

## EQUATORIAL GUINEA

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The territory of Equatorial Guinea includes the islands of Bioko and Annobon, and the mainland enclave of Rio Muni, which is bordered to the north by Cameroon and to the south and east by Gabon. The total surface area of the country is 28,051 km<sup>2</sup>, with mainland Rio Muni accounting for approximately 26,000 km<sup>2</sup>. Rio Muni has a coastal plain and a mountainous interior, and the climate is tropical with four seasons (two wet and two dry). The population of the country is about 470,000 with an annual growth rate of 2.5%. One third of the population lives in the urban areas, mainly in the capital of Malabo on the island of Bioko, and in Bata, the largest town, port and administrative centre on the mainland. Spanish is the official language but English and French are also widely spoken.

The economy is based mainly on hydrocarbon production and forestry, which together accounted for around 97% of total exports in 1999. Hydrocarbon production includes oil, natural gas and condensate, most of which is exported. The exciting discovery of the Ceiba field in 1999 by US company Triton has now confirmed the Gulf of Guinea as a major new petroleum province. Fast track-development of Ceiba, plus field expansion in the Niger Delta province, is expected to increase production rates to over 200,000 bbl/d during 2001. GDP has risen rapidly through the 90s; expanding by 310% between 1995 and 1999, with 1999 growth of 17% making it Africa's fastest growing economy.

Revenues from hydrocarbons are already leading to major infrastructural improvements, including a new deep-water Freeport, a methanol plant and processing facilities on Bioko, and road improvement and electrification programmes throughout the country.

Equatorial Guinea is a Democratic Republic with 14 political parties and is governed by a government of National Unity. There is one legislative house, the Chamber of Representatives of the People, which has 80 seats. Political diversity in the Government has been encouraged by the appointment of members from eight different political parties. The current peace existing in the country and the harmony between the political parties make Equatorial Guinea the most stable country in the region.

Bioko and Anabon are volcanic islands of the Cameroon Volcanic Line, composed predominantly of Cenozoic alkali basalts with little mineral potential. Mainland Rio Muni, however, comprises the Archaean terranes of the Ntem Complex and the Monts de Cristal Massif, both of which were partly reworked during the Proterozoic Eburnian and the Pan-African orogenies. Exploration in Rio Muni has indicated the presence of greenstone belts and major shear zones, including Eburnian terrane boundaries, which have a significant gold potential. Pan African transpressive structures are common in the west and are associated with granitic intrusions and pegmatite bodies that also occur across the interior. Low-metamorphic-grade shales, dolomites and quartzites occur in the southwest, representing the northernmost extension of the Niari foreland basin of the Pan-African-age West Congolian Orogeny. Higher-grade sedimentary packages, also attributed to the Pan-African, are found along the northern border of the country where they are associated with major strike-slip and thrust faults.

The coastal strip of Rio Muni comprises Cretaceous sands, shales and carbonates with basal conglomerates, developed during the rifting phase of Atlantic opening. The Fang and Bata Transatlantic Fracture Zones

come onshore at Rio Muni, linking to major lineaments, at least one of which shows evidence of Cenozoic rifting (the Benito Rift).

Current minerals production is negligible other than from artisanal gold mining activities in Rio Muni. Nevertheless, several studies have demonstrated the potential for gold, colombo-tantalite and diamond deposits, with previous exploration highlighting several areas of immediate interest. There is also potential for platinoids, dimension stone, base metals, and bauxite amongst other commodities.

Gold exploration and artisanal workings have identified three main areas – Coro, Aconibe and Mongomo on the northern margins of the Monts de Cristal terrane, as well as several other occurrences. These are small alluvial prospects currently yielding coarse gold, including several nuggets that occur with vein-quartz and lateritic minerals, attesting to nearby primary and secondary gold sources. The bedrock sources of the alluvial gold have yet to be delineated. Records are incomplete, but at least 2.3 t of gold was produced from the Coro area alone in the mid-70s. South of Rio Muni in Gabon, the Monts de Cristal, Du Chaillu and Ogooué terranes have numerous alluvial workings and are being actively explored by international gold mining companies, including the important prospects in the Etéké greenstone belt.

