



Bioenergy and Food Security Projects
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SWAZILAND

BEFS COUNTRY BRIEF



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1. BEFS

1.1 BIOENERGY AND FOOD SECURITY

Increasing costs of fossil fuels, the threat of climate change and the need to increase energy security and access have put alternative renewable energy sources, including bioenergy, high on the development agenda. Compared with other sources of energy, bioenergy potentially offers some developmental advantages. Bioenergy can target and stimulate the agriculture sector, a critical sector for development and poverty reduction, while improving energy access, creating a new market for producers, offering new employment opportunities, and potentially contributing to environmental objectives. Nevertheless, there are concerns regarding the actual viability of the sector and its environmental and socio-economic sustainability, also in terms of potential competition with food security.

1.2 THE BIOENERGY AND FOOD SECURITY APPROACH

To date, the rush to develop bioenergy as an alternative to fossil fuels has tended to occur in the absence of an understanding of the associated risks and benefits. In order to assist governments in gaining a proper understanding of the issues at stake, FAO has developed the Bioenergy and Food Security (BEFS) Approach.

FAO's **Bioenergy and Food Security (BEFS) Approach** aims to assist policy-makers in assessing the interplay between natural resource availability, bioenergy production potential, rural development and food security, and in strengthening their capacity to manage the trade-offs associated with bioenergy development.



1.3 THE BEFS COUNTRY BRIEF

Part of the first stage of the implementation of the BEFS Approach in a country, is to undertake a review of the agriculture, energy and food security situation at domestic level. This review provides the basis for the identification of potential bioenergy sources, and for a preliminary assessment of potential risks associated with the development of the sector.



The BEFS Approach consists of a **multidisciplinary** and integrated set of **tools and guidance** that can support countries throughout the following key steps of the bioenergy policy development and implementation process:

- **Identification of the key issues** surrounding **bioenergy and food security**, based on the conceptual foundation provided by the BEFS Analytical Framework, and through an **institutionalized dialogue** among relevant national stakeholders;
- **Assessment of the sustainable bioenergy potential**, based on an assessment of **land suitability** and **production costs**, and through an **analysis** of the **environmental** and **socio-economic** dimensions and implications of different bioenergy development pathways, with particular emphasis on food security;
- **Risk prevention and management**, through good environmental and socio-economic practices and related policy instruments;
- **Investment screening and appraisal** through an assessment of the viability and sustainability of proposed bioenergy investments/projects;
- **Impact monitoring, evaluation and response** at both national and project levels; and
- **Capacity building** both at **technical** and **policy** level through training on the above technical tools and guidance.

The BEFS Approach helps countries design and implement sustainable bioenergy policies and strategies, by ensuring that bioenergy development fosters both food and energy security, and that it contributes to both agricultural and rural development in a climate-smart way.

2. COUNTRY OVERVIEW

2.1 QUICK FACTS

SouSwaziland is a landlocked country located in Southeast Africa. The country has a total area of 17,364 square kilometers¹. It has a varying landscape, and a temperate climate with an average annual rainfall of 780 mm². The population in 2010 was 1,186,056 and increasing by an average of 1.5 percent per annum³. Of this, 74.5 percent is classified as rural³.



2.2 ECONOMY

In 2009, Swaziland's GDP grew by 1.2 percent. GDP per capita increased from \$1,291 in 1999 to \$1,563 dollars in 2009 (in constant US dollars)³. In 2010, consumer price inflation was at 4.5 percent³. Trade equaled 123 percent of the nation's GDP, with net inflows of foreign direct investment equating to 3.7 percent of GDP³. Between 1999 and 2009, the contribution of the agricultural sector to the gross domestic product (GDP) decreased from 13 percent to 8 percent, while the share of the industrial sector increased from 45 percent to 50 percent. Services remained stable at 42 percent of the GDP (**Figure 1 & 2**).

