

## Chapter 1.1

# The QMM/Rio Tinto Project History in Tolagnaro and its Social and Environmental Concepts

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### Abstract

This chapter provides an overview of the social and environmental aspects of the QMM/RioTinto project since the beginning of the project. It describes the general strategy, the approaches and efforts of QMM to define and implement its environmental program. For this, we describe the social and environmental context of the region and the different phases of the project. Then, some of the activities aimed at regional biodiversity and environmental conservation are listed and cross-referenced to various chapters in this book to provide a framework for QMM's environmental program.

### Résumé

#### L'histoire du projet QMM/Rio Tinto à Tolagnaro à travers ses enjeux sociaux et environnementaux.

Ce chapitre présente l'histoire du projet QMM/Rio Tinto depuis ses débuts à travers ses aspects sociaux et environnementaux. Il inclut aussi les enjeux, les approches et les stratégies utilisées par QMM pour définir les activités à mettre en place. Une description du contexte social et environnemental est présentée au début du chapitre ainsi que les diverses phases du projet. Finalement, certaines des activités environnementales sont décrites et plusieurs références aux chapitres de ce livre sont ajoutées pour faciliter la compréhension des divers enjeux.

### Introduction

QIT Madagascar Minerals (QMM) is a company jointly owned by Rio Tinto plc, UK and the Malagasy State represented by the Office des Mines Nationales et des Industries Stratégiques de Madagascar (OMNIS). Starting in 1986, QMM conducted an extensive exploration program along the eastern coast of Madagascar for heavy mineral sands, which are a source of titanium dioxide, principally in the form of ilmenite and rutile. These investigations led to the discovery of an economically viable ore deposit in the Anosy region near Tolagnaro. Most of the proposed mining areas consist of heavily degraded ecosystems. However, major sediments are located underneath some of the last remnant littoral forest in southeastern Madagascar, at Mandena, Sainte Luce, and Petriky (Vincelette *et al.* 2003, 2006; Fig. 1). The project was developed over 20 years and went through various steps into the recognition of the importance of the region's biodiversity. In this chapter we review the environmental and socio-economic activities of the QMM project over two decades. There are many economic, technical, and cultural issues with important ramifications for environmental conservation.

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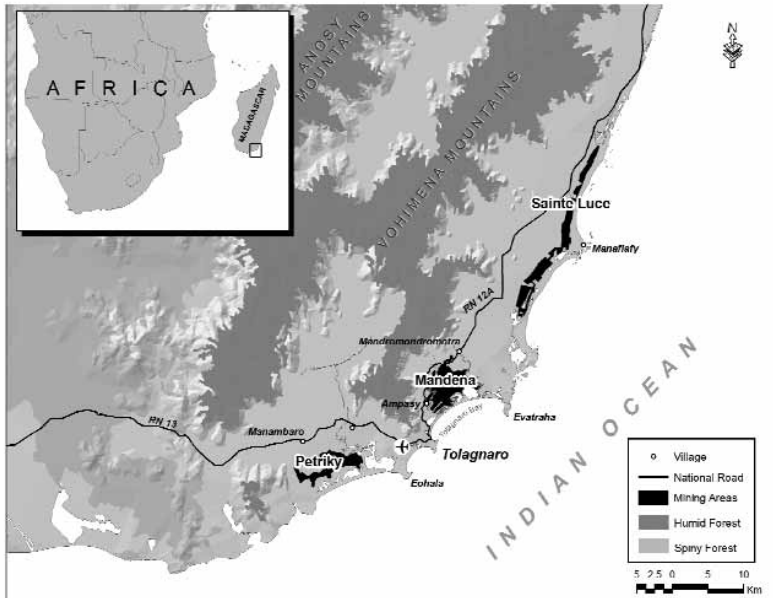


Figure 1. Location of the project area in southeastern Madagascar, which is delineated in the inset map of Africa and Madagascar.

