

**Ramsar Advisory Missions – No. 66:
Cayo-Loufoualeba, Republic of Congo (2010)**

23-27 June, 2010

MISSION REPORT

by

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Photo: Alexia Dufour

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Summary

- S1 This report presents the findings of an Advisory Mission focusing on the Cayo-Loufoualeba Ramsar Site in the Republic of Congo, undertaken from 23-27 June 2010. The Mission was requested by the Government of Congo to assist with their consideration of the potential impacts of a proposed mine for the extraction of potash (potassium chloride), in particular from the abstraction of large volumes of water needed for the intended method of “solution mining”.
- S2 The Mission was undertaken jointly on behalf of the Ramsar Convention, the Convention on Migratory Species (CMS) and the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA), against a background of increasing international concern about threats to wetlands from extractive industries.
- S3 A brief characterisation of the Cayo-Loufoualeba Ramsar Site and its international significance is presented. The designated area consists of two freshwater lakes and a complex of other coastal and terrestrial wetland habitats, which exhibit a large seasonal variation in rainfall, river flows and water levels. There is high biodiversity interest, and people benefit from a range of services provided by the ecosystem, including fish and other wetland resources on which many local inhabitants depend.
- S4 The report gives an overview of the potash mining development, the initial stages of which have already begun. The mine site itself (at Mengo) lies outside the Ramsar Site, but is linked to it in terms of water supply, gas supply (for power generation), and effluent brine disposal on the coast. The projected operational life-span is 20 years, and it may be extended beyond that.
- S5 The Mission reviewed material contained in an Environmental and Social Impact Assessment (ESIA) for the development. Although this material is extensive, a number of questions remain, and it is of concern that authorisations were given and pre-construction activities begun before the Assessment was formally approved. Some comments are made on the future development of the national Environmental and Social Assessment process.
- S6 In respect of water abstraction, one concern arises from the basing of water level projections in the ESIA on data for low flows that is up to 30 years old, and which therefore may not correctly reflect present-day conditions. Suggestions are made concerning contingency safeguards in the event of abstraction impacts on the Ramsar Site, and the Mission recommends an expansion of the rather limited plans for monitoring.
- S7 Ultimately, the likelihood is that abstraction for the mine, although involving large volumes of water, will only change water depths in the Ramsar Site by a matter of millimetres in the context of a natural seasonal variation measuring more than a metre. Of itself this is unlikely to constitute a significant adverse impact on the ecological character of the site. More important determinants are likely to be changes in patterns of rainfall and management of the connection between the Loémé River and the sea. This underscores the importance of addressing all influences on the Ramsar Site together, in an integrated regime of protection and management (including water resources).

- S8 The Mission was asked to give some attention to plans for a pipeline to carry gas to the potash plant at Mengo, most likely from Djeno/Côte-Matève on the coast, and crossing through part of the Ramsar Site. While not examined in depth, concerns are raised in relation to the separate pipeline ESIA's scant attention to wetland aspects, and there remains a lack of clarity about the status of different route options. Some concerns reported by local people in connection with an existing pipeline in the same area are also mentioned.
- S9 The planned disposal of brine effluent from the mine into the sea off Pointe Noire is briefly discussed. Recommendations are made on future monitoring, including coverage of cumulative effects and potential impacts on marine turtles (five species of which occur in the area).
- S10 Arrangements for the post-closure phase of mines can often be a weak and contentious element of associated plans and assessments, and greater attention to this is recommended in the present case.
- S11 The report comments on a number of other issues not connected to the mine but relevant to the management and protection of the Cayo-Loufualéba Ramsar Site. These include existing pipelines, threats from other developments, saltwater intrusion and invasive species. Some extensive oil terminal and power station infrastructure sits within the Ramsar Site boundary, mostly constructed prior to the Ramsar designation, but it is of concern that apparently some further developments have taken place since designation, seemingly without impact assessment studies or the submission of reports required under Article 3.2 of the Convention.
- S12 Recommendations are put forward on management planning and on statutory protected area status for the Ramsar Site.
- S13 A final section reviews various wider issues discussed with the Government and other stakeholders during the Mission, including education and awareness activities, improving knowledge of wetlands and migratory species, projects on the conservation and management of coastal mangroves, marine turtle conservation, transboundary and sub-regional activities, further work towards a National Wetland Policy, and strengthening Congo's National Ramsar Committee.
- S14 Twenty-two recommendations are made throughout the report, and for convenience the texts of these are repeated in a special concluding section.
- S15 As with any Ramsar Advisory Mission, this report is not an end in itself, but represents one stage in a process. It will be followed by actions within Congo to implement the recommendations and to monitor and report on progress. Dialogue and support from the three Convention/Agreement Secretariats will continue. In the context of fast-moving global interest in wetlands and extractive industries, catchment-based water resources management, coastal biodiversity conservation and a range of other key issues, this case example has the potential to offer a wealth of valuable experiences for wider audiences. Strong encouragement should be offered to all concerned in Congo for their continuing efforts towards securing the conservation and wise use of wetlands throughout the country.

1. Introduction and purpose of this report

The Ramsar Advisory Missions process

- 1.1 Ramsar Advisory Missions are a means by which the Convention on Wetlands (Ramsar Convention) provides technical assistance to Contracting Parties in the management and conservation of listed wetlands of international importance (Ramsar Sites) whose ecological character has changed, is changing or is likely to change as a result of technological developments, pollution or other human interference.
- 1.2 The Mission procedure (formerly known at different times as the Monitoring Procedure and the Management Guidance Procedure) was formally adopted by Recommendation 4.7 of the 4th meeting of the Conference of Parties (COP4) in 1990. Funding for Missions is typically from extra-budgetary sources which need to be sought each year. The main objective is to undertake fact-finding activities and to provide advice (always and only at the request of the Party concerned) in solving problems relating to the maintenance of the ecological character of a particular Ramsar Site or sites. Missions are sometimes also able to contribute advice and assistance on other Convention implementation issues at the same time. Reports are published, once they have been agreed by the recipient government, and this offers lesson-learning benefits for the Convention as a whole.
- 1.3 It is a Convention requirement (Article 3.2) that information on actual or potential changes in ecological character of Ramsar Sites should be passed without delay by the relevant Contracting Party to the Ramsar Secretariat. In some cases information arrives first from other organisations or individuals.
- 1.4 Part of the purpose of many Ramsar Advisory Missions is to provide an additional (international) source of assurance for the decision-making process, through auditing, testing and peer-review. This means that it is not necessarily expected that a RAM will generate ideas or insights that have not already been thought of, but it will cast them in a new light, bring independent scrutiny, and distil those issues that have particular relevance to the requirements and the adopted guidance of the Convention.
- 1.5 In this sense the approach which gives best value to the inviting country is often one of “constructive challenge”. Stakeholders should not therefore see it as primarily inquisitorial or compliance-based, but rather as an opportunity for the relevant authorities to test and demonstrate the quality (thoroughness, precaution, transparency, consistency, etc.) of the decision-making processes involved, in the context of Ramsar requirements. It is thus “advisory” in the true sense.
- 1.6 In some cases the issues at stake are of concern also to other Multilateral Environmental Agreements (MEAs), for example where the Ramsar Site carries another international designation. A fruitful practice has developed for several such Missions to be undertaken on a joint basis with representatives of Ramsar and the other MEA(s) concerned, and this was the approach taken in the present case (see below).

Purpose and objectives of the Mission to Cayo-Loufoualeba

- 1.7 In late 2009 the Ramsar Administrative Authority for Congo (the Ministry of Tourism and the Environment, now the Ministry of Sustainable Development, Forest Economy and the Environment) drew the attention of the Convention Secretariat to proposals by the company MagMinerals Inc for development of a mine for extraction of potassium chloride (commonly referred to as potash) at Mengo, northeast of the coastal city of Pointe Noire in the Department of Kouilou. While the location of the proposed mine is some 25 km from Cayo-Loufoualeba, there were concerns in particular as to the potential impact of the proposed continuous pumped abstraction of significant volumes of water from the Loémé river upstream of the Ramsar Site.
- 1.8 The Ministry requested the Convention's assistance in ascertaining the situation on the ground, evaluating the possible implications for the Cayo-Loufoualeba complex, and determining the measures that may be necessary to ensure the maintenance of the ecological character of the Ramsar Site.
- 1.9 Accordingly a Ramsar Advisory Mission was organised and took place from 23-27 June 2010, involving field visits; review of documents; meetings with government officials at national and local levels, staff of the mine and pipeline operating companies and NGO representatives; and consultations with local communities. Details of the programme and participants are given in the Acknowledgements and the Annexes at the end of this report.
- 1.10 Funding for the Mission was provided from the Ramsar Convention's Swiss Grant for Africa. (The Swiss Grant is a financial contribution generously made each year by the Federal Government of Switzerland, over and above the national assessed dues paid to the Convention's core budget, and it is dedicated to supporting wetland observation and wise use and the implementation of the Convention in Africa).
- 1.11 In addition to the Ramsar Convention, which the Republic of Congo joined in 1998, the country is also a Contracting Party to the Convention on Migratory Species (CMS), which it joined in 2000, and the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA, an Agreement as defined by the CMS), which it joined in 1999. Given the shared interests of all three MEAs in the values represented by the Cayo-Loufoualeba complex, a representative of AEWA and CMS participated in the Mission team (see Annex A), and the Mission formally became a joint mission on the part of these three MEAs, with coordination provided through the Ramsar Advisory Mission process.
- 1.12 The Terms of Reference for the Mission agreed between the Ramsar Secretariat and the Administrative Authority in Congo set out a number of primary objectives. At the initial meeting with Ministry officials the scope of these was updated and refined slightly, and the final objectives can be summarised as follows:
 - a) to review the potential implications for the conservation and wise use of the Cayo-Loufoualeba Ramsar Site of water abstraction from the Loémé river for the proposed potash mine at Mengo;

- b) to review the potential implications for the Ramsar Site of the construction of a pipeline for supplying gas to the proposed potash mine;
- c) to comment as appropriate on relevant impact assessment studies associated with the mine project, having regard to relevant Ramsar guidance;
- d) to review any other activities potentially posing a threat of changes to the ecological character of the Ramsar Site;
- e) to consider options for avoiding, minimising or mitigating negative impacts on the area's wetland ecosystems, their biodiversity and their services to people;
- f) to identify other key issues of relevance to the protection and management of the Cayo-Loufoualeba Ramsar Site, including the possibility of a site management plan, having regard to relevant Ramsar guidance;
- g) to seek the opinions of local people in the area of the Ramsar Site on the matters listed above;
- h) to comment as appropriate on wider issues concerning the implementation in the Republic of Congo of the Ramsar Convention, the Convention on Migratory Species, and the African-Eurasian Waterbird Agreement;
- i) to make recommendations to the Government of Congo (and others as appropriate) on the matters listed above.

1.13 It must be emphasised that a visit of a few days' duration cannot hope to do more than gain the briefest overview of a situation of the scale and complexity of that at Cayo-Loufoualeba. A Mission such as this does not purport to be an in-depth survey or assessment, but aims merely to form a rapid impression from an external perspective, and to provide a platform for synthesising some key points from the information obtained. Definitive findings as to environmental and social impacts, legal and policy implications and so on, must properly remain the province of other more specific studies on those matters.

2. The Ramsar Convention and extractive industries

- 2.1 The Cayo-Loufoualeba case sits in a strategic context of special concern in the Ramsar Convention in recent years regarding international trends in pressures on wetlands from mining and extractive industries of various kinds, and as such it forms a case example of some wider issues.
- 2.2 From about 2006 onwards, Contracting Party governments in Latin America and Africa in particular began increasingly to request scientific and technical guidance related to the impacts of mining and extraction in and around wetlands. Initially the emphasis was on oil and gas exploration and exploitation, but growing concerns related to virtually all sectors of the extractives industry, including precious and base metals, coal, sand and gravel, industrial minerals, peat and some renewable resources such as salt and soda ash.
- 2.3 The Convention's Scientific and Technical Review Panel (STRP) commissioned a special briefing paper on this subject, which was presented at the regional meeting of African Parties in Yaoundé, Cameroon, in November 2007 (Brown 2007). This showed that drivers for the trend of growing activity included a combination of accelerating global demand, high commodity prices, and low stockpile levels. Deposits previously regarded as marginal were becoming more economic to exploit, aided by ever-evolving extraction technologies. Globalised investment possibilities, for example increasingly involving finance from China (as in the present case), had expanded the funding options, and countries achieving new political stability became prime targets for rapid exploitation. A particularly notable trend was the shortening of timeframes for moving from exploration to exploitation, often severely compressing assessment and decision-making processes.
- 2.4 An information paper was then tabled at the 10th meeting of the Conference of Parties (COP10) in Changwon, Republic of Korea, in 2008 (Ramsar Secretariat, 2008a), and following debate the COP adopted Resolution X.26 on "Wetlands and extractive industries", which encourages a range of good policy and operational practices. Key elements in these discussions included:
 - governance (due process, independence, transparency, robust regulatory environment, capacity for compliance enforcement, responsibility for post-closure phases);
 - corporate social responsibility (i.e., on the part of the private sector operators);
 - an adequate scientific/technical information and knowledge base to support decision making and implementation of environmental safeguards (relating both to specific mining activities and to specific wetland values and vulnerabilities);
 - information and general guidance on best practices.
- 2.5 While the importance of treating these issues as an integrated package was recognised, there was seen to be a particular short-term need to improve the scientific and technical knowledge base so that the functions, sensitivities, resiliences and values (ecological, socio-economic and cultural) of wetlands can be adequately considered in decision-making and permitting procedures and in all phases of mining/extraction projects. The Resolution also emphasises the importance of early notification of proposed exploration and

extraction activities in order to provide sufficient time for collection of wetland inventory and baseline information in areas potentially affected.

