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Bioenergy and Food Security Projects

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# MALAWI

## BEFS COUNTRY BRIEF

FAO FIAT PANIS

Design: Runya Virattiya, Kaiwit Triamdamrong
Compiled by : Matthew Leete, Beau Damen and Andrea Rossi
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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

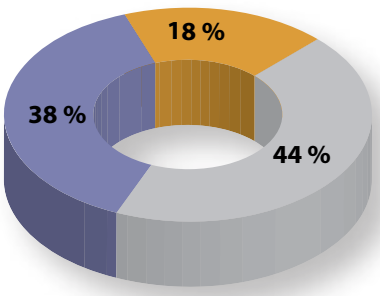
## 2.1 Quick facts

Malawi is a landlocked country located in Southern Africa and has a total area of 94,280 square kilometers[1]. It has a tropical to temperate climate with an average annual rainfall of 1,181 mm, and it includes a large body of water, Lake Malawi[2]. The population in 2010 was 14,900,841 and increasing by an average 3.1 percent per annum[3]. Of this, nearly 80 percent is classified as rural, down from 85% in 1999[3].

## 2.2 Economy

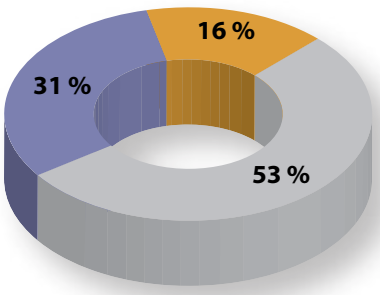
In 2009, Malawi's GDP grew by 7.6 percent. Between 1999 and 2009, GDP per capita increased from $157 to $177 (in constant US dollars)[3]. In 2010, consumer price inflation amounted to 7.4 percent[3]. In the same year, trade equaled 77.8 percent of the nation's GDP, and foreign direct investments equaled 2.8 percent of the latter[3]. Services are the main economic sector, with a 53 percent share of GDP in 2009 (compared to 44 percent in 1999), followed by agriculture with 31 percent - down from 38 percent in 1999. The industrial sector accounted for 16 percent of the gross domestic product in 2009, down from 18 percent in 1999 **(Figures 1,2)**.

Figure 1: Malawi GDP by Sector (1999)




Source: WDI (2010)

Figure 2: Malawi GDP by Sector (2009)





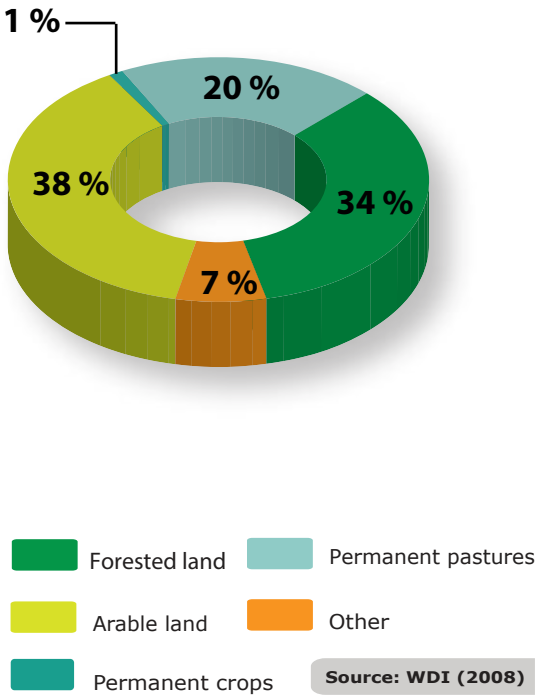
Source: WDI (2010)

# 3. Agriculture and Biomass

## 3.1 Land and water

Malawi has 55,720 square kilometers of agricultural land, or 59.1 percent of total land area **(Figure 3)**. Of that, 38 percent is classified as arable land. The country has over 17 billion cubic meters of renewable water resources available, of which 5 percent is withdrawn annually[4]. Of the total water withdrawn each year, around 84 percent is used in the agriculture sector[4].