FIGURE 1: SWAZILAND GDP BY SECTOR (1999)

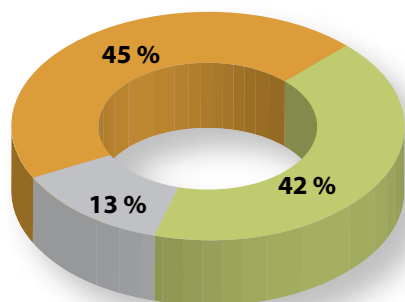
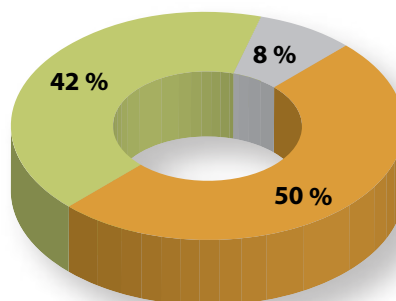


FIGURE 2: SWAZILAND GDP BY SECTOR (2009)



Agriculture
 Industry
 Services

Source: WDI (2010)

Source: WDI (2010)

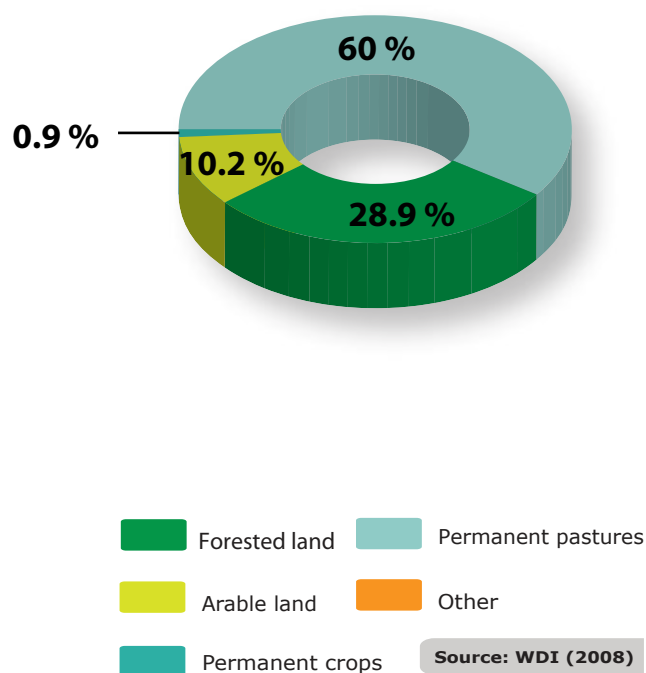
3. AGRICULTURE AND BIOMASS

3.1 LAND AND WATER

Swaziland has approximately 12,220 square kilometers of agricultural land, or 71 percent of the total land area (**Figure 3**). Of that, just over 10 percent is classified as arable land. The country has over 4.5 billion cubic meters of renewable water resources available, of which 23 percent is withdrawn annually⁴. Of the total water withdrawn each year, around 97 percent is used in the agricultural sector⁴.



FIGURE 3: SWAZILAND LAND USE (2008)



3.2 AGRICULTURE AND LIVESTOCK

The agricultural sector employs 29 percent of the labour force and contributes 3.5 percent of total exports⁵. The main farming systems in Swaziland are subsistence farming and conservation farming. The sector is characterized by both rain-fed and irrigated crop production.

Sugar cane is the main crop produced in Swaziland in terms of volume, followed by maize and roots and tubers. Sugar (both raw and refined) is the main export crop based on value. Between 1999 and 2009, sugar cane production increased by 16 percent and roots and tubers by 3 percent, while maize production decreased by 51 percent (**Figure 4**).

