Mining and Biodiversity

A collection of case studies – 2010 edition
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Foreword

Biodiversity is a term used to describe the breadth of life on earth – from animal species to genes and ecosystems. Concern for the conservation of biodiversity is related to its decline as a result of human activity on the planet. The reach of this vast number of activities, one of which is mining, is increasing with population growth. To draw attention to this concern, the United Nations has declared 2010 to be the International Year of Biodiversity: a celebration of life on earth and an invitation to take action to safeguard it.

More than ever, the conservation of biodiversity is a priority. Our member companies have committed to contributing to conservation of biodiversity and, in this context, ICMM has been part of a dialogue with the International Union for Conservation of Nature (IUCN) since 2004. In that same year, ICMM published its first set of case studies on integrating mining and biodiversity conservation and, in 2006, ICMM published its Good Practice Guidance for Mining and Biodiversity.

Since then, field experience has grown and good practices have continued to develop. In the run-up to the Convention on Biological Diversity’s 10th conference of the parties, ICMM has compiled a short collection of recent case studies to demonstrate good practices in biodiversity. Much as in the 2004 publication, these case studies are meant to show how good practice, collaboration, and innovative thinking can advance biodiversity conservation in the context of mineral exploitation.

It is our hope that these case studies will inspire companies, communities, governments, NGOs and scientists to co-operate in developing more avenues for integrating mining and biodiversity conservation.

Anthony Hodge
President, ICMM
Introduction

Biodiversity conservation is, and will continue to be, an important consideration for mining in the future. Mining is a significant economic activity in many countries – recent studies show that 41 nations are heavily dependent on mineral development and a further 7 have large internally focused industries (e.g. China and India). With increasing demand for raw materials, it is inevitable that mining will continue, and may expand into ever more remote regions. It is many of these same regions that scientists have identified as priorities for biodiversity conservation and possibly formal protection.

ICMM believes that the mining sector should assess how far it has come and how much more remains to be done to develop and implement sound biodiversity management methods so that it is ready to take on the increasing challenges that lie ahead. One particular challenge that the industry will have to face is the recognition that in some instances mining and conservation may not be compatible, as evidenced by ICMM members’ commitment not to mine or explore in World Heritage Sites.

Overview of the Case Studies

The selection of case studies for this volume represents voluntary contributions from a number of companies. It is not a comprehensive survey of biodiversity management practices across the sector. The cases span a range of geographies, types and phases of mines. We begin with three case studies on biodiversity management during the project (or planning) phase of mines in the U.S., Indonesia, and Madagascar. They are followed by a series of case studies of biodiversity programs implemented by operating mines in Argentina, Australia, Brazil, Colombia, Namibia, Peru, and South Africa.

Growing attention to biodiversity by ICMM members – and by the industry as a whole – is accompanied by the appearance of increasingly structured approaches to managing company impacts. ICMM and other organizations have published guidance for good practice in biodiversity management that promotes this structured approach. There are currently no definitive indicators of good biodiversity management practice; however for the purposes of this volume we identify the following common elements:

- **Company Biodiversity Commitment** – company-wide commitments to “no net loss” and “net positive impact” to biodiversity are beginning to appear as are similar commitments for example around “zero harm”, or “contributing to biodiversity protection in areas of operation”;

- **“No Go” Policies** – company-wide commitments to avoid mining within areas where harm to biodiversity is unacceptable, such as the commitment by ICMM members not to mine or explore in World Heritage Sites;

- **Mitigation Hierarchy** – structured biodiversity management approaches that begin with avoiding unacceptable impacts, minimizing the impacts that do occur, restoring areas that are impacted, and offsetting the residual net loss of biodiversity (and implementing additional voluntary projects in some cases);

- **Biodiversity Action Plans (or Management) (BAPs)** – written plans that identify and quantify company impacts and risks to biodiversity and explain how they will be managed according to a structured approach to achieve the company’s biodiversity commitments; and,

- **Biodiversity Reporting** – systems in place to report on biodiversity related activities either as part of company environmental or sustainable development reports, or as separate stand-alone publications.
Each case study begins with a rapid summary of the use of these elements by each company, as well as references to their sources of biodiversity guidance. In practice most companies are in the early stages of developing these elements – a process that realistically may require years to complete. More hard work will be needed in the future, and lessons learned by leading companies will undoubtedly assist the sector as a whole in improving its performance in biodiversity conservation.

But industry is not alone in this pursuit. A number of international NGOs are developing tools and approaches to assist companies seeking to improve their management of biodiversity impacts. In the second section of this volume there are descriptions of the work currently being undertaken to assist extractive companies by Birdlife International, the Business and Biodiversity Offsets Program, Conservation International, and The Nature Conservancy. The dedicated staff of these organizations welcome the opportunity to assist companies in piloting a range of innovative approaches to biodiversity conservation.

Looking to the Future

We expect that we will look back at this volume of case studies as a transition time from the more common historical practice of one-off voluntary conservation projects by mining companies to structured approaches that follow accepted guidelines for identifying, measuring, and managing impacts and risks. This will be accompanied by an evolution of BAPs to practical documents that integrate directly into company environmental management systems. With this broader use of a structured approach will come greater field knowledge to support the refinement of methods for biodiversity risk analysis, landscape-scale conservation assessment and planning, and design of biodiversity offsets.

We look forward to continuing to partner with others in supporting broader implementation of good practices for biodiversity conservation and in helping to shape this continuing evolution.

‘GROWING ATTENTION TO BIODIVERSITY BY ICMM MEMBERS – AND BY THE INDUSTRY AS A WHOLE – IS ACCOMPANIED BY THE APPEARANCE OF INCREASINGLY STRUCTURED APPROACHES TO MANAGING COMPANY IMPACTS.’
Rio Tinto is the majority shareholder of the exploration project Resolution Copper Mining (RCM), located in Superior, Arizona, USA. Initial exploration in 2001–2003 indicates a large copper ore body is present more than 2,100 meters below the surface, possibly the largest in North America, capable of producing 20 percent of expected future US copper demand over the next five decades. In addition to addressing the technical challenges of accessing the ore body at a depth of over 2,100 meters below the surface and a temperature of 80 degrees Celsius, pre-feasibility work is focused on evaluating a broad range of mining, processing and operating alternatives. Pre-feasibility studies are expected to conclude in 2013 with first production by 2020.

One complication for RCM is that the proposed mine requires use of 974 hectares of land that is currently owned by the U.S. Government in Tonto National Forest. In order to proceed with exploration, RCM must complete a land exchange with the government. A land exchange is effectively a trade of land parcels of equal economic value. Given Rio Tinto’s commitment to a net positive impact to biodiversity, the land exchange presents a unique opportunity to exceed the requirements of trading land of equivalent economic value by ensuring that the land parcels offered in the trade are also of equivalent or greater value for the conservation of biodiversity and provision of environmental services – a biodiversity offset.

To this end, RCM sought the assistance of stakeholders, holding a series of consultations with environmental groups, the outdoor recreation community, and others that place value on the area of Tonto National Forest proposed for the land exchange and who have informed views of local and regional conservation and outdoor recreation priorities that could be met by securing other parcels of land to be offered to the government in the trade, and conserved for the long term. Based on this, RCM has developed a proposal to trade 2,230 hectares of private land it has acquired, composed of a mosaic of areas identified as priorities for conservation and recreation in eastern Arizona.

From a biodiversity offset perspective, the portfolio of private parcels is more than double the size of the federal lands to be acquired, and nearly triple the size of the area that would actually be impacted by the mine.
The 1,244 hectare 7B Ranch straddles the San Pedro River that flows north from its headwaters in the Mexican state of Sonora. It is one of the last major undammed rivers in the Southwest. The San Pedro corridor is one of the most important riparian habitats in the Sonoran and Chihuahuan deserts, with more than 390 species of birds and a highly diversified mammal population. The 7B Ranch contains a 328 hectare relic Mesquite forest, which is unique in its own right, and also is designated by Birdlife International as an Important Bird Area. Potential habitat for a number of threatened and endangered species exists here. RCM has acquired the 7B and contracted with The Nature Conservancy to manage it as a conservation area until a land exchange is completed.

In consultation with conservation specialists, especially the Arizona Audubon Society, RCM rated the conservation value of the parcels in terms of ecosystem condition and priority for conservation in Arizona. In doing so, RCM was able to take a semi-quantitative approach using Rio Tinto’s quality hectares method, to determine whether the parcels represented equivalent or better conservation benefits than the government land. Table 1 provides a summary accounting of the net biodiversity impact of the land exchange, which proves positive.