## Background

The QMM exploration in the Tolagnaro region coincided with a period when extraction of natural resources and mining operations in economically and biologically sensitive environments in particular became a major political issue. At a global scale, the need to reconcile utilization of natural resources, conservation of threatened biota, and ethnical interests at a variety of scales led to the formulation of the “Convention on Biological Diversity” in Rio in 1992 (UNEP/CBD/COP 2006). Subsequently, a series of activities and measures have been developed to define appropriate ethical, social, and ecologically viable activities for the utilization and exploitation of

natural resources. In 1999, the Mining, Minerals and Sustainable Development Project group compiled a number of recommendations aimed at improving sustainable development in the wake of mining (MMSD Project 2002). Subsequently the World Conservation Union (IUCN) and the International Council on Mining and Metals (ICMM) initiated a dialogue to develop guidelines for enhancing the contribution of the mining industry to biodiversity conservation, including consideration and integration of the socio-economic and cultural rights, needs and concerns of indigenous people and local communities living near the proposed exploitation sites (IUCN-ICMM 2003, Table 1).

Table 1. Specific recommendations to implement appropriate practices associated with biodiversity conservation within mining operations (from IUCN-ICMM 2003).

Impact assessment	Environmental management systems and community development programs	Mine closure and rehabilitation	Community and indigenous peoples
Demonstrate corporate commitment to biodiversity	Document and assess local biota in consultation with appropriate partners	Develop appropriate and realistic objectives and targets	Effective engagement and participation
Adopt an ecosystem approach	Undertake comprehensive identification of actual impacts on local biota	Develop comprehensive closure strategies and plans	Legacy issues
Understand the nature of project sites	Plan and design preventive and mitigating responses to identified impacts on local biota	Promote progressive closure	Assessment
Assess biodiversity impacts	Implement preventive and mitigating responses to identified impacts on local biota	Plan for and promote rehabilitation with local species	Operations and management
Mitigate impacts on biota	Monitor, measure and report performance on biodiversity management	Maintain restoration standards and conditions following ownership changes	Closure
Facilitate and support partnership approach	Implement and support initiatives that promote and enhance the local biota	Develop dedicated financial provision	Code of ethics
		Promote public participation	

## The Situation in Madagascar

Madagascar is one of the primary countries where the principles of the Biodiversity Convention and the IUCN-ICMM guidelines apply. On the biodiversity side, Madagascar has been identified as one of the world's most important biodiversity hotspots (Myers *et al.* 2000, Mittermeier *et al.* 2004). Biodiversity hotspots are defined as areas with very high species richness and endemism, which have lost more than 75% of their original habitats due to human activities in recent times. Among the threatened ecosystems of Madagascar, the littoral forests, resting on sandy substrates and distributed along the coastal plain, have been attributed high conservation priority (Du Puy and Moat 1996, Ganzhorn *et al.* 1997, 2001, Rabeohitra *et al.* 1998, Ratsirarson and Goodman 1998, 2005, Dumetz 1999, Schatz *et al.* 2000, Bollen and Donati 2006).

On the socio-economic side, Madagascar ranges among the poorest countries on earth. The Institut des Statistiques de Madagascar lists a Gross Domestic Product (GDP) of US\$ 221 per capita for 2003 ([www.instat.mg/MADA/indic.htm](http://www.instat.mg/MADA/indic.htm); accessed on April 2, 2007) and US\$ 309 in 2005 with an inflation rate of about 11% in 2005 (Madagascar Action Plan 2007-2012; [www.madagascar.gov.mg/MAP](http://www.madagascar.gov.mg/MAP)).

Approximately 80% of the population is engaged in subsistence agriculture and levels of health care and education are low. Only 54% of the population living in urban areas has access to potable water and only 4% in rural areas. Average life expectancy is 52 years and the infant mortality rate is 89 per 1000. Literacy is estimated at 46% (CRD 2003).

At present, the agricultural productivity is low and is carried out often as subsistence agriculture. Most of the rural population therefore relies on forest resources during times of food shortage but also year-round for fire- and construction wood. This led to the destruction of a substantial proportion of the littoral forest ecosystems over the last 50 years (Vincelette *et al.* 2006).

The Anosy region is one of the ecologically most diverse regions of Madagascar (Barthlott *et al.* 1996, Goodman *et al.* 1997, Ramanamanjato *et al.* 2002), but also one of the poorest and most isolated of this island nation. The population of the Anosy region is expected to double before 2020, with an average annual increase of 2.9%. The regional GDP is estimated at US\$ 61 million, which translates into a per capita GDP of US\$ 182 (CRD 2003). The economy

is largely agricultural and dominated by rice and sisal cultivation. Given the reduced demand for sisal on the world market, production is dwindling and contributes less to the regional economy. Rice productivity is extremely low, and the region imports 12,000 tons annually.