- 2.6 The Convention Parties have already adopted or been provided with various tools and guideline texts on issues such as valuation of wetland ecosystem services, environmental impact assessment (EIA), strategic environmental assessment (SEA), and responding to change in wetland ecological character. There is less adopted thinking in the Convention on corporate social responsibility (CSR), but with recently increased development of Ramsar engagement with the private sector, this may receive greater policy attention in future as an element of the “wise use of wetlands” concept developed under the Convention.
- 2.7 Two other Ramsar Advisory Missions (RAMs) in the African Region have been prompted by minerals-related issues in recent years: one concerning soda ash at Lake Natron Basin in Tanzania in 2008 (Wilson *et al* 2008) and one concerning oil and gas at Marromeu Complex, Mozambique (Pritchard 2010).
- 2.8 In its work programme for 2009-2012 the STRP has further tasks on extractive industries and wetlands, including a review of guidance and the systematic identification of wetlands at risk. The Technical Committee of AEWA has identified similar needs for the same period, so insofar as the work relates to the regions of the AEWA flyway, this is being pursued as a joint endeavour between the Convention and the Agreement. Cayo-Loufoualeba and the other two recent African RAMs will provide important case-example inputs to this work. Hopefully the outputs will enhance the assistance that Ramsar and AEWA are able to provide to these and other Contracting Parties in future.

3. Overview of the Cayo-Loufoualeba Ramsar Site

- 3.1 To date, Congo has designated seven sites as Wetlands of International Importance (Ramsar Sites), with a combined surface area of 8,454,259 hectares. Cayo-Loufoualeba was listed in December 2007 and covers 15,366 hectares. It is located in the Department of Kouilou on the Atlantic coast in the southwest of the country, between the city of Pointe Noire to the northwest and the border with the putative Angolan province of Cabinda to the southeast (see Figure 1). It lies about 420 km from the Congolese capital, Brazzaville.

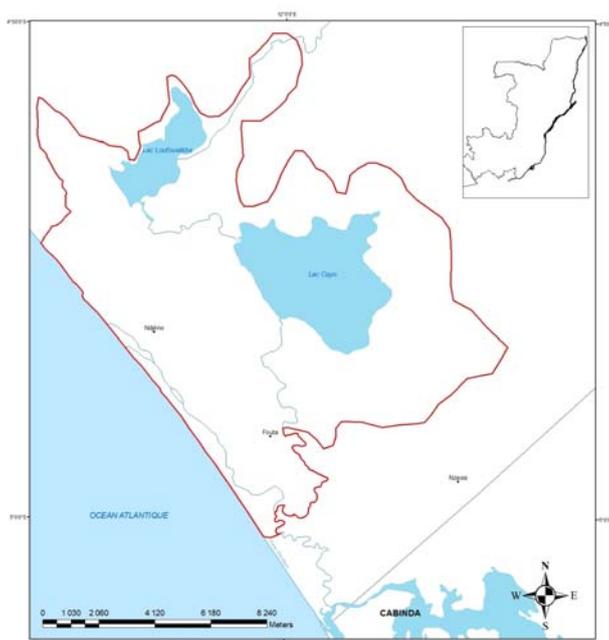


Figure 1: Location and boundary of the Cayo-Loufoualeba Ramsar Site

- 3.2 In addition to the two freshwater lakes, Cayo (the larger) and Loufoualeba, the site contains a complex of coastal and terrestrial wetland habitats, including the Loémé and Malonda rivers, mangroves, marshes, islets, streams and seasonally inundated forests. The seaward boundary is presumed to follow the tideline, thus embracing both salt and brackish areas within the site.
- 3.3 The quantity of water supplied from the Loémé river and the extent of wet areas within the site vary seasonally. Heavy rains typically fall from October to December with a peak in November; January sees a period of lighter rain and then moderate rains fall from February (another peak) until May, while from May/June to September it is mostly dry. Flows in the Loémé can range from 15 m³ per second (in August) to 45 m³ per second (in April), with the volumes of both lakes more than doubling (from 8 to 17 Mm³ in Loufoualeba and 30 to 70 Mm³ in Cayo), and water-levels rising by as much as 1.3 metres. The Ramsar Site performs valuable aquifer recharge and flood attenuation functions in this context.
- 3.4 According to the official Ramsar Information Sheet (RIS) for the site, Cayo-Loufoualeba qualifies a Wetland of International Importance on the grounds of meeting Ramsar criteria 2, 3 and 4 (species or communities that are endangered; ecosystems that are ecologically or biogeographically

important), as well as criteria 7 and 8 (significant populations of fish and sources of fish stock resources).

- 3.5 Red-listed species supported by the site are said to include hippopotamus (*Hippopotamus amphibious*), chimpanzee (*Pan troglodytes*), and gorilla (*Gorilla gorilla*), and the swamps of *Cyperus papyrus* are a favoured haunt of the marsh buck or sitatunga (*Tragelaphus spekei*) and the air-breathing fish *Protopterus annectens*, *Clarias gabonensis* and *C. buthupogon*. Other fish families represented include Bagridae, Claroteidae, Cichlidae, Mormyridae and Channidae, and a variety of crustaceans also occur. Further information on fish and invertebrates in the region around Pointe Noire, including Lake Loufoualeba, can be found in Mamonekene (2005) and Mamonekene (2006).
- 3.6 A total of 378 bird species have been recorded, of which 284 are regarded as breeding within the site. The Loango weaver (*Ploceus subpersonatus*) is classed as globally threatened, while other species of particular interest include Damara tern (*Sterna balaenarum*) and black-headed bee-eater (*Merops brewerii*).
- 3.7 Of 200 species of waterbirds which are restricted to the Congo-Guinea biome, 138 have been recorded within the Cayo-Loufoualeba Ramsar Site, including the white-crested tiger heron (*Tigriornis leucocephalus*), spot-breasted ibis (*Bostrychia rara*), Congo serpent-eagle (*Dryotriorchis spectabilis*), red-thighed sparrowhawk (*Accipiter erythropus*), long-tailed hawk (*Urotriorchis macrourus*), Cassin's hawk-eagle (*Spizaetus africanus*), and Latham's francolin (*Francolinus lathamii*). The site also hosts migratory white storks (*Ciconia ciconia*), pink-backed pelicans (*Pelecanus rufescens*), and marabou storks (*Leptoptilos crumeniferus*).
- 3.8 Within this extensive site there is a number of small and scattered human settlements, home to around 1,200 people who depend for their livelihood on the natural resources of the area. This hinges predominantly on their use of the fish resources, both for subsistence use and for selling locally. Fish are caught by net and some by line: the process is organised on a communal basis, and local knowledge of distribution and spawning cycles, etc., appears well-developed. Net mesh-size prevents capture of the youngest fish. Fishing is also practised by others from nearby areas, and hence this resource is of considerable significance in the overall economy of Kouilou.
- 3.9 Agriculture is also undertaken in the site, principally in the form of cultivation of manioc on patches of savannah grassland cleared by burning, and growing of vegetables in the silty margins of the lake where these become exposed during the dry season. Wood is collected for hut construction and for domestic fuel, and a small amount of hunting also takes place.
- 3.10 The RIS also cites cultural values of the site, in relation to spiritual beliefs and traditions concerning aspects of the wetland environment, and in relation to a richness of traditional knowledge.
- 3.11 Human uses of a more modern kind also feature. The main national highway 4 runs along the coast through the Ramsar Site; and in the Djeno area along the northern section of the highway lies a civic power station and the country's principal oil terminal, run by Total. The power station and at least part of the terminal are within the Ramsar Site boundary; but in both cases

their construction pre-dates the Ramsar designation. (Issues raised by this are discussed later in this report).

- 3.12 The site does not have statutory protected area status and as yet there is no site management plan. In some areas resource use is restricted to local community members; and under hunting laws a close season applies in the site from 1 November to 1 May.

4. Overview of potash mining proposals at Mengo

- 4.1 The overview below is based mainly on information in the project pages of the MagIndustries Corporation website (<http://www.magindustries.com/innerpage.aspx?pageid=116>) and in the extensive Environmental and Social Impact Assessment completed for the project in 2009 (GENIVAR 2009). The object here is not to give a summary of the entirety of this major project, but simply to provide a brief introductory context for the selected aspects that are of relevance to the Ramsar Site. Those aspects are then treated more specifically in the sections of this report which follow.
- 4.2 MagIndustries Corp. was founded in 1997 in Canada, and its subsidiary MagMinerals Potasses Congo SA was established to develop a production plant for potassium chloride (KCl), known as potash, near Mengo in the Congolese Department of Kouilou. Potash reserves in the area are estimated to be sufficient to support a production rate of 600,000 tonnes per year for at least 20 years. The intention would be to supply agricultural fertilizer to countries such as India, China and Brazil, where demand is growing as a result of heavy depletion of soil nutrients and expanding markets for biofuels.
- 4.3 KCl is a salt which is found in association with magnesium salt, in the form of carnallite, contained in carnallitite. The Department of Kouilou is underlain by one of the largest carnallite deposits in the world. Abundant supplies of local natural gas (for power generation and for the evaporation stage of the mining process) and proximity to one of the largest deepwater ports on the Atlantic coast of Africa (at Congo's "second city" of Pointe Noire) are practical advantages of the location which enhance the economic cost-effectiveness of extraction at Mengo.
- 4.4 The proposed plant lies in an area of eucalyptus plantations. MagIndustries acquired the local timber corporation that had been operating the plantations in the Mengo area, and another subsidiary, MagForestry, now manages them on a commercial basis.
- 4.5 Extraction in this case is proposed to be undertaken by the "solution mining" method. The carnallitite lies in four underground layers or "horizons", at depths ranging from 400 to 1,200 m below the surface. The uppermost horizon will not be mined, in order to avoid contamination of groundwater. In the other three horizons, soluble mineral deposits will be extracted by pumping in water heated to 95°C through a series of interconnected boreholes to dissolve the carnallite and form a brine solution, which is then pumped to the surface. Evaporation and cooling of the brine then crystallizes the KCl, which is processed into granular potash. The product will be transported by train to a storage and bulk loading terminal at the port of Pointe-Noire.
- 4.6 Extraction creates underground caverns. These are back-filled with injected sodium chloride and magnesium chloride brine (a by-product of the extraction process), which on cooling crystallises and solidifies to seal the caverns and stabilise pressures to avoid cavern collapse and influx of water from surrounding aquifers. The uppermost cavern will be separated from the groundwater-bearing strata above by 70 m of impermeable salt rock.

- 4.7 Residual brine effluent is to be transported 26 km away by a buried pipeline and discharged into the sea off the port of Pointe Noire. The disposal outfall will be 1.1 km offshore and will have a diffuser system (this aspect of the project is discussed further in section 7 below). Quantities to be disposed will reduce after the first two years of operation, when a proportion of the surplus will be used for backfilling the extraction caverns as described above.
- 4.8 Gas (referred to above) will be supplied to the plant by pipeline, most likely from Djeno to the south (this aspect of the project is discussed further in section 6 below). Water will also be supplied by pipeline, from a pumping station to be built on the Loémé river to the southeast (and this aspect of the project is discussed further in section 5 below).
- 4.9 The area of the plant itself will contain a variety of constructed infrastructure including pipelines, roadways, tank farms, warehousing and other storage areas, workshops, a power plant, a storm water collection basin, and a train loading station, as well as various administrative buildings and facilities for workers.
- 4.10 A range of operational matters are detailed in the Environmental and Social Impact Assessment commissioned by MagMinerals from GENIVAR and already referred to above. These include arrangements for waste disposal, landscaping, surface water management, control of hazardous materials, and social aspects. A series of topic-specific environmental and social management plans forms part of the ESIA, including for example a Biodiversity Management Plan and a Water Management Plan, which will be referred to further in other sections of this report. All are available from the ESIA web-page (in English only) at <http://www.magindustries.com/innerpage.aspx?pageid=167> . Some issues concerning the ESIA process are discussed in section 10 below.
- 4.11 In April 2008 a mining permit was granted to MagMinerals for proceeding with the project. The permit is valid for up to 25 years, and extensions of up to 15 years at a time can be applied for. Drilling of initial wells and other pre-construction activities began in late 2008. It was however only in February 2010 that the Ministry of Sustainable Development, Forest Economy and the Environment approved the ESIA. The main construction phase is expected to start in January 2011, with production occurring from early 2014.
- 4.12 With oil exports providing nearly 90% of state revenues in Congo at present, the Kouilou potash project is seen by its proponents as the first major diversification of industrial activity in the country. According to the ESIA, the 20-year extraction proposed is “the first step in a long-term project to develop a large deposit of magnesium, sodium and potassium salts” in the area.