The diamond potential relates in part to post-Eburnian lamproite dykes that extend along strike from the Mitzi diamond deposits in Gabon into the Nsork area of Rio Muni, 50 km to the north and west. Heavy-mineral sampling results have identified zinc-rich chromites in the Nsork area, similar to those found in the diamondiferous lamproites in the Mitzi area. Exploration in Gabon has identified Zn-chromites and diamonds in alluvial samples right up to the southern borders of Rio Muni.

Colombo-tantalite mineralisation is known in at least two areas (Aconibe and Ayamiken)

defined by Nb and Ta soil anomalies, and heavy minerals associated with Nb-Ta-rich pegmatites. Neither area has been explored in great detail and thus they represent early-stage exploration prospects for pegmatite and/or skarn systems associated with Pan African granitic intrusions. The Aconibe occurrence comprises discrete, laterally extensive pegmatites, which are also overlain by eluvial and alluvial deposits yielding grades of 3.0-7.5 kg/m<sup>3</sup>. Sample assays have demonstrated niobium-rich colombo-tantalite (62.36% Nb<sub>2</sub>O<sub>5</sub>) with subordinate tantalum (18.74% Ta<sub>2</sub>O<sub>5</sub>).

Widespread lateritisation and indications of bauxitic laterite, with grades up to 58.3% Al<sub>2</sub>O<sub>3</sub>, and 2.1% to 5.3% SiO<sub>2</sub>, indicate some potential for bauxite, particularly in the Nzangayong, Ncoasas, Ayamiken and Churu areas. Anomalous values of base metals, U, As, Ag, Mn and Mo have been detected in laterite above black shales which occur in the red-bed sequence near Cogo. The red-bed sequence is part of the West Congolian Niari foreland basin, with known base metal deposits immediately to the south in Gabon, and is also equivalent in age to the Katangan sequences of the Democratic Republic of Congo and Zambia. Serpentinised ultramafics and other basic intrusives along the footwall of the Benito Rift constitute an untested exploration prospect with some potential for base metals and platinoid elements. Similar basic intrusives have also been reported in southern Rio Muni, which may be a northern extension of the Kingué ultrabasic trend, with known Ni-Cu-PGE mineralisation.

Between 1980 and 1986, BRGM and a Spanish exploration company undertook regional and follow-up stream-sediment surveys utilising heavy mineral separates and sediment geochemistry. These highlighted the potential for gold production from alluvial deposits at Coro, as well as the occurrences of colombo-tantalite, diamond indicators, iron ore, radioactive minerals, rare earths and base metals in other areas. Other activities

included a side-looking radar survey and an aeromagnetic survey of Rio Muni.

In the late 90s the Exploration Licence for all of Rio Muni was held by United Meridian Corp (later named Ocean Energy) and BoMc Holdings Inc. These companies undertook a wide range of exploration activities including regional and prospect geological mapping, reconnaissance evaluation of the gold and bauxite potential of laterites, sampling and prospect evaluation of the artisanal workings, stream sediment sampling, interpretation of high-resolution radar imagery, and the generation of a comprehensive GIS database. At the end of 2000, the Licence lapsed and the entirety of Rio Muni has become open for exploration. The GIS database and historical exploration archives

are accessible for interested companies upon approval.

The Ministry of Mines and Energy is keen to develop an exploration-friendly environment, and to this end the Mining Law is in the process of being re-drafted. Exploration Licence Contracts are also being drafted to permit large areas to be explored over a 1- to 3- year period. The explorer may also opt for registration of smaller Prospect Areas (up to 100 ha) to permit detailed evaluation of individual prospects. Exploitation Licences will be granted upon submission of a mining programme that must include environmental management strategies and also meet acceptable health and safety standards in the workplace.