	Water expenditure share
Labor	18, 841	2, 900	21741	.9	.1
Capital (GOS)	11, 466	2, 200	13666	.84	.16

(iii) Taxes and subsidies

The Use Table reports net taxes only. It was therefore difficult to split the tax and subsidy figure between electricity and water. However, given that the water sector receives a lot of subsidies, it was assumed that all the tax was paid by the Electricity industry while the Water industry received all the subsidies. This is a very crude assumption, but probably the best in the absence of better information.

**F2.1.3 Electricity and water commodity income accounts**
**TABLE F.5: Intermediate income shares for water and electricity from different activities in SA**

Activities	Electricity	Water Use -	Total	% Use -	% Water
	Use - 1999	1999 million			
	million Rands	Rands			
Agricultural products	452.27	225.71	677.98	0.67	0.33
Mining and quarrying	3,733.23	426.56	4,159.79	0.90	0.10
Processed food	452.71	74.07	526.78	0.86	0.14
Beverages and tobacco	172.21	142.91	315.12	0.55	0.45
Textiles and clothing	251.36	57.76	309.12	0.81	0.19
Leather and footwear	27.81	2.12	29.93	0.93	0.07
Wood, furniture, paper, printing and publishing	640.63	91.89	732.52	0.87	0.13
Chemical products	1,383.65	88.56	1,472.21	0.94	0.06
Bricks and other non-metalic mineral products	508.58	35.04	543.62	0.94	0.06
Steel, metal production and machinery	5,052.05	121.64	5,173.69	0.98	0.02
Other manufacturing	98.53	10.08	108.61	0.91	0.09
Electricity	1,374.15	121.37	1,495.52	0.92	0.08
Water	427.29	4,092.64	4,519.93	0.09	0.91
Building construction	81.81	54.53	136.34	0.60	0.40
Civil engineering	105.92	37.06	142.98	0.74	0.26
Trade	1,340.37	280.16	1,620.53	0.83	0.17
Accommodation and catering	551.18	183.69	734.87	0.75	0.25
Transport and communication	1,904.38	416.01	2,320.39	0.82	0.18
Real estate, business and financial services	1,011.04	587.97	1,599.01	0.63	0.37
Government, domestic and other community services	1,202.06	609.70	1,811.76	0.66	0.34

(iv) Final demand consumption: Households and Government

(a) Households

**TABLE F.6 (a): Households water and electricity (aggregated) consumption in SA**

	Households use – 1999	% shares
	million Rands	
Electricity	10, 146	0.83
Water	2, 0491	0.17

It is noteworthy to mention that the Use Table does not disaggregate households (e.g. into low and high income like in the multi-country SAM). Therefore, to disaggregate electricity and water use according to these household classifications, the use proportions (for aggregated water and electricity value) available in the RSA SAM and reported in Table 6a was used. Table F.6 below reports the disaggregated households' water and electricity expenditure shares (also water and electricity income shares from households).

**TABLE F.6 (b): Households water and electricity consumption (disaggregated) in SA**

	Water and electricity* - 2000 million Rands	% shares
High income households	11, 442	.80
Low income households	2, 917	.20

\*Aggregate values from RSA 2000 SAM

Applying these shares to proportions in Table F.6 (a), the following expenditure shares for low and income households were derived and used to split water and electricity value between high and low income households in the multi-country SAM.

**TABLE F.6(c): Households water and electricity consumption shares in SA**

	Electricity income share	Water income share	Total
High income households expenditure shares	.66	.14	.8
Low income households expenditure shares	.17	.03	.2
Total	.83	.17	

The percentage shares in the shaded boxes were then used to split water and electricity use between high and low income households.

(b) Government

**TABLE F.7: Government electricity and water consumption in SA**

	Total Use – 1999 million Rands	% Shares
Electricity	323	.53
Water	292	.47
Total	615	1

#### **F2.1.4 Electricity and water commodity expenditure accounts**

Commodity expenditures are on imports, commodity supply and taxes. Imports expenditures are given in the Lesotho SAM. To split commodity supply, expenditure shares of 75% and 25% derived from Supply table (Statssa, 1999) for electricity and water, respectively were used. To split tax payments, a crude measure was used. Statssa does not publish disaggregated tax and subsidy figures. Only net taxes are published. Percentage shares of both electricity and water in total net taxes were calculated as 81% and 19%, respectively. These shares were applied to the aggregate value of water and electricity in RSA 2000 SAM to derive a split between water and electricity subsidies and taxes in the multi-country SAM. The disaggregated MC-SAM is presented in Appendix Table F8 below.