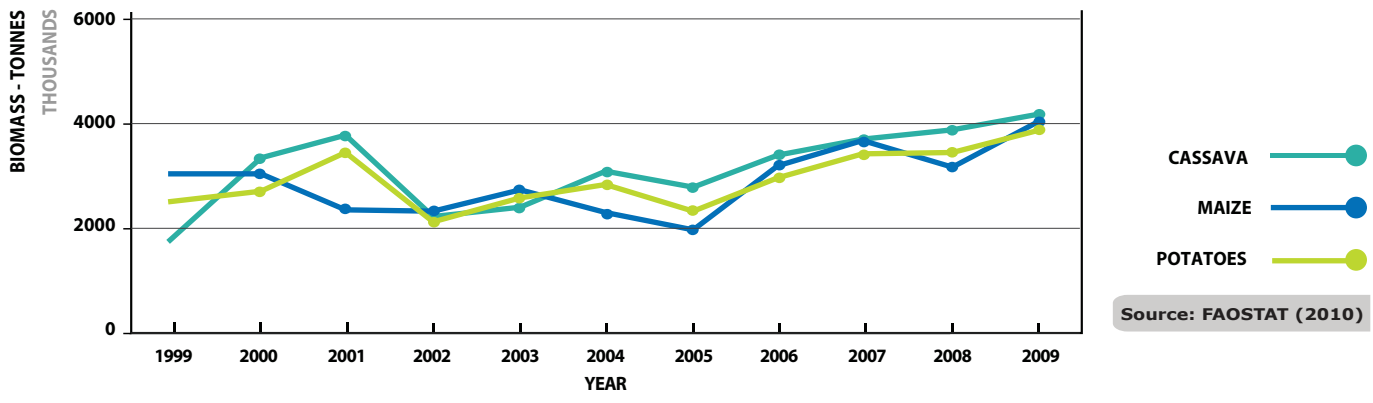
Figure 3: Malawi Land Use (2008)



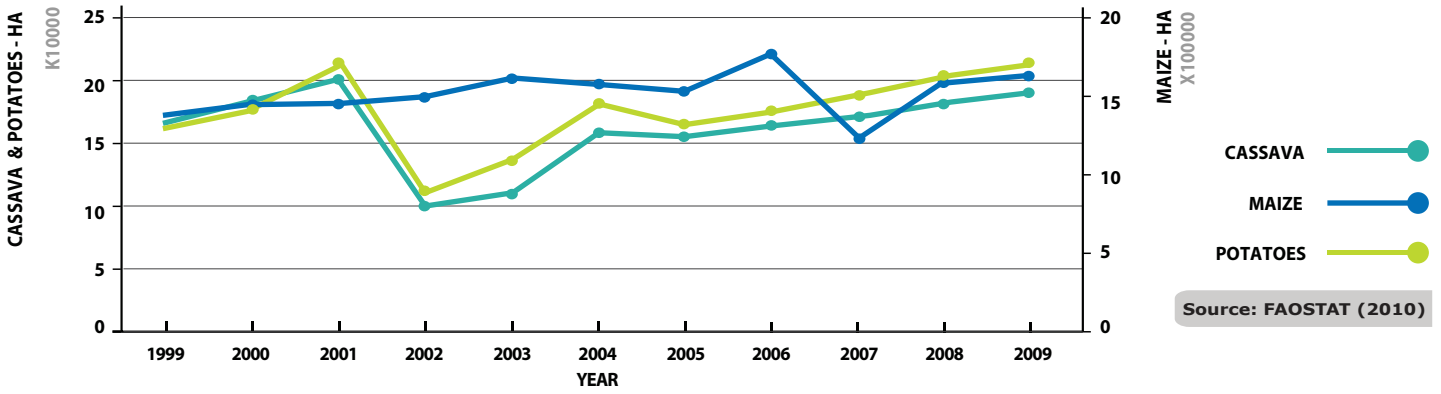

## 3.2 Agriculture and livestock

The agricultural sector employs approximately 73 percent of the total labour force and contributes 89 percent of total exports[2]. The main farming systems in Malawi are subsistence-based rain-fed agriculture and large-scale cash crop production with improved technologies and inputs[5]. Cassava is the main crop produced in Malawi in terms of volume, followed by maize and potatoes. Tobacco and tea are the main export crops in terms of value. Between 1999 and 2009, cassava production increased by 322 percent, maize production by 44 percent, and potato production by 86 percent **(Figure 4)**.

