

CÔTE D'IVOIRE

By Bob Foster

Exploration Consultants Ltd, Henley-on-Thames, UK

Côte D'Ivoire (Ivory Coast) is an independent republic of almost 16 million people. One of the larger countries of West Africa with an area of some 322,000 km², it borders the Gulf of Guinea and is bordered inland by Liberia (to the west), and Guinea, Niger, Burkina Faso and Ghana (to the east). The political and administrative capital is Yamoussoukro but the commercial capital and leading port is the city of Abidjan.

A narrow coastal strip is backed by a forest-covered coastal plain rising inland towards a mix of plains and low hills, with a small mountainous area around Man to the west. The highest point is Mount Nimba at 1,752 m elevation. Moving north, the land becomes savannah. The tropical climate is affected by distance from the sea: coastal areas have wet seasons from May to July, and from October to November. In the central areas the wet seasons are March to May and July to November; the shorter wet season in the north is from June to October. The official language is French and the former French colony, although gaining independence in 1958, still maintains close political and economic links with France. There are 60 native dialects, with Dioula the most widely spoken. The main ethnic groups are Baoule, Bete, Senoufou and Malinke. Major religions are Islam (63%), Christianity (12%) and indigenous beliefs (25%).

Côte D'Ivoire is a republic, with a multiparty presidential regime having been established in 1960. For more than three decades after independence under the leadership of its first president, Felix Houphouet-Boigny, Côte D'Ivoire was conspicuous for its religious and ethnic harmony, and economic progress in West Africa. However, the country's reputation for stability was shattered when General Robert Guei took power in a coup in December 1999. The first coup in the Côte D'Ivoire in 40 years of independence, it was followed by two major military rebellions, disputed elections and violence. Presidential elections to restore democracy in October 2001 led to yet more violence and a popular uprising that brought Laurent Gbagbo to power. But the new president's triumph has been soured by political and ethnic fighting between his supporters and those of rival opposition leader, Alassane Ouattara, following a troop mutiny in September 2002. Fighting continues in the western part of the country near the border with Liberia as the year closed.

The main exports are cocoa, coffee, tropical hardwoods, petroleum, cotton, bananas, pineapples, palm oil, fish and rubber-sourced latex. Agricultural products are a key element of the country's economy. Consequently, the economy is highly sensitive to fluctuations in international prices for these products and to weather conditions. Despite attempts by the government to diversify the economy, it is still largely dependent on agriculture and related activities, which engage roughly 68% of the population. Oil also plays an important role, although in recent years the downstream activities have

dominated through a major refinery and separate bitumen plant located in Abidjan. GDP in 2001 was estimated at US\$25.5 billion, of which agriculture contributed 28% and industry 29%, with manufacturing comprising the bulk of the latter figure. GDP was estimated to have fallen 1% in 2001, leaving *per capita* GDP at just US\$1,550.

Underlain almost completely by Archaean and early Proterozoic rocks, Côte D'Ivoire has considerable mineral potential, with important occurrences of gold, diamonds, iron, nickel, cobalt, copper and manganese, and bauxite having been identified. Like much of West Africa, however, it is gold that has been at the forefront of exploration since the introduction of a new favourable mining investment code in 1995.

The Ity mine is the country's major gold-producer, owned by French company Cogema (51%) and by the state mining company Sodemi (Société d'Etat pour le Developpement Minier de la Côte D'Ivoire with 49%). The low capital cost, high-grade open-pit, heap-leach operation commenced production in 1991. During 1999-2000, a total of 269,267 t of ore was stacked for treatment resulting in the production of 43,410 oz of gold. Nearby additional resource potential were identified in a 14 km-long anomalous zone. Gold production increased to some 55,000 oz/y following the completion of a crushing and agglomerating plant relocation and expansion project. However, rebel attacks near the end of the year (2002) forced the mine to close.

The other operating mine, Angovia, opened in July 1999, is owned by CMA, a wholly-owned subsidiary of France's BRGM. The reserve was originally computed at 2 Mt of ore averaging at 4 g/t Au, giving a mine life of about six years. The Afema mine situated in the southeast of the country closed on a care-and-maintenance basis in 2001 owing to the then weak gold price. Sodemi (32%) and Eden Roc Mineral Corp. of Canada jointly own Afema, which had been producing approximately 935 kg of gold annually.

Etruscan Resources made an application for the Agbaou permit in May 2002. The permit area is situated 200 km northwest of Abidjan and covers an area of 939 km². Previous exploration, including 18,000 m of drilling, had defined a saprolite and laterite resource of 12.3 Mt at a grade of 2.2 g/t Au (847,000 oz).