**TABLE F8: Micro MC-SAM for Lesotho and SA for the year 2000 (Million Maloti)**

		COUNTRY A: LESOTHO																			
		ENDOGENOUS ACCOUNTS																			
		Activities										Factors:		Labour	Capital	Institutions:	Households				
		Agriculture	Mining and quarrying	Manufacturing	Electricity	Water	Construction	Trade and Accommodation	Transport and communication	Real estate, business & services	Government, domestic & other community services	Skilled	Semi-skilled	Unskilled	GOS	Enterprises	Mountains - High income	Mountains - Low income	Other - High income	Other - Low income	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
ENDOGENOUS ACCOUNTS	Agriculture	1	1,193.49	0.00	655.71	0.19	-	10.36	18.06	0.08	0.18	4.74	-	-	-	-	47.70	10.57	628.62	49.62	
	Mining and quarrying	2	0.96	5.88	26.66	-	0.24	34.10	0.15	0.31	0.02	1.81	-	-	-	-	0.06	0.00	-	-	
	Manufacturing	3	188.77	0.54	2,380.15	26.99	2.37	1,077.03	201.91	104.45	20.42	243.42	-	-	-	-	126.47	58.69	2,215.50	248.31	
	Electricity	4	6.23	0.11	27.21	243.55	1.34	9.58	20.45	8.96	1.71	16.41	-	-	-	-	-	-	26.14	0.91	
Country A: Lesotho	Water	5	3.98	0.05	8.38	4.24	120.11	7.33	10.17	3.44	1.63	22.51	-	-	-	-	-	-	44.29	0.54	
	Construction	6	7.07	0.03	17.52	21.93	-	3,065.84	14.33	2.30	3.86	12.89	-	-	-	-	-	-	-	-	
Activities	Trade and accommodation	7	2.62	0.00	2.35	0.45	0.01	0.65	781.34	3.11	1.65	6.02	-	-	-	-	25.63	5.22	530.05	44.01	
	Transport and communication	8	1.63	0.65	49.04	2.83	0.30	26.83	64.03	315.95	6.42	45.42	-	-	-	-	3.02	1.72	74.14	14.45	
	Real estate, business & financial services	9	8.08	0.05	175.23	20.22	1.62	147.24	142.23	26.76	674.68	163.90	-	-	-	-	14.54	21.14	42.47	12.44	
	Government, domestic & other community services	10	-	0.11	139.03	-	-	18.97	3.47	3.33	1.83	707.74	-	-	-	-	3.16	14.82	332.97	136.59	
Factors:	Skilled	11	3.31	1.31	89.83	25.91	24.65	110.15	102.47	37.31	120.34	99.13	-	-	-	-	-	-	-	-	
Labour	Semi-skilled	12	112.20	1.38	132.20	24.72	23.51	216.68	50.08	201.52	216.68	57.04	24.23	-	-	-	-	-	-	-	
	Unskilled	13	452.87	0.97	120.79	3.61	3.44	47.67	18.49	18.29	38.19	17.68	-	-	-	-	-	-	-	-	
Capital	GOS	14	462.87	2.90	314.52	60.05	126.31	262.33	258.43	80.94	299.17	35.45	-	-	-	-	-	-	-	-	
Institutions:	Enterprises	15	-	-	-	-	-	-	-	-	-	-	-	-	1,073.98	-	-	-	-	-	
Households	Mountains - High income	16	-	-	-	-	-	-	-	-	-	2.61	70.78	106.65	-	-	48.75	1.41	-	-	
	Mountains - Low income	17	-	-	-	-	-	-	-	-	-	-	0.29	92.98	-	-	3.52	3.65	6.34	-	
	Other - High income	18	-	-	-	-	-	-	-	-	-	1,285.95	1,253.08	1,328.28	-	-	479.24	-	1.96	-	
	Other - Low income	19	-	-	-	-	-	-	-	-	-	-	3.11	457.27	-	-	2.11	-	28.31	5.70	
Country B: RSA	Agriculture	20	218.93	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Mining and quarrying	21	-	25.60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Manufacturing	22	-	-	3,891.84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Activities	Electricity	23	-	-	-	0.29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Water	24	-	-	-	0.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Construction	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Trade and accommodation	26	-	-	-	-	-	-	0.81	-	-	-	-	-	-	-	-	-	-	-	
	Transport and communication	27	-	-	-	-	-	-	-	77.51	-	-	-	-	-	-	-	-	-	-	
	Real estate, business & financial services	28	-	-	-	-	-	-	-	-	216.91	-	-	-	-	-	-	-	-	-	
	Government, domestic & other community services	29	-	-	-	-	-	-	-	-	85.86	-	-	-	-	-	-	-	-	-	
Factors:	Skilled	30	-	-	-	-	-	-	-	-	-	51.11	-	-	-	-	-	-	-	-	
Labour	Semi-skilled	31	-	-	-	-	-	-	-	-	-	-	52.65	-	-	-	-	-	-	-	
	Unskilled	32	-	-	-	-	-	-	-	-	-	-	-	59.44	-	-	-	-	-	-	
Capital	GOS	33	-	-	-	-	-	-	-	-	-	-	-	-	195.20	-	-	-	-	-	
Institutions:	Enterprises	34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Households	High income	35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Low income	36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.14	-	0.65	-	
EXOGENOUS ACCOUNTS	Government	37	12.96	6.49	1,172.99	0.65	66.31	-	35.14	26.37	63.19	65.90	-	-	-	366.99	184.00	2.87	1.46	274.53	25.14
	Lesotho exogenous accs	38	-	-	-	-	-	-	-	-	-	-	-	-	620.00	362.00	0.30	0.15	156.52	6.03	
	SA exogenous accs	39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Capital	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	ROW	41	11.52	1.95	204.31	0.01	0.00	-	0.04	4.08	11.42	4.52	9.02	9.29	10.49	48.80	-	0.01	-	0.19	
Discrepancy		42	-	-	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total			2,687.51	47.40	9,397.77	436.64	370.29	5,019.60	1,889.19	783.27	1,518.67	1,557.63	1,348.69	1,389.20	2,095.11	2,304.98	1,073.98	230.94	117.43	4,362.69	545.95

