



Bioenergy and Food Security Projects
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ZIMBABWE

BEFS COUNTRY BRIEF



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Design: Runya Virattiya, Kaiwit Triamdarnong

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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

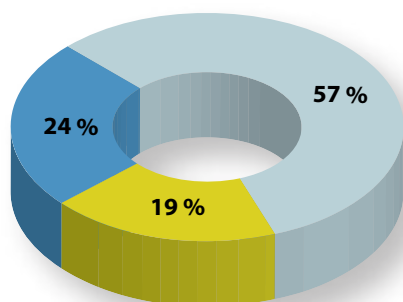
Zimbabwe is a landlocked country located in Southern Africa, with a total area of 386,850 square kilometers¹. Zimbabwe has three major river systems, and a tropical climate with an average annual rainfall of 657 mm². The population in 2010 was 12,571,454 and increasing by an average of 0.8 percent per annum³. Of this, 61.7 percent is classified as rural³.



2.2 ECONOMY

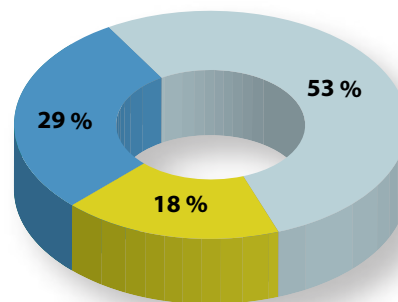
In 2009, Zimbabwe's GDP grew by 5.7 percent. GDP per capita fell from \$547 in 1999 to \$300 dollars in 2009 (in constant US dollars)³. In 2010, trade equaled 126.3 percent of the GDP, and foreign direct investments equaled 1.4 percent of GDP³. Between 1999 and 2009, the contribution of the agricultural sector to the gross domestic product (GDP) remained substantially stable, i.e. 19 percent in 1999 and 18 percent in 2009. The share of the industrial sector increased from 24 percent to 29 percent, while services remained the most important sector but with a decreasing share, i.e. from 57 percent to 53 percent of the GDP (**Figure 1 & 2**).

FIGURE 1: ZIMBABWE GDP BY SECTOR (1999)



Source: WDI (2010)

FIGURE 2: ZIMBABWE GDP BY SECTOR (2009)



Source: WDI (2010)

Agriculture
 Industry
 Services

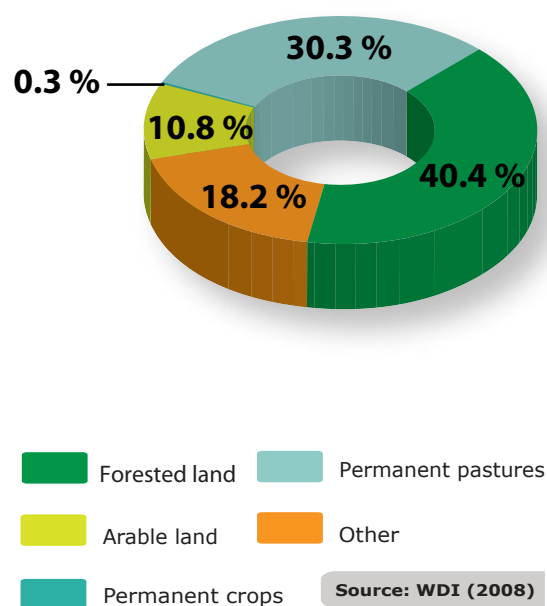
3. AGRICULTURE AND BIOMASS

3.1 LAND AND WATER

Zimbabwe has approximately 164,000 square kilometers of agricultural land, or 41.4 percent of the total land area (**Figure 3**). Of that, 10.8 percent is classified as arable land. The country has over 20 billion cubic meters of renewable water resources available, of which 21 percent is withdrawn annually⁴. Of the total water withdrawn each year, around 79 percent is used in the agricultural sector⁴.



FIGURE 3: ZIMBABWE LAND USE (2008)



3.2 AGRICULTURE AND LIVESTOCK

The agricultural sector employs around 60 percent of the total labour force and contributes 24.3 percent of total exports³. The sector is characterized by rain-fed production and low productivity.