5. Potential impacts of water abstraction

Water requirements for the mining operation

- 5.1 The mining operation at Mengo will require water for servicing domestic uses, drinking water, etc., and for the solution-mining and potash production process itself. It is the quantities required for the latter purpose (accounting for 95% of the water cycling through the plant) which are addressed here.
- 5.2 The solution-mining process requires a continuous flow of water for the entire productive lifetime of the plant. At Mengo this essentially divides into two phases. For the first two years of production, as the first carnallite deposits are dissolved and extracted, the entire volume of brine effluent is piped to the sea. After this period, a proportion of the effluent will be used instead for back-filling of excavated caverns, and with the reduction at that stage in volumes of effluent going to distant piped disposal, there will be a reduction in overall water requirements for the plant.
- 5.3 In the first phase, the requirement is understood to be for 1,040 m³ of water per hour (equating to 2% of the hourly river flow rate), falling in the second phase to some 540 m³ per hour for normal operations. The latter figure equates to an average consumption of approximately 4.3 million cubic metres per year. (These are the figures cited in the ESIA, where other figures including 1,038, 532 and 535 m³ per hour, and 8M, 4.5 M and 5 Mm³ per year respectively are also mentioned. Although these different figures arise partly from inclusion or exclusion of a small element of supply from rainwater at Mengo, and inclusion or exclusion of a small element of consumption for potable use in addition to use for potash extraction, the full reason for a difference of 700,000 m³ per year between the lowest and highest phase two figures used in the same document is not clear. An earlier communication to the Mission from the Ministry had cited yet another phase two figure, of 670 m³ per hour).
- 5.4 Investigations of potential water sources were commissioned by MagMinerals from the Canadian engineering and construction group SNC-Lavalin, who initially considered two possibilities: underground water pumped from large-diameter wells in the Mengo area, and surface water pumped from Lake Cayo.
- 5.5 Contrary to initial expectations, SNC-Lavalin's hydrogeological studies in 2005 showed that the Mengo area aquifers would not in fact have sufficient capacity to produce the flows required for the potash mine. Moreover, there were concerns about potential impacts on the water supply for the city of Pointe Noire, for which the same aquifer system is a principal source.
- 5.6 Attention turned in mid-2007 to Lake Cayo as a possible source of freshwater. The project team then became aware that lakes Cayo and Loufoualeba were in the process of being designated as a Ramsar Site, and so an alternative option was sought. It is not clear from the ESIA documentation what range of possibilities was considered at this stage, but the choice was eventually made to select a site on the Loémé River as the abstraction point, flow rates on the Loémé having been assessed as well above the potash mine plant's requirements. This location is also some 9 km closer to the plant than an abstraction point on the lake would have been (see Figure 2).

- 5.7 Although the motive for avoiding direct abstraction from the lake had primarily been to avoid incursion into the Ramsar Site, and selection of the river location does avoid infrastructure construction in the designated area, the Loémé supplies water to the Ramsar Site. Thus, with the proposed location of the abstraction point being upstream of it (at a distance of about 5 km from Lake Loufoualeba), potential concerns about impacts remained, as discussed below.

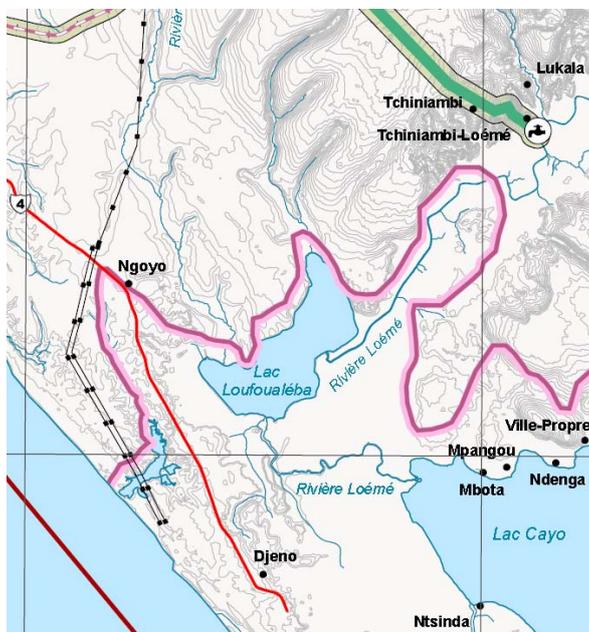


Figure 2: Location of proposed Loémé River water abstraction site (top right of map). Purple line shows the boundary of the northern part of Ramsar Site. (Source: adapted from ESIA).

- 5.8 Prior to the “first phase” described above, the intention would be for the Loémé River source also to provide water for the plant construction period, including for pre-solution mining cavern development.
- 5.9 Water resources in Congo are regulated under a National Water Policy and a Water Code, which provide for the protection and exploitation of surface and groundwater resources, the supply of drinking water, and the management of other water uses. Water abstraction is the responsibility of the Ministry of Energy and Hydraulics (i.e., not the Ministry of Environment, and thus separate from the national Ramsar Administrative Authority).

Proposed pumping station and water pipeline

- 5.10 At the proposed abstraction site, a pumping station will be constructed to pump the required water from the main channel of the Loémé River. (No construction or preparatory works had yet been begun at the time of the Mission visit). The pumping station will include a one-storey metal building (18 m x 12 m x 7 m), the pumps themselves, a feeder channel (6 m x 12 m x 8 m), a concrete retention basin (15 m x 4.5 m x 4.6 m), a 22 kV electrical power substation (7.25 m x 7.65 m, including an underground transformer oil collection pit), and a 7 m embankment.
- 5.11 To transport the pumped water to the mine site at Mengo, a 20 km long, 16 inch diameter carbon steel pipeline will be built and buried at a depth of one metre. An access roadway will be laid alongside the route of the pipeline, and

along the same route will be erected an overhead 22 kV power line to supply electricity to the pumping station from the mine site's gas turbine power plant.

- 5.12 The Potash Investment Agreement signed by MagIndustries Corp., MagMinerals Potasses Congo SA (MPC), and the Government of Congo assigns rights to MPC to operate a water pipeline from the Loémé River abstraction site to the plant at Mengo, without charge and free of taxes, subject *inter alia* to its operation in accordance with "good industry practice", including in particular "respect for the protection of the environment".

Water requirements for the wetland ecosystem

- 5.13 The Ramsar Convention promotes the development and application of techniques for estimating the so-called "environmental water requirements" of wetlands, and regulatory regimes for assigning "environmental flow allocations" for maintaining their ecological functions in the context of river basin or catchment management of water resources.
- 5.14 In principle a good starting-point would be to itemise those interests contained in a Ramsar Site which are considered to be critically dependent on water quantity, flow rate and patterns in periodicity/seasonality of water supply and distribution. Hydrological studies would then be required to characterise the water transfer mechanisms within and around the site, including the relationships between surface-water and groundwater flows.
- 5.15 Some relevant guidance is provided for example in Ramsar Convention (2002a) and (2005), and further guidance on determination of environmental water requirements and determination and implementation of environmental flow allocations is expected in future in the *Ramsar Technical Reports* series. The Convention's guidance on consultation and participation of local communities in wetland management (Ramsar Convention, 1999a) is also often relevant.
- 5.16 These approaches (apart from the community participation dimension) are strongly linked to the availability of technical data and thus to survey and analysis capacity. At present therefore they are of more theoretical interest in the case of Cayo-Loufoualeba, where central government resources for such work have been severely limited. In relation to a private sector development project, however, it is important that this indication be given of global good practice in this regard, *inter alia* as context for future arrangements for monitoring (referred to later below).

Potential abstraction impacts and their minimisation

- 5.17 Concerns on the part of the national Ramsar Administrative Authority about potential impacts on the Ramsar Site from the water abstraction proposals were the original motivation for their request for an Advisory Mission, as described in section 1 above.
- 5.18 At the village communities where the Mission held brief consultations during its field visits on 26 June, local community representatives also voiced concern about potential downstream effects of a reduction in water flows, specifically on fish reproduction. Villagers at Mboulou Ntombi recounted how they had observed a reduction of fish numbers when seasonal water abatement occurred earlier in the year than usual in 2007 and 2010, and

reasoned that any overall lowering of water levels in the wetland system could have analogous effects.

- 5.19 At both national and local level these concerns have been expressed in general and anecdotal terms. The Mission itself was in no position to make any empirical observations or test in practice what may or may not be likely to occur: the comments made here are therefore reliant on the data and conclusions presented in the existing Environmental and Social Impact Assessment.
- 5.20 The ESIA compares the planned abstraction rates (see above) to the 100-year low flow level in the Loémé River, based on historical water-level measurements undertaken at a sampling station on the river at the downstream extremity of the Ramsar Site (Poste Frontière), and on meteorological data. The annual average flow rate is said to be 27 m³/s and the 100-year low flow to be either 7.1 or 7.3 m³/s. The off-take rates required for the mine are said to be 0.28 m³/s during the first two years of operation, and 0.15 m³/s during normal operation thereafter. The assessment report equates these figures variously to 3.9 % or 4.1 % of the 100-year low flow for the first two years (as mentioned above, the ESIA is not fully internally consistent in the water abstraction requirement figures it cites) and 2.1 % thereafter.
- 5.21 A hydrological study in 2007 by SNC-Lavalin used yet another abstraction requirement figure, of 0.18 m³/s for the “normal operation” phase, or 2.5% of the low flow rate. This study is cited in the ESIA report as the source of a calculation as to the effect on water levels downstream of the pumping station, which are predicted for the open water body of Lake Cayo to amount to a lowering of the water level in 100-year low flow conditions of no more than 5 mm. The first two-year phase obviously takes more water, but even an assumed doubling of this result would only be a matter of a 10 mm drop in the levels in the lake in 100-year low flow conditions.
- 5.22 It is not clear how the calculations were made concerning change in lake levels, and the Mission was not provided with the SNC-Lavalin study. In a complex of marshes and lakes such as Cayo-Loufoualeba, and in an area of marked seasonal fluctuations in water availability and distribution, only part of the story will be told by predictions relating to a single open-water sampling location and a single low-flow benchmark. More critical effects of reduced water quantities in the system overall might be expected at the extremities of the normal extent of water distribution, i.e., at peak flow times as well as low flow times (areas inundated once a year becoming permanently dry, for example).
- 5.23 A bigger question may arise in relation to the assumptions made concerning the reference flow data used. The 100-year low flow figure appears to be based on a 25-year run of meteorological data ending in 1980, and a nine-year run of hydrological data ending in 1982, collated by French researchers from ORSTOM (Office de la Recherche Scientifique et Technique d’Outre-Mer). Monitoring began again in October 2008; but no comment is made in the ESIA on trends in water availability over any of these periods; and it is therefore not clear how much confidence can be placed in the quoted 100-year low flow figure as a correct benchmark for the future, given the age of the data and the scope for things to have changed since they were collected.

- 5.24 This point emphasises the importance of taking a strategic view, in both temporal and spatial terms. Regional trends in water supply and demand (precipitation and land-use) are highly relevant. The catchment includes areas of eucalyptus plantations, which can have a major effect on water balance. Pointe Noire currently takes its water from the Gambouissi River and from several aquifers; but the city is expanding and its water demands increasing: examination of options for future supply are said to include an option of sourcing water from the Loémé. Climatic trends in the region may indicate possible future changes in volumes (and timing) of rainfall in the catchment. All these issues are relevant to a potential question of cumulative impacts of abstraction in combination with other factors, and to the robustness of the ESIA's low flow benchmark as a basis for predictions.

Recommendation (i): A strategic review of existing or potential future abstractions by other operators elsewhere on the Loéme and Tienga rivers should be undertaken, inter alia to provide a fuller context for the recommendations on water management below and on management in the Ramsar Site more generally. The development of an integrated water resources management framework for these rivers should also be considered.

- 5.25 All this being said, it would appear from the SNC-Lavalin figures that in reality the magnitude of any change in water quantity resulting anywhere in the Cayo-Loufoualeba system is expected to be very minimal, and it is unlikely to have an adverse effect on the ecological character of the Ramsar Site. In terms of fish populations, other factors are likely to have a greater influence, including perhaps the timing of water fluctuations for "natural" reasons within the normal range of natural variation; and very probably the controlled and uncontrolled inflow and outflow of water at the boundary with the sea (see section 9 of this report below).
- 5.26 One further element to bear in mind in the risk management of this issue, is that leakage from the abstraction pumping and piping arrangement could lead to an increase in offtake volumes above those specified for normal operating conditions and used as the basis for the impact predictions. According to the ESIA, the pipeline will be inspected on a regular basis, although the method for this is not specified: given that it is to be buried and visual inspection will presumably not be possible, a pressure monitoring system might be expected, though the ESIA states at the same time that the pipeline "will not have leak detection or other control instrumentation installed".
- 5.27 The Water Management Plan for the Mengo plant (an integral part of the ESIA documentation) seeks to minimise the abstraction requirements from the Loémé River by supplementing the river water used in the solution mining process with a small amount from a rainwater collection area and stormwater retention basin at the plant. Some recycled water also makes a contribution to this (and to reducing volumes of effluent discharge from the mine).
- 5.28 Although not part of the abstraction issue *per se*, it is worth noting here that some waste water from the mine (i.e., the portion not used for conveying brine effluent to the sea) will be discharged into the Tienga river, which flows in turn ultimately into the Ramsar Site, connecting with Lake Loufoualeba. No issues have been raised in relation to changes in flow quantities arising from this. Concerning potential water quality implications, domestic wastewater (including from the construction site's 2,000-person accommodation facility)

will first pass through a sewage treatment plant, while surface water run-off will be channelled via physical barriers designed to remove suspended solids and floating oil or debris, prior to discharge into the river.

- 5.29 The Biodiversity Management Plan, which is incorporated as part of the ESIA, concentrates only on the active project development area itself, where inland wetland interests are assessed (by the ESIA) to be low. It does not address the biodiversity implications of any effects on water quantity downstream of the pumping station in the Ramsar Site.

Direct impact of constructing the pumping station

- 5.30 The installation of the pumping station, with the dimensions described earlier in this section, will have a land-take footprint of some 0.4 ha in riverside and forest-edge vegetation on the right bank of the Loémé River. Although this lies beyond the boundaries of the Cayo-Loufoualeba Ramsar Site, GENIVAR have recognised in their ESIA that it represents a small loss of wetland habitat. Accordingly they indicate that it “will be compensated by the rehabilitation of a degraded wetland, creation of a new similar habitat or by providing protection to equivalent area to be identified by the Republic of Congo Government or Ramsar”. No specific proposals had been advanced at the time of the Mission.

- 5.31 The Ramsar Convention has a formal regime for compensation for loss of wetland habitat in listed Ramsar Sites, conceived for situations where a site boundary restriction is expected to result. That is not the case here, but the design of this regime, the development of technical guidance for it, and the accumulation of some specific case experiences has helped to inform thinking in the Convention more generally on the subject of compensation, mostly at the level of systems and principles – see, for example, Ramsar Convention (1999c) and section 18 of Ramsar Secretariat (2008b). Further work on the subject features in the current work programme of the Convention’s Scientific & Technical Review Panel.