Table F8 Continued

	COUNTRY B: RSA	ENDOGENOUS ACCOUNTS																EXOGENOUS ACCOUNTS														
	Activities	ENDOGENOUS ACCOUNTS																Factors:				Lesotho exogenous accounts				RSA exogenous accounts						
		Agriculture	Mining and quarrying	Manufacturing	Electricity	Water	Construction	Trade and accommodation	Transport and communication	Real estate, business & financial services	Government, domestic & other community services	Skilled	Semi-skilled	Unskilled	GOS	Enterprises	High income	Low income	Government expenditure	Capital	Government expenditure	Capital	ROW	Discrepancy	Total							
		20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42								
ENDOGENOUS ACCOUNTS	Agriculture	1	25.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16.44	0.00	-	-	-	-	26.51	2,607.51						
	Mining and quarrying	2	-	0.33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.74	0.00	-	-	1.91	-	30.76	47.40						
	Manufacturing	3	-	-	398.08	-	-	-	-	-	-	-	-	-	-	-	-	-	533.38	316.30	-	-	829.65	-	425.37	9,397.77						
	Electricity	4	-	-	-	0.52	-	-	-	-	-	-	-	-	-	-	-	-	66.00	-	-	-	-	-	7.54	435.63						
	Water	5	-	-	-	-	110.12	-	-	-	-	-	-	-	-	-	-	-	22.15	-	-	-	-	-	11.36	370.29						
	Construction	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	98.43	2,162.61	-	-	-	-	387.21	5,019.60						
	Trade and accommodation	7	-	-	-	-	-	298.40	-	-	-	-	-	-	-	-	-	-	143.20	0.00	-	-	-	-	43.46	1,889.19						
	Transport and communication	8	-	-	-	-	-	-	92.48	-	-	-	-	-	-	-	-	-	112.38	0.00	-	-	0.01	-	48.03	763.27						
	Real estate, business & financial services	9	-	-	-	-	-	-	-	1.45	-	-	-	-	-	-	-	-	131.47	0.09	-	-	-	-	64.93	1,518.67						
	Government, domestic & other community services	10	-	-	-	-	-	-	-	-	17.05	-	-	-	-	-	-	-	159.80	-	-	-	-	-	16.75	1,557.63						
Factors:	Skilled	11	-	-	-	-	-	-	-	-	-	369.03	-	-	-	-	-	-	375.26	-	-	-	-	-	-	1,348.69						
Labour	Semi-skilled	12	-	-	-	-	-	-	-	-	-	-	168.50	-	-	-	-	-	377.14	-	-	-	-	-	-	1,389.20						
	Unskilled	13	-	-	-	-	-	-	-	-	-	-	-	1,218.47	-	-	-	-	114.63	-	-	-	-	-	-	2,055.11						
Capital	GOS	14	-	-	-	-	-	-	-	-	-	-	-	-	203.20	-	-	-	147.00	-	-	-	50.80	-	-	2,304.98						
Institutions:	Enterprises	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,073.98						
Household	Accountants - High income	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.60	-	-	-	-	-	-	0.15	230.94						
	Accountants - Low income	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.06	0.24	10.27	-	-	-	-	-	0.07	117.43						
	Other - High income	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11.33	-	-	-	-	-	-	-	2.83	4,362.69						
	Other - Low income	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.34	1.71	47.73	-	-	-	-	-	0.34	545.94						
	Agriculture	20	41,741.38	30.15	33,000.99	6.85	-	593.62	522.44	2.28	18.80	97.32	-	-	-	-	-	10,363.92	6,018.96	-	-	192.63	22.55	7,813.48	6,381.80	94,302.49						
Country B: RSA	Mining and quarrying	21	163.80	18,581.89	22,450.94	3,313.79	102.49	2,052.67	32.02	132.96	78.73	88.94	-	-	-	-	-	81.63	143.43	-	153.80	37.62	63,642.18	4,387.74	115,668.43							
	Manufacturing	22	11,915.62	11,515.05	456,930.03	938.51	489.22	21,388.84	22,334.55	19,517.64	18,881.41	15,750.88	-	-	-	-	177,401.62	71,165.62	-	21,384.78	68,941.71	134,351.79	-	9,754.87	1,047,034.24							
	Electricity	23	433.50	3,521.12	8,287.50	28,516.70	89.67	1,090.75	2,082.51	1,960.78	1,081.54	367.71	-	-	-	-	9,486.49	2,421.19	-	-	581.06	-	0.29	-	2,219.05	57,711.45						
