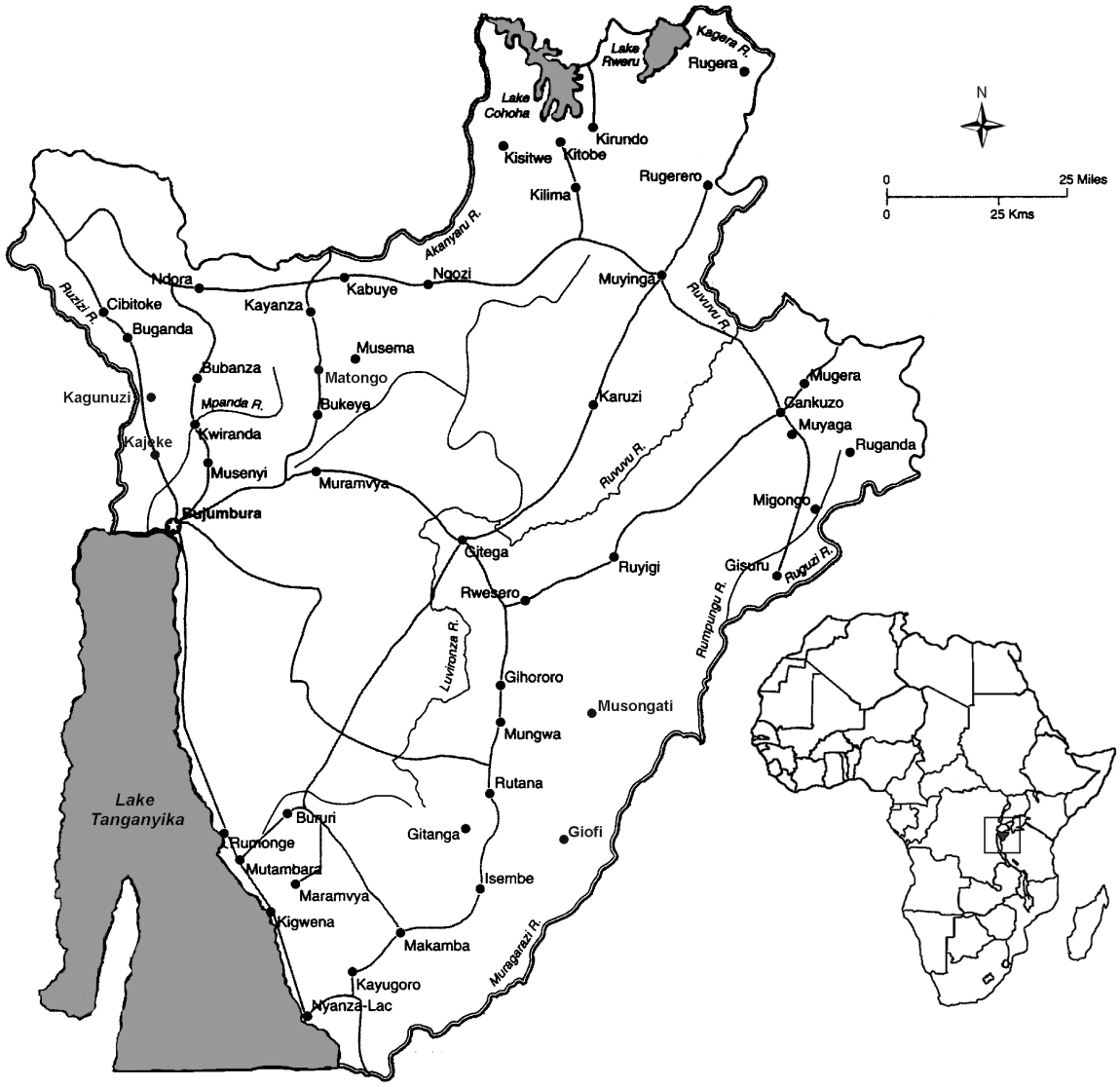
Burundi

Total population (July 2000 estimate): 6,055,000
Area: 27,830 km^2
Annual population growth rate (2000): 3.15%
Life expectancy at birth (1998): 42.7 years
People not expected to survive to age 40: Not available
GDP per capita (1998): US $570



Burundi is a landlocked densely populated mountainous country in central Africa, north of Lake Tanganyika. The mountain ranges of Burundi reach altitudes of 2,600 m. Between the mountains and Lake Tanganyika lies a 3 km wide alluvial plain, which widens towards the north into the 20 km wide Ruzizi Plain.

The economy of Burundi is largely based on agricultural production, with 90% of the population dependent on subsistence farming. In 1999, the agricultural sector accounted for 52% of the GDP. The main food crops are maize, beans, rice, potatoes, bananas, and cassava. The main cash crop is coffee, contributing approximately 80% of the country's foreign exchange earnings. Most soils in Burundi are highly degraded, with soil acidity, aluminum toxicity and low available nutrient contents, especially phosphorus, being the main limiting factors. Fertilizer imports into this landlocked country are expensive and alternative means to maintain and increase soil productivity are required.

The mining sector is small, with only low-volume gold, cassiterite and colombo-tantalite and wolframite deposits being mined. A large lateritic nickel deposit at Musongati in southeast Burundi (approximately 6% of the world's nickeliferous laterite) has not yet been developed. Artisanal mining of alluvial gold in the northwestern province of Cibitoke continued even during the civil war and the blockade.

In the last few years, political instability and civil war have affected both the development of Burundi.