- 5.32 A review of priorities and feasible options would be required in order to make specific suggestions in response to the question raised by this element of the ESIA, and the Mission is not equipped to do this. Given however that the area concerned is not part of the designated internationally important wetland area, there could be a wider scope of possibilities for offsetting the loss and/or achieving net gain. Without prejudice therefore to any general principles, the Mission offers one recommendation in this regard which may help.

Recommendation (ii): Further enhanced monitoring or the undertaking of other management measures (such as the amelioration of apparent impacts of existing pipelines – see below) may in this case be a more relevant application of MagMinerals’ proposed compensation for the land-take occasioned by construction of the water pumping station, than like-for-like habitat creation or enhancement.

Monitoring and contingency response options

- 5.33 During the operational life of the mine, water level, water quality (integrated water column), and rainfall monitoring data will be logged daily at the Loémé River pumping station (Mveto), as well as at the sampling stations re-established by MagMinerals in 2008 at Lake Cayo and Poste Frontière, where

they had previously been operated by ORSTOM until 1997. Monitoring will also take place at a further sampling station, Loémé Fourastier, which is situated much higher in the catchment to the northwest. Data will be collated monthly and interpreted/reported quarterly and annually.

- 5.34 In the Mission's view there should be additional monitoring to cover a more representative sample of the interests at stake in the Ramsar Site downstream of the pumping station as described above, and also to cover water quality in the River Tienga.

Recommendation (iii): The existing programme of water-level monitoring downstream of the abstraction site should be expanded from two sampling stations to at least eight, sited on a basis of expert eco-hydrological advice so as to represent key facets of the pattern of water movement through the Ramsar Site. Water quality in the River Tienga should also be monitored.

Recommendation (iv): A programme for monitoring changes in the spatial extent and distribution of water in the Ramsar Site should be established, making use as appropriate of airborne or remote sensing imagery.

- 5.35 While the Water Management Plan sets out intentions for water level monitoring as described above, it contains no information on triggers or alert limits for action in response to undesired or unexpected findings, and nothing on the available options for adaptive management actions. Both of these aspects should be part of future monitoring and management regimes.
- 5.36 Thinking about responses might for example need to include options in the event of unseasonably dry years, or a trend over time of reducing flows in the Loémé catchment, or any shift in the seasonal rainfall pattern (increased concentration of peak rainfall in a shorter season, for example).
- 5.37 The supplementing of river-derived water supplies by small amounts of surface water collected at the Mengo plant has been mentioned above. However the times when such surface water is available are the same times when flows are at their highest in the river, i.e., when offtake impacts unlikely to be significant. In terms of contingency response options, it would be more relevant to consider the scope for storage of surplus pumped river water in the rainy season for use as a supplementary supply at the plant in the dry season. There appear to be no insuperable technical obstacles to considering such a concept.

Recommendation (v): MagMinerals should develop thinking on options for contingency responses in the event that actual impacts on water levels in the Ramsar Site exceed the theoretical predictions (such as increasing the proportion of water supplied from alternative sources, or providing for on-site storage of wet-season supply for dry-season use).

- 5.38 The Republic of Congo's environmental regulatory framework does not include any numerical standards relating to water quantity or quality. The pumping station will require its own specific authorisation permit, but this appears not to allow the possibility of conditions that could apply restrictions on abstraction rates as a contingency response. The Potash Investment Agreement, already referred to above, appears already to authorise

MagMinerals to abstract an unlimited quantity of water. It does, however, contain a caveat that this should be subject to “industry good practice”, which is seen as including “protection of the environment”. No interpretation of these terms is given, but it would be fruitful to explore how this might be made meaningful in terms of the water quantity needs of the Ramsar Site.

Recommendation (vi): A study of water requirements for the maintenance of the ecological character of the Ramsar Site would be desirable, perhaps as a case study of applying relevant Ramsar guidance on ecological flow requirements. Informed by such a study, consideration should be given to setting an upper limit on abstraction volumes during relevant (dry) parts of the year, and/or in exceptionally dry years.

6. Potential impacts of gas supply pipeline

- 6.1 Although it did not feature in the initial versions of the Mission's Terms of Reference, nearer the time of the visit concerns were raised by the Ramsar Administrative Authority in Congo in relation to the probable incursion into the Ramsar Site of a pipeline to be constructed for carrying gas supplies to the potash plant at Mengo.
- 6.2 This pipeline is referred to briefly in the Environmental and Social Impact Assessment. A clean gas supply is required to fuel the electricity power generation unit at the mine site. The Impact Assessment refers to the pipeline being the subject of a separate ESIA. The Mission was unable to discover the reason for this separation, though it is doubtless linked to the fact that pipeline construction and operation is handled not directly by MagMinerals but by the separate company Eni Congo, who own the corridor wayleave rights and with whom MagMinerals signed a gas supply agreement in March 2009.
- 6.3 Brief extracts from one separate ESIA document produced by consultants for Eni Congo were duly provided to the Mission (Environnement Plus 2009). It is understood that at the time of the visit this assessment had not yet been subject to a review process. This ESIA addresses a supply route from Djeno/Côte-Matève, which lies to the south of the mine site. A new gas-fired power station has been constructed at Côte-Matève (see section 9 of this report below), and processing of gas could take place there before transporting it the distance (variously referred to in the assessment documents as 25 km, 27 km or 30 km) to Mengo by pipeline.
- 6.4 The route described in the Environnement Plus document would begin at the new power station at Côte-Matève (known as CEC, for Centrale Electrique du Congo, and also known as the "Grande Centrale"), where there is a gas treatment plant. For the first part of the distance from there, the results of a multicriteria analysis are said to favour the use of an existing pipeline corridor which carries seawater and untreated gas connectors between the CEC and the oilfield at Mboundi. (Bundling lines together obviously is a way of minimising land-take and other impacts, as well as taking advantage of existing wayleave rights). At a certain point, the new pipeline would branch away to the north towards Mengo.
- 6.5 The pipeline would be 16 inches in diameter and buried to a depth varying from 1 m to 2 m below the ground surface. The ESIA refers to safeguards in respect of farmland, forest areas and slope erosion, and monthly inspections are foreseen. There appear to be no specific references to effects on wetland interests, although (presumably for reasons of construction practicalities) it is indicated that construction in wetland areas would be timed to take place during the dry season.
- 6.6 The lack of reference to wetland interests is perhaps surprising, given that the proposed line crosses a northwestern corner of the Ramsar Site for a distance of about 4.0 – 4.5 km, notwithstanding that this is in the section of existing corridor where pipeline construction has already taken place in the (recent) past. (The point where the proposed line leaves the existing corridor, to branch northwards on a new corridor towards Mengo, lies well beyond the boundary of the Ramsar Site).

- 6.7 During the Mission's discussions with Eni Congo, they indicated that this route was in fact only one of two potential alternatives, between which a choice had not yet been made. The Mission is not aware of any impact assessment studies relating to a second alternative, and it would seem that until some kind of appraisal of environmental advantages and disadvantages of the two options can be compared, any strategic approach to the choice between them, in environmental terms, would be hampered.
- 6.8 In fact, the location of the second option was not made clear. The Mission believes that it may refer to a concept considered at an earlier stage involving supply of gas direct from the Mboundi oilfield to the north of the potash plant. Although this would not appreciably shorten the length of new pipe needing to be constructed, it would mean the gas destined for Mengo would have only to travel one-third of the distance it otherwise travels by virtue of needing (in the "first option" scenario) to be "cleaned" at the treatment plant at Côte-Matève. There would however be a need with the "second option" to construct a new dedicated plant for treatment of the raw gas supplied from Mboundi.
- 6.9 Without commenting on any of its other potential environmental implications, it is clear that this "direct supply"/"second" option is unlikely to pose any implications for the Cayo-Loufoualeba Ramsar Site, since it would be located well away from the site.
- 6.10 The situation is not altogether clear, since the view from MagMinerals, in discussions with them on the same day, was that the option of direct supply from Mboundi had been discarded some time ago. That could certainly be an explanation for the absence of any impact studies relating to it.
- 6.11 Even more puzzling than this, however, was MagMinerals' account of an initial section of the pipeline from the CEC at Côte-Matève having already been constructed, for a distance of 11 km along the existing "bundled" corridor as described above, contrary to the account given by representatives of Eni Congo to the effect that construction had not begun and that even route selection had not yet taken place.
- 6.12 Although the Mission on its very brief visit was not equipped to verify this situation one way or another, at a level of non-expert casual observation it did appear in the field (from driving along the existing pipeline corridor) that a new pipeline, additional to the out-bound gas and in-bound seawater ones, had indeed been laid alongside them. All three lines were marked by above-ground kilometre markers, but whereas the markers for the first two were labelled with their contents and dimensions, the markers on the third line were blank, as though it were not yet in use (consistent, in other words, with MagMinerals' account).
- 6.13 It may be, of course, that having built half of the intended distance, an obstacle has arisen in completing it along the line which departs from the existing consented wayleaves, and hence an originally discarded alternative option (or a completely new one) is now back in play. (It must be emphasised that this is mere speculation on the Mission's part, since further details are lacking).
- 6.14 The Mission does not have the information necessary to comment on the potential impact, if any, of a new pipeline crossing the northwest corner of the Ramsar Site on the line indicated in the Environnement Plus ESIA. All other

things being equal, it would be expected that use of the existing corridor would be likely to minimise any such impact, judging from the cursory field visit undertaken. If however a first 11 km has already been constructed, this will account for the whole of the area at issue, and the question therefore becomes largely academic. If this is the case, then it is unsatisfactory for construction to have proceeded prior to the ESIA being reviewed (this point arises in relation to other aspects of the overall case, and is referred to further in section 10 below).

Recommendation (vii): Route options for pipelines to be constructed by Eni Congo for supplying gas to the mine at Mengo from either Côte-Matève or Mboundi appear to need some clarification. Environmental and Social Impact Assessment studies should be undertaken in such a way as to compare the available alternatives strategically, well in advance of decisions being made. These studies and their essential review/validation should specifically detail any potential impacts on the ecological character of the Ramsar Site.

7. Potential impacts of brine disposal

- 7.1 The definition of “wetland” contained in the Ramsar Convention includes coastal and near-shore marine ecosystem types, and hence the scope of the Convention’s interests extends to these environments as much as to terrestrial and inland situations. The same is true of the African-Eurasian Waterbird Agreement, and even more so (i.e., extending further offshore) in the case of the Convention on Migratory Species, where priorities include certain migratory fish, cetaceans and marine turtles (see also section 10 below).
- 7.2 The Mission therefore has given some (necessarily brief) attention to the element of the potash mining project which concerns disposal of the brine effluent to a sea outfall, off the port of Pointe Noire. This was not discussed to any extent during the visit meetings, but there is extensive treatment of some of the issues in the GENIVAR ESIA documents.
- 7.3 The brine effluent from the plant at Mengo will be conveyed by pipeline to the outfall, the end of which will lie some 1.1 km from the shore and at a depth of 13.6 m. The final 400 m of the pipeline will form a diffuser, with 20 nozzle openings spaced 21 m apart, each rising vertically 5 m above the sea floor. This design is said to have been optimised in response to studies modelling the effluent plume. The discharge location was chosen so as to be in an area of rapid sloping to the requisite depths for suitable mixing, hence minimising the length of pipeline required (and thus minimising costs).
- 7.4 The total salt concentration of the effluent is expected to be approximately 35 %, i.e., roughly ten times the concentration in ambient seawater. The diffusion objective is for salinity to fall to no more than 3.85 % (i.e., 10 % above ambient) within a distance of 250 m. Initial modelling indicated that this should be achieved for the majority of the time; but it will not be achieved in the 5-8-day periods of low southeast current velocities which occur twice monthly during the “Grande Saison Froide” from June to September each year. Later modelling with revised data gave an improved picture of full achievement of the target within 100 m of the discharge.
- 7.5 The ESIA cautions that it is not possible to be precise about the findings of the hydrodynamic modelling predictions, with the margin of error on the dilutions and plume geometries being in the order of plus or minus 50%. With a worst case scenario, therefore, the “permanently impacted area” is said to extend to maximum distances of 200 m around each end of the 400 m diffuser, and with “temporarily impacted areas” of 1.8 km alongshore and 4.0 m offshore during the initial phases of the project.
- 7.6 Given the margins of error, the ESIA itself recommends further work to achieve greater precision, and that measurements of current speed and direction, salinity and temperature be collected over a 12-month period (especially for improved documentation of the frequency of low-velocity currents) at the proposed diffuser site. Further modelling of advection-dispersion and particle tracking is also recommended.
- 7.7 Once operational, various parameters of the brine effluent itself will be monitored at different intervals and compared to tolerance levels specified in the World Bank’s 2007 general environmental, health and safety guidelines for mining; with a commitment to act to rectify any detected exceedances of

the guideline levels of pollutants. In terms of the receiving environment, water quality and sediment quality will be monitored monthly and quarterly respectively, and marine benthos will be surveyed each year, but the position and number of sampling locations (and what coverage there will be of reference comparison sites elsewhere along the coast) is not clear.