	Water	24	213.51	381.24	639.93	313.84	12,210.55	96.11	502.46	430.41	636.19	189.43	-	-	-	-	1,845.06	495.91	-	-	119.01	-	0.09	-	560.99	17,621.65						
	Construction	25	180.38	695.37	-	906.62	-	83,636.22	1,770.87	524.52	2,732.80	639.57	-	-	-	-	-	-	-	1,999.51	61,256.51	2,125.83	-	-	7,876.25	148,570.96						
	Trade and accommodation	26	2,715.74	4,474.66	43,976.83	701.70	224.17	3,793.79	179,278.27	13,991.93	9,574.62	11,036.66	-	-	-	-	50,514.88	19,477.20	-	1,615.88	1,980.26	12,990.25	5,455.98	-	361,783.45							
	Transport and communication	27	2,123.89	10,620.30	26,550.06	799.39	494.93	3,312.77	12,046.10	19,912.45	6,543.86	1,281.84	-	-	-	-	39,011.63	17,383.36	-	1,401.69	96.11	8,986.17	5,584.94	-	215,260.88							
	Real estate, business & financial services	28	1,163.40	2,036.57	27,539.08	931.85	344.66	4,599.19	26,186.38	9,355.44	289,704.95	6,845.31	-	-	-	-	92,337.56	15,300.43	-	5,189.68	3,317.23	12,421.14	6,349.02	-	503,837.79							
	Government, domestic & other community services	29	401.59	3,332.36	23,582.35	7.95	9.33	510.86	614.44	1,089.08	1,656.95	70,145.76	-	-	-	-	35,372.61	6,856.29	-	12,567.26	-	-	-	-	6,765.71	667.65	163,895.26					
Factors:	Skilled	30	934.27	3,941.84	21,232.59	1,531.52	170.17	3,046.80	14,744.98	9,404.56	31,523.98	38,096.99	-	-	-	-	-	-	3.95	-	65,011.54	-	-	-	142.66	-	189,838.35					
Labour	Semi-skilled	31	395.27	1,352.28	8,902.17	661.11	73.46	781.30	23,095.38	6,288.49	14,758.25	2,588.36	-	-	-	-	-	-	-	-	31,200.88	-	-	89.20	-	90,238.81						
	Unskilled	32	6,371.44	16,624.78	46,251.90	4,192.92	465.88	9,666.18	13,002.88	20,637.17	5,024.79	2,504.25	-	-	-	-	-	-	-	-	19,212.59	-	-	-	-	135.94	144,150.15					
Capital	GOS	33	19,137.38	23,557.23	73,415.02	13,899.02	2,647.43	8,914.62	54,652.27	44,889.13	107,382.19	8,149.48	-	-	-	-	-	-	-	-	-	-	-	-	-	14,417.80	371,236.97					
Institutions:	Enterprises	34	-	-	-	-	-	-	-	-	-	-	-	-	219,030.98	-	-	-	-	-	-	-	-	-	-	51,337.00	-	270,367.98				
Household	High income	35	-	-	-	-	-	-	-	-	-	-	176,430.92	73,688.83	116,250.21	-	-	-	141,622.86	1,813.82	118.18	-	-	-	3,649.27	-	109.94	0.05	513,684.07			
	Low income	36	-	-	-	-	-	-	-	-	-	-	-	-	12,416.94	16,080.74	27,150.37	-	66,878.13	5,309.75	3,361.27	-	-	-	23,272.73	-	149.27	0.04	154,619.95			
EXOGENOUS ACCOUNTS	Government	37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	62.00	-	-	-	-	45.20	0.01	2,613.00					
Lesotho exogenous accs	Capital	38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	164.00	-	-	-	-	-	-	1,309.00					
RSA exogenous accs	Government	39	1,123.94	466.83	61,430.83	1,048.17	181.80	5,059.03	2,481.01	1,786.17	14,202.74	5,519.71	-	-	-	8,438.00	28,387.00	87,578.22	11,790.78	-	-	-	-	-	7,176.00	-	462.00	-	237,163.00			
	Capital	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	936.00	-	-	-	-	-	1,872.01	-	133,477.00				
	ROW	41	4,682.35	14,536.45	193,386.94	-	-	-	8,137.51	5,795.20	-	1.45	568.19	628.11	300.75	-	488.89	36,228.60	80.00	111.05	-	234.00	-	-	-	6,775.20	-	2,114.00	-	2,816.00	-	264,887.24
Discrepancy		42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	107.29	-	4,187.36				
Total			94,302.49	115,668.43	1,047,034.24	57,711.45	17,621.64	148,570.96	361,783.45	275,260.68	503,837.79	163,895.26	189,838.35	90,238.81	144,150.15	371,236.97	270,367.98	513,684.07	154,619.95	2,613.00	1,309.00	237,163.00	133,477.00	264,887.24	-	4,187.36						

