High-Level Conference on:

Water for Agriculture and Energy in Africa: the Challenges of Climate Change

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National Investment Brief

SWAZILAND

EXECUTIVE SUMMARY:

Despite a diversified economy and a successful commercial agriculture sector, subsistence agriculture still occupies some 70% of the population. Inequitable access to resources, long term soil deterioration and poor husbandry skills and practices have lead to low productivity, food insecurity and poverty for the families involved.

Agriculture takes place on two kinds of land holding. Title Deed Land (TDL), which accounts for some 4% of Swaziland's total land holding, is largely occupied by a dynamic commercial sub-sector that uses modern technology to produce sugar and other high value crops such as citrus, potatoes and vegetable etc. Sugar is almost entirely irrigated and accounts for over 90% of the country's total equipped area of around 50,000 ha and 84% of all irrigation abstractions, while in overall terms the TDL has some 97% of the total equipped area. The remainder of that land comprises Swazi National Land (SNL), and is occupied by the subsistence farmers referred to above. Rainfed maize is the dominant crop, although there is also some commercial production of cotton and vegetable on the SNL which is also characterised by large numbers of livestock grazing on communal pastures.

Available records confirm that temperatures are consistently rising and that precipitation is decreasing due to global climate change. Decreasing precipitation is becoming increasingly prevalent during crucial growth stages of the main subsistence crop – maize. This and deteriorating soil moisture properties is a major determinant of the low yields causing food insecurity and poverty.

Annually renewable freshwater resources are estimated to total some 4.5 km^3, of which 42% comprises cross border flow from neighbouring South Africa. There are five river basins, three of which begin upstream in South Africa. However, the flooded area upstream of the Jozini Dam in South Africa, extends into Swaziland, and thereby contributes to the total available freshwater. Total hydropower potential has been estimated to be 560 GWh/yr of which 33% is reportedly developed, but this is insufficient for Swaziland's needs which, despite other generating sources, imports over 60% of its electricity from South Africa.

The national development agenda is driven by a 25 year National Development Strategy which is largely targeted at poverty alleviation by removal of the constraints on smallholder agriculture and increasing employment both within and outside of the agricultural sector in the rural areas.

The only available investment envelope consists of US$51 million for the short term, of which US$21 million is allocated for small scale water control, US$27 million to irrigation scheme rehabilitation and US$3 million to large scale hydraulic projects. For the medium term, the total is US$59 million (US$13 million, US$63 million and US$20 million). And for the long term the total is US$59 million (US$7 million, US$12 million and US$41 million). It is recommended however, that these figures are treated with extreme caution.

1. CONTEXT

1.1 AGRICULTURE AND FOOD SECURITY

Agriculture

Subsistence agriculture provides the principle livelihood of approximately 70% of the population in Swaziland even though the manufacturing sector has diversified since the mid-1980s. Swaziland's total land area falls under two types of land holding. Some 46% comprises Title Deed Land (TDL) and is largely occupied by a dynamic commercial sub-sector which uses modern technology to produce mainly cash crops, principally sugar cane. Furthermore, an estimated 97% of all Swaziland's available irrigation infrastructure is found on the TDL and 84% of all irrigation abstractions are used for sugar cane (Riddell and Manyatsi *ibid*). The remainder of the territory comprises Swazi National Land (SNL) which is based on communal tenure and overwhelmingly characterized by traditional farming comprising semi-subsistence smallholder agriculture with communal grazing. Maize is the dominant crop with cattle herding on communal pastures and some commercial production of cotton and vegetables.

This delineation of land holdings has resulted in an agricultural sector that is highly dualistic, not least because of the grossly inequitable access to irrigation water supplies that characterizes typical large-scale TDL land holdings as compared to the myriad small plots farmed on the SNL. These are almost entirely rainfed and as such are not only subject to the vagaries of climate but also deteriorating soil moisture holding capacities that have arisen from poor husbandry practices over the years since independence. As a result, the SNL, where some 78% (Riddell and Manyatsi *ibid*) of the population lives and subsists, is no longer characterized by self-sufficiency but is instead marked by low productivity, low levels of commercialisation, relatively low incomes and increasing poverty.