The percentage of the regional population living below the poverty line is 82%, higher than the national average of 74%. Not one regional human development indicator (life expectancy, revenue, literacy, etc.) meets the national average. Ninety percent of the population does not have access to standard potable water, and 74% of appropriate age children do not attend school. Health centers are relatively few and far between, and are marginally staffed and equipped. Diseases affect the population such as malaria, filarial worms, leprosy, polio, and those sexually transmitted.

In 2004, 80% of the regional road network had become impassable for 12 months per year, which reduces the movement of goods and people, and contributes to the economic isolation of an ever-increasing number of communities. The cost of living is extremely high in the larger towns and villages of the region due to the inflated cost of transporting non-regional goods over long stretches of roads in very poor condition. The cost of export transport towards large non-regional market centers critically erodes the competitiveness of locally produced goods and commodities. This combination of socio-economic characteristics increases the pressure on the utilization of natural resources.

Industrial projects can provide economic development, but they also cause other problems, including the consumption of land, environmental vicissitudes, and cultural change. Historically and in recent decades, national and international investors often did not take into account the concerns of the local people. In part associated with this problem, the process leading eventually to the IUCN-ICMM (2003) guidelines had been initiated. For these reasons, large-scale mining projects in Madagascar combine many aspects of conceptual, perceived, and real conflicts of interest (Cadotte *et al.* 2002, Vincelette *et al.* 2006).

Due to the combination of economic poverty and almost unparalleled levels of biodiversity, many international non-governmental organizations (NGOs) have permanent programs in Madagascar and receive funding from donors to develop and implement socio-economic and environmental con-

servation programs on behalf of the government. This is the case in the Anosy Region. Here, the activities of various donors, NGOs, as well as the QMM project are integrated into a Regional Development Plan elaborated by a multi-sectoral regional committee (CRD 2003). The exploration phase and early activities of QMM predate the formulation of the Convention on Biological Diversity, the IUCN-ICMM formulation of guidelines for mining in sensible environments, the national politic of decentralization, and the creation of the CRD. There are many economic, technical, and cultural issues in the context of the QMM project with important consequences for environmental conservation.

### The Overall Context

Since the mid-1990s, Rio Tinto and its subsidiaries have had to adapt to meet the demands of a rapidly changing conservation landscape, including the need to take into account relevant environmental factors in obtaining access to lands, particularly in designated areas of high conservation value (Rio Tinto 2003). The conservation component of the attitude towards access to land of potential mining interest was strengthened through removal of the word “designated.” This signaled recognition of the importance of conserving biodiversity outside of classically defined protected areas. In addition, Rio Tinto’s revised land access policy explicitly refers to the use of land that is surplus to operational requirements for habitat protection and biodiversity conservation, subject to social considerations.

In late 2003, Rio Tinto provided further support to biodiversity issues with the promulgation of its biodiversity strategy and related position statement, biodiversity principles and technical guidance documents (Rio Tinto 2004). This guidance has been developed to support the Rio Tinto Environment Standards and the Rio Tinto Community Standard and any additional supporting documents as they are developed. The Rio Tinto Biodiversity Strategy and Guidelines was officially launched in November 2004 during the IUCN World Conservation Congress in Bangkok (IUCN 2004).

QMM’s credibility depends in large measure on showing that its business activities can have a positive impact on the lives of people and on the natural environment. It is no longer enough to ensure that living standards are not diminished, that community and social ties are preserved, and that fair compensa-

tion is provided for any loss of assets or economic opportunities. In order to achieve sustainable development, both assessment and programming need to include the identification of positive impacts and opportunities for actually enhancing socio-economic and environmental well-being. The mineral deposits that will be exploited are not inhabited by local people, however, it does represent a common property resource to the neighboring villagers. For the most part these are rural people engaged in subsistence production, which provides limited opportunities for development or economic growth. These villagers both endure and participate in a process of progressive deforestation and degradation of the environment in which they live.

According to Sarrasin (2006), the new mining code adopted by Madagascar will help to strengthen the private component of the mining sector. This opens up opportunities for the sector but also implies responsibilities and offers the companies a chance to demonstrate their capacities to implement the new standards formulated in their environmental strategies.