### Table 1: Impact accounting for the proposed land exchange

<table>
<thead>
<tr>
<th></th>
<th>Interior Chapparral</th>
<th>Madrian Oak woodland</th>
<th>Surface water, wetlands, floodplains, river channel</th>
<th>Other like for like or better habitats</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total size</td>
<td>Area affected</td>
<td>Quality coefficient</td>
<td>Area affected</td>
</tr>
<tr>
<td>East Plant – Maximum Footprint Land Exchange – Properties offered</td>
<td>3,025</td>
<td>1,850</td>
<td>0.00</td>
<td>1,850</td>
</tr>
<tr>
<td>Appleton Ranch</td>
<td>956</td>
<td>0</td>
<td>143</td>
<td>1.00</td>
</tr>
<tr>
<td>Cave Creek</td>
<td>149</td>
<td>7</td>
<td>0</td>
<td>128</td>
</tr>
<tr>
<td>East Clear Creek</td>
<td>640</td>
<td>0</td>
<td>0</td>
<td>160</td>
</tr>
<tr>
<td>JI Ranch</td>
<td>266</td>
<td>200</td>
<td>200</td>
<td>0.50</td>
</tr>
<tr>
<td>Dripping Springs</td>
<td>160</td>
<td>100</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>The Pond</td>
<td>95</td>
<td>95</td>
<td>95</td>
<td>0</td>
</tr>
<tr>
<td>Tangle Creek</td>
<td>148</td>
<td>0</td>
<td>108</td>
<td>0.50</td>
</tr>
<tr>
<td>Turkey Creek – JX Ranch</td>
<td>147</td>
<td>37</td>
<td>37</td>
<td>0.30</td>
</tr>
<tr>
<td>7B</td>
<td>3,073</td>
<td>0</td>
<td>1,766</td>
<td>0.50</td>
</tr>
<tr>
<td>All Offsets</td>
<td>5,634</td>
<td>499</td>
<td>177</td>
<td>159</td>
</tr>
<tr>
<td>Net Position (Acres)</td>
<td>-1,351</td>
<td>45</td>
<td>1,313</td>
<td>1,921</td>
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</tbody>
</table>
The IndoMet Coal Project (IMC) is a high quality metallurgical coal resource within the Maruwai Basin in the Indonesian part of the island of Borneo. Borneo is renowned for its high biodiversity, with some of the most species-rich flora and fauna in the world. IMC consists of seven Coal Contracts of Work (CCoW) that cover 355,000 hectares. The leases are primarily located in lowland tropical forest dissected by rivers and streams, thus making it an area of high ecological variation and biodiversity. The leases are located in the remote and relatively inaccessible district of Murung Raya, which is still 87% covered by tropical rain forests.

Cognisant of the high biodiversity of the area, IMC has since 2000 commissioned seven biodiversity surveys in order to better understand the biodiversity management challenges. From an early stage, it was realized that operating responsibly in an area of outstanding biodiversity such as Borneo would require a comprehensive biodiversity conservation and sustainable development strategy. In this, IMC was guided by the BHP Billiton Charter, Sustainable Development Policy and other fundamental principles. These involve being acutely aware of minimizing the footprint of mining operations, recognizing opportunities to work outside the mine areas as well as within them to achieve biodiversity goals, and engaging and working with biodiversity professionals, government, the community, and non-government organizations (NGOs) to achieve high standards of biodiversity conservation management.

IMC’s Biodiversity Strategy aims to deliver a net positive impact on biodiversity through a number of groundbreaking initiatives. Active engagement with NGOs has been a key part of these initiatives. They include:

- Conservation of the Bornean orangutan;
- Strategically improving sustainable land use planning in the region where the project is located; and,
- Facilitating the process to set aside areas that offset the negative impacts of mining activities on biodiversity around the mine site.

<table>
<thead>
<tr>
<th>Biodiversity Management Overview</th>
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<tbody>
<tr>
<td>Company Biodiversity Commitment:</td>
</tr>
<tr>
<td>Enhance biodiversity protection. Stand for Zero Harm to environment</td>
</tr>
<tr>
<td>“No Go” Policy:</td>
</tr>
<tr>
<td>No exploring or mining in World Heritage listed properties</td>
</tr>
<tr>
<td>Biodiversity Mitigation Hierarchy:</td>
</tr>
<tr>
<td>Yes, as guided by company sustainability policy and environmental standards and guidelines</td>
</tr>
<tr>
<td>Environmental Management System:</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>Biodiversity Action (or Management) Plans:</td>
</tr>
<tr>
<td>Yes, as part of the IMC Biodiversity Strategy and Land Management and individual site specific or infrastructure element Biodiversity Management Plans</td>
</tr>
<tr>
<td>Biodiversity Reporting:</td>
</tr>
<tr>
<td>Stakeholder meetings</td>
</tr>
<tr>
<td>BHP Billiton Sustainability Report</td>
</tr>
<tr>
<td>Sources of Biodiversity Guidance:</td>
</tr>
<tr>
<td>BHPB Group Level Document Environment Commissioned Biodiversity Survey Reports Nature conservation NGOS Consultants Local stakeholders (government and communities) Scientific literature ICMM Good Practice Guidance on Mining &amp; Biodiversity</td>
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</tbody>
</table>
Outcomes from external engagement workshops with leading conservation NGOs and leading conservation experts strongly recommended that the IMC project should explore mechanisms available in Indonesia to offset its environmental and biodiversity impacts by supporting the management of areas for forest and habitat restoration. While the process to secure these areas is long and involved, the IMC project is actively developing an offset strategy in collaboration with conservation partners and government.

In 2010, BHP Billiton signed a follow-on two year contract with FFI to build on results from the previous program of work and to ensure that the findings are used in developing a regional conservation strategy. Through this initiative BHP Billiton will leave a positive biodiversity legacy in the region. The project comprises five key elements:

- Sustainable Land Use Planning in which FFI will improve the capacity of local government agencies;
- Orangutan Relocation which is a continuation of BHP Billiton’s long-term engagement with the Borneo Orangutan Survival Foundation (BOSF);
- Building Local Conservation Leadership at village-level;
- Sustainable Finance and Management to ensure long-term sustainability of the regional conservation strategy; and,
- Communications and Awareness Raising Activities.

This project is an exciting opportunity to demonstrate best practice land use and the collaboration between business and biodiversity.

The second conservation initiative represents a wider contribution to biodiversity conservation through the development of a regional conservation and sustainable land use strategy. The initiative focuses on improving local government land use planning capacity and the identification of conservation options (such as offsets) in sustainably managed forests. In 2008, as part of the external engagement strategy of the IMC Biodiversity Strategy, BHP Billiton and Fauna and Flora International (FFI) commenced a joint project. FFI, a leading international environmental NGO, has been active in Indonesia for over 15 years, supporting conservation of over 3 million hectares of rainforest across the archipelago. The first phase of the project (2008 - 2009) focused on improving the understanding of high conservation value (HCV) areas within the Maruwai Basin encompassing two million hectares, and to propose options for developing a regional conservation strategy with district and provincial governments. A major outcome was the first district-wide assessment of conservation values using the globally recognized HCV method.

The Borneo Orangutan Survival Foundation’s (BOSF) Orangutan Reintroduction Centre Nyaru Menteng cares for and rehabilitates over 600 orangutans rescued from the wild or captivity. In 2007, at the Bali Climate conference, the Indonesian president, Susilo Bambang Yudhoyono, launched the National Orangutan Conservation Strategy and Action Plan. The plan stipulates that all orangutans held in rehabilitation centers must be released in the wild by 2015. Since 2006, IMC has assisted BOSF in identifying potential orangutan release sites. Once identified, IMC provided logistical support, safety management and helicopter transport for four orangutan translocation projects (one per year). As a result, a total of 149 rescued orangutans were safely released back into the wild. This group represents an important part of the wild population of the Bornean orangutan which is an endangered species and heavily threatened in the wild by habitat destruction and hunting. BOSF has previously identified the district of Murung Raya as a priority area for these releases because the area contains suitable habitat and, importantly, the area does not contain a wild orangutan population. The original orangutan population was exterminated over one hundred years ago by hunters and the BOSF translocation and release program is hoping to re-establish a new breeding population in Murung Raya, thus making a tangible contribution to the survival of the species in the wild.

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HSE Manager
IndoMet Coal Projects
Jakarta, Indonesia
david.savory@bhpbilliton.com

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The Ambatovy Project, located in the Republic Madagascar, is in the construction phase of an 18 km² open pit nickel and copper mine with an accompanying slurry pipeline and a US$ 2.3bn hydrometallurgical plant. The mine site is in an area of high biodiversity and species endemism, requiring rigorous biodiversity management.

As a world class mining project, Ambatovy and its shareholders believe in demonstrating good environmental management practices to secure its license to operate. To Ambatovy, a license to operate consists of the permanent support of civil society, local communities, national and international NGOs and governmental authorities regarding the manner in which social and environmental affairs are managed. Because national and international stakeholders universally consider Madagascar’s biodiversity to be of utmost importance, producing positive conservation outcomes is a critical component of this license to operate. Furthermore, shareholders recognize that Ambatovy’s biodiversity management practices have provided additional access to capital, and may help to improve future access to resources.

The company is undertaking its biodiversity management in a structured manner that follows the mitigation hierarchy across all aspects of biodiversity, and residual impacts are being offset through a multifaceted conservation program.

- **Avoidance** – analysis of pipeline route alternatives (21 major re-routes to avoid sensitive areas), re-routing and fine tuning during construction, conservation barriers created to isolate onsite conservation areas from construction activities, strict mine footprint modification protocols and a set-aside of an area of the ore body.

