

MALI

*By François du Plessis and Fousseyni Diakité
Randgold Resources, Mali*

The Republic of Mali is situated in West Africa and covers a total land area of 1.24 million km². It is currently the third largest producer of gold in Africa with three mines (Morila, Yatela and Sadiola) in production and two mines (Loulo and Tabakoto) in development. With the re-opening of Syama and Kalana, which have been under care and maintenance due to the drop in the gold price during the 1990s, Mali will remain a significant gold producer in Africa.

Mali is completely landlocked and infrastructure is limited. There is less than 5,000 km of paved road in the country and a single railway linking the capital city, Bamako to the port of Dakar on the Atlantic coast in Senegal. Before the civil war in Côte d'Ivoire, the main port of entry for Mali was in Abidjan and the country has embarked on an infrastructural development programme to improve its access to the sea. The Niger River also connects central Mali to Bamako. In addition, the Bamako – Conakry; Bamako – Dakar; Bamako – Nouakchott; and the Bamako – Ouagadougou – Tema (Accra) roads are under construction or being upgraded and should all be completed by the end of this decade.

Mali is amongst the poorest countries in the world, with the average *per capita* gross national income at US\$240 and GDP at US\$2.3 billion. Agriculture contributes 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. The latest growth estimate, as supplied by the *Economist Intelligence Unit*, for Mali's GDP in 2003 is 6%.

The Mali Government has sought to bolster its economy by encouraging investment and exploration in gold mining. Exploration permits are issued for three years, renewable for the same period based on the work performed. The Government has developed a research permit procedure which allows the holder the exclusive right to explore within the permit zone and also entitles the holder to apply for an exploitation permit over a limited period.

Mali's gold deposits are associated with Birrimian greenstone belts within Precambrian basement granitoids and are located in the western and southern parts of the country. These Birrimian belts contain major metallogenic provinces, each reflecting distinct geodynamic settings.

The Birrimian supercrustal assemblages were deformed during a regional compressive event, thrust faulted and then later dissected by numerous shear zones, often mylonitic. Regional metamorphism probably peaked toward the end of the compressional regime and was accompanied by an intrusion of syntectonic granitoids.

Fluids generated by the devolatilisation of subducted volcanic and sedimentary rocks were channelled by deep crustal brittle-ductile shear zones producing mesothermal gold deposits. The overall regional structure is seen to be dominated by north – south to northeast – southwest trending structures and sub-parallel arrays of mylonitic shear zones.

Exploration work undertaken over the past 20 years indicates that the major gold mineralisation occurrences in Mali lie in close proximity to the crustal scale fault zones and secondary fault structures associated with them or to felsic intrusions.

Apart from gold, Mali also hosts deposits of phosphate, kaolin, limestone and salt, which are exploited to a minor extent, and there are known resources of bauxite, lithium, uranium, iron, manganese, copper, tin and diamonds but none of these has been commercially exploited.

There has been an upward trend in Mali's gold production in recent years but production fell slightly in 2003. Production came from three large mines as well as from numerous artisanal workings. Mali's combined gold production over the past three years was 51.31 t (1.64 Moz) in 2001; 63.69 t (2.04 Moz) in 2002 and 51.60 t (1.65 Moz) in 2003. Artisanal production contributed 3 t (0.96 Moz) each year to these totals.

The Morila mine in southern Mali (Randgold Resources Ltd 40%; AngloGold Ashanti Ltd 40%; State of Mali 20%) produced 793,992 oz in 2003 at a total cash cost of US\$100/oz. At the end of the year Morila reserves stood at 3.1 Moz and measured and indicated resources at 3.62 Moz (including reserves). Based on the current reserves it is estimated that mining will cease in 2009 but exploration for further deposits, which would lengthen the life of mine, is continuing and has shown encouraging results.

At the Sadiola gold mine in western Mali (AngloGold Ashanti and lamgold Ltd each with 38%; State of Mali 18%; International Finance Corp 6%), 453,000 oz of gold were produced at an average total cash cost of US\$210/oz in 2003. The mine is budgeted to produce 466,000 oz in 2004 at a total cash cost of US\$214/oz. Reserves at the end of 2003 are 2.6 Moz and measured and indicated resources (including reserves) total 3.1 Moz.

At the Yatela heap leach mine (AngloGold Ashanti 40%; lamgold 40%; State of Mali 20%) some 25 km to the north of Sadiola, gold production amounted to 217,000 oz at a total cash cost of US\$235/oz. Reserves at Yatela at the end of 2003 were 1 Moz and resources stand at 1.5 Moz in the measured and indicated category (including reserves).

