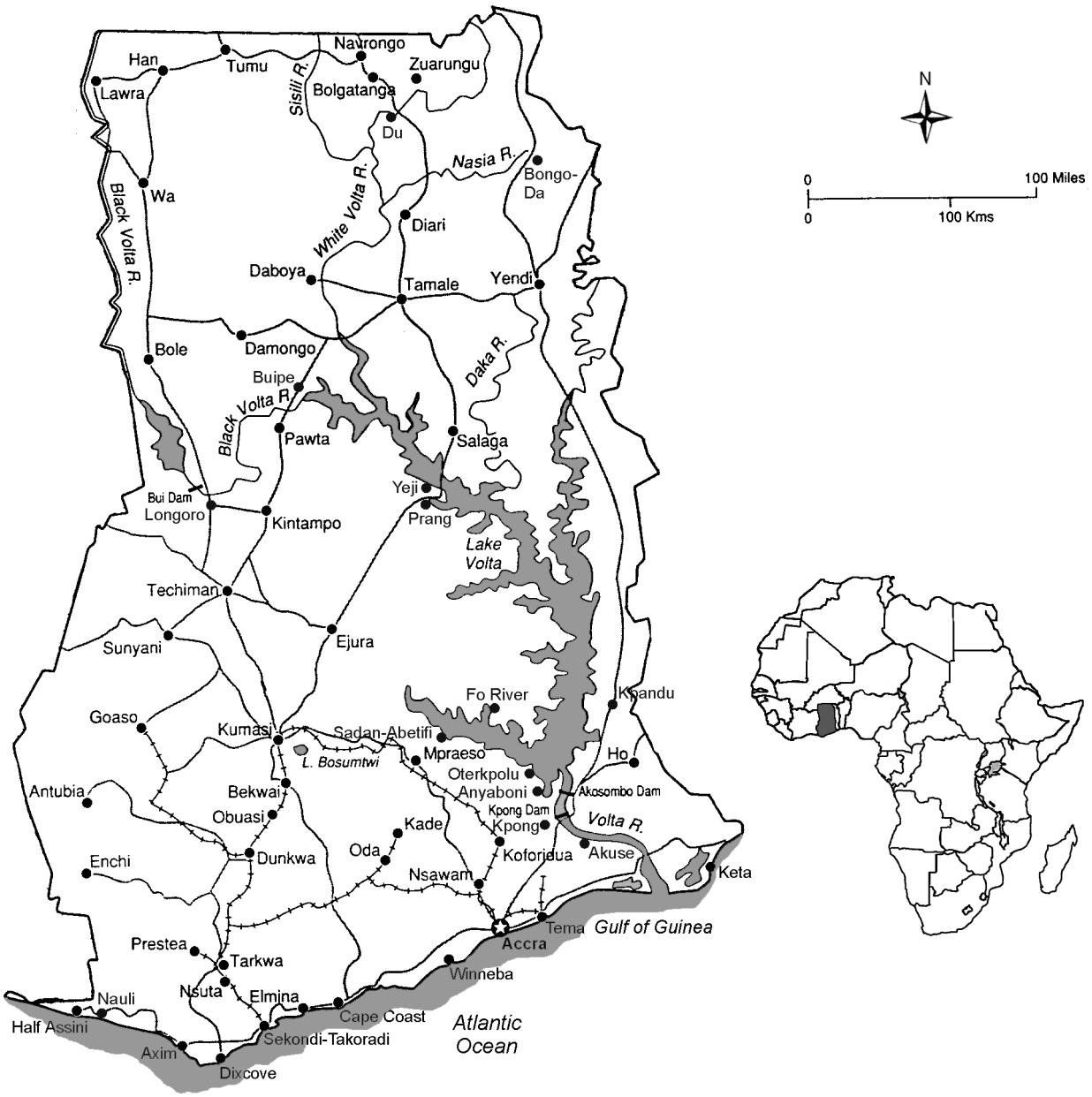
# Ghana

Total population (July 2000 estimate): 19,534,000
Area: 238,540 km$^2$
Annual population growth rate (2000): 1.87%
Life expectancy at birth (1998): 60.4 years
People not expected to survive to age 40 (1998): 20.6% of total population
GDP per capita (1998): US $1,735



The landscape and climate of Ghana are characterized by several zones ranging from a narrow coastal belt with a hot, humid climate in the south to a sequence of rolling hill ranges with wide valleys in the centre of the country to the hot, dry, semi-arid areas of the north.

