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Chapter 2

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Greg Love, Eduard Niesten, Karl Morrison, Marielle Canter, and Maureen Silos

INTRODUCTION

In the fall of 2005, Conservation International (CI) joined with the Mining Joint Venture (MJV) of BHP-Billiton Maatschappij Suriname and Suriname Aluminium Company LLC to conduct an Initial Biodiversity Assessment Planning (IBAP) project for the Brownsberg, Lely and Nassau plateaus of eastern Suriname. The IBAP is a science-based approach, which draws on CI's core competencies and expertise in biodiversity science and conservation planning. The methodology assesses an area's biodiversity within the socio-economic context of a region and identifies opportunities on how to conserve the region's ecosystems. The purpose of the IBAP methodology is to assist companies in incorporating biodiversity into their risk analysis and decision-making and planning processes from the earliest stages of project development.

The following chapter summarizes two outputs of the IBAP process, the socio-economic desktop assessment and biodiversity action plan workshop conducted in conjunction with the Rapid Assessment Program (RAP) biodiversity survey.

Socio-Economic Assessment

Chapter 1 of this volume (Love et al. 2007) provides an overview of the human population and economy of Suriname. Here we will focus on those socio-economic aspects that directly affect the Brownsberg, Lely and Nassau plateaus.

The Brownsberg, Nassau and Lely areas have a number of socio-economic variables that pose challenges to effective long-term conservation of biodiversity. All three areas have already been impacted by small-scale mining and associated activities (such as hunting). The Brownsberg National Park (BNP), which encompasses most of the Brownsberg plateau, is a very popular tourist destination, particularly for residents of Paramaribo and other population centers on the coast. Despite its protected status, it has apparently not been spared it from activities that negatively impact biodiversity in other parts of the country, as local residents regularly hunt and log near and occasionally in the BNP, and small-scale gold miners have been mining around and within its boundaries. Tourism is becoming an increasingly valuable source of income for the surrounding communities of the BNP, but even that seemingly benign activity may be negatively impacting the Park, though the precise extent of the damage remains unclear (Fitzgerald et al. 2002).

Small-scale (gold) mining

The literature review suggests that at the present time, small-scale gold mining and associated activities (principally uncontrolled hunting and fishing) are having the most negative impact on the three plateaus' ecosystems, although more data are needed to assess to what degree. Most small-scale miners exploit alluvial gold deposits using high-pressure hoses to extract soil and then processing soil in sluice boxes and gold pans using mercury. Measurements in many of the rivers that are impacted by gold mining indicate that most are polluted by mercury and have increased turbidity (Ouboter 2000). The sensitivity of freshwater species to these factors indicate that artisanal and large-scale mining could have severe impacts of freshwater species

(including amphibians), ecosystems services and the quality of water available to local populations.

Water pollution resulting from disposal of tailings into waterways is consistently identified by communities in the interior as the principal negative impact from small-scale mining (IADB 2005). Impacts on water flows from silting up of streams and alteration of stream beds contribute to the spread of water-related diseases (especially malaria), and inhabitants have to travel increasing distances to find potable water. The impacts of soil erosion and siltation on fish breeding grounds and habitats reduce species diversity and biomass of food fishes in streams affected by small-scale gold mining. Temporary mining camps also exert impacts on biodiversity through shifting localized intensification of hunting pressure and forest clearing. Thus, efforts to promote 'environmentally friendly' artisanal mining that avoids mercury will not necessarily reduce significant threats to habitat, biodiversity, water-quality and protein sources for people.

A range of negative social impacts also accompanies small-scale mining. The illicit nature of the sector makes it a ready conduit for violent crime, prostitution, the spread of sexually transmitted disease and intra-community conflicts over distribution of mining areas and earnings. Nevertheless, despite various negative environmental and social consequences of small-scale mining, the sector remains one of the few income-generating opportunities available to communities in the interior (Heemskerk 2001a). Although a response to the threats posed by small-scale mining may be among the most urgent conservation priorities in eastern Suriname, such a response will have to address a broad array of socio-economic issues in order to be successful.