Irrigation and water control

Over 80% of the irrigation has until recently, taken place in the low veldt[1], although there is some in all of the country's ecological zones. Based on physical land capability, the total irrigation potential of Swaziland is estimated at around 90,000 ha of which just under 50,000 ha was reportedly during preparation of the Common Agricultural Sector Policy Production. Sugar cane is the main irrigation sector industry in the country and provides direct employment to over 16,000 people (with another 20000 benefiting indirectly) dominates the irrigation sub-sector accounting for over 41,500 ha or 90% of the totally area currently irrigated. Other irrigated crops largely comprise citrus, vegetable, green maize, potatoes, rice and bananas. Irrigation ventures are classified as large (500 ha or larger), medium (between 50 and 500 ha) and small (less than 50 ha). There are apparently 10 large ventures which between them occupy 67% of the all irrigated land, while medium and small schemes account for 20% and 13% respectively. Despite the general orientation of the sector towards estate style commercial farming, recent initiatives such as the Swaziland Komati Project Enterprises have established a new paradigm for smallholder development by introducing commercialised production systems and funding mechanisms on a target area of around 6000 supplied by the Komati River. The main irrigation methods in Swaziland in order of importance are sprinkler, furrow, trickle (both surface and sub-surface) and centre-pivot. Large schemes are dominant on the TDL, while the smaller schemes are more normally encountered on the SNL (Riddell and Manyatsi *ibid*).

At the time of writing, these statistics are in the process of changing due to the implementation of the Lower Usuthu Small-holder Irrigation Project (LUSIP 2008). The Project involves the construction of three dams, on the Mhlatuzane River, Golome River and a Saddle Dam, to form an off-river reservoir to store water diverted from wet season flood flows in the Usuthu River. During the first eight years, the Project will construct the dams and a distribution system from the dams, together with on-farm works, to irrigate a net irrigable area of approximately 6 500ha. After completion of the first phase, currently underway, the Government of Swaziland intends to expand the Project into a second Phase,

[1] Swaziland is divided into four agro-ecological zones defined by a combination of elevation, landforms, geology and elevation. The high, medium and low veldts each occupy just under one-third of the country while the Lubombo Plateau occupies less than one-tenth

during which the water delivery system shall be extended and an area of further approximately 5, 000ha shall be developed.

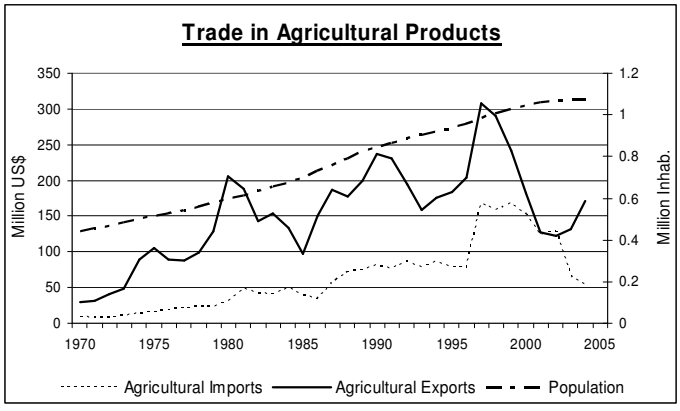
Food security

According to the FAO, Swaziland had a moderate level of undernourishment in 2003, with 3 out of every 25 persons undernourished. This represents a somewhat deteriorating situation. In 1992 for instance the average food supply in kcal/person/day was 2610, whereas by 2001 it had fallen to 2570. Similarly, in percentage terms, the undernourished comprised 10% of the population in 1992 and 12% in 2001. Even so, these figures compare well with the Southern Africa Region and Sub-Saharan Africa as a whole (41% and 33% respectively).

Swaziland has been classified as a middle income country (UNDP 1997), but the distribution of income is highly skewed: the same report found that about 400 000 people (or more than 40% of the population) were living in absolute poverty, with rural areas having a greater share of the poor (84%) than they have of total population (79%). Since the rural population is largely resident on SNL, these estimates of rural poverty also describe SNL poverty. In other words, rural SNL areas are disproportionately poor. Widening gaps in rural-urban development, escalating unemployment, declining family remittances, the rising trend of female-headed households, growing environmental problems leading to food insecurity and the vulnerability to drought of large parts of the country are all aggravating the poverty situation. In early 2007 for instance, a prolonged dry spell left around 400,000 vulnerable people - about 40 percent of the population - in need of approximately 40,000 metric tonnes (mt) of food assistance. The World Food Programme have predicted moreover, that even middle-class Swazis would be hard pressed by inflation in food prices, while the poor would be unable to purchase basic foodstuffs (UN Office for the Coordination of Humanitarian Affairs 2008 – food security).