- **Minimization** – reduction of the surface area subject to impacts through appropriate design and implementation, such as rehabilitation of areas cleared for exploration, reduction of the mine footprint through planning optimization.

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**BIODIVERSITY MANAGEMENT OVERVIEW**

**Company Biodiversity Commitment:**

No net loss (net gain preferred)

**“No Go” Policy:**

No species loss, priority habitat viability maintained

**Biodiversity Mitigation Hierarchy:**

Yes

**Environmental Management System:**

Yes

**Biodiversity Action (or Management) Plans:**

Yes

**Biodiversity Reporting:**

Monthly report to shareholders
Annual Sustainability Report
Independent audits and Scientific Consultative Committee
Regulatory reporting
Local community and stakeholder meetings
Business and Biodiversity Offsets Program meetings

**Sources of Biodiversity Guidance:**

International Finance Corporation, Performance Standard 6
Business and Biodiversity Offsets Program
ICMM Good Practice Guidance on Mining and Biodiversity
IUCN
IPIECA
NGOs
Scientific Consultative Committee
Consultants

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Photo: Propithecus diadema
This undertaking includes engagement with Malagasy regulatory agencies, international and local NGOs (Conservation International, Wildlife Conservation Society, World Wildlife Fund), local communities, international and local scientific communities, forest communities around the mine and the offset sites, and the Business and Biodiversity Offset Program. The Project has a strong commitment to ensuring stakeholder consultation, which has created transparency, improved communication and sharing of information, and inspired partnerships.

In addition to achieving the objectives set forth in the mitigation hierarchy thus far, the company’s biodiversity management plan has led to the development of significant capacity in Madagascar, both internally and externally to the Project team. This capacity may contribute to future projects in Madagascar and overseas. Ambatovy may also set a standard for large development projects in Madagascar – it is increasingly seen as a case study for best practices in biodiversity management.

REFERENCES:
AngloGold Ashanti’s operations in the Brazilian state of Minas Gerais include gold mining, processing, smelting and refining. They are found in important Brazilian biomes – Atlantic Forest, Cerrado (scrub forest) and the Campo Cerrado (open savanna), all of which are under intense pressure from urbanization, agriculture, forest exploitation and located in an area of important geological interest [an area called the Iron Quadrangle]. The Atlantic Forest is highly threatened and has lost 93% of its original coverage. It is among the top five global biodiversity hotspots. The Cerrado is the second largest Brazilian biome, covers 21% of the country’s territory, and is also identified in the list of 34 global biodiversity hotspots.

To achieve balance between mining and conservation, AngloGold Ashanti Brazil created two ecological reserves: the 147 hectare Mata Samuel de Paula Private Nature Reserve (RPPN) in Nova Lima, and the 726 hectare AngloGold-Cuiabá RPPN in Sabará. The reserves are in priority areas for conservation and help to ensure maintenance of biodiversity and preservation of natural ecosystems. AngloGold Ashanti also operates the Harry Oppenheimer Environmental Education Centre within the Mata Samuel de Paula RPPN.

AngloGold Ashanti has supported environmental studies to better understand the areas. Over a three-year period, the Universidade Federal de Minas Gerais (UFMG) and Faculdade de Estudos Administrativos de Minas Gerais (FEAD) conducted studies at Mata Samuel de Paula on animals (mammals, amphibians, reptiles, arachnids and birds), plants, water and soils to determine the species present and identify those threatened with extinction. The company published the results of the study in the book “Biodiversidade da Mata Samuel de Paula” [Biodiversity in the Samuel de Paula Forest] during World Environment Week in 2009. This work is distributed free of charge to public libraries and universities. An initial assessment was also made of the AngloGold-Cuiabá RPPN in partnership with the consultancy GHEOSFERA and the NGO AMDA (Minas Gerais Association for Environmental Defense) as part of the development of a management plan for the area.

### BIODIVERSITY MANAGEMENT OVERVIEW

<table>
<thead>
<tr>
<th>Company Biodiversity Commitment:</th>
<th>“We will contribute to biodiversity protection in our areas of operation”</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>”No Go” Policy:</strong></td>
<td>Will not mine or explore in World Heritage Sites</td>
</tr>
<tr>
<td><strong>Biodiversity Mitigation Hierarchy:</strong></td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Environmental Management System:</strong></td>
<td>ISO 14001</td>
</tr>
<tr>
<td><strong>Biodiversity Action (or Management) Plans:</strong></td>
<td>As prescribed in environmental license conditions</td>
</tr>
</tbody>
</table>
| **Biodiversity Reporting:** | Sustainability Report  
Individual company publications |
| **Sources of Biodiversity Guidance:** | Company guidance  
NGO technical information  
Scientific literature  
ICMM Good Practice Guidance on Mining & Biodiversity  
Consultants |
Following is an excerpt from the foreword of Biodiversidade da Mata Samuel de Paula by José Carlos Carvalho, Secretary of the Environment and Sustainable Development of the State of Minas Gerais:

In the midst of so much concern and disbelief in the future, what reason could there possibly be for AngloGold Ashanti launching the book Biodiversidade da Mata Samuel de Paula at this particular time? We thought of the best one of all: hope. That is to say, even in the midst of doom and gloom about the future, complicated by the unbridled ambition of many, there is still a place among us for companies and entrepreneurs who, in addition to seeking profit, can find a way in the intricate world of capitalism to build something for those who come after us so that they, too, may enjoy the blessings of the earth.

That objective is what led AngloGold Ashanti to set up, next to the beautiful capital of Minas Gerais, a Private Natural Heritage Reserve (RPPN), which it created and has maintained since 2000. Furthermore, it has supported studies, helping to understand the phenomena that take place within it, with the intention of compiling rich reference material for both specialists in the ecotones of the Atlantic Forest and Cerrado and students in general...

...Through this initiative, the company has added its name to the list of mining companies in Minas Gerais that have left behind a past of predatory exploitation and disregard for the community well-being and joined a group of companies that are focused on complying with the constitutional requirement of the social function of economic ventures, aware that protecting the environment is more than just a modern marketing strategy: it is a commitment to humanity.

The studies point to the ecological importance of the conservation units created by the company. At the RPPN Mata Samuel de Paula, 510 species of vascular plants were identified; of which 75 were pteridophytes and 435 were angiosperms. Of the plant species, nine are threatened with extinction, notably species like Melanoxylon braúna and Ocotea percoriacea. One hundred fifty-eight bird species were catalogued, of which four species are listed as threatened with extinction (Embernagra longicauda, the pale-throated pampa finch; Scytalopus indigoticus, the white-breasted tapaculo; Poospiza cinerea, the cinereous warbling-fin and Campephilus robustus, the robust woodpecker). There were 24 species of mammals, belonging to seven orders and 12 families. Of these, two species considered to be threatened with extinction were recorded, the lesser anteater (Tamanduá tetradactyla) and black-fronted titi (Callicebus nigrifrons). Seven species of reptiles were recorded, belonging to five families. Of these, three species are lizards, four are snakes. Fourteen species are anura amphibians belonging to five families.

In addition, the reserves created by the company are important additions to the mosaic of regional protected areas. In the landscape they join the natural monument of the Piedade mountain range, the Fechos Ecological Station, Capitão do Mato RPPN (belonging to VALE S/A), Caraça RPPN and others. AngloGold Ashanti will create an additional 180 hectare RPPN in the municipality of Santa Barbara, further ensuring the protection of this region, and consolidating 1053 contiguous hectares protected as RPPNs.

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Background

Antamina is an open pit copper, zinc, and molybdenum mining operation located in the Peruvian Andes, in the Department of Ancash. Ore is transported from the mine to a port facility in the coastal town of Huarmey, Peru via a 302 km pipeline. The nine-year-old mining complex is among the ten largest in the world and represents the largest mining investment (US$ 2.3bn) in the history Peru.

The mine is located at high elevation (4,300 msl) and the ecosystems present are largely composed of grasses and shrubs that can withstand the climatic extremes. However within the rugged topography of this region, forests composed of Polylepis trees can also be found, offering important habitat, especially for several IUCN red-listed species of birds. These forests have been heavily impacted over time by humans and grazing animals, reducing their natural extension by over 90 percent, and making them a major conservation priority in this landscape.

Antamina’s voluntary projects that address biodiversity are carried out by Asociación Ancash, a corporate foundation of Antamina. Among its main objectives are the creation of Private Conservation Areas (ACPs in Spanish) with communities that surround the area of influence of Antamina’s mining operation. This area has large and pristine forests of the genus Polylepis. Presence of the indigenous Polylepis weberbaueri species is remarkable.

Polylepis Forest Conservation Program

In 2003, Antamina and Asociación Ancash, Conservation International (CI), The Mountain Institute (TMI), and the Association of Andean Ecosystems (ECOAN in Spanish) developed the concept to restore and conserve Polylepis forests as a joint venture. The focus of the program is an area of some 200,000 hectares with patches of native Polylepis forests between Huascarán National Park and the Huayhuash Reserve.