Large-scale mining

With regards to large-scale mining, all three plateaus are currently under consideration for bauxite mining, and a large-scale gold mining concession is currently being explored in Nassau. The potential threats posed to biodiversity by the appearance of a large-scale mining in these areas, if not responsibly managed, include:

1. Direct threat from large-scale mining activity on the landscape through extraction and creation of access routes, affecting watersheds, forest cover and habitats;
2. The "magnet effect" – increasing population density as mining activities attract in-migration and increase attendant related pressures (cultivation, hunting, etc.);
3. Displacement of small-scale gold miners, forcing relocation to and impacts on other areas;
4. In the case of large-scale gold mining, a 'gold rush' of small-scale gold miners after mine closure, seeking to find leftover ore in a proven area;
5. "Boom-bust" economic development where after a mine closes, few if any economic opportunities remain for local residents.

Local Communities

Suriname has approximately 200 Maroon villages of 25 to 100 households, and at least 200 additional settlements called camps, or *kampus*. The majority of villages and settlements are found along waterways in the Sipaliwani and Brokopondo districts, including the Suriname, Tapanahoni and Marowijne Rivers and the Brokopondo Reservoir (IADB 2005). These bodies of water are all in close proximity to the three plateaus.

The Ndjuka Maroon group comprises a substantial portion of the population of eastern Suriname. Maroon communities depend on forest and natural resources for their subsistence, through shifting agriculture, fishing, hunting and gathering of forest products. Forests also provide medicine, construction materials, tools, etc. Typically, Maroon settlements lack adequate public services such as electricity, running water, schools, health clinics, waste processing, and the like, intensifying dependence and impacts on forest resources. Site-specific anthropogenic threats to biodiversity depend on localized population density, intensity of natural resource use, and technologies employed in resource utilization. However, more specific data on the size and scope of human activities and their impacts on the ecosystems of the plateaus in question and adjacent areas are lacking.

Ongoing conflicts surrounding land rights with Maroon as well as some Amerindian communities in Suriname undermines prospects for sustainable resource management and complicates the scope for conservation action. In short, Maroon communities maintain that the national Government of Suriname has limited jurisdiction over Maroon territories. In particular, the Maroon position is that they own the rights to sub-surface resources below their traditional territories, implying that the Government has no authority over small-scale mining and that large-scale mining concessions require local Maroon community consent and compensation. The Government takes the position that all sub-surface resources in Suriname are the property of the state, to be disposed of in the public interest as the Government sees fit. Although Government policy statements indicate an interest in working toward recognition and protection of traditional land rights, the issue of rights to sub-surface resources remains highly contentious. Concessionaires in both the mining and logging sectors find themselves squarely in the middle of this controversy, as existing logging concessions impact approximately 60% of Amerindian and Maroon communities, and mining concessions affect nearly 40% of these communities (IADB 2005).

Examples of local community protests relating to land and resource rights abound. In 1990, employees operating in a concession near Klaaskreek in the Brokopondo district were taken hostage by local villagers. Workers in a gold mining concession in the Aluku area in eastern Suriname were withdrawn following threats from local communities around the same time. With respect to eastern Suriname,

forced removal of small-scale gold miners from the Nassau area in 2003 illustrates the potential for friction between the formal and informal mining sectors.

The land and resource rights controversies have several implications of relevance for conservation actions. Insecure land rights fuel unsustainable behavior, since the absence of guaranteed tenure obviates any incentives to conserve or invest in long-term sustainability. Moreover, the controversy over land rights complicates conservation efforts, since such efforts necessarily require working with a broad array of stakeholders including government as well as local communities; conservationists must be careful with respect to strategies that imply – actually or seemingly – partiality to one position or the other on land-rights questions. Seeking a particular land use in areas claimed as traditional lands, whether it is a protected area or a resource concession, risks fueling social conflicts at several levels, with negative consequences for local people, the private sector and biodiversity. Finally, a large influx of investment into the area carries with it a danger of undermining an important part of Suriname's cultural landscape.