Figure 4: Malawi Crop Production- tonnes (2009)

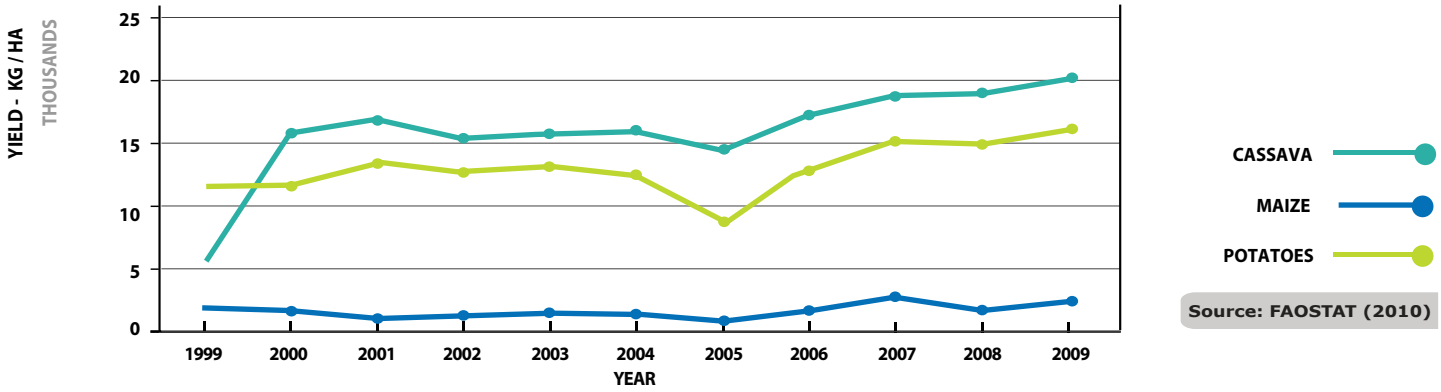


## Figure 5: Malawi Area Harvested- hectares (2009)




The expansion in the production of maize, potatoes and cassava between 1999 and 2009 was due to an increase in both the area harvested and yields. With regard to the latter, cassava yields rose by over 272 percent, maize yields by 23 percent, and potato yields by 44.3 percent **(Figure 6)**.

## Figure 6: Malawi Crop Yield- kilogram/hectare (2009)




A considerable share of agricultural output is wasted due to post-harvest losses **(Table 1)**. In 2009, 16 percent of the cassava, 4 percent of the maize, and 15 percent of the potatoes produced domestically was lost to waste[2].

## Table 1: Malawi Crop Utilization (2009)

| Commodity | Production | Domestic Consumption | Food Supply | Processing | Wastage | Feed | Seed | Other Utility |
|---|---|---|---|---|---|---|---|---|
| | Tonnes | Tonnes | Tonnes | Tonnes | Tonnes | Tonnes | Tonnes | Tonnes |
| Cassava | 3 823 236 | 3 823 116 | 1 023 237 | – | 600 000 | 2 199 999 | | – |
| Maize | 3 582 502 | 3 567 112 | 1 921 960 | 18 000 | 124 626 | 450 000 | 52 131 | 394 |
| Potatoes | 3 427 764 | 3 336 879 | 1 563 359 | – | 514 172 | 250 000 | 169 353 | 839 835 |

Source: FAOSTAT (2009)

With regard to livestock, permanent pastureland accounts for 20 percent of total available land according to 2010 data[3]. Around 15 million chickens, 3.5 million goats, one million cattle, 1.6 million pigs, and 191 thousand sheep are raised in Malawi[2].

