

## MALI

*By Dennis Jones, Vice President, Exploration  
IAMGOLD Corp.*

**T**he Republic of Mali in West Africa covers a total land area of 1.24 million km<sup>2</sup>, ranking it slightly bigger than South Africa in size and a little smaller than Peru. It is completely landlocked and infrastructure is limited. There are less than 2,000 km of paved roads in the country and there is a single railway linking the capital city, Bamako, to the port of Dakar on the Atlantic coast in Senegal. There is also river transport from Bamako northwest into central Mali along the Niger. Around two-thirds of the country is desert and 10% of the country's population of some 10.8 million are nomadic. Desertification is a problem and the Sahara is constantly encroaching south into the country's central semi-arid zone. The savannah region in the south is where the main cultivation takes place, and about 70% of the labour force is involved in farming (and fishing).

Mali is amongst the world's poorest countries and is heavily reliant on foreign aid. The average *per capita* gross national income is just US\$240 and GDP is about US\$2.3 billion, with agriculture contributing about 45%, industry 17% and services 38%. GDP grew on average by a respectable 5% in the period 1996-2000 but it declined in 2001 as a result of lower cotton production. Cotton is the principal cash crop and also the main export earner although, in recent years, Mali's mineral resource base, specifically gold, has become increasingly important, and gold now vies with cotton as the principal export commodity. Apart from gold, phosphate, kaolin, limestone and salt are exploited to a minor extent and there are known resources of iron, manganese, copper, tin, copper and diamonds but none of these has been commercially exploited. Mali's gold deposits are associated with Birimian greenstone belts within Precambrian basement granitoids and are located in the western and southern parts of the country.

Mali's gold production in 2002 once again showed the upward trend that has been seen in the past few years. Production came mainly from three large mines, as well as from numerous artisanal workings. The Morila, Sadiola and Yatela mines produced a total of 1.8 Moz of gold in 2002, compared with 1.3 Moz in 2001.

The Morila mine in southern Mali (AngloGold Ltd 40%: Randgold Resources Ltd 40%: State of Mali 20%) produced just over 1 Moz of gold at a total cash cost of US\$73/oz. These low production costs came partly as a result of mining a high-grade zone (recovered grade of 24.4 g/t in the third quarter – September 2003). At December 31, 2002, the Morila reserves were 4.2 Moz (at a US\$325/oz gold price and a 1.4 g/t cut-off) and the total measured and indicated resources (including reserves) amounted to 4.7 Moz (146.1 t). The treatment of previously uneconomic, lower-grade resources should become possible once the present programme of plant capacity expansion (additional crushing and four additional CIL tanks) is completed. AngloGold, the mine

operator, continues to carry out exploration around the open pit. Exploration expenditures on the mine permits in 2002 were US\$1.7 million and are forecast at US\$2 million for 2003.

At the Sadiola gold mine in western Mali (AngloGold and IAMGOLD Corp. each with 38%; State of Mali 18%; International Finance Corp. 6%), 480,000 oz of gold were produced at an average total cash cost of US\$164/oz in 2002. The mine is budgeted to produce 444,000 oz in 2003 at a total cash cost of US\$196/oz. Reserves at December 31, 2002 (at a US\$325/oz gold price and cut-offs of 0.96 g/t for oxides and 1.36 g/t for sulphides) are 31.8 Mt averaging 3.0 g/t of gold giving a contained gold content of 3.0 Moz (94.0 t). Measured and indicated resources (including reserves) total 3.8 Moz (120.7 t) of gold and inferred resources amount to a further 9.6 Moz (300.0 t) of gold.

Phase V drilling of the sulphide mineralisation below the Sadiola oxide orebody has been completed and the next phase of drilling, leading to a pre-feasibility study, is due to commence in June 2003. In addition, exploration continues to define satellite oxide deposits close to the Sadiola plant. The exploration budget at Sadiola in 2003 is US\$6.9 million.

At the Yatela heap leach mine (AngloGold 40%; IAMGOLD 40%; State of Mali 20%) some 25 km to the north of Sadiola, gold production amounted to 270,000 oz at a total cash cost of US\$177/oz. Reserves at Yatela at December 31, 2002 (at a US\$325/oz gold price and a cut-off of 1.17 g/t) were 1.3 Moz (39.0 t) of gold contained in 11.2 Mt of ore at an average grade of 3.5 g/t. The resources stand at 1.5 Moz (46.2 t) of gold in the measured and indicated category (including reserves) and an additional 0.3 Moz (9.4 t) of gold in inferred resources. Gold exploration in Mali saw increased activity in 2002 and this is expected to continue through this year if the price of gold remains significantly above US\$300/oz.