The strategy of the Polylepis program is to work with local communities to develop conservation agreements whereby technical assistance and materials for reforestation [and improved grazing practices] are exchanged for community assurances to conserve the restored forests. These agreements attempt to balance economic and other incentives [identified locally] and local pride in stewardship.
At the time the program started, conservation agreements were considered a novelty. The Polylepis project has been an important learning experience that helped to fuel the propagation of similar projects by CI in many other parts of the world.

Other Biodiversity Efforts

In addition to the Polylepis program, Antamina through the Asociación Ancash provides support to neighboring Huascarán National Park to strengthen its management and to resolve technical issues such as the recovery of degraded areas inside the park and the planning of low-impact tourism. Huascarán National Park has the highest peak in Peru and the area is one of the main centres of glaciers along the Andes and a source of fresh water for many of the small tributaries and main rivers that irrigate the valleys of the Andes. Based on more than twenty years of research this area is acknowledged for many endemic species, many of which are threatened.

The program has generated a number of additional unexpected benefits.

• Building relationships with local communities
• Involving local universities in the conservation of Polylepis forests
• Educating locals about the value of biodiversity
• Training locals in ecotourism, agro-forestry, and agro-silvo-pastoral methods
• Recognition within the industry for environmental innovation
• Potential expansion of the program to include other companies

The Ministry of Energy and Mines awarded the Sustainable Development Prize to the Polylepis Program in 2006, and in the same year the Peruvian Mining Society recognized Antamina for environmental responsibility. The Business and Biodiversity Offset Program has documented the program as a pioneer initiative in creating biodiversity offsets. In May 2009, the Minister of the Environment, Antonio Brack, announced the discovery of four species new to science found in the area by the ECOAN team and protected by local communities thanks to the Polylepis program’s conservation agreements.
Cerrejón is an open-pit mining operation dedicated to the exploration, extraction, transport, shipping, and export of thermal coal. It is located in the northeast of Colombia, on La Guajira peninsula. The mining operation uses the truck-and-shovel method and currently has a production capacity of 32m metric tonnes of coal per year.

Cerrejón has developed a Wildlife Management Plan that includes four specific programs:

**Fauna Rescue and Relocation**

Typically, open-pit coal mining begins with a survey of the area to be exploited and the removal of overburden so that mining can proceed. However, Cerrejón, has changed this process by first identifying vulnerable and low-mobility wildlife populations within its impact area. In Cerrejón’s case, the impact area is large, given that the mine licence area itself covers some 70,000 hectares. Additionally, Cerrejón operates its own rail line (150km in length) and seaport, each of which demands careful attention in relation to indigenous fauna.

When necessary, wildlife is captured using methods approved by the national environmental authority, and released into similar habitats that have not been zoned for mining. After fauna are released, they are monitored to track their condition and to ensure they are adapting to their new habitat. Over the past five years, approximately 26,000 animals (including mammals, fish, amphibians, and reptiles) have been rescued and relocated to safe areas that offer habitats and food sources similar to their original location.

**Fauna Rehabilitation Centre and Education Program**

The company completed the Cerrejón Fauna Rehabilitation Centre (CRFC—its Spanish acronym) in 2007 for the veterinary care of wildlife. The centre’s staff is comprised of a biologist, a veterinarian, and several field assistants who serve as local experts. Having extensive knowledge and training in sanitary, biological, and wildlife-management techniques, the team manages fauna recovery processes.

The CRFC has become well known in the region as a centre of excellence. It now also treats animals from outside of the mine’s immediate area of influence. This includes wildlife suffering from dehydration, injury, or from the impacts of isolation arising from illegal wildlife trafficking. This is particularly prevalent among the many species of monkeys and birds confiscated from illegal traffickers. To date, more than 1,600 animals have been treated at the centre, including fish, birds, mammals, and reptiles.

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**BIODIVERSITY MANAGEMENT OVERVIEW**

<table>
<thead>
<tr>
<th>Company Biodiversity Commitment:</th>
<th>Conduct business in harmony with the environment &amp; society</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;No Go” Policy:</td>
<td>Not stated</td>
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<tr>
<td>Biodiversity Mitigation Hierarchy:</td>
<td>Yes</td>
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<td>Environmental Management System:</td>
<td>ISO 14001</td>
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<tr>
<td>Biodiversity Action (or Management) Plans:</td>
<td>Yes, part of Comprehensive Environmental Management Plan</td>
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<tr>
<td>Biodiversity Reporting:</td>
<td>Annual Sustainability Report Regulatory reporting to local and national environmental authorities</td>
</tr>
<tr>
<td>Sources of Biodiversity Guidance:</td>
<td>Colombian environmental regulations Collaboration with Conservation International NGOs Scientific community and literature</td>
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</tbody>
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The results revealed a threatened population of crocodiles with an unbalanced age distribution, and a sea turtle population under pressure from hunting and egg collection for local consumption and trade. As a result, in 2007 Cerrejón developed a five-stage program to conserve these species.

Stage 1: Review of baseline data, and determination and identification of threats
• Determination of the ecological importance of these species and their crucial role in the mangrove ecosystem that they inhabit
• Contact with the local indigenous community to determine possible causes for the population decline of these species

Stage 2: Population monitoring to increase knowledge of these species
• Field collection of data with community support
• Determination of zones with highest nesting and feeding activity

Stage 3: Work with the indigenous community
• Social analysis of indigenous community in the area of the project
• Training workshops
• Creation of groups of leaders to be long-term beach patrollers and guards for the project
• Annual population census and habitat enrichment to increase nesting sites

Stage 4: Ex-situ conservation and release of wildlife
• Egg collection and removal to secure site to increase survival rate
• Adaptation and release of animals raised under controlled conditions
• Monitoring individuals with microchips and estimating the population increase of the species

Stage 5: Conservation Agreements
• Ongoing training and work with indigenous associations to achieve a conservation agreement

During the four years of this initiative, local communities have developed the capacity to oversee the conservation of these species. Capacity building involves ongoing education and training in conservation methods and on the importance of biodiversity in improving their standard of living.
Cerro Vanguardia (CVSA) is an open pit gold mining operation located in Argentina’s Patagonia region. The mine began development in 1997 and production in 1998. It produces approximately 200,000 ounces of gold per year.

The company has undertaken a range of biodiversity conservation projects with the objectives of:

- Identifying and evaluating local biodiversity;
- Understanding the interfaces between the mine and biodiversity;
- Evaluating the risks posed to biodiversity by the mine;
- Developing mitigation measures for potential impacts and strategies for restoration; and,
- Exploring possibilities for improving local biodiversity conservation.

Following is a description of two of the many programs that CVSA has undertaken to improve local biodiversity conservation. Other programs not described here include riparian zone and wetlands restoration through re-injection of treated water into the water table, as well as publication of a book on the biodiversity of the Central Patagonian Plateau where CVSA is located and is characterized by a great number of endemic species.

**Predatory Birds Program**

The objective of the predatory birds program is to identify the species of predatory birds that nest in Cerro Vanguardia, and implement a monitoring program that permits evaluation of their long-term dynamics in the area. Predatory birds in this area have suffered from habitat loss associated with deforestation by fuelwood users in the region, and the poisoning of their prey by ranchers. CVSA attempts to improve nesting conditions for some species through installation of nesting boxes.

Activities conducted under this program include:

- An analysis of the status of predatory birds in Central Patagonian Plateau where populations have been vastly reduced;
- A literature review of scientific studies on predatory birds in the region;
- Bird watching campaigns to identify species and areas of presence, from 2007 to present;
- Analysis of predatory bird diet, from 2007 to present;
- Identification of nests and observation of breeding success, from 2007 to present;
- Installation of nesting boxes;
- Monitoring of nests; and,
- Ongoing population monitoring.
Mara Reintroduction Program

The objective of this program is to reintroduce the mara (Dolichotis patagona), or Patagonian hare, an emblematic species of the Patagonian steppe, that was decimated throughout the province of Santa Cruz prior to the arrival of CVSA. The mara is listed by IUCN as a vulnerable species, and is locally extinct in many parts of Patagonia.

Activities conducted under this program include:

- Coordination with the government agency responsible for wildlife and protected areas, as well as Argentine zoologists;
- Selection of ideal habitats for reintroduction of mara in the area of CVSA in coordination with government wildlife officials;
- Selection of subspecies for reintroduction based on geographic analysis and availability of breeding stock in zoos.

Activities planned for this program include:

- Coordination of monitoring methodology between company personnel, wildlife officials, and zoologists;
- Further study of reintroduction sites to determine number of individuals to release;
- Transfer of breeding stock to area by the end of 2010.

Mara (Dolichotis patagona) or Patagonian hare
De Beers Marine
Kleinzee and Alexander Bay sea areas
South Africa

As a marine prospecting, mining and technical service provider De Beers Marine (DBM) provides services to clients in a range of operating environments. This includes operation of the South African Sea Areas Marine Diamond Mining Licence, SASA ML3, on behalf of the concession holder – De Beers Consolidated Mines (DBCM). The licence area is located on the north western coast of South Africa offshore of the coastal towns of Kleinzee in the south and Alexander Bay in the north. The ML3 licence covers an area of 8,800km². De Beers conducts the only offshore diamond mining operations in the world, which present unique challenges in assessing and monitoring environmental impacts.