Sugar cane is the main crop produced in Zimbabwe in terms of volume, followed by maize and cassava. Tobacco and cotton are the main export crops based on value. Between 1999 and 2009, sugar cane production decreased by 33 percent and maize production by 54 percent, while cassava production increased by 27 percent (**Figure 4**).

FIGURE 4: ZIMBABWE CROP PRODUCTION- TONNES (2009)

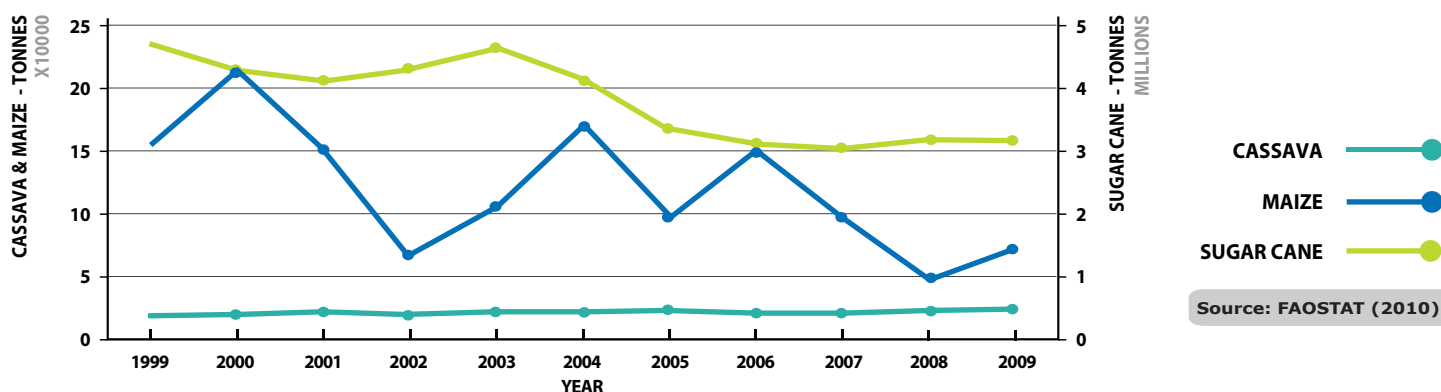
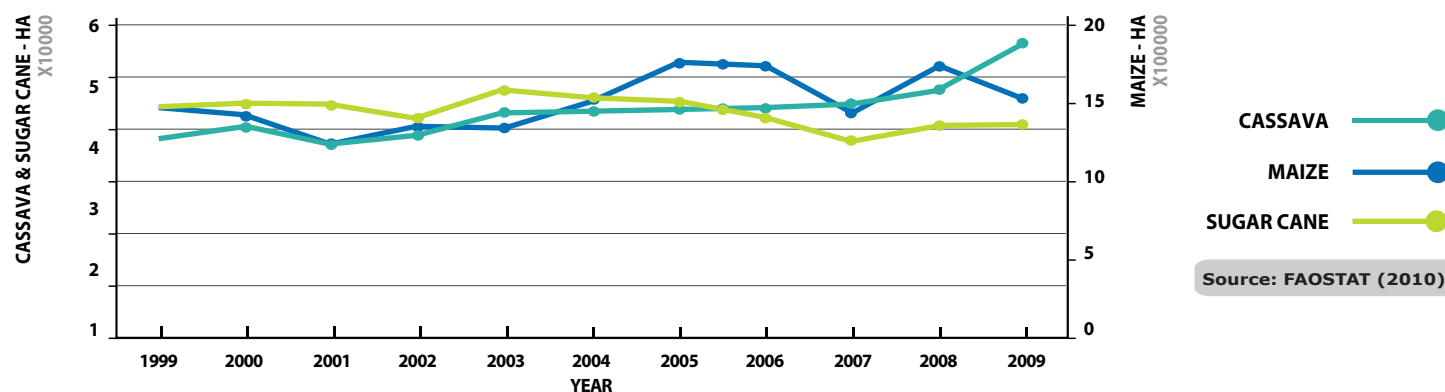
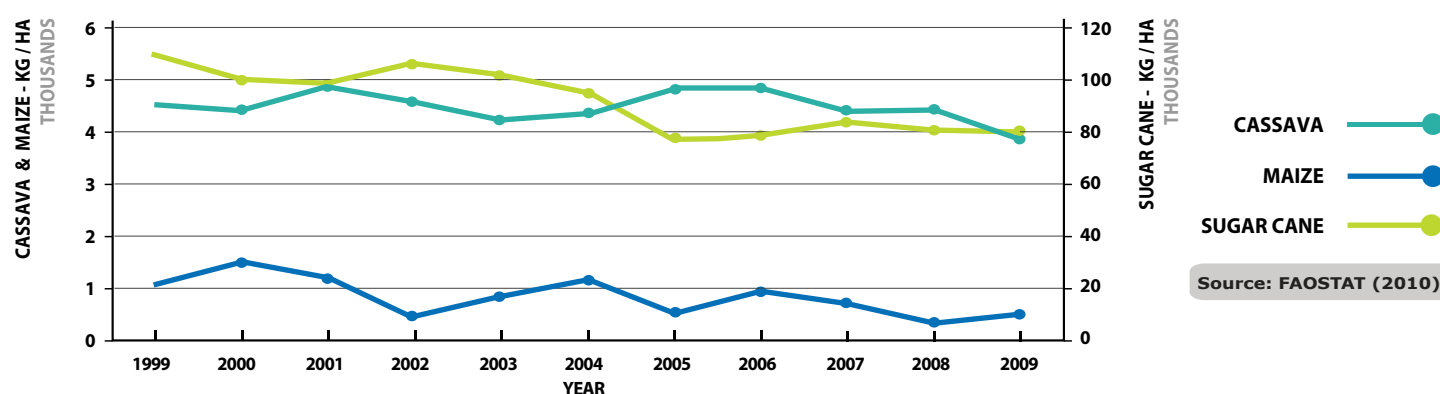