- 7.8 It is notable that despite the stated need for more modelling, the ESIA already feels able at the same time to conclude that potential impacts of the project on the biodiversity of the marine environment (effects on marine benthos and fish from modified currents, salinity and temperature in the zone of influence) “seem to be low”. The only mitigation measure referred to in respect of the brine discharge itself, apart from the diffusion design features mentioned above, is minimisation of volumes through “maximising the backfilling of spent caverns” – but it seems that was intended anyway to be part of the existing operational design concept for the mine. There is reference to using the results of monitoring of effluent, water and sediment quality, benthos, and coastal oceanographic conditions to “improve the design of the diffuser”, but it is not clear what kind of improvements might be envisaged.
- 7.9 Concerning potential impacts on marine turtles, the ESIA considers that this issue only arises in relation to the construction phase of the outfall pipe, and not to the brine discharge itself. Works are intended to be confined to between April and October to avoid the turtle nesting season, and re-covering affected areas with surface sand after the works are completed is also proposed. The associated Biodiversity Management Plan, however, foresees monitoring of turtle nesting in the Djeno area during both construction and operational phases. For the avoidance of doubt, and to extend questions of impact from on-shore impacts to off-shore impacts as well, the recommendation made below is intended to reinforce this idea.
- 7.10 Turtles have physiological homeostasis mechanisms for regulating their own body chemistry in a range of water salinities, and so should not be impacted directly by increased brine concentrations in the sea *per se*. They are however vulnerable to impacts on the marine plant matter on which they feed, and here there are greater sensitivities, so this should be a guiding factor in finalising the choice of outfall location and in framing the scope of monitoring.
- 7.11 The Mission aligns itself with the comments of Watha-Ndoudy (2009) on these aspects of the ESIA. In general terms, he found the assessment to have been rigorous and to have come to reasonable conclusions, but he expressed concern over the potential cumulative dimension of impacts over the operating life of the plant (i.e., 20 years or more) and the possible consequences for marine and coastal biodiversity (and fisheries) in the long term. In this context, therefore, the Mission stresses the importance of adequate monitoring and response strategies.

Recommendation (viii): A full and detailed long-term monitoring strategy should be drawn up for the marine and coastal receiving environment in the area of the brine discharge and comparison areas along the coast, and specific options should be set out for operational responses in the event of limit-exceedances or unexpected effects on biodiversity being detected. The scope of monitoring should be extended to cover marine turtles and their food sources in the operating phase as well as the construction phase of the project, and this element should be undertaken in partnership with the NGO Rénatura.

8. The post-closure phase

- 8.1 The post-closure phase is given some emphasis here, on the grounds that the attention given in recent times to issues of wetlands and extractive industries under the Ramsar Convention has identified the post-closure and post-handover phases of mining operations as one of the weakest areas of policy, planning and practice.
- 8.2 In some cases, the need for active environmental management and mitigation associated with a mine, for example in relation to water quality, can exist for several hundred years after its closure. Since the general likelihood is that the operating company will not be present at a mine site for such a period after its closure, the implication is that responsibilities and liabilities for such things will tend to pass to the public sector (Ramsar Convention Secretariat, 2008a). Impact assessment and cost-benefit calculations rarely reflect this dimension as fully as they should; yet social or environmental costs that persist for centuries can cast doubt on the worth of relatively short-term economic gains.
- 8.3 The ESIA for the Mengo potash project includes a “Closure and rehabilitation plan”, and although its content is for the most part fairly general, its inclusion is a positive sign. The emphasis of this plan is on the decommissioning process itself and some concepts for rehabilitation budgeting: less is said about the period thereafter. There is reference to environmental monitoring of surface water, groundwater and vegetation “for several years after closure”. It is said that the duration of this monitoring “will be determined in discussion with the authorities”; but at the same time (and perhaps in contradiction) the plan also describes it as taking place during two years of decommissioning and then for only three years post-closure.
- 8.4 Most of these issues in the present case will relate to the Mengo plant site itself, and hence are perhaps not so material to the values of the Cayo-Loufoualeba Ramsar Site. The post-closure fate of the Loémé pumping station and the water supply pipeline are perhaps the most relevant elements. According to MagMinerals, no decisions have yet been taken on whether any or all of this water supply infrastructure will be removed, and it is understood that this will depend on discussions with local communities about whether they might see post mine-closure uses for it. Clearly the issues discussed elsewhere in this Mission report concerning offtake volumes (and leakage control), and their impact on the Ramsar Site, will need to feature in these post-closure deliberations too.

Recommendation (ix): An outline review of options and proposals for the post-closure phase of the mine should be undertaken by MagMinerals in conjunction with the Congolese authorities, to include in particular the fate of all installed water management infrastructure, provision for continued environmental monitoring of post-closure effects (within and probably also beyond three years), and clear allocation of responsibilities and liabilities. An outline plan for post-closure (i.e., beyond merely decommissioning), postulating a range of scenarios if necessary but with criteria to guide decision-making, should be agreed and approved before production begins.

9. Other issues concerning management and protection of the Ramsar Site

- 9.1 In addition to the issues concerning the potash mine proposal, the Mission during its visit noted a number of other issues not connected to the mine but relating to the management and protection of the Cayo-Loufoualeba Ramsar Site. The main examples are described in this section.

Existing pipelines

- 9.2 In section 6 above, which discusses the pipeline for supplying gas to the potash mine, reference is made to the fact that two other existing pipelines already run through part of the Ramsar Site across its northwestern corner for a distance of about 4.0 – 4.5 km. One is a 16-inch pipe carrying raw untreated gas from the Mboundi oilfield to the CEC “Grande Centrale” power station at Côte-Matève, and the other is a 24-inch pipe carrying seawater in the opposite direction, from a collection system near the CEC for use in processes at Mboundi. (In fact, a third and older underground 12-inch pipeline takes oil from Mboundi to the Total terminal at Djeno and must also pass through the Ramsar Site, probably on the same route, but this third pipe was not substantively discussed during the Mission’s visit).
- 9.3 The existing gas and seawater pipelines were discussed with the village community at Tchilembi, who live and fish in the area of Lake Loufoualeba. They sought (and were given) assurances from the operator Eni Congo concerning safety and surveillance in relation to leakage and other risks. (Eni runs a small community liaison programme which should allow matters such as this to be discussed regularly with the local inhabitants.)
- 9.4 The villagers’ primary concern related to a location where they have noted a reduction in fish numbers, which they attribute to the construction of a crossing for the pipelines over one particular watercourse feeding the lake. There were two elements to this concern. The first relates to the fact that construction had proceeded without a process for observing the requisite traditional rites that should accompany any such intervention. A ceremony would be expected, in order to intercede with the spirits of the people’s ancestors and ensure the continued provision of fish resources in future. Eni Congo had not provided for these rites to be performed; and apart from any presumed impact on fish numbers, there appeared on the part of the villagers to remain a grievance in principle about local traditions not having been respected.
- 9.5 Where the pipelines cross the watercourse at issue, there are apparently three channels which have been left to allow the continued passage of water and fish. (Whether these are culverts or fish-passes or free stream channels was not made clear, and the Mission was not able to visit the location to see it at first hand). According to the villagers, however, despite this, the passage of fish has been obstructed, and the fish were described as “not knowing which way to go” (linked, it seems, to the failure to intercede with the ancestors as described above). The Mission established that it could be possible now to arrange for the ceremonial ritual to take place *post-hoc*, as it were, and that doing so would be welcomed.
- 9.6 The other element of concern, however, relates to the twice-yearly phenomenon referred to as “boumi”, which describes the flushing of certain

areas within the Ramsar Site by two main pulses of heavy rains in December and March. Accumulated organic material at the upper extent of water levels in the site is washed into the water column by these pulses; and the sudden eutrophication and consequent deoxygenation of the water (compounded by greater mixing of existing deoxygenated waters from the lake depths, which are a particularly notable feature of Lake Cayo) leads to a die-off of fish, which are then collected for food. This “windfall” harvest is integral to the local economy. The villagers at Tchilembi reported that the pipelines had restricted this phenomenon downstream of the crossing, and they were concerned at the impact of this on their livelihoods. Alternative structural configurations for the crossing may therefore be worth investigating.

Recommendation (x): Options for remedial measures (such as raising pipes on a bridging structure) should be investigated in relation to the reported impact on fish passage/fish populations and on the “boumi” phenomenon of the existing dual Mboundi-Djeno oil/water pipelines at the location fished by the inhabitants of Tchilembi.

The oil terminal and power stations at Djeno

- 9.7 In addition to the new CEC “Grande Centrale” power station mentioned earlier in this report (and further below), there is an existing smaller gas-fired plant referred to as CED (Centrale Electrique Djeno) or the “Petite Centrale”, a short distance further south at Djeno. This power station is within the boundaries of the Ramsar Site. It has been operating since 2002, and so pre-dates the December 2007 designation of the Ramsar Site. Subsequently, however, it had its generating capacity doubled from 25 megawatts to 50 MW by the construction of a second turbine, work which was completed only in December 2008. The supply of gas by pipeline from Mboundi became functional from April 2009.
- 9.8 These later developments therefore occurred within the listed Ramsar Site subsequent to its designation. The Mission is not aware of any reports submitted under Article 3.2 of the Convention (see section 1 above) in relation to this, nor of any environmental impact assessment studies addressing potential impacts on the ecological character of the Ramsar Site. It is of concern that these developments appear to have proceeded without such steps, and it is to be hoped that any similar matters would proceed differently in future.
- 9.9 Perhaps surprisingly the Total oil terminal at Djeno is also located within the boundaries of the Ramsar Site (although detailed maps were not available and the Mission was not able to confirm the exact relationship of its location to the boundary). This terminal has been in operation since 1972, but as with the comments made above in respect of the power station, any new developments related to the terminal in future would need to follow full procedures for avoiding impacts on the ecological character of the Ramsar Site. Operational risk management (including the associated port facility and risks posed to the marine environment) will also need to take close account of the vulnerability of wetland interests.

Other development threats

- 9.10 As mentioned in section 4 above, the Mengo potash mining project is seen as a first phase in a longer-term plan for more extensive exploitation of

magnesium, sodium and potassium salts in the area. The same upstream catchment regions include an area of exploration consents for tar sands (Wykes, 2009).

- 9.11 The zone of activity which includes the settlement of Djeno, the two power stations, the oil terminal and highway 4 leading north to Pointe Noire already impinges significantly on the Ramsar Site. The first 150 MW turbine at the new CEC “Grande Centrale” power station at Djeno began generating in March 2010; a second will double the output when construction is completed later in the year, and further expansion to 450 MW is provided for, dependent upon demand.
- 9.12 It can only be expected that industrial developments and the continuing expansion of the city of Pointe Noire will present pressures and potential threats for the environment of the Cayo-Loufoualeba area in future, and the highest standards of sensitive planning and environmental protection will be required.

Invasive species

- 9.13 Ramsar Parties have in the past highlighted the global significance of threats to wetlands from invasive species of plants and animals, including by the adoption of Resolution VIII.18 in 2002 (Ramsar Convention, 2002c), which indicates some key strategic areas of action for Parties and others.
- 9.14 The Ramsar Information Sheet for Cayo-Loufoualeba refers to the accidental introduction during the 1990s of the invasive aquatic plants *Pistia stratiotes* (water lettuce) and *Salvinia molesta* to the site. Reference is made to an integrated control programme, including awareness-raising among local people about wetland rehabilitation techniques.
- 9.15 During the Mission it was reported (V Mamonekene, pers. comm.) that complete eradication of both species from the site had been achieved in 2006, using biological control agents, presumed to be the weevils *Cyrtobagous salviniae* (for *Salvinia*) and *Neohydronomous affinis* (for *Pistia*). During the field visit a few floating plants were seen from a distance at both upper and lower levels of the Loémé River which could have been *Pistia*, but were perhaps more likely to be water hyacinth (*Eichhornia crassipes*, which is of course also invasive). Following any eradication programme, continuing vigilance is obviously necessary to detect and respond to any re-establishment of the plants (or new establishment of others such as *Eichhornia*).
- 9.16 It was also noted that some planting of bamboo had taken place within the Ramsar Site for the purpose of stabilising soil banks along roads and adjacent engineered watercourses. There are two bamboo species which are native to Congo, but it is not known whether these plantings are of one of those species or a non-native species. In any event, this can be a rapidly colonising plant, and again, watchfulness for unwanted spread in such an ecologically valuable area will be important.

Saltwater intrusion

- 9.17 During discussions with the Mission team, the villagers at Mboulou Ntombi on Lake Cayo reported their suspicion that more seawater had been entering the

lake in recent times (via the Loémé River connection to the sea). They cited more frequent sightings of primarily saltwater fish species in the lake (two types were mentioned, known locally as “bar” and “daurade blanche” – these names usually translate in English as “sea bass” and “sea bream” respectively, but since the distribution of both type-species with those names appears to lie well to the north of Congolese waters, identification of the relevant species here is not certain). Ibala Zamba (2004) has also noted brackish-water species in both lakes.

- 9.18 The Ramsar Information Sheet refers to the Ramsar Site’s potential vulnerability to pollution impacts from offshore oil extraction at times of high sea levels or high wave levels, suggesting that incursion of seawater may occur by occasional “overtopping” events. It may be that the frequency of such events has changed over time.
- 9.19 The Mboulou Ntombi fishermen, however, described a more probable cause, related to a regular practice of the community at Fouta on the coast, where a naturally-formed sand-bar separates the river from the sea. At times of the highest water levels in the river (in May each year), residents of Fouta breach the sand-bar to prevent flooding of the village. This allows faster outflow of water from the river, but it also allows more mixing of seawater and freshwater. It was not clear whether this is a long-established practice or a more recent one. The breach remains open for one to two months before becoming closed again by natural accretion of sediment. This is likely to be an important influence both on salinity and on water levels in at least parts of the site at relevant times of year.