Activities in the SASA ML3 concession area are typically conducted at depths of 100-140m below sea level. Suitable deposits are first identified and assessed using acoustic survey methods that do not utilize explosives as an energy source, as well as penetrating tools for collection of sediment samples. Mining involves the removal of unconsolidated surface sediments from the seafloor using a remotely operated underwater vehicle which is deployed from a large, purpose-designed vessel operated on an anchor spread. Typical cut depths in the mine plan for the licence area range from approximately 0.5m to 3m in depth. Sediments are pumped to the surface for onboard processing, with tailings being returned to the mined area.

Marine Mining and Biodiversity Impacts

Mining activities alter the nature of the seabed landscape or habitat. The disturbance of sediments results in unconsolidated sediments (sand, mud and rocks) being brought to the surface, processed and then returned to the sea. The communities that live in the targeted soft sediment areas are typically destroyed during the mining processes. However, independent scientific assessments of mining operations on the west coast of southern Africa have demonstrated that natural recovery of the unconsolidated sediment habitats occurs over time. The initial deposition of sediment and rocks results in some degree of backfilling of mined areas. This is followed by gradual re-filling of mined areas with fine sediments. Surveys have shown that seabed faunal communities also recover as the organic fine sediment layers re-establish. Re-colonization takes place by passive translocation of animals during storms or sediment sliding from nearby unaffected areas, active immigration of mobile species, and immigration and settlement of pelagic larvae and juveniles. Unlike terrestrial operations, active rehabilitation cannot be used; it therefore becomes necessary to scientifically demonstrate the natural recovery of the post-mining environment. This is achieved by conducting baseline biodiversity assessments prior to the commencement of mining, with post-mining monitoring programs to assess recovery. Recovery periods depend on the marine environment and the specific interactions with other natural processes, but studies indicate recovery periods of between 4 and 15 years for the seabed faunal communities in this region.
Marine Mining Impact Research

Several complementary sampling techniques are used to provide information on the seabed habitats and their associated biological communities. Studies of the fauna living in the fine sediments (infauna) are conducted using Van Veen grabs. Visual information of the physical environment and fauna has been gathered by using a submersible for direct observation and the collection of high resolution video. Geophysical surveys provide images of seabed roughness and bathymetry data. The company's benthic research program includes the collection of baseline data as well as post-mining assessments to assess and demonstrate the recovery of the environment after mining. These studies include the control sites in adjacent unmined areas to assess natural variability.

Partnerships and Collaboration

The understanding of the seabed environment and its biological communities around southern Africa is limited. For this reason, De Beers Marine has a history of involvement in general research in the field of marine science along the west coast of southern Africa. This has included the sponsorship of postgraduate students, collaboration on marine research and conservation initiatives as well as the provision of marine biological samples and data.

One such effort is the company’s collaboration with the World Wildlife Fund and the South African National Biodiversity Institute in the planning phase for the development of a network of Offshore Marine Protected Areas that adequately protects South Africa’s offshore marine biodiversity and enjoys wide support from all stakeholders. The objectives of the collaboration have been to:

- Share information, expertise and tools towards addressing the lack of benthic biodiversity knowledge in the Namaqua bioregion.
- Work together to identify marine areas for protection that best meet the separate objectives of these organizations.
- Collaborate on the further development of the Biodiversity Action Plan for the Mining Licence Area.

De Beers is providing offshore biodiversity information from submersible surveys and sediment/biological samples, as well as accurate spatial information about offshore mining activities and their impacts to enable conservation planners to more accurately reflect the pressures on offshore biodiversity.

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Background

Namdeb Diamond Corporation (Pty) Ltd, jointly owned by the Government of the Republic of Namibia and De Beers Centenary AG, operates a diamond mine on and adjacent to the southern coast of Namibia. Operations consist of large-scale placer mining, contractor mining and marine mining spread throughout nine mining licence areas (Douglas Bay, Elizabeth Bay, Bogenfels, Mining Area No. 1, Orange River, Atlantic 1, ML128A, ML128B and ML128C) in the Sperrgebiet. Diamond mining remains one of the biggest sources of income for Namibia. Although exploration continues on- and offshore, some of the land-based operations are winding down, putting more emphasis on the rehabilitation processes that will follow.

Diamond mining in the Sperrgebiet has taken place for more than 100 years, since the creation of the restricted area in 1908. These restrictions have inadvertently led to the protection of the biodiversity of a unique wilderness area. Mining licences make up 37% of the Sperrgebiet, but around 2% of the mining licences have been disturbed translating to only 0.7% of the Sperrgebiet.
One significant aspect was the potential impact mining could have on the behaviour, breeding and feeding ecology of the brown hyena along the coast within the Sperrgebiet National Park. Mining in the Pocket Beaches areas had to be planned to avoid or minimize negative impacts on this endangered species. Before and throughout the project, brown hyena activity was monitored through a partnership with the non-profit Brown Hyena Research Project, using visual and GPS collars, surveying habitat use, examining spatial distribution, and analyzing activity patterns. Scientific data provided the basis for decision-making and allowed for the ongoing mitigation, resulting in optimal land utilization and conservation.

The monitoring program showed how traffic would create human-wildlife conflict, and as a result the project’s proposal for the construction of permanent accommodation midway between Chameis and Bogenfels changed to mobile units that would be erected at each of the mining sites. This eliminated all traffic on a road that is frequently crossed by brown hyenas to access their food source.

Real-time data continues to inform decision-making and corrective action as the mining operations progress. An example of this took place during mid-mining at Bogenfels, when analysis of telemetry data revealed increased occurrence of a collared animal to the accommodation site, increasing the risk of human-wildlife conflict. On investigation it was found that the domestic effluent disposal soak away was not functioning correctly, luring the animals to a consistent freshwater source. This was rectified immediately, and the subsequent telemetry data showed movement patterns normalizing again.

Namdeb continues to support the Brown Hyena Research Project, and is in the process of incorporating other operations along the coast and along the Orange River into this monitoring program. The value added by this type of monitoring lies in the ability to take corrective action as soon as trends are highlighted, which makes for improved mitigation and ultimately conservation.
Rio Tinto and biodiversity

Rio Tinto is a leading global mining group, combining Rio Tinto plc, a public company listed on the London Stock Exchange, and Rio Tinto Limited, which is listed on the Australian Securities Exchange. Rio Tinto is involved in every stage of the mining business and is a direct producer of aluminium, copper, iron ore, coal and uranium. The group operates throughout the world but is focused in Australia and North America.

Rio Tinto recognizes that biodiversity and ecosystem service degradation are issues of global significance that will have long reaching, negative effects for society if not addressed promptly.

In 2004, Rio Tinto first made a public commitment to biodiversity conservation and a goal of having a “net positive impact” (NPI) on biodiversity. Put simply, Rio Tinto aims to ensure that biodiversity and its conservation ultimately benefit from the company’s presence in a region. While it is obviously an ambitious goal, it is one that elicits interest and scrutiny from many of its stakeholders. The biodiversity strategy and NPI goal is a voluntary commitment Rio Tinto has made in response to changing societal expectations and the company’s understanding of its value for business.

In support of the Strategy and NPI goal, Rio Tinto has developed and implemented an overarching suite of support and guidance materials for use by its operating sites to conserve the biodiversity features on the land it manages. This support comes from its formal partnerships with BirdLife International, Conservation International, Earthwatch Institute, Fauna & Flora International, and Royal Botanic Gardens, Kew, as well as internal biodiversity planning expertise. The suite of materials developed for its operations includes guidance for a staged approach to biodiversity action planning for Rio Tinto operations, methodologies for assessing quality of habitat, guidance materials for NPI target, an NPI accounting workbook and an on-line collaborative forum. The action planning guidance utilizes the impact checklists provided in the ICMM Good Practice Guidance for Mining and Biodiversity.

Assessing Rio Tinto’s impacts to biodiversity is an important step in implementing its biodiversity strategy. A Group-wide biodiversity values assessment protocol was developed in 2007 to assess the biodiversity values of Rio Tinto’s land holdings and surrounding areas to help prioritize action. The protocol assesses operations’ biodiversity values based on land in proximity to biodiversity-rich habitats, the species of conservation significance present, additional site-specific biodiversity values, and threats to their conservation. Operations were ranked as “very high,” “high,” “medium,” or “low”.

For those operations ranked as “very high” or “high”, it is an internal requirement for the operation to develop and implement a Biodiversity Action Plan (BAP) that includes specific restoration, offset, and avoidance measures in order to achieve the NPI target. Rio Tinto also requires each of its “very high” and “high” ranked operations to report annually on progress against the NPI target for habitats of conservation significance.

Rio Tinto’s biodiversity action planning pilot program

In mid 2007, Rio Tinto’s Australian coal division (Rio Tinto Coal Australia, RTCA) volunteered to lead and pilot the initial development of the biodiversity action planning process. Two separate regional biodiversity plans were developed, as RTCA has operations situated in two distinct biogeographical regions – the Bowen Basin in Queensland, and the Hunter Valley in New South Wales. Additionally, each of the operations in each region has one or more priority biodiversity features in common. Most of the RTCA operations have been ranked through the Group-wide biodiversity values assessment as either ‘high’ or ‘very high’, primarily due to the presence of endangered ecological communities. Of particular regional importance are the Brigalow and Bluegrass communities in the Bowen Basin and the Box Gum Woodland and the Warkworth Sands Woodland communities in the Hunter Valley.