FIGURE 5: ZIMBABWE AREA HARVESTED- HECTARES (2009)



The fall in sugar production was due to a 9 percent decrease in area harvested along with a 27 percent decrease in yields. Maize production fell because of a 56 percent decrease in yields despite a 4 percent increase in area harvested. Cassava production rose due to a 47 percent increase in area harvested, even with yields falling 14 percent (Figures 5, 6).

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



A share of agricultural output is wasted due to post-harvest losses (Table 1). In 2009, nearly 5 percent of the maize and cassava consumed within the country was lost to waste.

TABLE 1: ZIMBABWE 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	3 100 000	3 100 000	-	3 100 000	-	-	-	-
Maize	700 000	1 603 742	1 377 450	4 991	76 062	100 000	45 240	-
Cassava	216 149	216 537	205 342	-	10 807	-	-	384

Source: FAOSTAT (2009)

With regard to livestock, permanent pastureland accounts for 30.3 percent of total available land according to 2010 data³. Approximately 32.5 million chickens, 5 million cattle, 2.9 million goats, 630 thousand pigs, 380 thousand sheep, and 112 thousand asses are raised in Zimbabwe.

3.3 POLICY

To date, Zimbabwe has not developed a comprehensive national agricultural policy. However, an overall vision has been outlined, which is “to promote development of an efficient, competitive and sustainable agriculture sector, which assures food security and increased income⁵.” In line with this vision, the agricultural sector policy that is being formulated aims to increase production for both household and national food security; increase funding for agricultural infrastructure and the sector; improve produce quality; improve production technology; preserve natural resources; and effectively manage and administrate land reform⁵.

4. FOOD SECURITY

4.1 NUTRITION

Nutrition remains a serious concern in Zimbabwe. Stunting was found in 35 percent of children under the age of five in 2010⁶. In Zimbabwe, maize makes up 39.5 percent of the average daily calorie intake in the country, followed by wheat with 11.5 percent and sugar with 9.3 percent (**Table 2**). In total, these commodities account for 60.3 percent of the average daily calorie intake, while animal products contribute 8.9 percent to the latter⁷.