Management planning

- 9.20 The establishment and implementation of management plans for Ramsar Sites and other wetlands has long been seen as a key mechanism for achieving the conservation and wise use of such sites. The Contracting Parties have recognised that doing so “helps to decide upon the objectives of site management; identify and describe the management actions required to achieve the objectives; determine the factors that affect, or may affect, the various site features; define monitoring requirements for detecting changes in ecological character and for measuring the effectiveness of management; demonstrate that management is effective and efficient; maintain continuity of effective management; resolve any conflicts of interest; obtain resources for management implementation; enable communication within and between sites, organizations and stakeholders; and ensure compliance with local, national and international policies” (Ramsar Convention, 2002b).
- 9.21 In Congo at present a management plan is in place for only one of the country’s seven Ramsar Sites (Conkouati Douli), and at another (Lac Télé) a plan has been drawn up but not yet adopted. According to the country’s national report to the 10th meeting of the Conference of Parties (Direction Générale de l’Environnement, 2008), statutory protected area status is seen by the Government of Congo as a prerequisite for the establishment of a site management plan, since this seemingly enables the requisite financing. Cayo-Loufoualeba is not yet a protected area (see below) and hence does not yet have such a plan.
- 9.22 The Mission considers that it is important now to consider steps towards establishing a management plan for Cayo-Loufoualeba, without necessarily

making this contingent on securing protected area status for the site. Many of the issues described in the present report would be important topics to cover in the plan, such as water levels (including management of the sea outflow breaching), monitoring (including hydrological issues and waterbirds), contingency response arrangements, control of invasive species and promotion of public awareness, among others. The concentration of private sector development interests in the areas nearby, including those of MagMinerals, Eni Congo and Total, may offer scope for conversations regarding funding support and/or forms of support “in kind” such as assistance with survey work, digitised mapping, etc. The process could advance in stages, with agreed management objectives being adopted first, followed by an outline plan, and ultimately a more detailed plan.

- 9.23 Global guidance on management planning is available from the Ramsar Convention, primarily in the Annex to Resolution VIII.14, “*New Guidelines for management planning for Ramsar Sites and other wetlands*” (Ramsar Convention, 2002b). The Convention’s guidance on consultation and participation of local communities in wetland management (Ramsar Convention, 1999a) is also relevant. Another useful resource on management planning for protected areas specifically in francophone Africa is Triplet (2009).
- 9.24 Two project proposals for funding by the Global Environment Facility (GEF) are under development concerning the conservation and management of coastal mangrove ecosystems in Congo. These are relevant to the Cayo-Loufoualeba Ramsar Site, since this is one of the areas of the country where the much-diminished national mangrove resource is still relatively well represented. The first project, “Harmonisation of management policies and management systems for conservation of mangrove ecosystems in Africa” extends to 24 countries in all; while the second, “Integrated management of mangrove ecosystems, other wetlands and associated coastal forests”, is specific to the Republic of Congo. It will be important for both of these to be fully integrated with all steps that may be taken for future management planning in the Cayo-Loufoualeba Ramsar Site.

Recommendation (xi): A management plan should be drawn up for Cayo-Loufoualeba by the Congo Direction-Générale de l’Environnement, having regard to the relevant Ramsar guidance annexed to Resolution VIII.14. Among other things this should embrace the waterbird and other monitoring measures referred to in other recommendations here, and should set objectives in relation to saltwater intrusion (including establishment of the optimal approach to the practice of sand-bar breaching), maintenance of fish populations, integration of coastal conservation activities for mangroves and turtles (including for example the two GEF projects currently under development for management of mangroves), and safeguards against invasive species and other threats, including those associated with increasing development of Pointe Noire.

Protected area status

- 9.25 Reference has been made above to the lack of any statutory protected area status for the Cayo-Loufoualeba Ramsar Site; and in section 3 above it was mentioned that the only existing controls consist of a restriction of resource use in some areas to local community members and the application of a hunting close season from 1 November to 1 May.

- 9.26 Over and above any perceived necessity (as mentioned above) for protected area status as a precursor to the establishment of a site management plan, in the Mission's view such status for Cayo-Loufoualeba is desirable in its own right. While the Convention creates no automatic expectation that Ramsar Sites should be legally protected, there is an expectation that Contracting Parties should have in place some form of mechanism that is capable of detecting and responding to actual or potential change in the ecological character of designated sites.
- 9.27 The various pressures and vulnerabilities relating to Cayo-Loufoualeba and described elsewhere in this report suggest that this issue should receive serious consideration; and now may be a particularly appropriate moment to do so, while active attention is being focused on conservation issues in the area. A suitable process exists in the Congo national legal system and has been applied for example in the Lac Télé part of the "Réserve Communautaire du Lac Télé/Likouala-aux-Herbes" Ramsar Site in the north of the country. Continuing sustainable resource use by local inhabitants would of course be provided for, while safeguarding against any risks of overexploitation.
- 9.28 The recommendation made on this point below is couched specifically in terms of the Ramsar Site, but obviously the definition of the boundaries and precise extent of a protected area may need to consider other natural environment interests that may also exist. The Mission makes no comment on those, or on whether an eventual designation should extend beyond the defined wetland system, but simply recommends that at least the whole of the Ramsar Site should be included.

Recommendation (xii): The Direction-Générale should investigate the scope for conferring statutory protection (protected area status) to the Ramsar Site, embodying legally-backed safeguards and sufficient mandates for decisions and plans addressing the relevant issues identified in other recommendations in this report.

10. Some wider issues discussed during the Mission

Education and awareness activities

- 10.1 Although it was pleasing to see some level of awareness about the significance of Ramsar listing for the Cayo-Loufoualeba complex at different levels of government, and to see reference to it in the ESIA for the potash mine proposal, information and awareness beyond these places (for example, among local people living within the site) appeared to be almost nil, and the ESIA does not address the implications of Ramsar status to any great degree. There was even less awareness about the CMS and AEWA.
- 10.2 There is an opportunity here to develop an appreciation of the very positive dimensions to the “story” of Ramsar, CMS and AEWA (livelihoods, sustainability, ecosystem services, and so on), not only at this site but more widely; and the three agreements each have various supporting materials that can help. For example, the Ramsar website (www.ramsar.org) has examples of useful downloadable literature and other resources, especially in the area dedicated to materials related to its programme on Communication, Education, Participation and Awareness (CEPA); as well as the current CEPA programme itself (Ramsar Convention, 2008a).
- 10.3 While no tourism or recreation takes place in the Ramsar Site, education and awareness among inhabitants of the site itself and the surrounding areas, including Pointe Noire, among schoolchildren, resource users, administrators and other stakeholders could be extremely important to the future of the area, as well as to successful implementation of existing national policies on the environment in Congo.
- 10.4 The Biodiversity Management Plan which is included in the potash mine ESIA contains a number of proposed “programmes”, of which Programme 11 is entitled “Implementation of an Education Programme on the Protection of Biodiversity and the Environment”. The objective of this programme is to “promote awareness about the study area’s remarkable sites, including the recently-declared Cayo-Loufoualeba Ramsar Site”. This objective is expressed in terms of its being a means to reduce the impact of subsistence activities of local people on the biodiversity significance of the local environment, which is not the most felicitous signal for the document to send out! The willingness to make a constructive contribution is genuine, however, and the purposes defined for the opportunity could be re-shaped in broader and more appropriate ways.
- 10.5 The Plan also makes general reference to mitigation measures proposed for various aspects of the project including “enhancement and/or creation of managed areas for terrestrial, freshwater and marine environments in partnership with local groups and NGOs”: it is certainly correct that collaboration with such groups will be a key both to management and to awareness-raising, so these references are welcome.
- 10.6 Perhaps pre-eminent among relevant potential collaborators in the area is the Pointe-Noire-based conservation NGO *Rénatura Congo* (www.renatura.asso.eu.org), with whom the Mission team held one meeting during the visit. They have specialist expertise among other things on the marine turtles which occur in the Ramsar Site and throughout the country’s coasts, and their existing activities could provide a useful springboard for an

education and awareness initiative on wetland and migratory species interests more broadly, both in a thematic sense and a geographical sense.

Recommendation (xiii): MagMinerals are encouraged to pursue their interest in catalysing and supporting local education and awareness activities on wetlands and other environmental conservation issues, linked to the Congo government's implementation of communication activities under the Ramsar Convention, CMS and AEWA, as far as possible in close conjunction with the NGO Rénatura.

Improving knowledge of wetlands and migratory species in Congo

- 10.7 In terms of awareness and understanding at a more technical level, with some exceptions (such as fish diversity in Lake Loufoualeba) there are generally only relatively rudimentary levels of scientific data and knowledge concerning wetlands, waterbirds and other migratory species in Congo. Again, the opportunity of attention to the present case could usefully be taken to stimulate efforts for improving this situation, including through sources of international assistance and with particular reference to requisite programmes of monitoring (which in turn obviously inform appropriate management actions). A good springboard for this could be to take advantage of dialogue through AEWA with potential donor countries for actions in pursuit of the Agreement's current Strategic Plan (2009-17).

Recommendation (xiv): The Congo Direction-Générale de l'Environnement, in conjunction with the Direction-Générale de la Recherche Scientifique et Technique and relevant university departments, should consult with the AEWA Secretariat concerning possible opportunities for external assistance for activities to improve knowledge and data on wetlands and migratory waterbird species in Congo, in the context inter alia of the country's implementation of the AEWA Strategic Plan 2009-17.

- 10.8 One other specific step already discussed with the Ramsar Secretariat would be to ensure that official data on the country's Ramsar Sites are fully complete and up to date, including provision of the expected revised Information Sheet for the Lac Télé/Likouala-aux-Herbes site.

Recommendation (xv): The Direction-Générale should take steps to ensure that Ramsar Information Sheets submitted to the Ramsar Secretariat for all Ramsar Sites in the country are up to date, including provision of a revised version of the Sheet for Lac Télé/Likouala-aux-Herbes.

Mangrove conservation projects

- 10.9 Section 9 above has already referred to the projects being developed for GEF funding, one in Congo specifically and one in a partnership of several African countries, concerning conservation and management of mangrove ecosystems. Reference was made in the context of section 9 to the need for close linkages with future management planning at Cayo-Loufoualeba, but the point should be made in relation to Ramsar implementation in Congo in a broader sense as well.

- 10.10 The Convention has acknowledged on various occasions the significance and the vulnerability of mangrove systems in relation to their biological productivity and their role in coast protection, carbon sequestration, and other values, and their under-representation in protected area networks. They have also been highlighted in the context of the Convention's indicators of effectiveness. In addition to Cayo-Loufoualeba, another of Congo's Ramsar Sites "Parc national Conkouati-Douli", also has important mangrove stands. The issue however should equally be regarded as one of integrated coastal zone management priorities for the country as a whole, and to that aspect of Ramsar implementation as much as to the management of the designated sites.
- 10.11 It is important therefore to ensure that both projects are fully harmonised and coherent with implementation of the Ramsar Convention (and CMS and AEWA) in Congo, and that offices with responsibility for these different domains have the best possible communication and liaison arrangements with each other. It is equally important that the projects themselves reflect fully the implementation objectives established under all three agreements in the country. It is of concern, for example, that in one draft proposal document provided to the Mission in respect of the 24-country project, a list of five "Conventions that touch on mangrove ecosystems" is given without including the Ramsar Convention! (The Ramsar Secretariat may be able to assist with comments on these issues in relation to documentation on the two projects as they are developed further in future.)

Recommendation (xvi): The Government of Congo and its project partners should ensure that the two projects in development for GEF funding for activities relating to mangroves are designed and implemented in such a way as to reflect and be fully harmonised and coherent with the implementation in Congo of Ramsar, CMS and AEWA.

Marine turtle conservation

- 10.12 Congo is an important country for marine turtles, hosting five species: green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*), leatherback (*Dermochelys coriacea*), loggerhead (*Caretta caretta*), and olive ridley (*Lepidochelys olivacea*). All are red-listed species, with hawksbill and leatherback being classed as critically endangered. The leatherback and olive ridley are said to occur most frequently, with particularly important breeding concentrations of olive ridley in the Baie de Luango in the north of the country, but nesting of all species (the location of which in some cases varies from year to year) potentially occurring anywhere along the coast, including in the Cayo-Loufoualeba Ramsar Site. Egg-laying takes place between November and March, varying according to the species.
- 10.13 As discussed in section 7 above, the ESIA for the potash mining project considered that the potential for impacts on turtles from brine effluent disposal into the sea would be confined to the construction phase of the outfall pipe; but in its Recommendation (viii) the Mission suggests that the scope of the associated monitoring programme should be extended to cover marine turtles in the operating phase, too (as in fact appears to be foreseen, at least in terms of on-shore monitoring, by the ESIA's Biodiversity Management Plan). It should also extend to monitoring their marine plant food sources, and the findings should be made public.

- 10.14 Despite their endangered status, marine turtles have no specific legal protection in Congo. Threats include by-catch in fishing nets, poaching for meat, and gathering of eggs (a previous spiritual taboo against egg collection appears no longer to prevail) The Biodiversity Management Plan for the Mengo potash project includes a provision for surveillance and protection against killing of females, nest poaching, and egg collection in the nesting areas at Djeno. Section 9 of the present report has referred to potential risks associated with the oil terminal and its associated port at Djeno. Elsewhere in the country, the Government has referred to the discovery of dead turtles at the Conkouati-Douli Ramsar Site as raising suspicions about pollution impacts from offshore oil exploitation (Direction Générale de l'Environnement, 2008).
- 10.15 The NGO Rénatura is a leading body in Congo for turtle conservation projects, and it has been undertaking systematic monitoring of turtles for around seven years. It would appear to be the obvious partner with which the government and the private sector should collaborate on further work in this topic area; including the MagMinerals Biodiversity Management Plan which includes, in its Programme 3, "Provide financial support to local NGO to conduct a programme that will recruit and train monitoring personnel from the local workforce; describe sea turtles populations, mark individuals, measure biometric components, monitor nesting activity and egg hatching; reduce or eliminate egg collection; protect the nesting area; report the findings and communicate the results to local communities; and develop interpretative activities and potential for tourism". Triplet (2009) includes a specific chapter on marine turtles which may prove helpful.
- 10.16 Surprisingly, there is no reference to marine turtles in the Ramsar Information Sheet (RIS) for Cayo-Loufoualeba, even though at least some of the country's red-listed species would appear to breed within its boundaries. The national Ramsar Administrative Authority should investigate whether the RIS may need updating to reflect what is now known about this aspect of the values of the site.
- 10.17 In the context of the Convention on Migratory Species, Congo has since May 1999 been a signatory to the Convention's Memorandum of Understanding concerning Conservation Measures for Marine Turtles of the Atlantic Coast of Africa, which covers all five of the species occurring in Congolese waters. This offers a formal intergovernmental framework within which any measures on the matters described above on marine turtles could be pursued.