### Environmental activities to date

Since 1989, QMM has devoted significant financial and administrative resources to studies that aimed to describe the flora and fauna of the Anosy Region, to identify local and regional endemic species, habitats, ecosystem diversity, and their biogeographic relationships. Furthermore, other studies addressing socio-economic issues and the interface between human needs and conservation issues have also been conducted. In collaboration with various institutional partners the major goals of these research programs can be divided as:

- Conservation of the regional biodiversity,
- Rehabilitation of land after mining,
- Partial restoration of natural ecosystems after mining, and
- Sustainable utilization and management of local natural resources.

An assortment of these studies and some of the results are presented in this monograph.

### Project phases

At an early stage, studies were undertaken to understand aspects of the region’s biodiversity and the local socio-cultural and economic context associated with the proposed mining project. The knowledge

generated by these studies was very important to the successful development of the Terms of Reference for QMM's Social and Environmental Impact Assessment (SEIA, QMM 2001). Throughout these preliminary stages, from 1989-2001, QMM coordinated these studies and submitted the SEIA to the Malagasy Government for its review, which subsequently lead to the issuing of an environmental permit associated with the exploitation process.

To respond to the concerns of the government, local populations, and NGOs, the project has worked for over 15 years on different biodiversity and conservation issues. This has involved terrestrial and aquatic research (fauna, flora, ecosystems, habitats, ecology, seeds, plant phenology, etc.) with an assortment of experts from diverse institutions such as Bat Conservation Madagascar, BirdLife International, Field Museum of Natural History, Flora and Fauna International, Kew Gardens, Malagasy and foreign universities, Missouri Botanical Garden, Smithsonian Institution, and others. Major steps in the environmental program are listed in Table 2.

### Community and Natural Resources Context

The 2000 ha of the Mandena deposit are now 75% open lands, 10% highly degraded forest, and 15% wetlands (see Vincelette *et al.* Chapter 2.4). In addition, the invasion of the low-lying wetlands by an aggressive and non-utilitarian exotic tree species, *Melaleuca quinquenervia*, has begun to eliminate an economical-

ly essential species of reed, *Lepironia mucronata*, (see Randriatafika *et al.* Chapter 6.6). The lakes, which border the deposit, and upon which several villages of fishermen depend, have decreased in productivity due to over-fishing with maladapted materials and techniques (see Réville *et al.* Chapter 5.1). Another essential forest product, *Flagellaria indica*, (see Rabenantoandro *et al.* Chapter 6.7), used by fishermen to fabricate lobster traps, is becoming scarce. Further, certain local populations suffer from the effects of reduced access to firewood, wood, and vines for construction, medicinal and herbal plants, aquatic resources, and reeds, upon which women in particular depend for income.

The knowledge developed by QMM and its collaborators over 15 years of endeavor permitted the company to propose in its Environmental Management Plan a set of environmental rehabilitation and conservation actions. Some of the more important aspects include:

- Establishment of conservation zones in order to conserve and manage biodiversity and to ensure sustainable access by the population to renewable forest products (e.g. medicinal plants). The Mandena Conservation Zone (230 ha), established in 2000, has served as a pilot project, and has been successful in conserving and regenerating portions of the forest (see Rarivoson Chapter 6.1). The Sainte Luce Conservation Zones established in 2005 include 747 ha of forests and wetlands.
- Ecosystem restoration to double the size of

Table 2. Major steps in the environmental program between the exploration phase in 1986 and investment decision in 2005 of QMM.

1989-1992	First phase of social and environmental studies: carried out by external consultants on flora, fauna, soil and geology, hydrology, aquatic, and socio-economic issues (GRAIGE 1990, Lowry and Faber-Langendoen 1991, Creighton 1992, CSSA 1992, Lewis Environmental Consultants 1992, Mackie, Martin and Associates 1992, Rabeson 1992, QMM 2001).
1996-2001	Second phase of studies: establishment of a social, environmental and conservation team within QMM; recruiting of consultants and collaborators (universities, research institutions, NGOs).
1998	Signature of the "Framework Agreement" with the Malagasy Government.
1998-2001	Elaboration of the Social and Environmental Impact Assessment (SEIA) (QMM 2001).
2001	Deposition and approval of the SEIA with public consultations organized by the Office National de l'Environnement (ONE).
2002	Elaboration of the Environmental Management Plan (EMP).
2002-2005	Final feasibility studies and semestrial reports to ONE 2002-2005.
August 2005	Investment decision by Rio Tinto.
2006	Start of construction of the infrastructure.
2009	Expected start of the mining operation (up to 60 years).
± 2070	Mine closure.

natural forest wherein indigenous and endemic species will be conserved (see Vincelette *et al.* Chapter 6.5).