Ghana is a country with extensive mineral and agricultural resources. The export economy is dominated by the sale of gold, cocoa and timber. The agricultural sector contributes about 36% to the GDP and employs approximately 60% of the labour force. The main food crops are cassava, yams, plantain, taro, rice and maize. The main exports crops are cocoa and coffee.

Ghana is a mining country with gold mining playing an important part in its long history. Ghana is the second largest producer of gold in Africa, with at least twelve formal gold mines, seven of which are large open pit operations. It is the third largest producer of aluminum metal and manganese on the continent. Small amounts of diamonds are also found in Ghana. In 1994, small-scale miners recovered more than 10% of the 53 tonnes of gold produced in Ghana. The International Labour Organization (1999) estimated 50,000-300,000 people to be involved in small-scale gold and diamond mining in Ghana.

**Geological outline**

The geology of Ghana is dominated by predominantly metavolcanic Paleoproterozoic Birimian sequences and the clastic Tarkwaian in the central west and northern parts of the country. Clastic shallow water sediments of the Neoproterozoic Volta Basin cover the east of the country. A small strip of Paleozoic and Cretaceous to Tertiary sediments occur along the coast and in the extreme southeast of the country.

**AGROMINERALS**

**Phosphates**

No major phosphate deposits have been discovered in Ghana as yet (Kesse 1985; Sheldon 1986; Iddrisu 1987) although indications of phosphate mineralization are known from 4 principal geological resources:

1. Eocene sediments of the Keta Basin, similar to the middle Eocene Hahotoe phosphates in neighbouring Togo,
2. Devonian sediments of the Sekondi Series, along the coast of Ghana,
3. Phosphatic sediments in the Neoproterozoic/early Paleozoic middle Voltaian rocks below a prominent carbonate horizon, similar to the types found in neighbouring Burkina Faso, Benin and Niger,
4. phosphates associated with igneous rocks.

**Eocene sediments.**

Early indications of phosphate mineralization in Eocene sedimentary beds are based on sludge samples from boreholes drilled during water surveys in southeast Ghana, close to the border with Togo. Some of the sludge samples contained phosphate concentrations ranging from 10-15% $P_2O_5$ (Annan Yorke 1974). However, no follow-up surveys have been carried out to date (Kesse 1985; Iddrisu 1987).

Sheldon (1986) concluded that these Eocene beds form the most attractive prospect for finding extensive sedimentary phosphates, which could be excavated easily on various scales. He noted that the phosphate-bearing Aflao bed (mean 14.53% $P_2O_5$) described by Annan Yorke (1974) is most likely the unweathered equivalent of the phosphate ore bed of the Hahotoe deposits in neighbouring Togo. ‘The total amount of phosphate in the 20 ft. ore bed at the Hahotoe deposit in Togo (which is currently mined) and the 35 ft. sequence drilled at Aflao (Ghana) are essentially the same’ (Sheldon 1986).

**Devonian sediments**

Devonian sediments of the Sekondi Series occur along the coast of Ghana. Phosphorite nodules containing up to 14.7% $P_2O_5$ were reported in the Devonian Takoradi shales (Austin and Smit 1965). The phosphatic nodules are believed to be fish coprolites. The occurrence is of limited extent and phosphates are unlikely to be extracted, even by small-scale methods.

**Neoproterozoic/early Paleozoic rocks**

Neoproterozoic/early Paleozoic rocks in the Volta Basin are similar in stratigraphic position to the phosphate bearing strata in neighbouring Burkina Faso, Benin and Niger. In the Volta Basin of Burkina Faso and Benin these phosphates occur stratigraphically above a widespread tillite horizon and are associated with barites, limestones and oolitic limestones (Trompette *et al.* 1980). In the Volta Basin of Ghana, similar successions with occurrences of tillites and barites have been described (Iddrisu 1987). However, exploration work on phosphates by Ashanti Goldfield Corporation Ltd. in 1975 and by the Ghana Geological Survey was inconclusive (Iddrisu 1987).