Biodiversity action planning at Australian operations

As of July 1 2010, 82 percent of Rio Tinto operating sites in Australia have developed and implemented a Biodiversity Action Plan (BAP), whether as part of a regional plan or as a site-specific plan.

A further 12% of operations are currently developing a BAP and by mid 2011, it is expected that all RTCA managed operations in Australia will have BAPs developed and implemented.

The development of BAPs is also continuing at many of Rio Tinto’s managed operations across Africa, North America and South America.

In addition to these habitats of conservation significance and the presence of other significant floral, avian and mammalian species, RTCA over time has been subject to increasing regulatory pressure that has typically required upfront offset and restoration commitments before future expansion works are approved by Government. In particular, at one project site in the Hunter Valley, the presence of an endangered ecological community has delayed approval of the project until appropriate biodiversity measures are in place to ensure that the ongoing protection of this unique ecological community can be assured.
As a result, RTCA identified a business case for a more proactive and strategic approach to managing biodiversity and recognized the biodiversity action planning process as providing the ideal starting point. The RTCA biodiversity action planning process commenced prior to the development of Rio Tinto’s NPI target and the release of the action planning guidance material, so it provided a valuable exercise for the Rio Tinto Group in developing and refining its action planning methodology. While the RTCA BAPs provided the genesis for biodiversity action planning throughout the Group and a framework for the development of a number of BAPs at other Rio Tinto operations, the lack of a quantifiable Group-wide biodiversity target resulted in the development of a series of management actions that did not directly necessarily address the need for long-term, large-scale habitat protection measures such as offset, restoration or avoidance activities.

The NPI target and improvements to the biodiversity action planning process

As discussed above, the RTCA BAPs were developed and implemented prior to the release of the Rio Tinto NPI target. Following the release of this NPI target and the development of accompanying NPI accounting tools and methodology, RTCA has since reviewed the BAPs for both the Hunter Valley and Bowen Basin regions. This review, done in light of the NPI target and improved action planning guidance materials has led to a number of improvements in the action planning process.

The most significant improvement to the BAP process resulting from the introduction of the NPI target and methodology is the direct incorporation of habitats of conservation significance into the action planning process. The NPI accounting methodology requires Rio Tinto operations to identify habitats of conservation significance present on lease that have been, or are likely to be impacted by operational activities. A significant habitat can be a threatened ecological community and/or provide essential or preferred habitat for one or more listed species.

Threat assessment in the Rio Tinto biodiversity action planning process includes disturbance to any species or habitat that is almost certain, as well as the possibility of impacts to species or habitats that are listed as threatened or endangered. For each species or habitat threatened, a line of action is developed to ensure its conservation. Consequently, through the tracking of disturbed areas in the NPI accounting process, an important ‘cross-check’ is provided by ensuring that actions have been developed for habitats of conservation significance and incorporated into the BAP. If a habitat of conservation significance has been disturbed and no action assigned to its protection/restoration, then a ‘red flag’ is raised and a direct conservation action must be developed.

Other improvements to the action planning process resulting from the introduction of the NPI target and methodology include the development of an improved means to identify priority biodiversity features, the ability to identify and assess potential opportunities, overall improved readability, and a stronger alignment with Rio Tinto’s internal reporting requirements.

The NPI target has been the main driver behind the development of longer-term actions, with an emphasis on offset and restoration actions and less on baseline studies, research and community and stakeholder programs. While these additional conservation actions still play an important role in managing biodiversity at an operational level, longer-term actions such as offsetting and restoration are what will ultimately progress an individual operation and Rio Tinto overall towards its NPI target.

Rio Tinto and biodiversity management – the next steps

Rio Tinto is proposing to add further rigour to its biodiversity management and commitment to NPI through the development and management of a third-party verification program that will provide a level of independent assurance to Rio Tinto that its operations are progressing towards NPI. Through this verification program, and the ongoing development and implementation of biodiversity action plans throughout all of its operations worldwide, Rio Tinto will remain confident in working towards its target of NPI. Rio Tinto is also currently considering the incorporation of its NPI accounting and biodiversity action plans into its on-line internal HSE performance reporting tool which may significantly assist in the Group’s tracking of performance against its commitments. The organization also believes that this will not only demonstrate its commitment to the environment but also raise the bar for biodiversity conservation management within the broader mining sector and contribute to broader knowledge in the field.
2 Blend landscape planning with mitigation hierarchy: How can development conform to the hierarchy (i.e., when impacts should be avoided and when offsets are appropriate)?

Key tasks
- Compile data on existing and projected cumulative impacts for the region.
- Identify conflicts between the conservation portfolio and potential impacts. Make recommendations for applying the mitigation hierarchy based on biodiversity criteria of vulnerability (degree of threat) and irreplaceability (rarity/uniqueness), and potential for “re-drawing” the conservation portfolio to meet conservation goals elsewhere in region.

3 Determine project impacts and identify portfolio of best offset opportunities: How will offsets deliver values ecologically equivalent to those lost, be located at an acceptable proximity to the impact site, and contribute to landscape conservation goals?

Key tasks
- Estimate expected direct and indirect project impacts to biological targets; goals for offsets are established based on these impacts.
- Identify optimal offset opportunities using site-selection algorithm (i.e., Marxan) at increasing spatial extents from project site.

4 Evaluate offset options in terms of their potential contribution to conservation goals and their cost-effectiveness: To what extent will offsets compensate for impacts? Which offsets provide best return on investment – highest conservation value at least cost and risk?

Key tasks
- Estimate potential contribution of offsets to conservation goals. Consider “additionality” (i.e., offset conservation value additional to existing values), probability of success, and time-lag to conservation maturity (i.e., how long it takes for offsets to deliver conservation at a maturity level similar to what was lost at impact site).
- Estimate cost to implement offsets in portfolio. Evaluate this cost and expected conservation value to identify offsets that will provide highest conservation return.
The Nature Conservancy recognizes that project success depends not only on Development by Design providing an effective and scientifically defensible approach, but also on delivering results in a practical, timely, and cost-effective manner. Current Development by Design projects are being applied in timeframes of 6 to 18 months, with implementation taking place in different geographies and habitat types, in data-rich and data-poor environments, and with a variety of stakeholders. The Conservancy is looking to expand this project experience, to support improvements in mitigation and better outcomes for development and nature conservation.

For more information
Visit Development by Design website at:
www.nature.org/aboutus/development

Related Publications


More than 75% of America’s birds migrate between two or more countries. Some species like shorebirds, waterfowl, seabirds, raptors and small passerines move between continents, some undertaking immense journeys spanning the entire length of the Western Hemisphere. Because of their migratory habits, many species depend on discrete sites along flyways for breeding, feeding and staging. The degradation or destruction of these sites puts entire populations at risk. Indeed, the populations of many migratory species are in serious decline as habitats disappear or are converted to other uses.

Through support from the U.S. government and with the participation of partners in every country in the Western Hemisphere, BirdLife is compiling a comprehensive database on Important Bird Areas (IBAs) and Neotropical migrant birds that will enable conservation practitioners to identify and conserve IBAs critical to dependent migratory birds up and down their flyways.

The concept of the flyway initiative is to build partnerships with companies operating near, or otherwise associated with, IBAs or specific migratory species, and to collaborate in the conservation of critical bird habitat along the flyways. The idea to link sites along species flyways has already been developed at some institutional levels within some countries and regions, and this initiative integrates with them by bringing additional support for objectives that are common to both partner companies and BirdLife organizations.

The Initiative to Date

Currently, Rio Tinto through its Kennecott Utah Copper (KUCC) business unit supports this initiative, in partnership with the Rio Tinto-BirdLife Program and the USFWS - Neotropical Migratory Bird Conservation Action (Fund). Launched in April 2009 the initiative has advanced a range of partnership projects based on the principle that the migratory bird diversity associated with Great Salt Lake, which is of ongoing interest and value to KUCC, can actually be more effectively conserved globally by addressing conservation research, action, environmental education and sustainable livelihood development at critical migratory IBAs along the Americas flyways that selected species use throughout their migratory lifecycle. BirdLife International, through BirdLife Partner NGOs and its programs throughout the Americas, supports IBA-based activities in Saskatchewan, Utah, Mexico, Peru, Argentina and Chile.

To date, activities have included:

- Publication of IBA and birding inventories;
- Priority baseline survey and conservation actions at IBAs and other habitats critical for migratory species;
- Visitor management at key sites;
- Environmental education programs in partnership with local communities;
- Exchange programs for capacity-building and international awareness raising; and,
- Sustainable livelihood development through community-based ecotourism at sites.

BirdLife, with Rio Tinto’s continued support over the next four to five years, plans a series of ambitious projects to continue supporting the flyway initiative. It also welcomes the support of other potential partner companies.