- Development of eco-tourism activities in the conservation zones to generate revenues for the community.
- Establishing Madagascar's largest tree nursery, capable of producing 200,000 seedlings per year, of both fast growing and indigenous species (see Rarivison and Mara Chapter 6.2, Randriatafika *et al.* Chapter 3.3) and providing guidance for the establishment of public tree nurseries.
- The planting of 100 ha of fast growing timber species per year, off the mining site. The first of these plantations was established in 2002 and will be mature and exploitable in 2010 (see Rarivison and Mara Chapter 6.2, Rarivison *et al.* Chapter 6.3).
- Once mining begins, an additional 100 ha per year of plantations will be established on the deposit, following the extraction and back fill pathway.
- Capacity building to enable the local communities to manage the plantations for fuel wood, construction wood, commercial sales, apiculture, and as a sheltered environment for cattle.

Biodiversity programs include biodiversity monitoring on the level of communities, populations, and population genetics, endemic species conservation plans, threatened lemur translocation program, and long-term seed conservation. Examples for many of these topics are addressed by chapters included in this book. The QMM environmental program touches at numerous levels the question of education, a primordial step to advance conservation, including the development of a littoral forest flora field guide; and international and national student programs and field schools have visited and worked on the sites in the last ten years.

Given the level of anthropogenic habitat change in the littoral forests in the past decades and the anticipated commencement of mineral extraction, questions associated with habitat restoration have been an important focus of research activities. These include wetland restoration trials demonstrating the ability to grow components of this ecosystem, and hydrological and aquatic research to produce a strategy for improving fishing practices, techniques, and materials, along with resource management techniques to enhance breeding habitats, mangrove regeneration, and dune stabilization.

All of these measures have been or are currently being implemented at Mandena as trials. Large-scale offsite tree plantations have been sowed at Mandena and Conservation Zones have been implemented at Mandena and Sainte Luce prior to mining. These various actions have been conducted in close partnership with the local populations and authorities.

### Co-management agreement

The principle of active and reciprocal partnership, mutual respect, and long-term commitment has been formulated in the Mandena Co-Management Agreement (see Rarivison Chapter 6.1). This agreement was developed after an exhaustive consultation process involving interested parties, including project opponents, in both Madagascar and abroad. The aim was to understand their concerns and to seek their advice and assistance in addressing the project and regional development issues. The agreement creates a co-management structure in which QMM, the communes, and the Ministry of Environment, Water and Forest authorities participate in a management committee (COGE = Comité de Gestion), and it is reinforced by a *dina*. The *dina* is a uniquely Malagasy construct. It is a social contract, instituted with traditional practices, to manage a potential source of conflict. It describes the situation or problem to be addressed, identifies the respective commitments of the various parties, and determines the sanctions to be applied in case of non-compliance. *Dinas* are widely applied in Madagascar and have come to be legally recognized. More importantly, as they are anchored in custom and tradition, they render legal agreements culturally acceptable at the villagers' level, and in many cases more tangible than national laws and regulations.

Whereas the current *dina* primarily addresses the concerns and priorities of the local population regarding the quality and quantity of their natural resources, the *dina* can be extended to include a wider range of community development issues and responses. Ultimately, it should lead to sustainable improvements to the quality of life. This will require investment in infrastructure, capacity building and health issues associated with the influx of foreign workers or workers from other regions, as well as in institutions for savings and credit, in agricultural production, in other social services, and enterprise promotion. The participatory approach to monitoring and evaluation of those programs will become the pri-

mary means of maintaining dialogue with the communities. Thus, the *dina* should provide a framework but also the basis for the development of the program through mutual consultation and participation. These activities must be put into a regional context and be integrated in the regional development plan (CRD 2003) that will then result in a regional management plan for the people and their environment.

As a whole the QMM project has the opportunity to fulfill the new standards set in a collaborative effort by the IUCN-ICMM in 2003 (IUCN-ICMM 2003, IUCN 2004) for mining projects. This is not just an obligation associated with the permit for mining but also a chance to build a model for mining projects and to come to more sustainable forms of social, socio-economic and ecological developments.

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