Gaps in Information

It is clear from the literature and resource search that while all three plateaus are generally considered by a number of different categorizations to be important areas for biodiversity, there are significant information gaps for both biodiversity and socio-economic issues. This is particularly true for many specific taxonomic groups, ecosystem functions and services, impacts of human activities and the biodiversity value of these areas relative to other areas of Suriname. For Lely and Nassau, it appears that the only substantive understanding is of plant diversity, while little is known about the diversity of other taxonomic groups such as mammals, birds, amphibians, reptiles and insects. In contrast, there has been relatively extensive work done in the BNP for plants, mammals, reptiles and birds (including a monitoring plan), but even in these areas researchers have recommended further studies to better understand the biodiversity in the area.

The issue of small-scale gold mining and its impacts on freshwater ecosystems have also been addressed in a number of studies, such as Mol and Ouboter's study (2004) on the negative impacts to fish diversity and community structure from small-scale mining activities in the Mindrineti River near the BNP. Despite these and similar studies, the cumulative impacts of this and other extractive activities such as large-scale mining, logging and hunting on Suriname's ecosystems are still not well understood. In terms of how the ecosystems of these areas function, the services they provide (such as watershed protection) and their importance relative to other areas of Suriname, too little data exist to make concrete conclusions. Further study on various taxonomic groups, ecosystem functions and services and comparison to other areas of Suriname (and possibly in the larger Guayana Shield) could help fill many of these gaps.

BIODIVERSITY ACTION PLAN WORKSHOP SUMMARY

As part of the IBAP methodology, a workshop was held in Paramaribo on November 8-9, 2005 with the goal of arriving at a realistic assessment of the impacts of human activities on biodiversity and socio-economic conditions in the Nassau, Lely and Brownsberg regions and generating ideas on how to mitigate those impacts and contribute to the region's long-term conservation. Specific workshop objectives were as follows:

1. Improved understanding of the overall socio-economic conditions and biodiversity of the Nassau, Lely and Brownsberg regions;
2. Identification and confirmation of principal stakeholders in the region;
3. Identification, description, and prioritization of threats to biodiversity conservation;
4. Presentation of opportunities for biodiversity conservation; and
5. Completion of a draft Biodiversity Action Plan to support stakeholders in the Lely, Nassau and Brownsberg regions in achieving biodiversity conservation.

RECOMMENDED BIODIVERSITY ACTIONS

Workshop participants initially identified a number of threats in the Lely, Nassau and Brownsberg plateaus, including hunting, trapping, illegal logging, small-scale mining and large-scale mining, lack of regulatory enforcement, waste and trash disposal, and tourism activities. Key actions that could take place to address the threats identified are presented below as a preliminary action plan, with an indication of the time line for each of the identified actions and the suggested stakeholders to be involved in each action.

Brownsberg

Six issues were identified as priorities for biodiversity conservation action in the Brownsberg region: lack of regulatory enforcement, small-scale mining, illegal logging, hunting, waste and trash management, and tourism activities (Tables 2.1-2.5).

Nassau

Six issues were identified as priorities for biodiversity conservation action in the Nassau region: hunting, trapping, illegal logging, waste and trash management, small-scale mining and large-scale mining (Tables 2.6-2.11).

Lely

Three issues were identified as priorities for biodiversity conservation action in the Lely region: hunting, small-scale mining and large-scale mining (Tables 2.12-2.14).

In addition to the aforementioned mentioned issues, the Lely working group came up with additional, general

recommendations for conservation of that area:

1. Use lessons learned from Brownsberg to inform issues in Lely in the short term.
2. Compared to the Brownsberg region, Lely is relatively intact which allows for proactive thinking on how to avoid certain mistakes made in Brownsberg.
3. Get stakeholders to commit to gather more information to decide how resources could be used.