Partnering with BirdLife International

BirdLife International can support corporate partners in biodiversity programs through a regional network of conservation organizations in the Americas that:

- has broad geographic coverage,
- is focused on species and site conservation,
- is engaged in relevant national and regional initiatives,
- is grass-roots based,
- has established relationships with key conventions,
- has staff working at the species and site levels in more than 25 countries,
- has a strong science base,
- has well developed information management capacities, and;
- is actively engaged with the private sector, amongst other important traits.
Migration and important bird areas: a strategy for biodiversity conservation

Migratory flight paths

- Shore birds
- Sea birds
- Land birds
- Raptors
- Waterfowl
Conservation International
IBAT for business: an on-line tool for mining and exploration companies to manage environmental risks

As demand for minerals grows in response to increasing global standards of living there is an increasing drive for exploration and mining in hitherto unexplored areas often characterized by pristine natural environments and unique biodiversity. Demonstrating a commitment to responsible development and conservation is now essential in managing business risk and opportunity. Negative impacts on biodiversity can affect a company’s license to operate and diminish shareholder value, while positive actions can improve credibility and loyalty among key stakeholders.

Through ongoing private sector collaboration, CI and its partners have identified a number of common challenges to biodiversity risk management. Among them, early exploration activities frequently do not document overlaps with sensitive biodiversity. Time and considerable amounts of money may be spent before these risks are identified, causing unnecessary tension with environmental stakeholders and potentially lost opportunities to consider project alternatives. According to industry leaders, biodiversity information is not easily accessible making it difficult to conduct early stage evaluations. Additionally, junior mining companies may lack resources or capacity to carry out such analyses.

In response to these stated business needs, an Alliance was formed between four leading conservation organizations: BirdLife International, Conservation International, IUCN and UNEP-WCMC. Together, the Alliance partners developed the Integrated Biodiversity Assessment Tool for Business (IBAT). This user-friendly online platform provides businesses with centralized access to globally recognized biodiversity information. Access to this information at the earliest stages of project planning makes it easier to consider alternative projects, approaches or locations at a time when such changes are still economically viable. Beyond screening, IBAT can help inform and prioritize subsequent data collection, assessment and planning in the project cycle. IBAT supports a critical first step and is intended to inform – not replace – these subsequent processes.

Business Applications of IBAT

- Informing corporate biodiversity commitments and policies
- Screening potential investments
- Siting an operation in a given region
- Assessing risks associated with potential sourcing regions
- Prioritizing biodiversity research around operating sites
- Focusing conservation interventions and offsets
- Reporting on corporate biodiversity performance

The fine-scale spatial data available through IBAT includes legally protected areas as well as sites known to hold critical biodiversity, known as key biodiversity areas. By providing information on both protected and unprotected high priority sites for conservation, IBAT informs the practical implementation of environmental safeguard policies and industry best practice standards. The tool integrates globally compiled datasets from each of the IBAT Alliance conservation organizations as well as their extensive networks of experts and partners operating in over 200 countries worldwide.

Core Data Available through IBAT

- **Protected Areas**
  - Nationally designated parks, reserves, indigenous and communal areas
  - UNESCO World Heritage, Ramsar, and Man-and-Biosphere sites
  - Information is drawn directly from the World Database of Protected Areas (WDPA), a joint venture of UNEP-WCMC and IUCN’s World Commission on Protected Areas, which is the most comprehensive global dataset on marine, freshwater and terrestrial protected areas.

- **Key Biodiversity Areas**
  - Areas comprising critical habitat for the survival of globally threatened or geographically concentrated species that can be managed for conservation
  - Vulnerability of globally threatened species based upon IUCN Red List.

IBAT’s web-based mapping tool enables users to overlay their land holdings and prospecting sites with these comprehensive datasets in order to assess site specific biodiversity risks. Given that many early stage projects are confidential, an added value of IBAT is the ability for business users to assess potential overlap without publicly sharing their areas or territories of interest with external parties. Subsequent engagement with relevant conservation organizations at an appropriate time for follow up advice and assessment is however strongly encouraged.

De Beers Case Study

In December of 2008, De Beers began actively using the Integrated Biodiversity Assessment Tool for Business. The tool was used as part of the De Beers Biodiversity Overlap Assessment (BOA) which aimed to determine where the company’s ground holdings/licenses overlap with or are adjacent to legally designated protected areas and areas of high biodiversity value. Maps depicting this information were compiled using data from IBAT and superimposed onto existing De Beers’ data, and the final product maps were exported to PDF files for easy access.
Ingrid Watson, [De Beers’s exploration division] outlined the value of the tool:

The outcome has proved to be a very useful visual record, which has been further enhanced through using additional descriptive data provided on IBAT, i.e. country biodiversity information and details on the protected areas and KBA. The main value of IBAT is having all the available biodiversity information accessible through a single site, which is user-friendly and easy to access. The broad range of both geographic and descriptive information provided is very useful as well as the indication as to the completeness of the data.

IBAT enabled an initial evaluation of De Beers’ Environmental Policy commitment across the Family of Companies for all prospecting and operations sites. With this assessment De Beers was able to strengthen its commitment to biodiversity in their Environmental Policy which now states: “aiming to have no net loss of biodiversity over the operating lifetime collectively for the Family of Companies by minimizing the negative impacts through responsible planning and stewardship of biodiversity, from exploration through to the closure of operations and making a contribution to biodiversity conservation in the regions within which we operate” (April 2009) [Patti Wickens, De Beers Environmental Principal].

Advances of IBAT

Since the launch of the Integrated Biodiversity Assessment Tool in October 2008, nearly 200 corporate users have registered at the site representing over 145 companies. In addition, over 100 consultants have also registered at the site. The initiative has also resulted in increased support for maintenance and further development of the key datasets that form the basis for the tool: the World Database on Protected Areas; the IUCN Red List of Threatened Species; and, the Key Biodiversity Areas.

In an effort to expand the practical application of IBAT, the Alliance has partnered with organizations such as the International Finance Corporation (IFC). Together with IFC staff, a modified tool has been developed to meet the specific needs of lenders. This customized version of IBAT directly supports the implementation of IFC Performance Standards by aligning data outputs with IFC language and definitions. The IBAT Alliance also continues to work closely with standards bodies to review biodiversity definitions and ensure policy language is consistent with the latest conservation science.

Through ongoing collaboration with the public and private sector, IBAT and its Alliance partners are empowering the extractive industry to incorporate biodiversity considerations into project planning.

### Most valued aspects of IBAT based on feedback received from recent users

<table>
<thead>
<tr>
<th>IBAT Feature</th>
<th>Business Benefit</th>
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<tbody>
<tr>
<td>Centralized online database on protected areas, threatened species and sensitive habitats</td>
<td>Early integration of biodiversity considerations into project planning</td>
</tr>
<tr>
<td>Site level spatial data</td>
<td>Rapid identification of critical biodiversity risks within a project boundary</td>
</tr>
<tr>
<td>User-friendly interface</td>
<td>Empower in-house engineers to incorporate conservation priorities into early stage project design and decision-making</td>
</tr>
<tr>
<td>Interactive mapping tool</td>
<td>Efficiently explore project alternatives and gain insight into the regional conservation context</td>
</tr>
<tr>
<td>Biodiversity risks reported by species; descriptive data, meta data</td>
<td>Determine the scope of baseline studies and ESIs; prioritize additional biodiversity assessments</td>
</tr>
<tr>
<td>Downloadable data sets</td>
<td>Conduct custom in-house analysis by overlaying biodiversity information with internal databases</td>
</tr>
<tr>
<td>Exportable maps</td>
<td>Easily present findings to senior leadership and key decision makers</td>
</tr>
<tr>
<td>Alignment with reporting standards [such as GRI: EN11, EN12]</td>
<td>Accurately and efficiently report on corporate biodiversity performance; faster approval processes</td>
</tr>
<tr>
<td>Partnership with leading conservation organizations</td>
<td>Build credibility and confidence among key stakeholders and investors</td>
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</table>
The Business and Biodiversity Offsets Program (BBOP) is an international partnership of more than 50 leading companies, government agencies, financial institutions, and conservation organizations and experts. All are members of its Advisory Group. Together, the members aim to test and develop best practices on biodiversity offsets and conservation banking worldwide. This work is based on real experiences in pilot projects.

A biodiversity offset is a way to demonstrate that a development (such as a mine or palm-oil plantation) can be implemented in a manner that results in no net loss or a net gain of biodiversity. BBOP defines biodiversity offsets as ‘the measurable conservation outcomes of actions designed to compensate for significant residual adverse biodiversity impacts arising from project development’ after appropriate prevention and mitigation measures have been taken. The goal of biodiversity offsets is to achieve no net loss and preferably a net gain of biodiversity on the ground with respect to species composition, habitat structure, ecosystem function and people’s use and cultural values associated with biodiversity.

Developing principles, methods and tools

BBOP has developed a set of core principles for biodiversity offsets. The principles establish a framework for designing and implementing biodiversity offsets and verifying their success, and they provide the compass for all of the other BBOP products (see Box A on page 32).