**APPENDIX G – MULTI-COUNTRY ECOLOGICAL SOCIAL ACCOUNTING MATRIX (MC-ESAM)**

		COUNTRY A: LESOTHO																
		ENDOGENOUS ACCOUNTS																
		Activities																
		Factors: Labour Capital Institutions: Households																
		Government, domestic & other community services																
		Agriculture	Mining and quarrying	Manufacturing	Electricity	Water	Construction	Trade and Accommodation	Transport and communication	Real estate, business & services	GOS	Enterprises	Mountains - High income	Mountains - Low income	Other - High income	Other - Low income		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
ENDOGENOUS ACCOUNTS		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
	Agriculture	1	1,193.49	0.00	655.71	0.19	-	10.36	18.06	0.18	4.74	-	-	-	-	47.70		
	Mining and quarrying	2	0.96	5.98	26.66	-	0.24	34.10	0.15	0.31	0.02	1.81	-	-	-	0.06		
	Manufacturing	3	188.77	0.54	2,380.15	26.99	2.37	1,077.03	201.91	104.45	20.42	243.42	-	-	-	126.47		
	Electricity	4	6.23	0.11	27.21	243.55	1.34	9.58	20.45	8.96	1.71	16.41	-	-	-	-		
Country A: Lesotho	Water	5	3.98	0.05	8.38	4.24	120.11	7.33	10.17	3.44	1.63	22.51	-	-	-	44.29		
	Construction	6	7.07	0.03	17.52	21.93	-	3,065.84	14.33	2.30	3.86	12.89	-	-	-	-		
Activities	Trade and accommodation	7	2.62	0.00	2.35	0.45	0.01	0.65	781.34	3.11	1.65	6.02	-	-	-	25.63		
	Transport and communication	8	1.63	0.65	49.04	2.83	0.30	26.83	64.03	315.95	6.42	45.42	-	-	-	3.02		
	Real estate, business & financial services	9	8.08	0.05	175.23	20.22	1.62	147.24	142.23	26.76	674.68	163.90	-	-	-	14.54		
	Government, domestic & other community services	10	-	0.11	139.03	-	-	18.97	3.47	3.33	1.83	707.74	-	-	-	3.16		
Factors:	Skilled	11	3.31	1.31	89.83	25.91	24.65	110.15	102.47	37.31	120.34	99.13	-	-	-	-		
Labour	Semi-skilled	12	112.20	1.38	132.20	24.72	23.51	201.52	216.68	50.08	57.04	24.23	-	-	-	-		
	Unskilled	13	452.87	0.97	120.79	3.61	3.44	47.67	18.49	18.29	17.68	-	-	-	-	-		
Capital	eoS	14	462.87	2.90	314.52	60.05	126.31	262.33	259.43	80.94	299.17	36.45	-	-	-	-		
Institutions:	Enterprises	15	-	-	-	-	-	-	-	-	-	-	-	-	1,073.98	-		
Households	Mountains - High income	16	-	-	-	-	-	-	-	-	-	2.61	70.78	106.65	-	48.75		
	Mountains - Low income	17	-	-	-	-	-	-	-	-	-	0.29	92.98	-	3.52	3.65		
	Other - High income	18	-	-	-	-	-	-	-	-	-	1,285.95	1,253.08	1,328.28	-	479.24		
	Other - Low income	19	-	-	-	-	-	-	-	-	-	-	3.11	457.27	-	2.11		
Country B: RSA	Agriculture	20	218.93	-	-	-	-	-	-	-	-	-	-	-	-	-		
	Mining and quarrying	21	-	25.80	-	-	-	-	-	-	-	-	-	-	-	-		
	Manufacturing	22	-	-	3,881.84	-	-	-	-	-	-	-	-	-	-	-		
Activities	Electricity	23	-	-	-	0.29	-	-	-	-	-	-	-	-	-	-		
	Water	24	-	-	-	-	0.08	-	-	-	-	-	-	-	-	-		
	Construction	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	Trade and accommodation	26	-	-	-	-	-	-	0.81	-	-	-	-	-	-	-		
	Transport and communication	27	-	-	-	-	-	-	-	77.51	-	-	-	-	-	-		
	Real estate, business & financial services	28	-	-	-	-	-	-	-	-	216.91	-	-	-	-	-		
	Government, domestic & other community services	29	-	-	-	-	-	-	-	-	-	65.86	-	-	-	-		
Factors:	Skilled	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Labour	Semi-skilled	31	-	-	-	-	-	-	-	-	-	51.11	-	-	-	-		
	Unskilled	32	-	-	-	-	-	-	-	-	-	-	52.65	-	-	-		
Capital	eoS	33	-	-	-	-	-	-	-	-	-	-	-	59.44	-	-		
Institutions:	Enterprises	34	-	-	-	-	-	-	-	-	-	-	-	-	195.20	-		
Households	High income	35	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	Low income	36	-	-	-	-	-	-	-	-	-	-	-	-	-	0.14		
EXOGENOUS ACCOUNTS	Government	37	12.96	6.49	1,172.99	0.65	66.31	-	35.14	26.37	63.19	66.90	-	-	366.99	184.00		
	Capital	38	-	-	-	-	-	-	-	-	-	-	-	-	620.00	362.00		
	Lesotho ex. Accs.	39	-	-	-	-	-	-	-	-	-	-	-	-	-	9.24		
	Natural water	40	-	-	-	-	-	-	-	-	-	-	-	-	-	0.05		
	RSA ex. Accs.	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	Government	42	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	Capital	43	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	POW	44	11.52	1.35	204.31	0.01	0.00	-	0.04	4.08	11.42	4.52	9.02	9.29	10.49	48.80		
Discrepancy		45	-	-	-	0.01	-	-	-	-	-	-	-	-	-	0.01		
Total			2,687.51	47.40	9,397.77	435.64	370.29	5,019.60	1,889.19	763.27	1,516.67	1,557.63	1,348.69	1,389.20	2,055.11	2,304.98		