In 2001 Ashanti Goldfields Co. was granted a three-year exploration permit on the Allangoua permit in the southeast close to the Ghanaian border. A rotary airblast (RAB) drilling programme was undertaken, with the focus being on old artisanal workings. Previous RAB drilling on the Abradine prospect showed that the mineralisation occurs in discontinuous pods with limited tonnage potential. However, interest remains high, primarily due to the presence of the major Afema Shear Zone in Birimian greenstone-belt rocks.

Exploration by Randgold Resources Ltd at the Tongon gold property on its Nielle permit in 2001 resulted in an increase in inferred resources of 1 Moz of contained gold to 2.9 Moz (or 34 Mt at 2.65 g/t Au). The property was the subject of a prefeasibility study in 2002. The mineralised zone has been delineated to date over a 1.4 km strike length in one zone, and over 700 m in

another. The original exploration programme was designed to assess the continuity and test the upside potential of mineralisation along two zones covering more than 4 km of strike length, believed to be extensions of the Syama gold belt from neighbouring Mali.

Golden Star Resources was actively exploring on the Tanda (Comoe) gold project during 2000. Golden Star had a 40% interest in the property in joint venture with North Ltd and Sodemi. However interest appears to have waned with no activity publicly reported during 2002.

In the first half of 2001, Australian junior Equigold commenced drilling the Bonikro gold prospect, situated on the Oume permit. In late 2002 the company reported an independently-assessed indicated plus inferred resource of 25.06 Mt averaging 1.6 g/t Au for 1.3 Moz at a cut-off grade of 0.6 g/t Au. Bonikro is 94% owned by Equigold.

In the northern part of the country another Australian junior, Afminex, is exploring the Korhogo and Tengrela gold prospects. Five significant gold-in-soil anomalies have been identified at Tengrela, close to the Mali border, with those at Sissingue and Kanakono extending over distances of 6 km and 5.2 km respectively. About 11% of the anomalies at Sissingue are reported to exceed 300ppb gold and highest values in the two zones are 8,641 ppb and 2,240 ppb respectively. Of the other anomalous areas, artisanal workings are present in the Katara anomaly and ancient workings have been noted in the Zinguinasso anomaly.

Golden Star Resources has several diamond exploration projects in Côte D'Ivoire, with the focus being on the Tortiya area. African Mining and Petroleum Resources plc (AMPR - a re-incarnation of African Carnegie Diamonds plc, a subsidiary of Australian Carnegie Minerals NL) has a joint venture with Sodemi (25%) covering the 1,000 km² Bobi and Toubabakou diamond prospects. The area covers several kimberlitic dykes and sills. The initial target is a 6 km long stretch along the Legbo River, as well as the Bobi dyke which could represent a potential source. Exploration in 2000 included trenching and sampling of the northwestern part of the dyke followed by diamond drilling but there does not appear to have been any activity since mid-2000. However, AMPR stated its intention of generating cash flow by purchasing diamonds from artisanal miners and then moving to production from the alluvial deposits.

Alluvial diamond mining has an official annual output of 20,000 ct, of which 75% is said to be gemstone quality, although actual production in 2001 was believed to be around 155,000 ct. All of the alluvial mining is sourced from kimberlite fields at Tortiya, Seguela and Korhogo.

The largest potential mining development under evaluation during 2001 was the Biankouma-Touba nickel deposit, a joint venture between Falconbridge Ltd and Sodemi, whereby Falconbridge has the option to earn an 85% interest. The project includes four deposits (Sipilou North, Fougouesso, Moyanga and Viyala), with an indicated resource of 126.4 Mt at 1.57% Ni and

0.11% Co, and an inferred resource of 138.3 Mt at 1.39% Ni and 0.12% Co. Work during 2001 was focusing on hydrometallurgical testing. The third party originally involved in the joint venture, Trillion Resources, withdrew during 2000, and Falconbridge's option entitlement consequently increased from 60% to 80%.

Necessary infrastructure to support this major venture would include a 500 km rail link between San Pedro on the coast and the project site at Sipilou, near Biankouma. The Canadian International Development Agency (CIDA) has reportedly awarded a grant of C\$600,000 to the government to cover the cost of a feasibility study for the railway to be undertaken by Canadian rail operator Canarail. It is anticipated that the same rail link could also be utilised to promote exploitation of the Mount Nimba iron-ore deposits on the border with Liberia and Guinea.

The vast iron-ore deposits at Mount Nimba and Mount Kalayo, in the western border area, estimated at 3,000 Mt, have so far attracted little attention owing to the grade of the deposits, estimated at 40% Fe. However, recent negotiations to develop a gas pipeline to service an iron-ore pelletising plant on site has been discussed with Normandy Mining, Sodemi and a Chinese investment group. There has also been talk of a rail link between Mount Nimba to the port of San Pedro.

Other commodities targeted for evaluation are bauxite resources of 1,200 Mt, manganese resources of at least 35 Mt and tantalite deposits.