Food and agriculture trade and import balance

With minor exceptions, Swaziland is a net exporter of agricultural produce (see illustration) with sugar and wood pulp being the most significant foreign exchange earners. The total value of exports in 2004 has been estimated at US$960 million. In 2006 21.7% of the total exports comprised agricultural produce and products, with raw sugar accounting for the 15% of the total exports (World Bank, 2008). Some 60% of the exported commodities go to the Republic of South Africa, to which the local currency is pegged; but the USA is also a market – orange juice for instance. Recent reforms to the global sugar market which resulted in a 17% drop in EU prices for instance; inspired significant efforts towards increased efficiencies within and diversification of the local sugar industry.



1.2 WATER RESOURCES AND HYDROPOWER

Over 95% of surface water withdrawals is used for irrigation in the country where average renewable surface water resources are estimated to total around 4.5 km^3/year, of which some 42% comprises cross border river flows from South Africa. There are five key basins:

- The **Lomati River system,** which is located in the north of the country, originates in South Africa and flows through Swaziland back into South Africa before entering Mozambique.
- The **Komati River system**, ditto
- The **Mbuluzi River system** which originates in Swaziland and flows into Mozambique.
- The **Usuthu River system**, which originates in South Africa along with several major tributaries and flows out of Swaziland to form the southern border between South Africa and Mozambique.

- The **Ngwavuma River system** which lies in the south of country and flows into South Africa before entering Mozambique.

A sixth river, the **Pongola**, also provides water for Swaziland via the Jozini Dam which, although located entirely in South Africa, floods some land on the Swaziland side of the border. Some of the impounded water is available to Swaziland.

The seasonality of rainfall has resulted in a storage based response to the ever increasing demand for water in the country. A total of 10 major dams are involved and are used for irrigation, domestic and industrial purposes. They have a combined storage capacity of 588.15 m^3x10^6: but it is interesting to note that just one of them, the Maguga Dam accounts for over 50% of the total stored volume, however it requires several seasons to fill, hence the total stored by it may not all be available during any one season. The LUSIP dams, which are not included in the 10, will increase the total stored volume by 155-160 Mm^3.

In 1992, the technically feasible hydropower potential was estimated at 560 GWh/year, of which 300 GWh/year would be economically feasible with approximately 33% of the technically feasible potential exploited (International Mini-hydro Atlas). More recently (2004/05), a study of available water for hydropower generation was carried out in Swaziland as part of the national water study commissioned by the United Nations Economic Commission for Africa (UNECA). It involved field assessment of major hydropower stations, hydrological assessment of the major water courses where hydropower generation plants are located, climatic changes over the last 10 years and an assessment of the demand for electricity in the country. The study showed that more than 90% of the electricity which Swaziland Electricity Board (SEB) provides to its customers is produced by hydropower while a small proportion is produced by diesel power. The study also showed that the capacity of SEB to generate hydropower is limited mainly by low water flows. It was found out that due to limited capacity to generate hydropower, SEB imports most of the electricity from ESKOM in South Africa. The causes of low water flows were found to be upstream abstractions and long-term drought conditions. This indicated that hydropower generation is now less favourable in Swaziland than it was in the 1970s, when most of the existing schemes were built or studied. But another cause for reduced availability of water for hydropower generation is deforestation and increasing land use pressure in the catchment leading to high sedimentation levels in reservoirs. It was concluded that, while the future of locally generated hydropower is limited by dwindling water flows, the capacity to generate more power can be increased by constructing additional dams. It was also recommended that deforestation and intensive cultivation of the catchment areas need to be controlled to reduce the sedimentation of hydropower reservoirs and that more dams should be constructed to counteract the effects of droughts on river flows (Mwendera, 2006).

The Maguga Dam, Swaziland's largest public works project and the fourth largest in Southern Africa, in addition to increasing the supply of irrigation water and the creation of tourism opportunities centered around the fresh water lake, has the potential to meet 50% of Swaziland's electricity needs thereby lessening Swaziland's dependency on South Africa (eia.doe.gov 2002).