FIGURE 4: SWAZILAND CROP PRODUCTION- TONNES (2009)

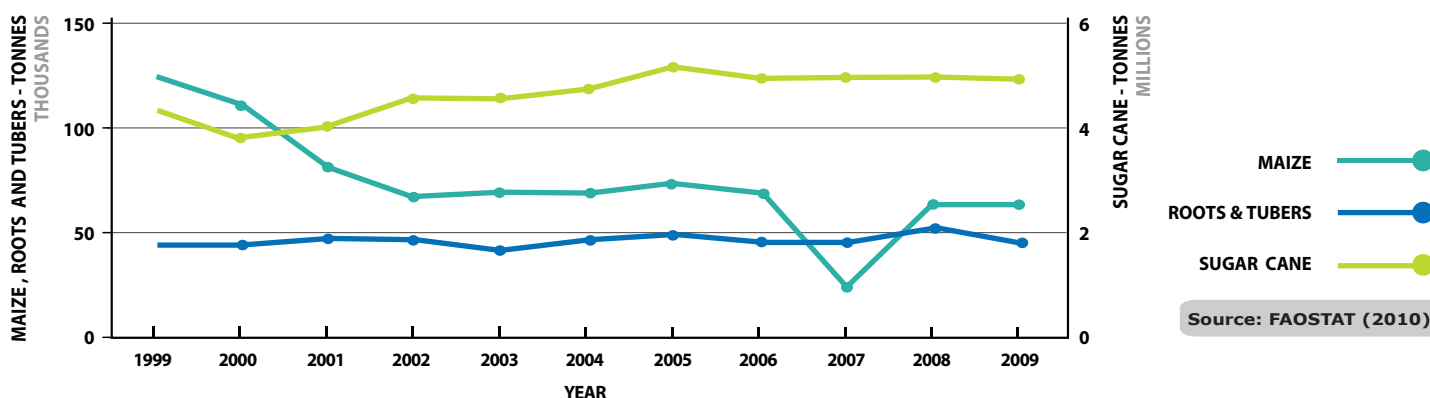
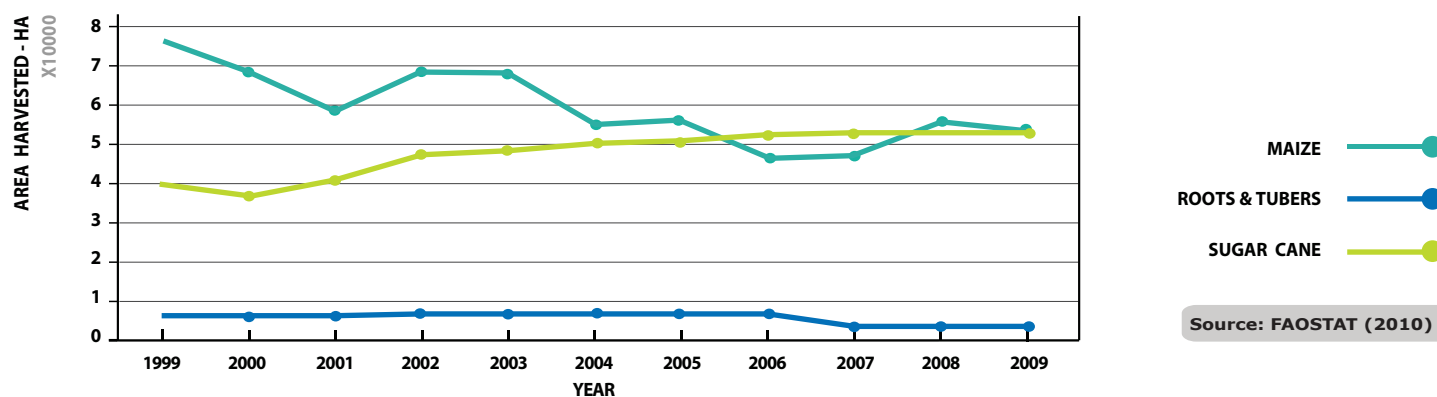
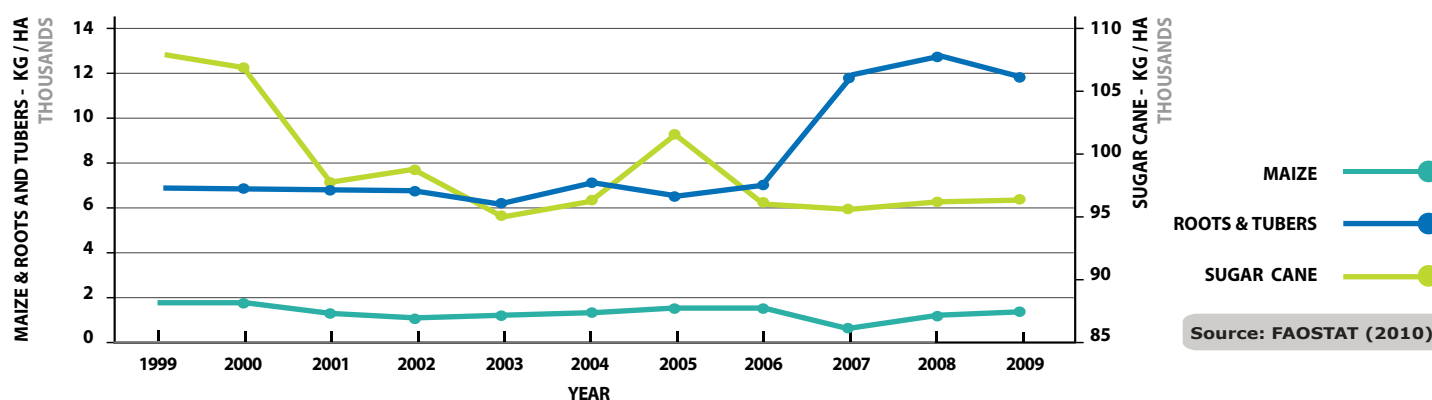