**APPENDIX H – MULTIPLIER MATRIX FOR THE MC-ESAM**

		LESOTHO																			
		Production																			
		Factors																			
		Institutions																			
		Government, domestic & other community services																			
		Skilled																			
		Semi-skilled																			
		Unskilled																			
		GCS																			
		Entrepreneurs																			
		Households - High income																			
		Households - Low income																			
		Other - High income																			
		Other - Low income																			
LESOTHO		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
Production		Agriculture	Mining and quarrying	Manufacturing	Electricity	Water	Construction	Trade and Accommodation	Transport and communication	Real estate, business & services	Government, domestic & other community services	Skilled	Semi-skilled	Unskilled	GCS	Entrepreneurs	Households - High income	Households - Low income	Other - High income	Other - Low income	
Agriculture		1	2.033	0.056	0.229	0.250	0.154	0.255	0.201	0.201	0.164	0.214	0.450	0.455	0.432	0.110	0.237	0.501	0.200	0.471	0.300
Mining and quarrying		2	0.003	1.142	0.005	0.005	0.002	0.024	0.003	0.004	0.002	0.006	0.004	0.004	0.004	0.001	0.002	0.004	0.003	0.004	0.005
Manufacturing		3	0.656	0.143	1.498	0.753	0.347	1.008	0.766	0.687	0.391	0.766	0.993	0.994	0.994	0.239	0.512	1.070	0.794	1.039	1.032
Electricity		4	0.029	0.012	0.016	2.291	0.025	0.032	0.067	0.063	0.019	0.065	0.039	0.030	0.037	0.009	0.019	0.025	0.020	0.041	0.030
Water		5	0.017	0.008	0.007	0.047	1.489	0.018	0.029	0.023	0.013	0.052	0.028	0.027	0.025	0.006	0.014	0.012	0.012	0.030	0.023
Construction		6	0.027	0.006	0.014	0.309	0.010	2.586	0.056	0.052	0.021	0.060	0.024	0.024	0.025	0.006	0.012	0.022	0.018	0.025	0.031
Trade and accommodation		7	0.120	0.030	0.033	0.124	0.006	0.006	1.828	0.102	0.093	0.090	0.250	0.257	0.238	0.061	0.132	0.250	0.109	0.270	0.206
Transport and communication		8	0.041	0.036	0.025	0.067	0.027	0.059	0.140	1.739	0.040	0.125	0.073	0.072	0.079	0.017	0.037	0.064	0.055	0.075	0.106
Real estate, business & financial services		9	0.100	0.025	0.017	0.291	0.064	0.226	0.339	0.186	1.868	0.430	0.146	0.149	0.177	0.036	0.078	0.225	0.363	0.162	0.230
Government, domestic & other community services		10	0.127	0.032	0.060	0.110	0.070	0.112	0.117	0.100	0.062	1.919	0.211	0.207	0.202	0.048	0.104	0.241	0.221	0.549	0.549
Factors																					
Skilled		11	0.037	0.042	0.030	0.194	0.120	0.104	0.155	0.125	0.166	0.104	1.059	0.057	0.064	0.014	0.020	0.056	0.062	0.060	0.065
Semi-skilled		12	0.120	0.046	0.042	0.198	0.123	0.108	0.264	0.159	0.100	0.095	1.081	0.080	0.092	0.019	0.042	0.086	0.059	0.085	0.083
Unskilled		13	0.359	0.039	0.083	0.006	0.049	0.093	0.090	0.093	0.083	0.095	0.101	0.102	1.099	0.025	0.053	0.124	0.074	0.105	0.096
GCS		14	0.427	0.102	0.119	0.501	0.579	0.430	0.430	0.313	0.436	0.248	0.204	0.205	1.049	0.106	0.233	0.180	0.214	0.214	0.213
Institutions																					
Enterprises		15	0.199	0.048	0.056	0.233	0.270	0.136	0.200	0.146	0.203	0.115	0.095	0.096	0.096	0.489	1.049	0.109	0.084	0.099	0.099
Households - High income		16	0.034	0.007	0.008	0.026	0.021	0.019	0.028	0.020	0.019	0.015	0.016	0.065	0.066	0.025	0.053	1.022	0.011	0.015	0.014
Households - Low income		17	0.018	0.002	0.003	0.005	0.003	0.005	0.005	0.005	0.005	0.005	0.007	0.008	0.053	0.002	0.004	0.021	1.028	0.007	0.005
Other - High income		18	0.465	0.120	0.132	0.524	0.377	0.362	0.533	0.300	0.369	0.369	1.190	1.139	0.887	0.265	0.560	0.269	0.190	1.247	0.262