There are also several mini-hydro stations in operation, with a total capacity of 9.1 MW. These are reportedly less sensitive to prolonged dry spells (International Mini Hydro Atlas).

1.3 CLIMATE CHANGE

Models developed or assessed by the Intergovernmental Panel on Climate Change as cited by FAO (FAO 2008) suggest that Swaziland will become drier and hotter as a result of climate change. This expectation is confirmed by observable trends. And the evidence is both analytical and anecdotal. Analysis of historic rainfall data for instance, shows a clear trend towards decreasing rainfall throughout the principle growing season (FAO 2003). Of particular concern are especially intense shortfalls which are beginning to occur during the establishment and maturation stages of the main rainfed crop – maize. Similarly, although the weather service does not have the statistics to make long-term comparisons, available data suggest that in the last 15 years there has been a 12 percent increase in days with temperatures over 35 degrees Celsius, and up to a 50 percent decline in precipitation during the months of September and October. This is well noted by Government in its first communication to the United Nations Framework Convention on Climate Change (Government of

Swaziland) which clearly identifies and quantifies risks in terms – *inter-alia* – of reduced stream flows "under all scenarios".

In addition, anecdotal evidence is appearing from both the expert and lay communities, and these are largely consistent with the analytical results. "It used to be the rains would fall in August and September, and the farmers would know when to plough; now it is October and November we see the rains fall. There are dry spells in January, just as the crops are maturing" (Chairman of the National Disaster Management Authority cited quoted by the UN Office for the Coordination of Humanitarian Affairs 2008 – food security). Or "Experienced farmers like Matsebula do not need weather service statistics to tell them there are now more hot days than when he was a herd boy on his family farm thirty years ago" (UN Office etc ibid). Although not directly relevant to this section, it is important to note that prospects for mitigating the effects of climate change are being compromised by a long term decline in the soil moisture holding capacities (FAO 2003).

2. NATIONAL STRATEGIES FOR WATER, AGRICULTURE AND ENERGY

2.1 POLICY CONTEXT

The Government has in place, a 25 year *National Development Strategy* (NDS), which essentially comprises a national vision, a vision that has reportedly been adopted by stakeholders. Inter-alia it includes a timely acknowledgement of the need to remove constraints on smallholder agriculture along with the need to re-orient Government's role towards the facilitation and support of small farmer development. As such, the NDS underlines the need to **define and strengthen national policies and strategies geared towards poverty alleviation in the long term**. It recognizes that poverty is more prevalent in the rural areas, and therefore suggests that investment in smallholder agriculture, among other concerted efforts, will be vital for poverty alleviation. Swaziland's then current policy thrust for achieving food security was to maximise real incomes through employment and income generation from both agricultural and non-agricultural sources. This policy perspective, which considers food security an aspect of poverty alleviation, wisely replaced the former policy framework which was based on staple food self-sufficiency targets.

Supporting sub-sector policies included a *Livestock Development Policy* (June 1995) a *National Co-operative Development Policy* (2000). Even so, there remained a need for a *Comprehensive Agricultural Sector Policy* (CASP) for Swaziland that integrates not only the sub-sector polices drafted to date but also those yet to be drafted in order to fill the remaining gaps. Accordingly, in February 2001, the Principal Secretary of the Ministry of Agriculture and Co-operatives of the Swaziland Government requested FAO to assist in the preparation of a Comprehensive Agricultural Sector Policy (CASP) for the country. This is understood to have been promulgated in 2004. Additionally, by way of support to the CASP FAO also provided support to the preparation of a National Irrigation Policy and Strategy, a draft of which was tabled by a team comprising both FAO and government experts in late 2004. At the time of writing however, finalisation still awaits the results of additional local consultancy and consultation studies, the status of which is unknown.

Swaziland does not have a clear policy on water use and management. The overall management of water resources therefore takes place on an ad hoc basis through several uncoordinated pieces of legislation, spread among a number of Ministries as well as other institutions outside the government. However, the Water Act of 2003 has pronounced policy nuances that address important allocative, regulatory and institutional issues, all of which have relevance to the irrigation sector.