Practical guidance to support best practice biodiversity offsets

BBOP has developed interim guidelines to support design and implementation of best practice biodiversity offsets, offering a range of methodologies. The following interim guidance, produced in 2009 at the end of the Program’s first phase, is available at: http://bbop.forest-trends.org/guidelines

The Biodiversity Offset Design Handbook presents information on a range of issues, methods and tools from which offset planners can select approaches best suited to their circumstances. It describes a process that offset planners can use in designing a biodiversity offset, from initial conception of a development project to the selection of offset sites and activities. This includes describing the project; exploring the policy context; engaging stakeholders; undertaking biodiversity surveys and applying the mitigation hierarchy; quantifying residual impacts; identifying and comparing potential offset sites; calculating conservation gains for preferred offset sites; and deciding upon the final scope, scale, nature and location of offset. In addition, appendices to the Handbook set out summaries of various offset methodologies and guidelines around the world.

The Biodiversity Cost-Benefit Handbook focuses on people living in and around projects and potential offset sites. To be successful in the long term, biodiversity offsets should compensate indigenous peoples, local communities and other affected stakeholders for impacts on their biodiversity-based livelihoods and amenities. They also need to deliver the offset’s conservation gains without making local people worse off (e.g. from resource use restrictions created by the offset), and to provide incentives and perceived benefits for local people to participate in delivery of the required conservation gains. The Handbook explains how to use economic tools of valuation and cost-benefit analysis to make this comparison and arrive at a package of benefits for local stakeholders that compensate for residual impacts and secure involvement and support for the offset.

1. While biodiversity offsets are defined here in terms of specific development projects (such as a road or a mine), they could also be used to compensate for the broader effects of programs and plans.
The Biodiversity Offset Implementation Handbook. The success of a biodiversity offset will depend on ensuring that the project has an effective institutional and management structure; sufficient funding; and systems to ensure that offset objectives are achieved. This Handbook assumes that the nature of offsetting activities and magnitude and location of the offset (in a single location, or as a composite) have been identified and that the planner is now seeking to put in place the mechanisms for implementation, permanence and good governance. It offers a discussion of the potential roles and responsibilities of potential stakeholders, legal and institutional aspects of establishing an offset, and how a biodiversity offset management plan can be developed. The Handbook suggests a number of ways in which a biodiversity offset can be financed over the long-term, discussing ways to calculate the short and long-term costs of implementing the biodiversity offset, and exploring long-term funding mechanisms, such as the establishment of conservation trust funds and non-fund options that explore a diverse array of revenue sources to achieve sustainability. It addresses how a biodiversity offset can be monitored and evaluated, and the final section helps the offset planner prepare to launch the implementation of the offset.

Resource Paper on Biodiversity Offsets and Stakeholder Participation. Effective participation is critical to the success and fairness of biodiversity offsets. This paper explains the value and purpose of stakeholder identification, engagement and participation in the design and implementation of biodiversity offsets, and provides guidance on relevant good practice tools and approaches. It helps offset planners implement the Principles on Biodiversity Offsets by offering suggestions and source material on best practices in the participation of stakeholders in the design and implementation of biodiversity offsets.

Resource Paper on the Relationship between Biodiversity Offsets and Impact Assessment. This paper considers whether and how the process of designing and delivering biodiversity offsets should be integrated with impact assessment. It explains why impact assessment might be considered a suitable ‘vehicle’ for biodiversity offsets and outlines its possible role. It introduces Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA) and describes how they interrelate in planning systems. Many businesses integrate their environmental and social impact assessment processes in Environmental and Social Impact Assessment (ESIA) and embed these in overall Social and Environmental Management Systems, as the paper explains.

A glossary explains the various terms commonly used in biodiversity offset design and implementation.

Case studies on five of BBOP’s pilot projects demonstrate how biodiversity offsets may be approached in a variety of practical settings. The case studies include:

- The Ambatovy Project, Madagascar
- Bainbridge Island, United States
- Potgietersrust Platinums Limited, South Africa
- Akyem Gold Mining Project, Ghana
- Strongman Mine, New Zealand

In addition, BBOP has published an example of a biodiversity offset (Fictional Letabeng Case Study) and an analysis of compensatory conservation case studies from across the world.

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Further guidance

BBOP has embarked on its second phase (July 2009 – June 2012), and is also looking ahead to a possible third phase (2012-2015). The current work program focuses on five priority areas that will inform development of improved guidance for biodiversity offsets.

Policy: BBOP is initiating several country-level partnerships with governments that have requested advice on offset policy development, land-use/bioregional planning, aggregated offsets, and/or conservation banking mechanisms.

Pilots: to broaden experience on the application of biodiversity offsets and to gather a wide variety of ‘lessons learned’, BBOP aims to increase its portfolio of pilots to include projects from several different industry sectors and countries. The on-the-ground experiences will be used to inform the work on further developing and improving guidelines on biodiversity offset design and implementation.

Guidelines: BBOP will build on the interim guidelines produced in Phase 1 to improve technical guidance on biodiversity offset design and implementation. The guidance will be informed by sound science, broader sectoral and geographic experiences and best available knowledge and methods. BBOP’s Guidelines Working Group intends to cover topics such as non-offsettable impacts, the quantification of biodiversity losses and gains, site selection and landscape level planning, uncertainty and adaptive management, and multiple benefit offsets.

Training: BBOP is preparing training materials and courses to build better understanding of and capacity for planning and undertaking biodiversity offsets.

Assurance: BBOP is preparing (for July 2012) verification and auditing protocols to inform the development by July 2015 of internationally agreed upon biodiversity offset standards.

Box A: BBOP’s Principles on Biodiversity Offsets

Biodiversity offsets should be designed to comply with all relevant national and international law, and planned and implemented in accordance with the Convention on Biological Diversity and its ecosystem approach, as articulated in National Biodiversity Strategies and Action Plans.

1. No net loss: A biodiversity offset should be designed and implemented to achieve in situ, measurable conservation outcomes that can reasonably be expected to result in no net loss and preferably a net gain of biodiversity.

2. Additional conservation outcomes: A biodiversity offset should achieve conservation outcomes above and beyond results that would have occurred if the offset had not taken place. Offset design and implementation should avoid displacing activities harmful to biodiversity to other locations.

3. Adherence to the mitigation hierarchy: A biodiversity offset is a commitment to compensate for significant residual adverse impacts on biodiversity identified after appropriate avoidance, minimization and on-site rehabilitation measures have been taken according to the mitigation hierarchy.

4. Limits to what can be offset: There are situations where residual impacts cannot be fully compensated for by a biodiversity offset because of the irreplaceability or vulnerability of the biodiversity affected.

5. Landscape context: A biodiversity offset should be designed and implemented in a landscape context to achieve the expected measurable conservation outcomes taking into account available information on the full range of biological, social and cultural values of biodiversity and supporting an ecosystem approach.

6. Stakeholder participation: In areas affected by the project and by the biodiversity offset, the effective participation of stakeholders should be ensured in decision-making about biodiversity offsets, including their evaluation, selection, design, implementation and monitoring.

7. Equity: A biodiversity offset should be designed and implemented in an equitable manner, which means the sharing among stakeholders of the rights and responsibilities, risks and rewards associated with a project and offset in a fair and balanced way, respecting legal and customary arrangements. Special consideration should be given to respecting both internationally and nationally recognised rights of indigenous peoples and local communities.

8. Long-term outcomes: The design and implementation of a biodiversity offset should be based on an adaptive management approach, incorporating monitoring and evaluation, with the objective of securing outcomes that last at least as long as the project’s impacts and preferably in perpetuity.

9. Transparency: The design and implementation of a biodiversity offset, and communication of its results to the public, should be undertaken in a transparent and timely manner.

10. Science and traditional knowledge: The design and implementation of a biodiversity offset should be a documented process informed by sound science, including an appropriate consideration of traditional knowledge.
Acknowledgements

Special thanks

The development of this publication would not have been possible without the input and support of many individuals and organizations. ICMM gratefully acknowledges the following contributions:

Jared Hardner, Hardner & Gullison Associates LLC

Case Study Contributors:

Mike Wegleitner, Resolution Copper Mining
David Savory, BHP Billiton
Steven Dickinson, Golder Associates
Andrew Cooke, Ambatovy Project
Cameron Jones, Rio Tinto
Irany Maria de Lurdes Braga, AngloGold Ashanti Brasil
Bruno Stefan De Simoni, AngloGold Ashanti Brasil
Mirko Chang, Asociación Ancash
Luis Vigo, Asociación Ancash
Lina Báez, Cerrejón Coal Company
Fernando Salomone, Cerro Vanguardia, S.A.
Lesley Roos, De Beers Marine
Ronel van der Merwe, Namdeb Diamond Corporation
Bruce Mckenney, The Nature Conservancy
Joe Kiesecker, The Nature Conservancy
Jonathan Stacey, Birdlife International
Rowena Smuts, Conservation International
Dr. Amrei von Hase, Forest Trends

ICMM Team

Anne-Marie Fleury, Mark Holmes, Andrew Mackenzie, Fernanda Diez, Casilda Malagon and Hanna Hindström for their contribution to this publication.

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