Geological outline

Geologically, folded and slightly metamorphosed clastic sediments of the Mesoproterozoic Kibaran belt underlie most of Burundi. Rocks of this belt extend from the Democratic Republic of Congo through Burundi and Rwanda into northwest Tanzania and Uganda in an east-northeast direction. The Kibaran rocks are intruded by granites, and along a 350 km long 'alignment,' a narrow zone of mafic and ultramafic intrusions (Deblond and Tack 1999). The Kibaran is flanked in the eastern part of the country by Neoproterozoic shallow water sediments of the Malaragazi Supergroup (Tack 1995) with basal conglomerates, schists, dolomitic limestones and lavas. Tertiary and Quaternary sediments fill parts of the Western Rift at the northern tip of Lake Tanganyika.

AGROMINERALS

Phosphates

Only igneous and residual phosphate accumulations have been found in Burundi so far. The residual igneous phosphate deposit at Matongo, 70 km north of Bujumbura (3^o 4' S; 29^o 37' E) was discovered in 1975 during an airborne geophysical survey (Songore 1991). The residual phosphates overlie a strongly weathered carbonatite, which is part of the much larger Neoproterozoic Upper Ruvubu alkaline complex (Tack *et al.* 1984). The residual phosphatic zone is up to 55 m thick. The composition of the ore varies strongly. A typical sample from the weathered phosphate ore contains approximately 30% fluor-apatite and 17% caxonite (an iron-phosphate mineral), the rest is composed of clay, feldspar and limonite (Kurtanjek and Tandy 1989). The solubility of the Matongo apatite is low: the citric acid soluble P of the phosphate concentrate is 1.6% (IFDC, quoted in van den Berghe 1996).

Over the last few decades, the deposit was appraised by the United Nations, by the British Sulphur Corporation and various other agencies and institutions. The detailed feasibility study showed reserves of 17.3 million tonnes of ore at 11.0% P_2O_5 (cutoff 5% P_2O_5) or 40 million tonnes at 5.6% P_2O_5 (Kurtanjek and Tandy 1989). The engineering company MacKay and Schnellmann completed test work for the feasibility study of phosphate fertilizer production and concluded that there was insufficient high-grade material to support a super-phosphate plant (Songore 1996).

Composting with Matongo Phosphate Rock and Urea

Agronomic experiments using Matongo phosphate concentrate as direct-application fertilizer have been generally unsuccessful. This is likely a result of the nature of the unreactive phosphate ore. However, experiments where the unreactive Matongo phosphates were mixed with urea in a composting system showed improved performance and higher agronomic effectiveness (van den Berghe 1996).

Limestone/dolomite/travertine

Widespread Neoproterozoic dolomitic limestones of the Musindozi Group (dolomitic limestones, calcareous shales and lavas) and of the Mosso Group (silicified dolomitic limestones and lavas) exist in southeastern Burundi, mainly northeast and southeast of Rutana, close to the border with Tanzania (Tack and Thorez 1990). The resources are large. Dolomitic limestones of more than 130 million tonnes are reported from east of Rutana. The high magnesium contents render these deposits unsuitable as raw material for cement production but suitable for the production of lime or ground dolomitic limestone for agricultural purposes (Sinzumusi 1989; Ntahindurwa 1990). Lime is produced in Giofi, Bukemba, Muramba and Shaka, south and east of Rutana. In addition, small dolomitic limestones are reported from Kajeke and Kagunuzi, both north of Bujumbura (Lorenz 1996).

Travertine deposits, much smaller in volume and variable in composition, are located in the northwest of Burundi, in Cibitoke, Busiga, Gihungwe, and Ruhanga (Verhaeghe 1964; Lorenz 1996). The individual travertine deposits are commonly less than 1 million tonnes in size, the largest being in Cibitoke with estimated reserves of approximately 1 million tonnes (Lorenz 1996). These resources could be used for local agricultural lime production or as agricultural limestone.

Another potential source of liming material, the carbonatite of Matongo is extensive (1,800 m long, and up to 250 m wide) but is deeply weathered. ‘Fresh’ carbonates are encountered only at depths below 45 m. Underground mining has been considered to extract the carbonates as a possible source for cement manufacture, but proved technically difficult and uneconomic.

Limestones and dolomites are calcined at several locations in the east of the country. At present the calcined material is used mainly for building purposes and whitewash. The Agronomy Department of the University of Burundi encourages the use of ground dolomitic limestone for agricultural purposes on the acid soils of Burundi (Wouters, pers. comm. 1984; Niyondezo 1987; Sinzumusi 1989; Ntahindurwa 1990).

Peat

Peat resources in excess of 300 million tonnes are located in Buyongwe near Ngozi (Niyondezo 1987). There are, however, environmental concerns with the extraction of peat from wetlands in Burundi.

Composting experiments using peat and organic residues in combination with the relatively insoluble Matongo phosphate rock have been proposed by Mathur (pers. comm. 1987). This composting technique with peat and unreactive PR has been successfully applied in Canada (Mathur *et al.* 1987).

Agromineral potential

The potential of utilizing the igneous, relatively insoluble phosphate resources of Matongo are limited because the low-grade iron-rich phosphate deposit requires considerable upgrading and processing. However, should the phosphates be mined on a larger scale the concentrate should be tested in composting systems in a similar fashion as described by van den Berghe (1996).

There are very extensive sources of dolomites in Burundi and efforts should be made to utilize these resources to ameliorate the predominantly acid soils in the country.

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