The most advanced projects are in western Mali where Nevsun Resources completed a feasibility on its Tabakoto deposit in late 2002, and where Randgold Resources expects to complete a feasibility study on its Loulo and Yalea properties in 2003.

The Tabakoto feasibility study, carried out by MDM of South Africa, concluded that an open-pit operation would be viable at a gold price of US\$325/oz. The study suggested that at a mining rate of 650,000 t/y and an average grade of 5.5 g/t the operation would produce some 526,000 oz of gold at a direct cash cost of US\$185/oz and would have a mine life of five years. Capital costs would be in the order of US\$24 million. During 2002, Nevsun acquired additional ground adjacent to Tabakoto, most significantly purchasing SEMAFO's 77% interest in the Segala property for US\$9 million. The Segala measured and indicated resource, as estimated by Snowden Mining Industry Consultants of Australia, contains 15 Mt at an average grade of 2.4 g/t (at a cut-off of 1 g/t) but this mineralisation was not included in the Tabakoto feasibility study. Nevsun is in discussion concerning the negotiation of project financing.

To the west of Tabakoto, Randgold's Loulo and Yalea deposits are the subject of a feasibility study. The last reported measured and indicated resource was 3.5 Moz contained in 26.5 Mt averaging 4 g/t Au. Results of the feasibility study are expected by the second quarter of 2003.

Adjacent to Randgold's Loulo and Nevsun's Tabakoto mining leases, Axmin is actively exploring its Kofi project area. Systematic soil geochemistry and geological mapping have been completed across the permits with the identification of significant drill targets. An inferred resource has been independently estimated from the initial drilling of the first two targets. The resource totals 1.4 Mt averaging 2.3 g/t of gold. Future exploration will follow up on this initial discovery as well as systematically test the many remaining targets.

Southwest of the Sadiola mine, Robex Resources Inc. has carried out a pre-feasibility study on the La Corne placer deposit on its Diangounte property. Reserves of the placer were estimated at 875,000 oz and the pre-feasibility study carried out by BUMIGEME Inc. concluded that the 1.8 million m<sup>3</sup> of alluvium averaging 3.2 g/m<sup>3</sup> Au could be profitably mined. Production would be 30,000/oz/y with a direct cash cost of US\$66/oz. Robex is seeking financing for the project.

Southeast of Sadiola at the Kantela prospect, North Atlantic Nickel has an option to acquire a 100% interest in the property from Ambogo Consulting. There are some old gold workings on the property and a limited amount of drilling has been carried out by earlier property owners. North Atlantic Nickel also has another property close to Kantela where a soil geochemical anomaly has been identified. In addition, the company has other properties in the south.

Also working to the south of Sadiola is Great Quest Metals Ltd which has a number of properties. At the Bourdala property (an amalgamation of small miners' concessions), a limited drilling programme has indicated the presence of mineralisation with intercepts of up to 24 m averaging 2 g/t Au. Further south, adjacent to the Segala mining lease, Great Quest holds the Baroya and Kenieba concessions which cover extensive old gold workings. At Baroya, one target appears to be the extension of Nevsun's Segala deposit but only pitting and trenching has been carried out on the property to date. Great Quest also has properties, Winza and Baoule River, in the south of Mali for which it is looking for joint-venture partners.

In the south of Mali, to the south of the Syama mine (which is now on care-and-maintenance), Etruscan Resources has an option to acquire 100% of the Finkolo permit where BHP and Barrick have both carried out drilling some years ago. Etruscan has completed a detailed geophysical survey over a strike length of some 6 km. The results of this programme suggest that earlier drilling did not test the most prospective areas. Etruscan plans to drill-test these targets in 2003. Etruscan also holds the rights to the Djelimangara, Kolomba and Sanoukou concessions south of Sadiola but only preliminary

work has been done to date. Sanoukou covers extensive old and active artisanal workings.

The European-funded SYSMIN project comprising a regional airborne magnetic and a radiometric survey, has been completed but the data are not yet available to the public. Selected areas, including the Syama area in southern Mali and the Kenieba area in western Mali, have been selected for airborne electromagnetic surveys. A regional mapping programme aimed at updating all geological maps over Birimian rocks (the major host of West African gold deposits) in Mali is expected to start soon.