Other - Low income		19	0.084	0.010	0.015	0.024	0.014	0.024	0.025	0.024	0.022	0.022	0.031	0.033	0.254	0.008	0.016	0.039	0.018	0.032	1.034
SUMMARY																					
Total intra-country production multipliers			3.026	1.456	1.905	4.136	2.204	4.302	3.900	3.035	2.602	1.815									
Own sector intra-country multipliers			2.033	1.142	1.498	2.291	1.489	2.586	1.828	1.739	1.858	1.519									
Linkages with other sectors			1.120	0.316	0.474	1.955	0.785	1.908	1.788	1.296	0.826	1.815									
Induced household income			0.800	0.194	0.215	0.811	0.686	0.547	0.791	0.583	0.641	0.525									
SOUTH AFRICA																					
Production																					
Agriculture		20	0.367	0.084	0.141	0.102	0.054	0.124	0.108	0.105	0.084	0.110	0.150	0.151	0.147	0.041	0.076	0.170	0.108	0.151	0.141
Mining and quarrying		21	0.030	0.764	0.047	0.029	0.014	0.050	0.029	0.032	0.023	0.034	0.036	0.036	0.036	0.010	0.018	0.037	0.028	0.036	0.037
Manufacturing		22	0.916	0.819	1.536	0.801	0.424	1.204	0.908	0.973	0.720	1.029	1.145	1.149	1.144	0.319	0.564	1.109	0.907	1.144	1.173
Electricity		23	0.041	0.094	0.062	0.038	0.017	0.046	0.036	0.047	0.038	0.046	0.044	0.044	0.044	0.014	0.021	0.044	0.026	0.042	0.044
Water		24	0.014	0.026	0.015	0.011	0.037	0.013	0.011	0.015	0.014	0.015	0.014	0.014	0.014	0.004	0.006	0.014	0.011	0.013	0.014
Construction		25	0.011	0.028	0.013	0.010	0.005	0.012	0.010	0.014	0.017	0.015	0.012	0.012	0.012	0.004	0.006	0.012	0.010	0.011	0.012
Trade and accommodation		26	0.226	0.338	0.286	0.192	0.096	0.244	0.203	0.267	0.221	0.267	0.245	0.246	0.245	0.077	0.115	0.243	0.194	0.233	0.249
Transport and communication		27	0.175	0.344	0.207	0.151	0.074	0.187	0.171	0.527	0.169	0.204	0.189	0.190	0.190	0.080	0.089	0.187	0.148	0.180	0.196
Real estate, business & financial services		28	0.317	0.440	0.376	0.340	0.144	0.379	0.364	0.400	0.900	0.400	0.361	0.362	0.369	0.114	0.169	0.377	0.369	0.340	0.367
Government, domestic & other community services		29	0.100	0.151	0.124	0.088	0.046	0.110	0.092	0.107	0.093	0.204	0.120	0.120	0.126	0.036	0.056	0.109	0.101	0.115	0.152
Factors																					
Skilled		30	0.084	0.136	0.108	0.083	0.041	0.099	0.086	0.107	0.117	0.146	0.134	0.097	0.099	0.029	0.046	0.096	0.083	0.093	0.108
Semi-skilled		31	0.044	0.064	0.052	0.043	0.022	0.051	0.040	0.058	0.057	0.054	0.047	0.005	0.047	0.014	0.022	0.040	0.039	0.045	0.049
Unskilled		32	0.110	0.206	0.122	0.079	0.039	0.104	0.083	0.117	0.078	0.099	0.102	0.102	1.130	0.029	0.049	0.105	0.080	0.100	0.104
GCS		33	0.329	0.475	0.335	0.272	0.150	0.312	0.300	0.354	0.379	0.326	0.299	0.301	0.301	0.173	0.144	0.312	0.252	0.292	0.309
Institutions																					
Enterprises		34	0.194	0.280	0.197	0.161	0.093	0.184	0.165	0.209	0.223	0.192	0.177	0.177	0.178	0.102	0.085	0.184	0.149	0.172	0.183
High income		35	0.306	0.494	0.347	0.262	0.136	0.314	0.273	0.352	0.337	0.361	0.339	0.336	0.330	0.116	0.146	0.311	0.253	0.296	0.320
Low income		36	0.087	0.137	0.094	0.072	0.039	0.086	0.075	0.097	0.093	0.091	0.086	0.090	0.089	0.037	0.040	0.086	0.080	0.081	0.086
SUMMARY																					
Total inter-country production multipliers			2.197	3.084	2.796	1.841	0.881	2.368	1.933	2.486	2.279	2.482									
Own sector inter-country multipliers			0.37	0.76	1.54	0.04	1.54	0.01	0.20	0.53	0.90	0.28									
Linkages with other sectors			1.83	2.32	1.25	1.80	0.87	2.36	1.73	1.96	1.38	2.20									
Induced household income			0.09	0.14	0.09	0.07	0.04	0.09	0.08	0.10	0.09	0.09									

