

# Rwanda

Total population (July 2000 estimate): 7,229,000

Area: 26,338 km<sup>2</sup>

Annual population growth rate (2000): 1.14%

Life expectancy at birth (1998): 40.6 years

People not expected to survive to age 40 (1998): 45.9% of total population

GDP per capita (1998): US \$660



Rwanda is a landlocked mountainous country in Central Africa. The landscape of this 'land of a thousand hills' is characterized by rolling highlands in the central and eastern part of the country and rift-related volcanic mountains and rift lakes in the west and northwest.

Rwanda is one of the most densely populated countries in sub-Saharan Africa (more than 270 persons per km<sup>2</sup>), putting considerable pressure on the cultivated land. There is only one hectare of arable land per person in Rwanda. The economic base is mainly small-scale and subsistence agriculture with about 90% of the population involved in farming. The agricultural sector contributes approximately 46% of the GDP. Food crops of Rwanda include plantains, sweet potatoes, cassava, potatoes, sorghum, beans and maize. The main export crops are tea and coffee.

Soil erosion, soil nutrient depletion and soil acidity with associated Al toxicities are the main soil related constraints to agricultural development in Rwanda.

The mineral resource base of Rwanda is restricted to small deposits of cassiterite, wolframite, tantalite and gold, extracted mainly by small-scale methods. Large amounts of methane gas are found in Lake Kivu (Lac Kivu), along the border with the Congo Democratic Republic. The methane reserves at the bottom of Lake Kivu are estimated to be in the order of 2 trillion cubic feet (TCF). They are believed to have a regenerative capacity of more than 8 billion cubic feet per annum. Presently, the gas is used in the Rwanda Brewery and Lemonade Company on the shore of Lake Kivu.

### **Geological outline**

The geology of Rwanda is similar to the geology of neighbouring Burundi and southern Uganda. The oldest rocks of Rwanda are migmatites, gneisses and mica schists of the Paleoproterozoic Ruzizian basement overlain by the Mesoproterozoic Kibaran Belt. The Kibaran, composed of folded and metamorphosed sediments, mainly schists and quartzites intruded by granites, covers most of Rwanda.

Cenozoic to Recent volcanic rocks occur in the northwest and west. Some of these volcanics are highly alkaline and are extensions from the Birunga volcanic area of southwestern Uganda. Tertiary and Quaternary sediments fill parts of the Western Rift in the western part of the country.

### **AGROMINERALS**

#### **Phosphates**

No phosphate occurrence of economic significance has been reported from Rwanda.

#### **Limestone/dolomite/travertine**

Very hard, dolomitic limestones with MgO contents up to 17% have been found in Precambrian rocks as thin beds and lenses in the area around Kibuye (Grigoriev 1981). The origin of this deposit has been questioned, as some authors discuss the possibilities that the Kibuye carbonates are not sedimentary, but may be of igneous, carbonatitic origin (Verhaeghe 1964). Other dolomitic limestones and dolomites are reported from Mbabara Island, northwest of Kibuye, where reserves are reported to be on the order of several million tonnes. Verhaeghe (1964) reports other crystalline dolomitic limestones, for instance near Mushao, Kariba and Kamanyola, at the border to the Democratic Republic of Congo.

Most travertine deposits in Rwanda are small and are spatially related to the Rift Valley area in western Rwanda (Verhaeghe 1964). The most extensive travertine deposit is located near Mashyuza, southeast of Cyangugu. This deposit consists of travertine, 5 m thick with reserves of more than 6 million tonnes. Plans

have been discussed to use this travertine as raw material for a local cement plant and for the production of calcium cyanamide fertilizer.

Grigoriev (1981) reported the total reserves of travertine deposits, excluding Mashyuza, as 2.45 million tonnes (of which 1.47 million tonnes are in the 'possible' category). Verhaeghe (1964) reported several more travertine occurrences in areas along the Western Rift. They require further exploration, quantification, and studies on their site-specific agronomic value.

#### **Testing of Liming Materials in Rwanda**

Several studies have been undertaken using liming materials to overcome soil pH related constraints. The soil pH in the Gikongoro and Byumba regions for instance is commonly below 5, and subsoil pH levels are as low as 4.0 (Vander Zaag *et al.* 1984; Yamoah *et al.* 1992). Several agronomic investigations have shown that the use of up to 5 tonnes CaCO<sub>3</sub> per hectare may be necessary to reduce soil acidity and the associated Al toxicity to significantly increase yield (Vander Zaag *et al.* 1984). In some areas of Rwanda, the use of 2-4 tonnes per hectare of local limestone or dolomite resources has proved to be agronomically effective, significantly enhancing the yield of wheat, beans and potatoes (Yamoah *et al.* 1992).

#### **Peat**

There are several deposits and occurrences of peat in Rwanda. The main peat deposits are located south and east of Cyangugu, and in northern Rwanda, east of Ruhengeri. However, the extraction of these peat deposits for horticultural production or for energy purposes is problematic and there are environmental concerns with this practice.

Peat has been envisaged as an acidulating medium for phosphate rock. Composting experiments using peat and organic residues in combination with relatively insoluble phosphate rocks have been successfully applied in Canada (Mathur *et al.* 1987).

#### **Agromineral potential**

The potential of developing liming materials in Rwanda is largely limited to the availability of agricultural limestone along the Western Rift. Raising and maintaining the soil pH above 5.5 to keep extractable Al concentrations low is a desirable soil management technique.

The use of the locally available limestone/dolomite/travertine resources will be an important low-cost sustainable management technique for providing food security to farmers in Rwanda.

#### *References:*

- Grigoriev S 1981. Les Travertines du Rwanda.-Programme des Nations Unies pour le Developpement - Projet de Recherches Minières - RW 80/001, 46pp.
- Mathur SP, Proulx JG, Leveque M and RB Sanderson 1987. Composting of an igneous rock phosphate. In: Wachira JK and AJG Notholt (eds.) Agrogeology in Africa. Commonwealth Sci. Council, Technical Publ. Series 226:129-145.
- Vander Zaag P and C Kagenzi 1986. The phosphorus requirements of five consecutive potato crops on an Andept in Rwanda. *Am. Potato J.* 63:121-129.

Vander Zaag P, Yorst RS, Tangmar BB, Yayashi K and RL Fox 1984. An assessment of chemical properties for soils of Rwanda with the use of geostatistical techniques. *Geoderma* 34:239-314.

Verhaeghe M 1964. Inventaire des gisement calcaires, dolomies et travertins du Kivu, du Rwanda et du Burundi. Département Géologie et Mines du Burundi, 95pp.

Yamoah CF, Burleigh JR and VJ Eylands 1992. Correction of acid infertility in Rwandan Oxisols with lime from indigenous source for sustainable cropping. *Exp. Agric.* 28:417-424.