## 3.3 Policy

*The Agricultural Development Program (ADP),* which was adopted in 2008, outlines a number of objectives, including: to improve food security and agricultural growth by increasing productivity; to reduce post-harvest losses; to diversify crop and livestock production; to increase market expansion and penetration; to develop shareholder cooperation and partnerships; and to promote sustainable land and water utilization[5].

# 4. Food Security

## 4.1 Nutrition

Stunting was found in 45 percent of children under the age of five in 2010[6]. In Malawi, maize makes up 50 percent of the average daily calorie intake, followed by potatoes with 8.4 percent and cassava with 5.8 percent **(Table 2)**. Animal products account for 3.8 percent of the average daily calorie intake.

## 4.2 Food Security and Food Prices

Malawi is classified as a Low Income Food Deficit Country. Currently, 52 percent of the population lives below the poverty line[6] and 27 percent is undernourished[3]. With a high percentage of the country's population living in poverty, food security is a national concern.

In 2009, domestic production was high enough that only minimal amounts of staple crops needed to be imported into the country for domestic consumption **(Table 3)**.

Table 2: Malawi Food Crop Caloric Intake (2009)

| Ranking | Commodity | Calorie Share (%) |
|---|---|---|
| 1 | Maize | 50 |
| 2 | Potatoes | 8.4 |
| 3 | Cassava | 5.8 |
| 4 | Sugar | 5.4 |
| 5 | Pulses | 4.1 |
| 6 | Groundnuts | 3.1 |
| Subtotal Food Crop share | | 76.8 |
| Animal Products Share | | 3.8 |
| Total Calories (kcal/capita/day) | | 2 318 |

**Source: FAOSTAT (2009)**

Table 3: Malawi Net Food Crop Trade (2009)

| Commodity | Production | Import | Export | Stock Variation | Domestic Consumption | Import Share of Consumption |
|---|---|---|---|---|---|---|
| | Tonnes | Tonnes | Tonnes | Tonnes | Tonnes | % |
| Maize | 3 582 502 | 54 941 | 3 665 | - 1 066 667 | 2 567 112 | 2 |
| Potatoes | 3 427 764 | 452 | 428 | - 90 909 | 3 336 879 | 0 |
| Cassava | 3 823 236 | 0 | 120 | 0 | 3 823 116 | 0 |

**Source: FAOSTAT (2009)**

## 4.3 Policy

The 2006 *Food Security Policy* has three main objectives: 1) Sustainable food availability; 2) Sustainable access to food; and 3) Stability in food. According to the policy, achieving *Sustainable food availability* requires increasing food quality and quantity, agricultural inputs, and credit access; promoting irrigation development and integrated water resource management; developing mechanization, technology, management strategies, and agricultural subsectors; and improving the coordination and management of food imports and market access. In order to achieve *Sustainable access to food,* it is necessary to promote food and resource access at household level; increase purchasing power and income levels of dependants; change farmers from subsistence orientation to commercial; and improve social support. Finally, *Stability in food* can be achieved by improving disaster preparedness management, disaster resource management, and shock control[5].