## APPENDIX H continued

		SOUTH AFRICA										Factors					Institutions			
		Production																		
		Agriculture	Mining and quarrying	Manufacturing	Electricity	Water	Construction	Trade and accommodation	Transport and communication	Real estate, business & financial services	Government, domestic & other community services	Skilled	Semi-skilled	Unskilled	GDP	Entrepreneur	High income	Low income		
LESOTHO		20	21	22	23	24	25	24	27	28	29	30	31	32	33	34	35	36		
<b>Production</b>																				
	Agriculture	1	0.002	0.002	0.001	0.002	0.004	0.002	0.002	0.001	0.002	0.002	0.002	0.005	0.001	0.001	0.001	0.001		
	Mining and quarrying	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
	Manufacturing	3	0.004	0.004	0.004	0.004	0.011	0.005	0.005	0.003	0.004	0.005	0.005	0.012	0.002	0.003	0.003	0.004		
	Electricity	4	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
	Water	5	0.000	0.000	0.000	0.001	0.031	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000		
	Construction	6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
	Trade and accommodation	7	0.001	0.002	0.001	0.001	0.003	0.002	0.004	0.002	0.001	0.002	0.002	0.002	0.003	0.001	0.001	0.001		
	Transport and communication	8	0.001	0.001	0.000	0.001	0.001	0.001	0.001	0.002	0.000	0.001	0.001	0.001	0.001	0.000	0.000	0.001		
	Real estate, business & financial services	9	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.000	0.000	0.001		
	Government, domestic & other community services	10	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.003	0.000	0.001	0.001		
<b>Factors</b>																				
	Skilled	11	0.001	0.001	0.001	0.001	0.003	0.001	0.001	0.001	0.001	0.003	0.001	0.001	0.000	0.000	0.001	0.001		
	Semi-skilled	12	0.001	0.001	0.000	0.001	0.003	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.001	0.001		
	Unskilled	13	0.003	0.003	0.002	0.003	0.003	0.003	0.002	0.003	0.001	0.002	0.002	0.002	0.011	0.001	0.002	0.002		
	GDP	14	0.002	0.001	0.001	0.002	0.013	0.001	0.002	0.001	0.002	0.002	0.002	0.003	0.001	0.001	0.001	0.001		
<b>Institutions</b>																				
	Entrepreneur	15	0.001	0.001	0.000	0.001	0.006	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.001		
	High income	16	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000		
	Low income	17	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
	Other - High income	18	0.003	0.004	0.002	0.003	0.010	0.004	0.004	0.003	0.003	0.004	0.005	0.005	0.010	0.001	0.002	0.002		
	Other - Low income	19	0.001	0.001	0.000	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000		
	<b>Subtotal</b>																			
	Total inter-country production multipliers		0.010	0.010	0.008	0.010	0.053	0.010	0.014	0.012	0.007	0.010								
	Own sector inter-country multipliers		0.002	0.000	0.004	0.000	0.031	0.000	0.004	0.002	0.001	0.001								
	Linkages with other sectors		0.008	0.011	0.005	0.010	0.010	0.011	0.011	0.011	0.007	0.010								
	Induced households income		0.004	0.005	0.003	0.004	0.012	0.005	0.005	0.005	0.003	0.004								
<b>SOUTH AFRICA</b>																				
<b>Production</b>																				
	Agriculture	20	1.899	1.103	0.165	0.101	0.098	0.140	0.116	0.112	0.101	0.130	0.150	0.155	0.157	0.075	0.126	0.147		
	Mining and quarrying	21	0.041	1.230	0.069	0.169	0.096	0.094	0.039	0.040	0.033	0.044	0.045	0.046	0.021	0.036	0.044	0.053		
	Manufacturing	22	1.162	1.059	2.395	0.965	0.993	1.442	1.139	1.160	1.000	1.338	1.379	1.409	1.419	0.661	1.120	1.366		
	Electricity	23	0.082	0.141	0.078	2.054	0.100	0.097	0.102	0.097	0.094	0.106	0.106	0.106	0.049	0.083	0.106	0.110		
	Water	24	0.036	0.038	0.022	0.060	3.200	0.031	0.036	0.033	0.036	0.037	0.037	0.037	0.037	0.017	0.029	0.037		
	Construction	25	0.026	0.040	0.010	0.093	0.022	2.313	0.047	0.033	0.040	0.043	0.029	0.029	0.013	0.021	0.020	0.020		
	Trade and accommodation	26	0.467	0.489	0.420	0.845	0.460	0.541	2.400	0.611	0.464	0.702	0.592	0.603	0.606	0.262	0.478	0.605		
	Transport and communication	27	0.374	0.504	0.296	0.366	0.462	0.421	0.441	2.341	0.343	0.387	0.440	0.452	0.454	0.213	0.362	0.435		
	Real estate, business & financial services	28	0.578	0.625	0.515	0.696	0.767	0.940	0.781	2.920	0.901	0.942	0.928	0.929	0.929	0.416	0.705	0.965		
	Government, domestic & other community services	29	0.162	0.216	0.176	0.166	0.166	0.187	0.178	0.184	0.171	1.948	0.266	0.262	0.262	0.118	0.200	0.267		
<b>Factors</b>																				
	Skilled	30	0.152	0.196	0.155	0.194	0.172	0.212	0.243	0.226	0.279	0.595	1.194	0.194	0.195	0.089	0.151	0.195		
	Semi-skilled	31	0.077	0.090	0.074	0.094	0.087	0.097	0.206	0.131	0.136	0.125	0.094	1.095	0.095	0.044	0.074	0.101		
	Unskilled	32	0.247	0.309	0.179	0.203	0.215	0.306	0.206	0.283	0.140	0.178	0.156	0.159	1.160	0.074	0.126	0.155		
	GDP	33	0.764	0.688	0.469	0.907	0.922	0.640	0.798	0.794	0.881	0.618	0.544	0.544	0.551	1.253	0.420	0.544		
<b>Institution</b>																				
	Entrepreneur	34	0.451	0.406	0.277	0.535	0.544	0.378	0.465	0.468	0.520	0.365	0.321	0.323	0.325	0.739	1.353	0.321		
	High income	35	0.643	0.720	0.457	0.769	0.692	0.724	0.907	0.794	0.798	0.904	1.406	1.377	1.370	0.568	0.962	0.592		
	Low income	36	0.193	0.199	0.134	0.228	0.214	0.194	0.220	0.220	0.210	0.199	0.224	0.339	0.360	0.221	0.375	0.168		
	<b>Subtotal</b>																			
	Total inter-country production multipliers		4.825	4.444	4.153	5.075	6.324	6.037	5.440	5.400	5.189	5.623								
	Own sector inter-country multipliers		1.899	1.230	2.395	2.054	3.280	2.313	2.408	2.341	2.920	1.948								
	Linkages with other sectors		2.927	3.214	1.758	3.021	3.043	3.724	3.032	3.059	2.269	3.675								
	Induced households income		0.836	0.920	0.630	0.996	0.905	0.918	1.027	1.014	0.968	1.182								