4.2 FOOD SECURITY AND FOOD PRICES

Zimbabwe is classified as a Low Income Food Deficit Country. Currently, 72 percent of the population lives below the poverty line³ and 30 percent is undernourished⁶. With a high percentage of the country's population living in poverty, food security is a national concern. Zimbabwe is a net importer of two key staple crops, maize and wheat. In 2009, 56.4 percent and 90.4 percent respectively of total domestic consumption of maize and wheat was imported (**Table 3**). Potential increases in the price of these two commodities on the international market can thus affect the trade balance, as well as the welfare of net consuming households.

TABLE 2: ZIMBABWE FOOD CROP CALORIC INTAKE (2009)

Ranking	Commodity	Calorie Share (%)
1	Maize	49.5
2	Wheat	11.5
3	Sugar	9.3
4	Soyabean Oil	3.2
5	Sorghum	2.6
6	Roots & Tubers	2.6
Subtotal Food Crop share		68.7
Animal Products Share		8.9
Total Calories (kcal/capita/day)		2 219

Source: FAOSTAT (2009)

TABLE 3: ZIMBABWE NET FOOD CROP TRADE (2009)

Commodity	Production	Import	Export	Stock Variation	Domestic Consumption	Import Share of Consumption
	Tonnes	Tonnes	Tonnes	Tonnes	Tonnes	%
Maize	700 000	1 003 919	176	- 100 000	1 603 742	56.4
Wheat	40 000	456 259	912	- 80 000	415 347	90.4
Sugar Cane	3 100 000	-	0	-	3 100 000	0

Source: FAOSTAT (2009)

4.3 POLICY

The draft *Food and Nutrition Security Policy* of 2011 is set to become the most relevant document related to food security in Zimbabwe. Once implemented, the policy will commit the government to better policy analysis and advice; enhancing food security; providing social assistance to all Zimbabweans; enhancing food safety and standards; improving nutrition security; and implementing and managing a national food and nutrition security information system⁵.

5. ENERGY AND BIOENERGY

5.1 ENERGY SUPPLY AND DEMAND

Approximately 41.5 percent of the country has access to electricity³. The majority of electrified households live in urban areas, while only around 19 percent of rural people have access to electricity⁷.

Zimbabwe is heavily reliant on imported oil, natural gas, and refined petroleum products⁷. In 2010, fuel imports made up 11.2 percent of total merchandise imports³. Biomass, mostly solid biofuels, accounts for 68.9 percent of total primary energy supply and 85.5 percent of total final energy consumption⁸ (Figure 7 & 8). Other potential renewable energy options include solar energy, wind energy, geothermal energy, hydropower, and an expansion of modern bioenergy⁷.

FIGURE 7: ZIMBABWE TOTAL PRIMARY ENERGY SUPPLY (2009)

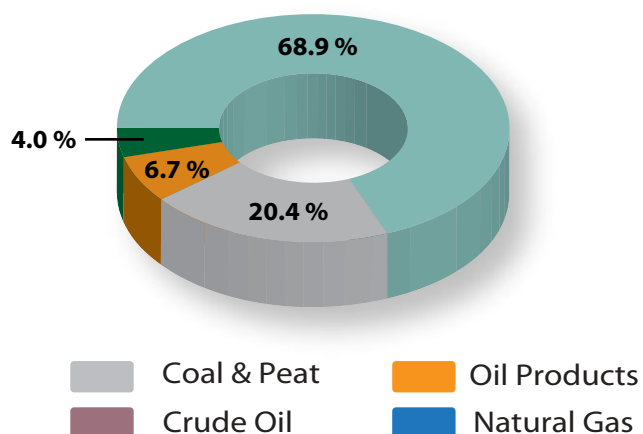
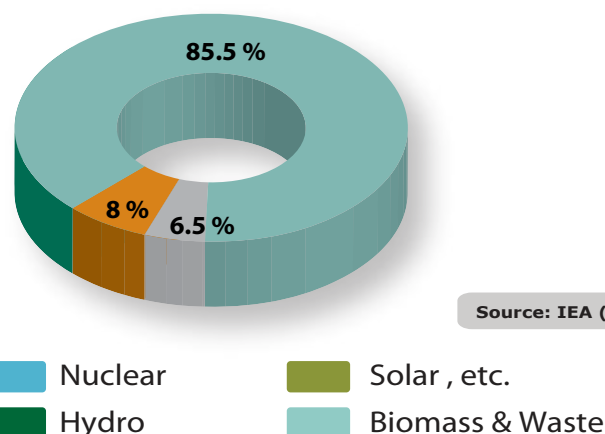