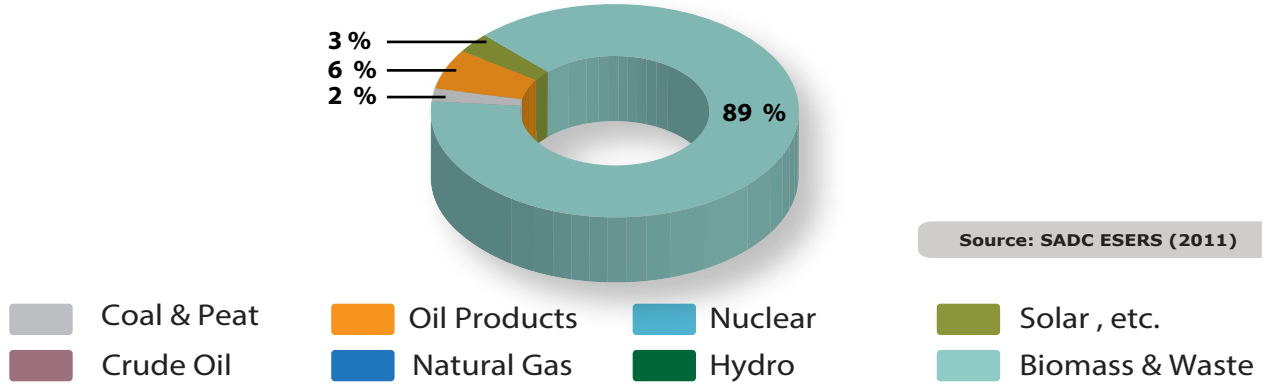
# 5. Energy and Bioenergy

## 5.1 Energy supply and demand

Approximately 9 percent of the country has access to electricity [3]. The majority of electrified households live in urban areas, while only 1 percent of rural households have access to electricity [7].

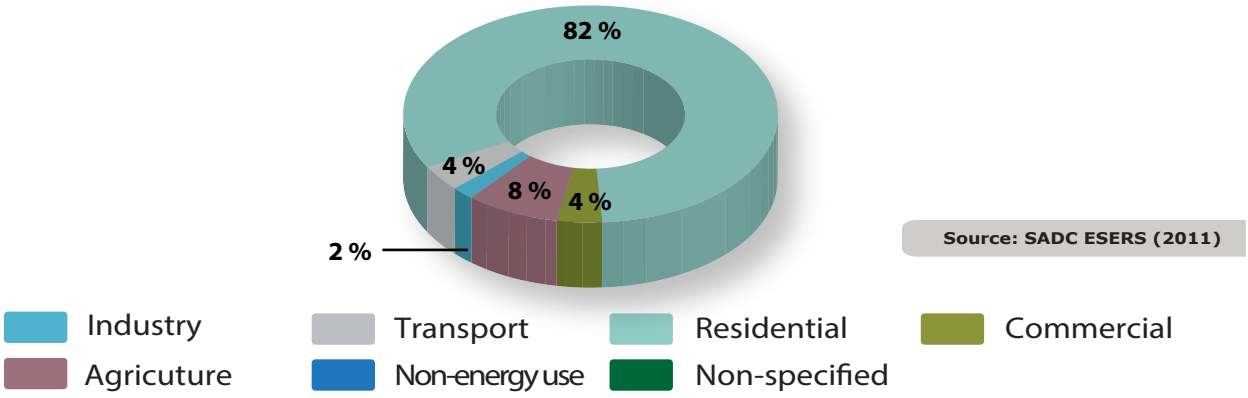
Biomass accounts for almost 90% of final energy consumption in Malawi **(Figure 7)**. Malawi is heavily reliant on imports of oil, natural gas and refined petroleum products [7]. In addition to traditional biomass, other potential renewable energy options include modern bioenergy, solar energy, wind energy, and hydropower [7].

Figure 7: Malawi Final Energy Consumption by Source (2009)




The main consumer of energy in Malawi is the residential sector, accounting for over 82 percent of total energy use, followed by agriculture with 8 percent **(Figure 8)**.

Figure 8: Malawi Energy Use by Sector (2009)




## 5.2 Modern bioenergy

As of May 2010, Malawi produced approximately 36 million liters of ethanol per annum [8]. Additional projects for the production of ethanol from sugar cane and molasses and of biodiesel from jatropha are currently being established [8].