FIGURE 5: SWAZILAND AREA HARVESTED- HECTARES (2009)



As shown in **Figures 5 and 6**, the increase in sugarcane production that occurred between 1999 and 2009 was due to a 30 percent expansion in harvested area, while yields decreased by 11 percent. With regard to maize, the significant decrease in production during the same period was the result of a 30 percent reduction in both harvested area and yield. Roots and tubers production increased slightly with the yield increase of 65 percent, even with area harvested decreasing by 37 percent.

FIGURE 6: SWAZILAND CROP YIELD- KILOGRAM/HECTARE (2009)



A share of agricultural output is wasted due to post-harvest losses (**Table 1**). In 2009, around 10 percent of maize and roots and tubers consumed within the country was lost to waste.

TABLE 1: SWAZILAND CROP UTILIZATION (2009)

| Commodity | Production | Domestic Consumption | Food Supply | Processing | Wastage | Feed | Seed | Other Utility |
|----------------|------------|----------------------|-------------|------------|---------|--------|--------|---------------|
| | Tonnes | Tonnes | Tonnes | Tonnes | Tonnes | Tonnes | Tonnes | Tonnes |
| Sugar Cane | 5 000 000 | 4 999 990 | – | 4 999 990 | – | – | – | – |
| Maize | 60 765 | 166 794 | 81 459 | 11 775 | 16 659 | 32 452 | 2 098 | 22 351 |
| Roots & Tubers | 13 472 | 15 619 | 13 461 | – | 1 346 | – | 421 | 391 |

Source: FAOSTAT (2009)

With regard to livestock, permanent pastureland accounts for 60 percent of total available land according to 2010 data⁵. Over 585,000 cattle, 276,000 goats, 30,000 pigs, 28,000 sheep, 14,800 asses, and 2 million chickens were raised in 2009 in Swaziland³.

3.3 POLICY

The 2005 *Comprehensive Agricultural Sector Policy (CASP)* is the main policy document geared toward economic growth, poverty alleviation, food security, and sustainable resource management⁶. The four main goals outlined in the CASP are: to increase agricultural output and productivity; to increase agricultural sector earnings; to improve food security; and to ensure sustainable land and water resource usage and management while stabilizing agricultural markets⁶.

4. FOOD SECURITY

4.1 NUTRITION

Nutrition remains a serious concern in Swaziland. Stunting was found in 40 percent of children under the age of five in 2010⁷. In Swaziland, maize makes up 28.5 percent of the average daily calorie intake in the country, followed by and sugar cane with 14.1 percent and wheat with 17.3 percent (**Table 2**). Animal products account for make up 10.5 percent of the total calorie intake⁸.