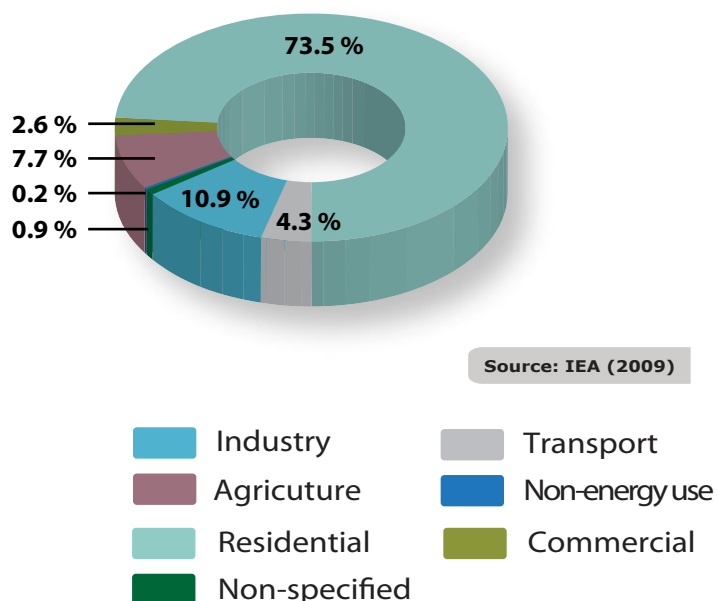
FIGURE 8: ZIMBABWE TOTAL FINAL ENERGY CONSUMPTION (2009)



Source: IEA (2009)

The main consumer of energy in Zimbabwe is the residential sector, accounting for over 73 percent of energy use⁸ (Figure 9).

FIGURE 9: ZIMBABWE ENERGY USE BY SECTOR (2009)



Source: IEA (2009)

5.2 MODERN BIOENERGY

As of May 2010, Zimbabwe produced over 150,000 liters of ethanol from sugar cane per year⁹. There were also four bioenergy projects in the planning or implementation phase across the country, including the retrofitting of old mills not in use. 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 Zimbabwe's energy mix.

5.3 POLICY

In 2008, the government of Zimbabwe introduced a draft National Energy Policy. The objectives outlined in the draft policy are: to ensure accelerated economic development; to help facilitate rural development; to promote small and medium scale business enterprises; to ensure environmentally friendly energy sector development; and to ensure efficient utilization of energy resources⁷.

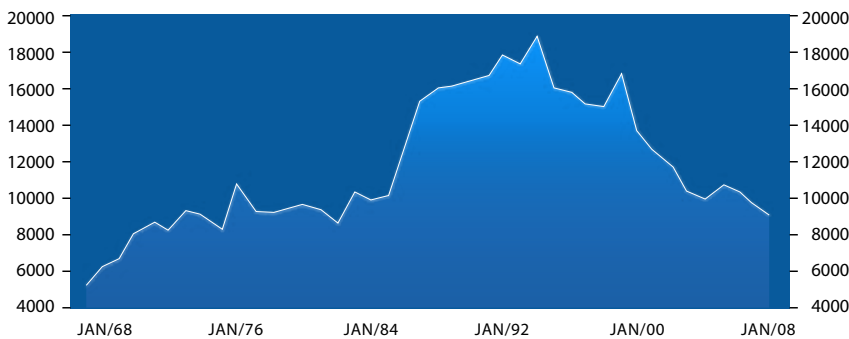
6. ENVIRONMENTAL CONCERNS

6.1 CLIMATE CHANGE

Climate change has already started to impact Zimbabwe. The country is experiencing shifting seasonal rainfall patterns, increased heavy rainfalls, longer droughts, lower average annual rainfall, and a decline in ecosystem biodiversity¹⁰.