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

## 5.3 Policy

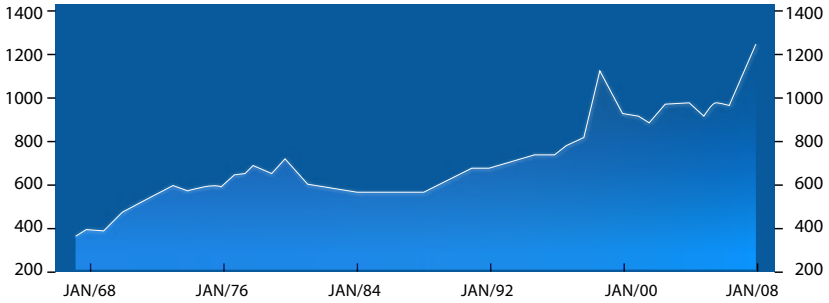
The *National Energy Policy,* which was adopted in 2003, outlines the following objectives: to improve the technical and economic performance of the energy supply industry; to enact legislation to improve sector governance; to increase the rate of rural electrification; and to establish a liberalized private sector industry [7].

# 6. Environmental Concerns

## 6.1 Climate change

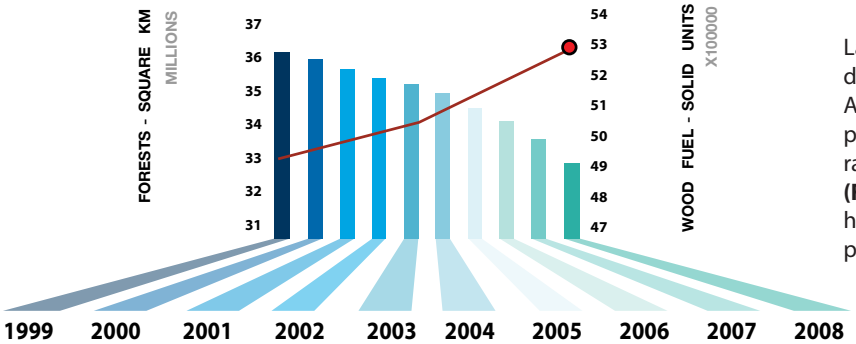
Climate change has already started to impact Malawi. In recent years, for instance, flooding and drought have affected crop production and yields, energy generation, fish stocks, and forest areas [2]. $CO_2$ emissions have increased significantly over the past few decades **(Figure 9)**. In 2008, consumption of liquid fuels accounted for 79 percent of total emissions [3].

### Figure 9: Malawi $CO_2$ Emissions- KT (2008)




Source: WDI (2010)

### Figure 10: Malawi 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 Malawi. As noted previously, biomass accounts for almost 90 percent of final energy consumption[10]. Forested areas are rapidly shrinking to meet the demand for wood fuel[11] **(Figure 10)**. 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 *National Environmental Policy*, which was adopted in 1996 and then revised in 2004, outlines the following objectives: promoting sustainable utilization and management of natural resources; facilitating ecosystem rehabilitation and management; enhancing public awareness, education, and participation; integrating management systems and participation with decentralized government systems, NGO's, and the private sector; developing and updating environmental information systems; and facilitating the development and review of environmental policies, legislation, and conflict management systems in the environment and natural resources sector [5].

# Summary


- Malawi's agricultural sector employs 73 percent of its total labor force and accounts for 29 percent of the country's GDP.
- Out of Malawi's total land area, 59.1 percent is used for agricultural purposes, with 38 percent of this area classified as arable land. Around 5 percent of the country's renewable water resources is withdrawn annually.
- Maize, potatoes and cassava make up 64.2 percent of the average daily calorie intake, with maize alone providing 50 percent of the latter. Animal products account for 3.8 percent of the calorie intake .
- Malawi is classified as an LIFDC. In 2009, domestic production levels of staple crops were high enough that only minimal amounts of imports were required to meet domestic consumption.
- Around nine percent of households have access to electricity. Biomass accounts for almost 90% of final energy consumption.
- Malawi currently produces around 36 million liters of ethanol. Additional projects for the production of both ethanol and biodiesel are currently underway. Further assessment is needed in order to adequately understand the potential role of bioenergy within Malawi's energy mix.
- Malawi's forest area is declining as the demand for forest products and especially wood fuel increases.
- Over the last ten years, Malawi 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 Malawi.

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