Recommendation (xvii): The Government of Congo and MagMinerals should develop a collaborative strategy with Rénatura Congo for the conservation of marine turtles in Congo, to include the measures identified in the Mengo potash project's Biodiversity Management Plan Programme 3, wider monitoring programmes, active implementation of the CMS MoU on African Atlantic Marine Turtles, and any necessary updating of relevant details in the Ramsar Information Sheets for the Cayo-Loufoualeba and Conkouati-Douli Ramsar Sites.

Transboundary and sub-regional activities

- 10.18 It is obviously in the very nature of multilateral agreements such as Ramsar, CMS and AWEA that transboundary cooperation should feature strongly in the agenda. Matters touched on in this report concerning migratory

waterbirds, marine turtles and the multi-country geography of the Congo river basin are examples of why this is such a key issue in Congo. International cooperation is one of the three so-called “pillars” of the Ramsar Convention, and the Conference of Parties has adopted a number of relevant texts on it, including for example guidance on transboundary cooperation (Ramsar Convention, 1999b) and on river basin management (Ramsar Convention, 2008c).

- 10.19 The Convention also supports the concept of transboundary designation of Ramsar Sites, where two or more countries which share a transboundary wetland system of international importance arrange to coordinate connected site listing and management objectives. There are now a number of examples of this in existence.
- 10.20 Of the seven Ramsar Sites in Congo, four are located on the border with neighbouring countries. The national Ramsar Administrative Authority has identified the possibility of transboundary cooperation in respect of the wetland systems of Nouabalé Ndoki (with Lobeké in Cameroon and Dzanga Sangha in Central Africa); Lake Tété (with Lake Tumba in the Democratic Republic of Congo); Conkouati Douli (with Gamba Mayumba in Gabon); and Odzala (with Dja in Cameroon and Minkebé in Gabon). In the last of these, Odzala is not Ramsar-listed, but the three areas are already linked in the TRIDOM Accord on transboundary cooperation between the three countries.
- 10.21 The Government sees good possibilities for transboundary Ramsar designation in particular in the case of Lakes Tété and Tumba, in the context of a proposed GEF project on “Sustainable forest management in the Lake Tété – Lake Tumba trans-boundary wetland landscape” (“forest” here refers largely to swamp forest, so in fact this is a wetland-focused project). The area covered by this project includes two Ramsar Sites in Congo (“Réserve Communautaire du Lac Tété/Likouala-aux-Herbes” and “Grands Affluents”) and one in the Democratic Republic of Congo (“Ngiri-Tumba-Maindombe”). The 24-country proposed GEF project on coastal mangroves mentioned earlier is another relevant opportunity for cooperation, as of course is also the implementation of the CMS MoU on African Marine Turtles, also mentioned above.
- 10.22 In recent years an expanding programme of “Regional (and sub-regional) Initiatives” has taken shape in various parts of the world in the framework of the Ramsar Convention. Initiatives are proposed by Contracting Parties themselves and are subject to a process of formal approval by the Convention’s Standing Committee. Proposals have in the past been discussed for a Ramsar Regional Initiative which would focus on the Congo Basin (which could in principle be relevant to a total of eight countries), but to date no agreement has been reached on a single structure by which this could be taken forward.
- 10.23 In the meantime, integrated management of water resources in the Basin is being addressed by a river basin commission, the International Commission for the Congo-Oubangui-Sangha Basin, known as CICOS. There are links between CICOS and the Ramsar Administrative Authority in Congo, and it is encouraging to see the connection being made with implementation of the Convention in this respect.

- 10.24 In general, the authorities in Congo are to be commended on their attention to the transboundary cooperation possibilities that exist in the context of implementing Ramsar and the other Conventions. The recommendation on this offered below is made in the spirit of encouragement and support for the efforts already underway, and for further progress in future.

Recommendation (xviii): The Government of Congo should establish appropriate operational and policy linkages between its Ramsar/AEWA/CMS implementation activities and its engagement in relevant transboundary and sub-regional processes (such as CICOS, the International Commission for the Congo-Oubangui-Sangha Basin), having regard inter alia to relevant Ramsar guidance annexed to Resolutions VII.19 and X.19.

A National Wetland Policy

- 10.25 The establishment of National Wetland Policies or National Ramsar Policies has long been encouraged by the Convention – such policies are used by many Contracting Parties to set their strategic direction for wetland conservation and wise use in the country, and to situate this in the overall body of national policy relating to other sectors, so that it can be addressed in its true context.
- 10.26 According to its national report to the Conference of Parties in 2008 (Direction Générale de l'Environnement, 2008), Congo has drafted a National Wetland Policy, but this has not yet been adopted. Progress with doing so is described as being dependent on completing a full national wetland inventory, including details of problems facing all the country's wetlands. This in turn is seen as dependent on securing the necessary funding.
- 10.27 In the Mission's view there need not be such a dependence on completing a full inventory first, and it would be desirable to proceed with adoption of a policy as a strategic guiding instrument on the basis of what is known now, while continuing to seek funding to improve knowledge in future. It is understood that a national wetland management plan is also foreseen, and in fact the specifics of additional inventory information may be more relevant to that plan than to the national-level policy as such.

Recommendation (xix): The Government of Congo should finalise and formally adopt as soon as possible the National Wetland Policy it has already drafted, without making this conditional on funding for a national wetland inventory (which can be pursued on a separate parallel track).

The National Ramsar Committee

- 10.28 As with the national policy concept described above, National Ramsar Committees, National Wetland Committees or their equivalent have also long been encouraged by the Convention as a tool to assist implementation within each country. Congo already has a National Ramsar Committee in place and is to be commended on this positive step. It is understood however that the Committee has only met irregularly on a few occasions. Although the scope of its work in principle is defined as covering strategic policy issues, follow-up of global decisions, resourcing issues, and general knowledge-exchange, to date it has focused mainly on consideration of proposals for new Ramsar Site

designations. It would be desirable in future for it to become a regular forum, and for its activities routinely to cover Convention implementation as a whole.

- 10.29 The Committee also commendably includes NGOs, and in more recent times has included representatives not only of the lead (Environment) Ministry, but also officials from the Ministries of Foreign Affairs and Finance. Taking a cross-government approach to Convention implementation in this way is extremely important. The same principle applies to synergy and harmonisation with the implementation agendas of other biodiversity-related MEAs, and again the Congo example is a positive one, with the National Focal Points of some other Conventions (the information in the National Report is not consistent as to exactly which ones) already participating in the National Ramsar Committee.
- 10.30 This participation could be extended to other relevant focal points, in particular those for CMS and AEWA (given, among other things, the importance of the country's wetlands for migratory waterbirds and other migratory species), and the business of the Committee could also extend to issues of joint concern to the different Conventions and Agreements (as is done in some other countries). In the case of AEWA, this approach is encouraged in the Agreement's Strategic Plan for 2009-2017 (Target 5.7).

Recommendation (xx): The Congo National Ramsar Committee should be strengthened so that it is able to meet regularly and address the full range of national implementation issues of relevance to the Convention. It should also consider adapting its scope to cover in appropriate ways the national implementation of the CMS and AEWA, with reference to Target 5.7 of the AEWA Strategic Plan 2009-2017.

The Environmental and Social Assessment process

- 10.31 The in-depth Environmental and Social Impact Assessment (ESIA) for the Mengo potash mine project (GENIVAR, 2009) was a significant source of information for the Ramsar Advisory Mission's consideration of the mining proposal. It represents one of the first few Assessments undertaken under the current system in Congo, and the Environment Ministry has been keen to establish a good standard of approach from the outset, as well as learning lessons from these early experiences. There is also interest in feeding these experiences into the possible future development of national guidelines on procedures and good practices.
- 10.32 The Ramsar Convention and the CMS have both adopted guidance on Environmental Impact Assessment (and on Strategic Environmental Assessment, SEA), which is harmonised with that developed under the Convention on Biological Diversity (see, for example, Ramsar Convention, 2008b), while AEWA is soon to publish guidelines on avoiding, minimising and mitigating impacts on waterbirds (see AEWA, 2008). It may be useful for the Congolese authorities to take these sources into account in the course of refining and further developing the national system in future.
- 10.33 One particular national study (Watha-Ndoudy and Nzila, 2010) has reviewed the state of play with EIAs specifically in relation to mining projects in Congo, and it concludes with a number of recommendations. The Mission has not gone into these issues, as they were beyond its scope, but one or two comments are made below arising from the Mengo case example.

- 10.34 Neither has the Mission has not set out to critique the specific Mengo ESIA (the Assessment, running to over 1,000 pages plus a range of additional annexes, obviously touches on a variety of issues that go beyond those bearing on wetland impacts), but it has examined relevant sections of it and has had regard to earlier commentaries (such as that by Watha-Ndoudy in 2009, mentioned in section 7 above).
- 10.35 Bearing those caveats in mind, the impression formed overall was of a thorough and professional undertaking, and although some inconsistencies and inaccuracies were noted in passing, none were critical to the Mission's consideration of the substantive issues. In terms of some of the key principles mentioned in the guidance from the Conventions referred to above, the published ESIA does not go as far as one might expect into the question of alternatives to the favoured project option (where it touches on alternatives at all, its comparisons are often in terms of project costs rather than environmental impacts), and from a wetland perspective there are weaknesses in terms of attention to variability (seasonal and annual) and to the catchment perspective.
- 10.36 Another generic issue mentioned in the international guidance is the role of independent peer review. It is noted that the Congolese system has no mandatory requirement for review of impact statements. In the case of the Mengo potash project however, a review of the ESIA was undertaken under the auspices of an inter-departmental Technical Commission, which produced a report of its findings (Direction Générale de l'Environnement, 2009). Involving a group of around 12 different specialists who were given a short time (some felt it was far too short) to digest the material and comment, this was the first review undertaken in this way in Congo. The Commission's work was not framed by any official guidelines on the review process, but it is understood that thought may be given to compiling some kind of guidance on this in due course.
- 10.37 A further noteworthy issue concerns the sequencing of validation and approval decisions. MagMinerals were granted a mining permit authorising them to proceed with the Mengo potash project in April 2008, and initial drilling and other pre-construction activities began later that year. As mentioned above, however, the review of the ESIA did not take place until 2009, and it was only in February 2010 that the Ministry of Sustainable Development, Forest Economy and the Environment gave its approval to the ESIA!
- 10.38 This sequencing would seem to undermine a fundamental purpose of carrying out an impact assessment, since if the decision-making authorities had concluded that the assessment had revealed potential impacts that could not be mitigated and were unacceptable in terms of public policy goals, it would by that stage have been too late to act on such a conclusion. The Mission became aware of similar issues in relation to impact assessments for the pipeline and power station developments mentioned elsewhere in this report.

Recommendation (xxi): The Government of Congo should continue the development of its national Environmental and Social Impact Assessment system and associated capacity-building, taking stock systematically of lessons learned from early experiences, having regard to the relevant Ramsar guidance annexed to Resolution X.17 and

equivalent AEWA Conservation Guidelines, and in particular timing assessments sufficiently far in advance of developments so that their results can properly influence decisions about whether consent should be granted, and providing for adequate independent review of impact statements and of the findings of project monitoring.

Reporting on progress

- 10.39 A final recommendation is made here concerning follow-up to all the other recommendations in this report. It is to highlight the opportunity presented by the fact that with the Meeting of the Parties to AEWA and the Conferences of the Parties to Ramsar and CMS taking place in late 2011 and early 2012, the submission of triennial national implementation reports for all three MEAs will fall due in 2011. This should be well timed for the incorporation of an update from Congo on the situation with respect to relevant matters covered in the present report, drawing the attention of a wider audience to the progress made, and helping to share lessons and experiences.

Recommendation (xxii): The Direction-Générale de l'Environnement should use the opportunity in 2011 of compiling Congo's national reports to the 11th Ramsar Conference of Parties (COP11), the 5th AEWA Meeting of Parties (MOP5), and the 10th CMS Conference of Parties (COP10) to provide information on progress in implementing the recommendations given in this report.

11. Recommendations

Water abstraction for the potash mine

- (i) A strategic review of existing or potential future abstractions by other operators elsewhere on the Loéme and Tienga rivers should be undertaken *inter alia* to provide a fuller context for the recommendations on water management below and on management in the Ramsar Site more generally. The development of an integrated water resources management framework for these rivers should also be considered.
- (ii) Further enhanced monitoring, or the undertaking of other management measures (such as the amelioration of apparent impacts of existing pipelines – see below) may in this case be a more relevant application of MagMinerals' proposed compensation for the land-take occasioned by construction of the water pumping station, than like-for-like habitat creation/enhancement.
- (iii) The existing programme of water-level monitoring downstream of the abstraction site should be expanded from two sampling stations to at least eight, sited on a basis of expert eco-hydrological advice so as to represent key facets of the pattern of water movement through the Ramsar Site. Water quality in the River Tienga should also be monitored.
- (iv) A programme for monitoring changes in the spatial extent and distribution of water in the Ramsar Site should be established, making use as appropriate of airborne or remote sensing imagery.
- (v) MagMinerals should develop thinking on options for contingency responses in the event that actual impacts on water levels in the Ramsar Site exceed the theoretical predictions (such as increasing the proportion of water supplied from alternative sources, or providing for on-site storage of wet-season supply for dry-season use).
- (vi) A study of water requirements for the maintenance of the ecological character of the Ramsar Site would be desirable, perhaps as a case study of applying relevant Ramsar guidance on ecological flow requirements. Informed by such a study, consideration should be given to setting an upper limit on abstraction volumes during relevant (dry) parts of the year, and/or in exceptionally dry years.