In terms of climate change adaptation, Government's declared strategies (Government of Swaziland) are to facilitate an expansion of recent private sector initiatives with regard to the installation of water saving irrigation equipment and to make good any remaining shortfalls by means of additional storage. To this end the possibility of a new dam in the Usutu catchment has been raised. In addition to increasing irrigation water use efficiencies, Government also recognises that cropping calendars may have to change for both rainfed and irrigated crops (see also Riddell and Manyatsi 2003) and that crops themselves may have to be diversified.

As far as mitigation in the water resources/agricultural sectors is concerned, Government intends to increase the forested area, introduce agro-forestry based farming systems (Government of Swaziland).

2.2 INVESTMENT ENVELOPE

The investment envelope for the short, medium and long term is presented in the Table below and expressed in million US $ (based on CAADP investment projections).

Time scale	**Type of investment (million US$)**			
	Small scale water control	Rehabilitation of irrigation	Large scale hydraulic projects	**Total**
Short-term	21	27	3	**51**
Medium-term	13	63	20	**96**
Long-term	7	12	41	**59**
Total	**40**	**102**	**64**	**206**

2.3 PROJECT PORTFOLIO

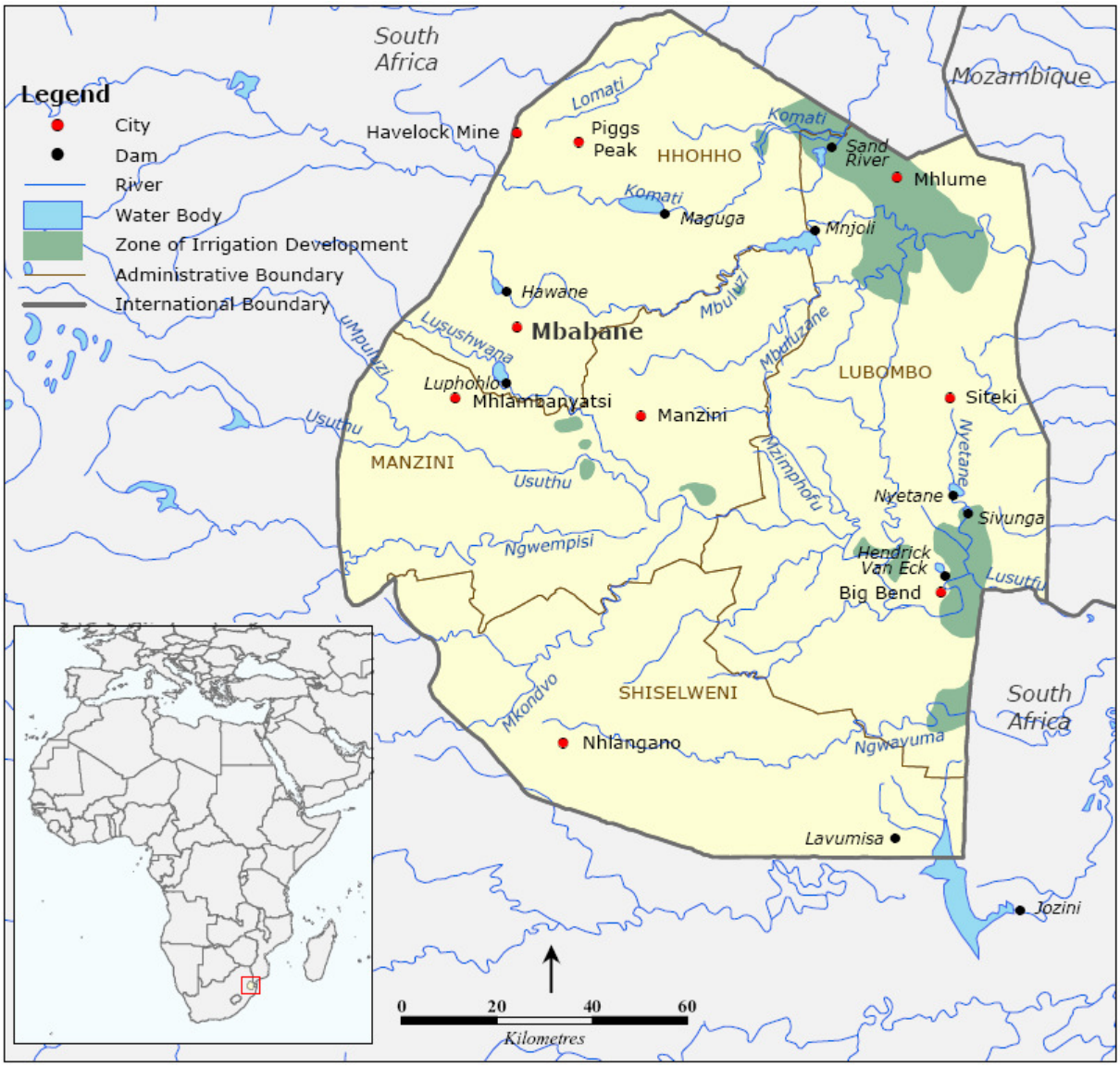
Section 3 presents recently achieved, active and pipeline projects related to the above investment envelope. It should be noted that this table concerns programmes or projects costing in excess of US$1.0 million. As such it does not make mention of several micro-projects financed on a community project grant basis by the European Union; Instead it is limited to the historic Lavumisa and Komati Downstream Development Project and the ongoing Lower Usuthu Smallholder Irrigation Project, each of which features in the National Medium Term Investment Framework (Government of Swaziland 2005).