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BROWNSBERG**Table 2.1.** Lack of regulatory enforcement at Brownsberg.

Proposed opportunities/actions	Time frame (years)	Stakeholders
<ul style="list-style-type: none"> Institutional strengthening of government agencies for effective law enforcement in the following areas: <ul style="list-style-type: none"> staff development equipment field stations for rangers increase of salaries capacity to draft environmental laws 	0-3	<ul style="list-style-type: none"> Ministry of Natural Resources (NH) Ministry of Labor, Technological Development and Environment (ATM) Ministry of Justice and Police (J&P) Department of Geology and Mining (GMD) National Institute for Environment and Development (NIMOS) Suriname Forestry Authority (SBB) Nature Conservancy Division (NB) Donor agencies (i.e. WWF)
<ul style="list-style-type: none"> Amendment of existing laws to reflect the new challenges to biodiversity conservation 	0-3	
<ul style="list-style-type: none"> Establishment of a legal authority for monitoring and enforcing environmental laws 	0-3	

Table 2.2. Small-scale mining at Brownsberg.

Proposed actions	Time frame (years)	Stakeholders
<ul style="list-style-type: none"> Formation of miners associations Awareness raising and education Law enforcement Introduction of improved mining techniques Formulate adequate policy on Small-scale mining 	All: 0-3	<ul style="list-style-type: none"> Small scale miners Ministry of Natural Resources (NH) National Institute for Environment and Development (NIMOS) Ministry of Labor, Technological Development and Environment (ATM) Ministry of Justice and Police (J&P) Foundation for Nature Conservation Suriname (STINASU) Ministry of Finance District Commissioner of Brokopondo Resort Council Brownsweg COGASUR (Association of Brazilian small scale miners)

Table 2.3. Illegal logging at Brownsberg.

Proposed actions	Time frame (years)	Stakeholders
<ul style="list-style-type: none"> Adequate law enforcement Institutional strengthening of government agencies 	All: 0-3	<ul style="list-style-type: none"> Ministry of Natural Resources (NH) National Institute for Environment and Development (NIMOS) Ministry of Spatial Planning and Land Policy (ROGB) Ministry of Justice and Police (J&P) District Commissioner of Brokopondo Resort Council Brownsweg Suriname Forestry Authority (SBB) Local communities Illegal loggers

Table 2.4. Hunting at Brownsberg.

Proposed actions	Time frame (years)	Stakeholders
<ul style="list-style-type: none"> Education and awareness raising 	0-3	<ul style="list-style-type: none"> Nature Conservancy Division (NB) Ministry of Natural Resources (NH) Foundation for Nature Conservation Suriname (STINASU)
<ul style="list-style-type: none"> Adequate enforcement of hunting laws for nature park 	3-5	<ul style="list-style-type: none"> Local communities Loggers Miners Wildlife rangers
<ul style="list-style-type: none"> Institutional strengthening of government agencies 	3-5	

Table 2.5. Waste and trash at Brownsberg.

Proposed actions	Time frame (years)	Stakeholders
<ul style="list-style-type: none"> Education and awareness raising 	0-3	<ul style="list-style-type: none"> Visitors Ministry of Regional Development Nature Conservancy Division (NB) Ministry of Justice and Police (J&P) Foundation for Nature Conservation Suriname (STINASU) Local communities Miners
<ul style="list-style-type: none"> Provide waste disposal facilities 	0-3	
<ul style="list-style-type: none"> Adequate law enforcement 	3-5	

NASSAU

Table 2.6. Hunting at Nassau.

Proposed actions	Time frame (years)	Stakeholders
<ul style="list-style-type: none"> Minimize access Regulate hunting practices Adequate law enforcement Strengthening capacity government agencies Provide alternative food supply (?) 	All: 0-3	<ul style="list-style-type: none"> Timber companies Suriname Forestry Authority (SBB) Ministry of Justice and Police (J&P)

Table 2.7. Commercial trapping at Nassau.