4.2 FOOD SECURITY AND FOOD PRICES

Currently, in Swaziland 69 percent of the population lives below the poverty line³ and 19 percent is undernourished⁷. With a high percentage of the country's population living in poverty, food security is a national concern.

Swaziland is dependent on imports of maize and wheat, which are main staple crops in the country. In 2009, 63.6 percent of the maize and 76 percent of the wheat consumed domestically in Swaziland was imported (**Table 3**). Potential increases in the price of maize and wheat on the international market can thus have significant impacts on the trade balance, as well as on the welfare of net consuming households.

TABLE 2: SWAZILAND FOOD CROP CALORIC INTAKE (2009)

| Ranking | Commodity | Calorie Share (%) |
|----------------------------------|----------------|-------------------|
| 1 | Maize | 28.5 |
| 2 | Wheat | 17.3 |
| 3 | Sugar | 14.1 |
| 4 | Rice | 7.4 |
| 5 | Roots & Tubers | 5.1 |
| 6 | Roots, Other | 3.9 |
| Subtotal Food Crop share | | 76.3 |
| Animal Products Share | | 10.5 |
| Total Calories (kcal/capita/day) | | 2 249 |

Source: FAOSTAT (2009)

TABLE 3: SWAZILAND NET FOOD CROP TRADE (2009)

| Commodity | Production | Import | Export | Stock Variation | Domestic Consumption | Import Share of Consumption |
|------------|------------|---------|--------|-----------------|----------------------|-----------------------------|
| | Tonnes | Tonnes | Tonnes | Tonnes | Tonnes | % |
| Maize | 60 765 | 106 047 | 19 | 0 | 166 794 | 63.6 |
| Wheat | 400 | 42 651 | 23 | 13 000 | 55 818 | 76 |
| Sugar Cane | 5 000 000 | – | 10 | – | 4 999 990 | 0 |

Source: FAOSTAT (2009)

4.3 POLICY

The *Food Security Policy* of 2005 has the goal of ensuring that all people in Swaziland have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life at all times⁶. The policy has four key pillars: Food Availability; Food Access; Food Utilization and Nutritional Requirements; and Stability of Supply⁶.

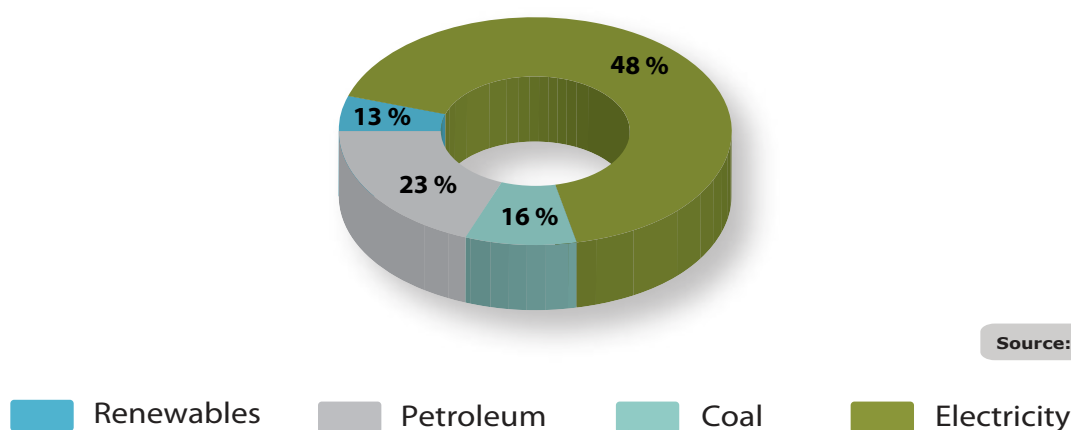
5. ENERGY AND BIOENERGY

5.1 ENERGY SUPPLY AND DEMAND

Approximately 27 percent of the country has access to electricity³. The majority of electrified households live in urban areas, while only 4 percent of rural people have access to electricity⁸.