3. PROJECT PROFILES (ON-GOING AND PROJECTED)

Project title	Funding Partners	Lifeline	Total Budget	Description
I. PROJECTS RECENTLY IMPLEMENTED				
Lavumisa Irrigation Project				This project comprises 300 ha of irrigation using water pumped from Jozini Dam in South Africa by the South African Government by way of compensated farmers from the inundated area on the Swaziland side. A total of 75 farmers benefit under the scheme. Crops grown include vegetables, cabbages, green peppers and green maize.
Komati Downstream Development Project (KDDP)	AfDB, Government of Swaziland	2003-2007	UA 17.12 Million	The project will comprise three main components: (A) Agriculture Development (including provision of irrigation system), (B) Infrastructure Development, and (C) Project Management.
II. ON-GOING PROJECTS				
National Programme for Food Security		2007-2011	US$ 107 million	The programme is divided into six components which address: (1) Crop and Livestock Intensification and Diversification, (2) Support Services and Rural Infrastructure, (3) Community Development and Livelihoods Diversification, (4) Natural Resource Management, (5) Health and Nutrition, and (6) Disaster Management and Safety Nets.
SEB III MAGUGA HYDROPOWER	European Investment Bank	Sterted in 2003	EUR 7,000,000	Construction of a 19 MW hydropower station to be added to an existing large irrigation dam
LOWER USUTHU SMALLHOLDER IRRIGATION	AfDB, BADEA, DBSA, EU, EIB, IFAD, Government of Swaziland and Beneficiaries.	2004-2012	UA 85.39 Million	The project will support the development of the water resources of the Lower Usuthu and the provision of irrigation infrastructure and credit funds to enable smallholder farmers to intensify and diversify their agricultural production building on existing market linkages with the private sector. The main crop will be sugarcane. The project will comprise four main components: (A) Upstream Works (including 3 dams) and Distribution System, (B) Downstream Development, (C) Environmental Mitigation, and (D) Project Co-ordination and Management
Small scale Irrigation Development Programme			US$3.125 million	
III. PIPELINE PROJECTS				
Development of the Ethemba Dam on the Mkhondvo Dam	Not identified yet		n/a	Development of a water storage infrastructure on the Mkhondvo Dam to avail water to smallholder farmers along the Mkhondvo river in Swaziland
Development of the Mbuluzi Dam on the Mbuluzi River	Not identified yet		n/a	Development of a water storage infrastructure on the Mbuluzi river to argument the water supply to the Mbabane City in Swaziland
Development of a strategic fuel Depo at Phuzumoya in Swaziland	Not yet identified		n/a	The development of a strategic fuel depo to increase fuel reserves for the Kingdom of Swaziland. This will increase the assurance of energy supplies to irrigation machinery used in agriculture.
Supply of Potable and irrigation Water Supply to the greater Lavumisa areas	Not yet identified		n/a	The project aims to develop the relevant infrastructure for the supply of potable and irrigation water to the population of Lavumisa
Rural Electrification	Not yet identified		n/a	Project aims to provide electricity to the rural areas of Swaziland.
Multipurpose Earth Dams Construction and Rehabilitation Project	FAO-NEPAD	4 years	US$5.2 million	Components: 1.Technical Assistance (Project Manager); 2. Local engineers for design and supervision of dam construction and rehabilitation; 3. Socio–economist and EIA for dam site selection studies; 4.