Pipelines to the potash mine

- (vii) Route options for pipelines to be constructed by Eni Congo for supplying gas to the mine at Mengo from either Côte-Matève or Mboundi appear to need some clarification. Environmental and Social Impact Assessment studies should be undertaken in such a way as to compare the available alternatives strategically, well in advance of decisions being made. These studies and their essential review/validation should specifically detail any potential impacts on the ecological character of the Ramsar Site.

Brine discharge from the potash mine

- (viii) A full and detailed long-term monitoring strategy for the marine and coastal receiving environment in the area of the brine discharge and comparison areas along the coast should be drawn up, and specific options should be set

out for operational responses in the event of limit-exceedances or unexpected effects on biodiversity being detected. The scope of monitoring should be extended to cover marine turtles and their food sources in the operating phase as well as the construction phase of the project, and this element should be undertaken in partnership with the NGO Rénatura.

Following closure of the potash mine

- (ix) An outline review of options and proposals for the post-closure phase of the mine should be undertaken by MagMinerals in conjunction with the Congolese authorities, to include in particular the fate of all installed water management infrastructure, provision for continued environmental monitoring of post-closure effects (within and probably also beyond three years), and clear allocation of responsibilities and liabilities. An outline plan for post-closure (ie beyond merely decommissioning), postulating a range of scenarios if necessary but with criteria to guide decision-making, should be agreed and approved before production begins.

Other issues concerning management and protection of the Ramsar Site

- (x) Options for remedial measures (such as raising pipes on a bridging structure) should be investigated in relation to the reported impact on fish passage/fish populations and on the “boumi” phenomenon of the existing dual Mboundi-Djeno oil/water pipelines at the location fished by the inhabitants of Tchilembi.
- (xi) A management plan should be drawn up for Cayo-Loufoualeba by the Congo Direction-Générale de l’Environnement, having regard to the relevant Ramsar guidance annexed to Resolution VIII.14. Among other things this should embrace the waterbird and other monitoring measures referred to in other recommendations here, and should set objectives in relation to saltwater intrusion (including establishment of the optimal approach to the practice of sand-bar breaching), maintenance of fish populations, integration of coastal conservation activities for mangroves and turtles (including for example the two GEF projects currently under development for management of mangroves), and safeguards against invasive species and other threats, including those associated with increasing development of Pointe Noire.
- (xii) The Direction-Générale should investigate the scope for conferring statutory protection (protected area status) to the Ramsar Site, embodying legally-backed safeguards and sufficient mandates for decisions and plans addressing the relevant issues identified in other recommendations in this report.

Broader issues

- (xiii) MagMinerals are encouraged to pursue their interest in catalysing and supporting local education and awareness activities on wetlands and other environmental conservation issues, linked to the Congo government’s implementation of communication activities under the Ramsar Convention, CMS and AEWA, and as far as possible in close conjunction with the NGO Rénatura.
- (xiv) The Congo Direction-Générale de l’Environnement, in conjunction with the Direction-Générale de la Recherche Scientifique et Technique and relevant university departments, should consult with the AEWA Secretariat concerning

possible opportunities for external assistance for activities to improve knowledge and data on wetlands and migratory waterbird species in Congo, in the context *inter alia* of the country's implementation of the AEWA Strategic Plan 2009-17.

- (xv) The Direction-Générale should take steps to ensure that Ramsar Information Sheets submitted to the Ramsar Secretariat for all Ramsar Sites in the country are up to date, including provision of a revised version of the Sheet for Lac Télé/Likouala-aux-Herbes.
- (xvi) The Government of Congo and its project partners should ensure that the two projects in development for GEF funding for activities relating to mangroves are designed and implemented in such a way as to reflect and to be fully harmonised and coherent with the implementation in Congo of Ramsar, CMS and AEWA.
- (xvii) The Government of Congo and MagMinerals should develop a collaborative strategy with Rénatura Congo for the conservation of marine turtles in Congo, to include the measures identified in the Mengo potash project's Biodiversity Management Plan Programme 3, wider monitoring programmes, active implementation of the CMS MoU on African Atlantic Marine Turtles, and any necessary updating of relevant details in the Ramsar Information Sheets for the Cayo-Loufoualeba and Conkouati-Douli Ramsar Sites.
- (xviii) The Government of Congo should establish appropriate operational and policy linkages between its Ramsar/AEWA/CMS implementation activities and its engagement in relevant transboundary and sub-regional processes (such as CICOS, the International Commission for the Congo-Oubangui-Sangha Basin), having regard *inter alia* to relevant Ramsar guidance annexed to Resolutions VII.19 and X.19.
- (xix) The Government of Congo should finalise and formally adopt as soon as possible the National Wetland Policy it has already drafted, without making this conditional on funding for a national wetland inventory (which can be pursued on a separate parallel track).
- (xx) The Congo National Ramsar Committee should be strengthened so that it is able to meet regularly and address the full range of national implementation issues of relevance to the Convention. It should also consider adapting its scope to cover in appropriate ways the national implementation of the CMS and AEWA, with reference to Target 5.7 of the AEWA Strategic Plan 2009-2017.
- (xxi) The Government of Congo should continue the development of its national Environmental and Social Impact Assessment system and associated capacity-building, taking stock systematically of lessons learned from early experiences, having regard to the relevant Ramsar guidance annexed to Resolution X.17 and equivalent AEWA Conservation Guidelines, and in particular timing assessments sufficiently far in advance of developments so that their results can properly influence decisions as to whether consent should be granted, and providing for adequate independent review of impact statements and of the findings of project monitoring.

Reporting on progress

- (xxii) The Direction-Générale de l'Environnement should use the opportunity in 2011 of compiling Congo's national reports to the 11th Ramsar Conference of Parties (COP11), the 5th AEWA Meeting of Parties (MOP5) and the 10th CMS Conference of Parties (COP10) to provide information on progress in implementing the recommendations given in this report.

12. Concluding remarks

- 12.1 As with any Ramsar Advisory Mission, this report is not an end in itself, but represents one stage in a process. The brief nature of the Mission visit and the selective nature of its coverage has been emphasised, and the report should not be taken as a comprehensive review of all the issues. The targeted recommendations made here are, however, the product of an extremely positive and collaborative process, and it is hoped that they will carry significant weight with all involved in further planning and decision-making concerning Cayo-Loufoualeba and the wider implementation of Ramsar, CMS and AEWA in the Republic of Congo.
- 12.2 This report will hopefully be of benefit to a number of key players and stakeholders involved with the issues, and all are urged to study and act as appropriate on the recommendations made. Each department and organisation will have its own priorities according to its particular remit, and so the recommendations have been grouped on a topic basis without attempting to put forward one overall prioritisation.
- 12.3 The original concern which prompted the initiation of the Mission is of course the question of water abstraction for the potash mine and its potential impact on the wetland system. A range of necessary safeguards and desirable management approaches have been discussed in this report. It seems likely that under normal conditions, water levels (particularly in lake Cayo) may be influenced more by the dynamics of the connection between the Loémé River and the sea, and by seasonal variations in the patterns of rainfall, than by an increase in abstraction. This underscores the importance of addressing all influences on the Ramsar Site together and taking steps towards an integrated protection and management regime for the area as a whole.
- 12.4 Other concerns relating to pipelines, brine disposal, monitoring and non-mine-related development pressures have also been covered, as well as positive measures for policy, administrative arrangements and public engagement. The scope for coordinated implementation of the three MEAs (Ramsar, CMS and AEWA) offers an especially positive opportunity for the future.
- 12.5 Next stages will include the elaboration of actions within Congo to implement the Mission's recommendations, and to monitor and report on progress. Dialogue and support from the three MEA Secretariats will continue. In the context of fast-moving global interest in wetlands and extractive industries, catchment-based water resources management, coastal biodiversity conservation and a range of other key issues, this case example has the potential to offer a wealth of valuable experiences for wider audiences. Strong encouragement should be offered to all concerned in Congo for their continuing efforts towards securing the conservation and wise use of wetlands throughout the country.

Acknowledgements

The Mission Team is extremely grateful to the Government of the Republic of Congo for hosting this Mission, and to the Direction Générale de l'Environnement in the Ministry of Tourism and Environment (later the Ministry of Sustainable Development, Forest Economy and the Environment) for in-country coordination of arrangements and for attending face to face meetings. Thanks are due in particular to Lambert Imbalo, Thérèse Kilonda, Gilbert Madouka, Victor Massala, Alexis Minga and Grégoire Nkeoua.

In the Département and Préfecture of Kouilou we thank David Maméné and Antoine Bitá.

We greatly appreciate the time given to meetings and the generous provision of transport and facilitation of field visits by MagMinerals Inc. (Eric Bonheur and Marie-Hélène Turgeon) and Eni Congo SA (Roccontonio Catalano and Marc Nkoko).

Appreciation is extended especially to the village leaders, fishermen and community members of Mboulou Ntombi and Tchilembi, who gave a warm welcome, valuable time, and the benefit of their knowledge, insights and opinions to the Mission's deliberations.

Nathalie Breheret and Philippe Fasquel of Rénatura, and Victor Mamonekene of the Institut de Développement Rural at the Université Marien Ngouabi, are warmly thanked for their time and expert advice.

Cathleen Cybele provided superb support from the Ramsar Secretariat; and the indispensable work of document translators Hélène Fabre and Danièle and Richard Devitre is warmly acknowledged.

The Mission would not have been possible without funding from the Swiss Grant for Africa (provided to Ramsar by the Government of Switzerland) and from the Secretariat of UNEP/AEWA (acting also on behalf of UNEP/CMS).

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**Annex A:
Mission team members**

The Mission team comprised the following:

Dave Pritchard (UK)	Consultant; Mission leader and principal report author
Alexia Dufour (Switzerland)	Regional Affairs Officer, Ramsar Secretariat
Sergey Dereliev (Germany)	Technical Officer, Secretariat of the African-Eurasian Waterbird Agreement (also representing the Secretariat of the Convention on Migratory Species)
Roseline Ognimba (Congo)	Ramsar National Focal Point, Direction Générale de l'Environnement, Government of Congo
Noël Watha-Ndoudy (Congo)	Consultant; Laboratoire de Géosciences de l'Environnement et de Géologie Appliquée, Congo

Annex B:
Mission itinerary and meetings held

Wednesday 23 June 2010

Evening

Europe-based Mission team members arrive in Brazzaville

Thursday 24 June

Morning

Meeting with V Massala, Head of Pollution Prevention and *ad interim* Chief Executive Officer on Environment, Ministry of Sustainable Development, Forest Economy and the Environment, Brazzaville

Meeting with L Imbalo, Directeur de Cabinet, and A Minga, Conseiller du Ministre, Ministry of Sustainable Development, Forest Economy and the Environment, Brazzaville

Afternoon

Team fly to Pointe Noire

Evening

Team consultations

Friday 25 June

Morning

Meeting with A Bitá, Departmental Director of Environment, and D Maméné, Préfecture de Kouilou, Pointe Noire

Meeting with M-H Turgeon, Health, Safety and Environment Manager, MagMinerals Inc., Pointe Noire

Meeting with R Catalano and M Nkoko, Eni Congo SA, Pointe Noire

Afternoon

Field visits to site of proposed Loémé river water abstraction site, pipeline routes and viewpoints over Lac Loufoualeba, courtesy of MagMinerals Inc.

Evening

Meeting with V Mamonekene, Institut de Développement Rural, Université Marien Ngouabi, Pointe Noire

Meeting with N Breheret and P Fasquel, Rénatura, Pointe Noire

Saturday 26 June

Morning

Field visits to areas around Lac Cayo, Loémé river, pipeline routes, water sampling stations, industrial installations at Djeno, and areas around Lac Loufoualeba, courtesy of Eni Congo SA

Consultations with community representatives and fishermen, Mboulou Ntombi village meeting, Lac Cayo

Consultations with community representatives and fishermen, Tchilembi village meeting, Lac Loufoualeba

Afternoon

Team fly to Brazzaville

Evening

Team consultations

Sunday 27 June

Morning

Meeting with A Minga, Conseiller du Ministre, and V Massala, Head of Pollution Prevention and *ad interim* Chief Executive Officer on Environment, Ministry of Sustainable Development, Forest Economy and the Environment, Brazzaville

Afternoon

Team consultations

Evening

Europe-based Mission team members depart for Europe

Annex C: List of acronyms

AEWA	Agreement on the Conservation of African-Eurasian Migratory Waterbirds
CEC	Centrale Electrique du Congo
CED	Centrale Electrique Djeno
CEPA	Communication, Education, Participation and Awareness
CICOS	International Commission for the Congo-Oubangui-Sangha Basin
COP	Conference of the Parties
CMS	Convention on Migratory Species
CSR	Corporate Social Responsibility
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
GEF	Global Environment Facility
KCI	Potassium chloride (potash)
MEA	Multilateral Environmental Agreement
MoU	Memorandum of Understanding
MPC	MagMinerals Potasses Congo SA
MW	Megawatt
NGO	Non-Governmental Organisation
ORSTOM	Office de la Recherche Scientifique et Technique d'Outre-Mer
RAM	Ramsar Advisory Mission
RIS	Information Sheet for Ramsar Wetlands (Ramsar Information Sheet)
SEA	Strategic Environmental Assessment
STRP	Ramsar Scientific & Technical Review Panel
TRIDOM	Dja-Minkebé-Odzala tri-national landscape



Photo: Alexia Dufour