Combustible renewables and waste account for 48 percent of the total primary energy supply, followed by petroleum products at 23 percent (Figure 7). Biomass, especially wood fuel, constitutes about 90% of the total final energy consumption. Biomass is still the main fuel for cooking and heating in rural households, and is also the primary source of electricity self-generation in the sugar, pulp and saw mill industries. (Figure 7). Other potential renewable energy options include modern bioenergy, solar energy and continued expansion of hydropower⁸.

FIGURE 7: SWAZILAND PRIMARY ENERGY SUPPLY (2007)



5.2 MODERN BIOENERGY

In 2007, around 1.8 million tonnes of bagasse were produced from the sugar industry, 80% of which was used for industrial processes, heating and the remainder for electricity generation. As of May 2010, two bioenergy projects were being established. These projects aim to produce ethanol from sugar cane and biodiesel from jatropha⁹.

Further assessment is needed in order to adequately understand the potential role of bioenergy within Swaziland's energy mix.

5.3 POLICY

The 2002 *National Energy Policy* was developed with the aim of promoting sustainable energy supply and use for the benefit of all citizens of Swaziland. The key objectives outlined in the policy are: to ensure access to energy for the entire nation; to create new employment within the energy sector; to ensure security of energy supply; to stimulate economic growth and development; and to promote environmental sustainability¹⁰.



6. ENVIRONMENTAL CONCERNS

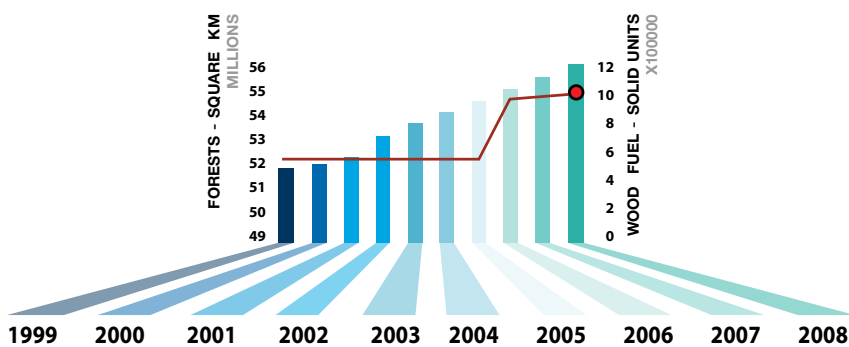
6.1 CLIMATE CHANGE

Climate change has already started to impact Swaziland. The country is experiencing increasing average temperatures, long periods of drought, and higher incidence of pests and diseases¹¹. Reported CO₂ emissions have decreased slightly in the last 10 years, after a sharp increase during the second half of the 1990s (**Figure 8**). Liquid fuel consumption is the main emission source, accounting for 62.4 percent of total CO₂ emissions in 2008³, followed by consumption of solid fuels such as wood fuel.

FIGURE 8: SWAZILAND CO₂ EMISSIONS - KT (2008)



FIGURE 9: SWAZILAND FOREST AREA VS. WOOD FUEL PRODUCTION (1999-2008)



Source: FAOSTAT (2010)



As noted previously, forestry and forest products are heavily utilized in Swaziland, with biomass and especially wood fuel accounting for about 90% of the total final energy consumption¹². Despite this and the growing global demand for wood products, forested area increased by 7 percent between 1999 and 2008¹³ (**Figure 9**).

6.2 POLICY

The *Swaziland Environment Action Plan (SEAP)* provides a framework for sound and sustainable environmental management. Revised in 2004, the plan aims to increase capacity building for effective environmental management; promote public awareness and environmental education; effectively utilize and manage biodiversity; enhance resource management for increased productivity; and manage pollution, waste, and environmental health in a safe and sustainable manner⁶.