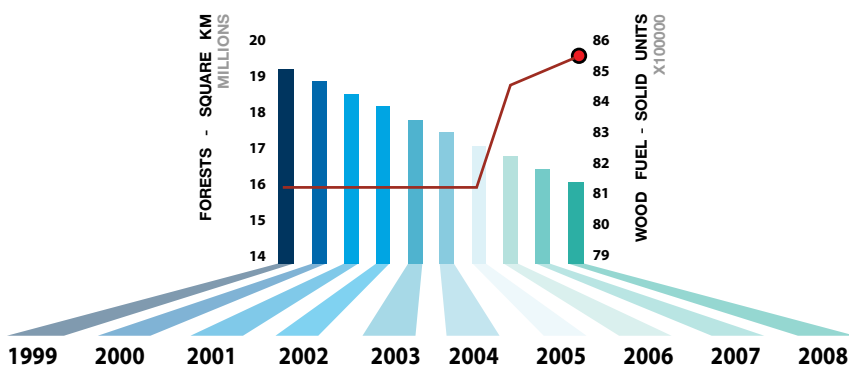
Reported CO₂ emissions have fallen considerably over the last twenty years, after a sharp increase during the second half of the 1980s (**Figure 10**). Consumption of solid fuels such as wood fuel is the main emission source, accounting for 78.5 percent of total CO₂ emissions in 2010, while liquid fuel consumption contributes 19.3 percent to this total³.

FIGURE 10: ZIMBABWE CO₂ EMISSIONS - KT (2008)



Source: WDI (2010)

FIGURE 11: ZIMBABWE FOREST AREA VS. WOOD FUEL PRODUCTION (1999-2008)



Source: FAOSTAT (2010)



Land-use change and especially deforestation and forest degradation are major sources of GHG emissions in Zimbabwe. As noted previously, forestry and forest products are heavily utilized, with biomass accounting for 68.9 percent of total primary energy supply and 85.5 percent of total final energy consumption⁸. Forested areas are rapidly shrinking to meet domestic demand for wood fuel wood and export demand for wood products (**Figure 11**). In addition to GHG emissions, unregulated harvesting of wood fuel is causing other environmental problems as well, especially in terms of biodiversity loss.

6.2 POLICY

The 2003 *National Environment Policy* outlines a number of objectives: to conserve natural resources and biodiversity in an environmentally sustainable manner; to promote equitable access and the sustainable utilization of natural resources; to encourage sustainable development and efficient resource use; to promote public awareness and participation; to establish and promote environmental information management systems; and to promote regional and international environmental agreements⁵.



SUMMARY

- Zimbabwe's agricultural sector employs around 60 percent of its total labor force and accounts for 19 percent of the country's GDP.
- Out of Zimbabwe's total land area, 41.4 percent is used for agricultural purposes, with 10.8 percent of this area classified as arable land. Around 21 percent of the country's renewable water resources is withdrawn each year.
- Maize, wheat, and sugar make up 60.3 percent of the average daily calorie intake. Maize alone provides 39.5 percent of this total. Animal products provide an additional 8.9 percent.
- Zimbabwe is classified as an LIFDC. Zimbabwe imported 56.4 percent of the total amount of maize and 90.4 percent of the total amount of wheat consumed domestically in 2009. As a result, increases in the world price of maize and wheat could have an effect on domestic prices and food security.
- Around 41.5 percent of households have access to electricity. The large majority of energy consumed is supplied by biomass. Utilization of other forms of renewable energy such as modern bioenergy, solar, wind, geothermal, and hydro could increase energy access and diversify Zimbabwe's energy profile.
- Zimbabwe currently produces over 150,000 liters of ethanol as modern bioenergy. The country has projects in the planning and implementation stages to produce ethanol and biodiesel in the near future, including renewed operation of offline plants. Further assessment is needed in order to adequately understand the potential role of bioenergy as part of the energy mix and assess potential trade-offs associated with bioenergy development.
- Zimbabwe's forest area is declining as the demand for forest products and wood fuel increases. Policies that decrease dependence on traditional biomass and encourage environmental sustainability will deliver a range of benefits.
- Over the last ten years, Zimbabwe 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 Zimbabwe.



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