Proposed actions	Time frame (years)	Stakeholders
<ul style="list-style-type: none"> Implement education and awareness program Research 	All: 0-3	<ul style="list-style-type: none"> WWF Forestry Service (LBB) Conservation International University of Suriname

Table 2.8. Illegal logging at Nassau.

Proposed actions	Time frame (years)	Stakeholders
<ul style="list-style-type: none"> Enforcement of legal logging 	0-3	<ul style="list-style-type: none"> Forest Service (LBB)

Table 2.9. Waste/trash at Nassau.

Proposed actions	Time frame (years)	Stakeholders
<ul style="list-style-type: none"> Education and awareness programs Waste minimizing plans Rainwater collection by companies 	All: 0-3	<ul style="list-style-type: none"> NGOs Companies

Table 2.10. Small-scale mining at Nassau.

Proposed actions	Time frame (years)	Stakeholders
<ul style="list-style-type: none"> Minimize impact through implementing best practices 	3-5	<ul style="list-style-type: none"> Government NGOs Business External funders
<ul style="list-style-type: none"> Limit expansion of SSM through regulation (encouraging legal vs. illegal) 	3-5	<ul style="list-style-type: none"> Government NGOs
<ul style="list-style-type: none"> Technology transfer Training on mercury 	0-3	<ul style="list-style-type: none"> NGOs Companies
<ul style="list-style-type: none"> Clean up of old mines (case by case basis) 	3-5	<ul style="list-style-type: none"> Companies

Table 2.11. Large-scale mining at Nassau.

Proposed actions	Time frame (years)	Stakeholders
<ul style="list-style-type: none"> Evaluate impact studies through EIA and other studies 	0-3	<ul style="list-style-type: none"> Companies
<ul style="list-style-type: none"> Applying best practice environmental management (land opening, minimizing area where roads are placed) 	0-3	
<ul style="list-style-type: none"> Closure and reclamation plan (government and companies) 	3-5	
<ul style="list-style-type: none"> Facilitating exchange and communication between government, NGOs, and companies regarding road closures 	0-5	
<ul style="list-style-type: none"> Encourage government to maintain high standards of good practice 	0-3	
<ul style="list-style-type: none"> Review mining legislation (currently being redrafted) 	0-3	<ul style="list-style-type: none"> Companies NGOs
<ul style="list-style-type: none"> Study dangers SPP to minimize impact 	0-3	<ul style="list-style-type: none"> Companies NGOs University

LELY

Table 2.12. Hunting at Lely.

Proposed actions	Time frame (years)	Stakeholders
<ul style="list-style-type: none"> • Provide education, food and entertainment for airstrip employees • Wildlife management • Law enforcement • Data collection 	All: 0-3	<ul style="list-style-type: none"> • Garimpeiros • Airstrip employees • Large scale miners

Table 2.13. Small-scale mining at Lely.

Proposed actions	Time frame (years)	Stakeholders
<ul style="list-style-type: none"> • Training in new technologies 	0-3	<ul style="list-style-type: none"> • Brazilian miners • Large scale companies • Maroons • Geology and Mining Department (GMD) • Law enforcement authorities
<ul style="list-style-type: none"> • Mercury traps 	0-3	
<ul style="list-style-type: none"> • Law enforcement 	0-100	
<ul style="list-style-type: none"> • Economic opportunities 		
<ul style="list-style-type: none"> • Public information 	0-3	

Table 2.14. Large-scale mining at Lely.

Proposed actions	Time frame (years)	Stakeholders
<ul style="list-style-type: none"> • Baseline study 	0-3	<ul style="list-style-type: none"> • BHP Billiton • Suralco • Grassalco • National Institute for Environment and Development (NIMOS) • Small scale miners • NGOs • CANARC • Government
<ul style="list-style-type: none"> • Proactive regional land use planning 	0-3	
<ul style="list-style-type: none"> • Resource management plan 	3-5	
<ul style="list-style-type: none"> • NGO ongoing campaign and lobby for better regulation and legislation 	0-5	