SUMMARY

- Swaziland's agricultural sector employs 29 percent of the total labor force and accounts for 8 percent of the country's GDP (2009 data).
- Out of Swaziland's total land area, 71 percent is agricultural land, with just over 10 percent of this area classified as arable land. Around 23 percent of the country's renewable water resources is withdrawn annually.
- Maize, sugar cane, and wheat make up 59.9 percent of the average daily calorie intake. Maize alone provides 28.5 percent of the latter. Animal products provide an additional 10.5 percent.
- Swaziland is dependent on imports of maize and wheat to meet domestic consumption levels, which are the main staple crop in the country. Potential increases in the price of maize and wheat on the international market can thus have significant impacts on the trade balance, as well as on the welfare of net consuming households.
- Combustible renewables and waste account for 48 percent of the total primary energy supply, followed by petroleum products at 23 percent. Biomass, especially wood fuel constitutes about 90% of the total final energy consumption. Approximately 27 percent of the country (but only 4 percent in rural areas) has access to electricity.
- Bagasse is used to produce electricity in Swaziland. In addition, two projects for the production of ethanol from sugar cane and biodiesel from jatropha are currently being established. Further assessment is needed in order to adequately understand the potential role of bioenergy within Swaziland's energy mix.
- Over the last ten years, Swaziland has implemented a range of policies affecting the agricultural, energy, and environmental sectors. The development of better data on the topics covered in this brief will strengthen the government's ability to assess the effectiveness of these policy interventions and improve future decisions regarding food security and energy sector development in Swaziland.

REFERENCES

1. Infoplease, 2012. World- Countries- Swaziland. [online] Available at: <<http://www.infoplease.com/ipa/A0108004.html>> [Accessed 27 February 2012].
2. The Food and Agriculture Organization of the United Nations, 2012. FAOSTAT. [online] Available at: <<http://faostat.fao.org/site/291/default.aspx>> [Accessed 2012].
3. The World Bank Group, 2012. Data by Country: Swaziland. [online] Available at: <<http://data.worldbank.org/country/swaziland>> [Accessed 2012].
4. The Food and Agriculture Organization of the United Nations, 2012. AQUASTAT. [online] Available at: <<http://www.fao.org/nr/water/aquastat/dbase/index.stm>> [Accessed 2012].
5. The Food and Agriculture Organization of the United Nations, 2012. Countries- Swaziland. [online] Available at: <<http://www.fao.org/countries/55528/en/swz/>> [Accessed 2012].
6. Southern African Development Community, 2011. Regional Agricultural Policy- Country Summary Agricultural Policy Review Reports. [pdf] Available at: <http://www.sadc.int/fanr/docs/rap/RAP_Combined_Summary_Reports-8_May_2011.pdf> [Accessed 2012].
7. The Food and Agriculture Organization of the United Nations, 2011. The State of Food Insecurity in the World. [pdf] Available at: <<http://www.fao.org/docrep/014/i2330e/i2330e.pdf>> [Accessed 2012].
8. Renewable Energy and Energy Efficiency Partnership, 2012. REEGLE Country Profiles. [online] Available at: <<http://www.reegle.info/countries>> [Accessed 2012].
9. Southern African Development Community, 2010. SADC Biofuels State of Play Summary. [pdf] Available at: <http://www.probec.org/fileuploads/f1110902010040316-_SADC_BIOFUELS_STATE_OF_PLAY_STUDY.pdf> [Accessed 2012].
10. Government of Swaziland, 2004. The National Energy Policy 2002. [online] Available at: <<http://www.ecs.co.sz/energy/energy/index.htm>> [Accessed 2012].
11. United Nations Development Programme, 2012. UNDP Climate Change Country Profiles. [online] Available at: <<http://geog.ox.ac.uk/research/climate/projects/undp-cp/#documentation>> [Accessed 2012].
12. International Energy Agency, 2012. Statistics & Balances. [online] Available at: <<http://www.iea.org/stats/index.asp>> [Accessed 2012].
13. The Food and Agriculture Organization of the United Nations, 2012. FORESTAT. [online] Available at: <<http://faostat.fao.org/site/626/default.aspx#ancor>> [Accessed 2012].