				Review of existing dams and catchment management training programme; 5. Preparation of dam site evaluation criteria/methodologies; 6. Identification and selection of dam sites; 7. Design of dams and catchment area protection measures; 8. Identification and design of downstream development possibilities; 9. Implementation of training programme for dam committees on dam management and maintenance; 10. Tender process and construction of dam and catchment protection measures; 11. Project Administration; 12. Capacity building and institutional support.

ANNEX 1: MAP OF WATER CONTROL IN SWAZILAND:



ANNEX 2: COUNTRY STATISTICS

Country and population			
Area of the country	2005	1736	1000 ha
Cultivated area as % of the total area of the country	2005	11.1	%
Total population	2005	1032	1000 inhab
• of which rural	2005	76	%
Population economically active in agriculture	2005	115	1000 inhab
• as % of total economically active population	2005	31	%
• female	2005	46	%
• male	2005	54	%
Economy and Development			
Gross Domestic Product (GDP) (current US$)	2007	2942	million US$/yr
• value added in agriculture (% of GDP)	2006	10.94	%
• GDP per capita	2007	2569	US$/yr
Access to improved drinking water sources			
Total population	2006	60	%
Urban population	2006	87	%
Rural population	2006	51	%
Water Resources and management			
Average precipitation	2007	13.7	10^9 m^3/yr
Total actual renewable water resources	2007	4.51	10^9 m^3/yr
Dependency ratio (transboundary rivers)	2007	41.5	%
Total actual renewable water resources per inhabitant	2007	4370	m^3/yr
Total dam capacity	2002	0.585	10^9 m^3
Total water withdrawal	2000	1.042	10^9 m^3/yr
• as % of total actual renewable water resources	2000	23.10	%
IRRIGATION AND DRAINAGE			
Irrigation potential	2007	93	1000 ha
Water Management			
Area equipped for irrigation: full control - total	2003	49.860	1000 ha
Equipped lowlands	2000	0.0	1000 ha
Total area equipped for irrigation	2003	49.860	1000 ha
• Area equipped for irrigation as % of cultivated area	2000	26	%
• Annual increase rate		-	%
• Power irrigated area as % of area equipped for irrigation		-	%
• Area actually irrigated as % of area equipped for irrigation	2002	90	%
Non-equipped cultivated lowlands and flood recession	2000	0.0	1000 ha
Total agricultural water managed area	2003	49.860	1000 ha
• Agricultural water managed area: as % of cultivated area	2000	26.2	%
• Drained cultivated area as % of total cultivated area		-	%
Typology of irrigation schemes			
Small-scale schemes (< 50 ha)	2003	6,482	1000 ha
Medium-scale schemes (50 - 500 ha)	2003	9,972	1000 ha
Large-scale schemes (> 500 ha)	2003	33.406	1000 ha
Irrigated crops			
Rice	2003	0.050	1000 ha
Maize	2003	0.500	1000 ha
Potatoes	2003	0.075	1000 ha
Sugar cane	2003	41.516	1000 ha
Vegetables	2003	0.778	1000 ha
Bananas	2003	0.050	1000 ha
Citrus	2003	2.513	1000 ha
ENERGY INDICATORS			
Energy Production			Mtoe
Net Imports			Mtoe
TPES			Mtoe
- TPES/Pop			toe/capita
- TPES/GDP			toe/thousand 2000 US$
- TPES/GDO (PPP)			toe/thousand 2000 US$ PPP
Electricity Consumption			TWh
- EC/Pop			kWh/capita

ENERGY SUPPLY AND CONSUMPTION

	Coal	Gas	Crude oil	Petroleum products	Hydro	Other Renewable & Waste	Others	TOTAL
Production								
Imports								
Exports								
International Marine Bunkers								
Stock Changes								
Total Primary Energy Supply (TPES)								

* in thousand tonnes of oil equivalent (ktoe) on a net calorific value basis.

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