In August 2004, lamgold agreed to merge with the international assets of Gold fields Ltd of South Africa in an all-share reverse takeover. lamgold will be renamed Gold Fields International Ltd (GFI) and will be owned 70% by Gold Fields and 30% by existing lamgold shareholders. In the preceding months, lamgold had been the subject of an unsolicited takeover offer from Denver-based Golden Star Resources Ltd.

Resolute Mining Ltd exercised its option to buy Randgold Resources' 80% interest in the Syama mine (State of Mali 20%) in April 2004, which had been kept under care and maintenance. Resources at Syama at the end of 2003 were 5.2 Moz of gold contained in 50.5 Mt of ore at an average grade of 3.2 g/t and a feasibility study is being carried out to determine the viability of restarting the mine. Elsewhere in Mali, the Kalana mine (Avnef 80%: State of Mali 20%), which is situated 250 km south of Bamako, is also scheduled to pour gold again in 2004. Gold production from Kalana in 2004 is expected to amount to approximately 15,000 oz, rising to 20,000 oz in 2005.

Gold exploration in Mali saw increased activity in 2003, and this is expected to continue through the year if the gold price remains significantly above US\$300/oz. The most advanced projects are in western Mali where both Randgold Resources and Nevsun Resources have decided to develop the Loulo and Tabakoto Mines respectively.

The Loulo gold mine project (Randgold Resources 80%: State of Mali 20%) is situated in western Mali adjacent to the Falémé River which forms the frontier with Senegal. The open-pit operation, which will be developed at a capital cost of US\$80 million, is scheduled to go into production in July 2005 and is expected to exceed 200,000 oz of gold at a cash cost of US\$233/oz per year over a six-year period, with a throughput of 180,000 t/mth and an estimated average head grade of 3.7 g/t Au. The resources stand at 5.32 Moz of gold in the measured and indicated category.

Loulo is in fact turning into two projects. Latest assay results from the ongoing deep drilling programme at the Yalea deposit continue to demonstrate continuity of mineralisation along strike and down dip, confirming significant potential to extend the projected mine life to 15 years or more.

Of the 16 deep diamond drill holes drilled to date at Yalea, seven have been drilled to depths of between 400 and 500 m below surface and have delineated the depth projection of high-grade payshoots from surface, intersecting strong sulphide mineralisation over true widths of between 3 and 36 m with grades ranging up to 40 g/t. The orebody remains open to the north and south and at depth.

Similarly, at the Tabakoto mine site, situated in southwestern Mali, construction is under way and production is scheduled to start in mid-2005. The anticipated annual milling rate is 650,000 t of ore at a delivered mill grade of 5.45 g/t Au at cash operating costs of between US\$230 and US\$250/oz.

There are about 120 exploration permits currently held by various operators with London- and Nasdaq-listed Randgold Resources considered the dominant explorer in Mali.

Both Randgold Resources and AngloGold Ashanti continue to carry out exploration around the Morila pit and within the JV mining permit, and Randgold Resources in the Morila region where drilling programmes have been commissioned.

In addition to the construction of the Loulo gold mine within the Loulo mining lease, Randgold Resources has recently announced an aggressive drilling programme aimed at extending the underground resources below the current design pit as well as following up the additional targets. Randgold Resources also holds additional exploration and reconnaissance permits both in its own right and with JV partners. These are at various stages of exploration.

Adjacent to Randgold Resources' Loulo mining lease, Axmin is actively exploring its Kofi project area. Southwest of the Sadiola mine, Robex Resources Inc has carried out a prefeasibility study on the La Corne placer deposit on its Diangounte property. Southeast of Sadiola at the Kantela prospect, North Atlantic Nickel has an option to acquire a 100% interest in the property from Ambogo Consulting. Also working to the south of Sadiola is Great Quest Metals which holds the Bourdala property and the Baroya and Kenieba concessions. To the south of the Syama mine, Etruscan Resources holds the rights to the Djelimangara, Kolomba and Sanoukou concessions and has the option to acquire 100% of the Finkolo permit where BHP and Barrick both carried out drilling some years ago. Malian citizens have also become active in these areas and are shareholders in advanced projects such as Foulabala (in the Bougouni region), Banakoro (Kangaba), Kantela (Sadiola area) and Kodieran (in the Kalana region).