**Other phosphate occurrences**

Minor phosphate occurrences of various origins have been reported by Kesse (1985), Sheldon (1986) and Iddrisu (1987). Small apatite occurrences have been found in pegmatites in the Bole and Anobabo areas and in the nepheline syenite/carbonatite complex of the Kpong area (Sheldon 1986; Iddrisu 1987).

**Other agrominerals**

**Limestone/dolomite**

There are several large and many small limestone and dolomite deposits in Ghana. Most of the limestone deposits have been investigated for their potential use in the cement industry. Dolomitic limestone and dolomite occurrences with less than 5% MgO content have not been investigated in detail.

Afenya (1982), Kesse (1975, 1985) and Iddrisu (1987) report dolomitic limestone deposits in a sequence of lower Voltaian sediments near Oterkpolu ($0^o$ 05' W; $6^o$15' N) in the eastern region of Ghana. Iddrisu (1987) reports reserves of 8-10 million tonnes. The resources are currently being worked for the production of terrazzo chips (Kesse 1985). No data on the rate and amounts of disposal or use of carbonate fines and wastes are available. The limestone/dolomite resources in the Buipe area ($1^o$30' W; $9^o$00' N) represents the largest occurrence of magnesian limestone in northern Ghana. The total reserves are 6 million tonnes of limestone and 138 million tonnes of dolomite (Kesse 1985). The reserves of the Bongo-Da limestone/dolomite beds ($0^o$15'W; $10^o$22'N) within the lower Voltaian in northern Ghana are 15 million tonnes of calcitic limestone and 20-30 million tonnes of dolomite. The deposits are suitable for lime production (Kesse 1985). The Nauli limestone deposit, made up of an extensive ridge containing several beds of Campanian limestone, occurs in southwestern Ghana ($5^o$02' N; $2^o$ 45'-$2^o$ 50' W). This deposit with a strike length of more than 50 km has been investigated for its use as potential raw material for the cement industry. The reserves of these limestone beds are in excess of 23 million tonnes and are easily mineable by open-cast methods (Kesse 1985). Smaller limestone/dolomite deposits are known from the Fo river area in southeast Ghana (15 m thick, in excess of 1.5 million tonnes, low Mg content), and near Daboya (162,000 tonnes limestone, 0.5 million tonnes dolomite) in northern Ghana. Other small limestone occurrences are reported from the Anyaboni and Sadan-Abetifi areas, in the Longoro, Prang and Yeji areas, in the Ashanti Region, and in the Du area of the Upper Eastern Region (Kesse 1985). Calcitic shell deposits (reserves = 700,000 tonnes) are currently collected from the sandbanks of the Volta River near Akuse for the production of lime (Kesse 1985).

Agricultural experiments with calcitic limestone on acid soils of the high rainfall area of SW Ghana resulted not only in increased grain yield of maize but also in improved soil and water conservation (Bonsu 1991). The application of agricultural lime at rates of 1-4 tonnes $ha^{-1}$ improved grain yield in a linear fashion. Bonsu (1991) relates the reduction of soil and water losses to prolific root growth and better soil structure in the limed soils.

**Gypsum**

There are no economic gypsum deposits in Ghana. Kesse (1985) reported small amounts of gypsum and gypsiferous clays from near Accra and localities in the Western Region, and from the Keta region.

**Agromineral potential**

So far, no large phosphatic resources have been delineated in Ghana. However, the potential for finding local phosphate resources is considered good. Best indications of good quality phosphatic sediments are in Eocene sediments of the Keta Basin in the extreme southeastern corner of Ghana, in the striking continuation of the Togo phosphate beds. Sheldon (1986) rated the probability of finding and developing phosphate deposits in the Keta area as ‘high’ and suggested more detailed work.

Local limestone resources are currently used mainly for whitewash purposes. Based on the need for agricultural liming materials on acid soils, these resources should be evaluated on their suitability for small-scale production of ground limestone and dolomite.

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