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Chapter 1

The conservation context of the Lely, Nassau and Brownsberg Plateaus within Suriname

Greg Love, Eduard Niesten, and Karl Morrison

SUMMARY

The Lely, Nassau and Brownsberg plateaus are located in eastern Suriname in the Guayana Shield, a region noted for its high biodiversity and extensive tracts of intact Neotropical forest. The 2003 Guayana Shield Priority-Setting Workshop determined that, despite many gaps in information, the three plateaus fall into an area designated as one of the highest priority areas for conservation in the entire Guayana Shield. Specific biodiversity data are lacking for Lely and Nassau, but ecological research and monitoring efforts for the 11,600 ha Brownsberg Nature Park (BNP), which encompasses most of the Brownsberg plateaus, have led to relatively better understanding of certain taxonomic groups, notably plants, mammals, birds, reptiles and amphibians, but little on others such as insects and fishes.

Results of surveys of plant diversity in 2003–2005 (see Chapter 3) on the three plateaus showed that all three areas have high plant diversity compared to most lowland forest plots in western Suriname and suggest that they may constitute a unique ecosystem in Suriname (Bánki et al. 2003; ter Steege et al. 2004, 2005). In addition to high biodiversity, the three plateaus provide many watershed services for local and coastal communities, as well as important sources of food, medicine and building materials for Maroon communities. The BNP is also a very popular tourist destination, particularly for residents of Paramaribo and other population centers on the coast.

All three plateau ecosystems are relatively intact owing to low population density, which presents many unique opportunities for conservation over a relatively large landscape area. However, they face a number of current and potential threats, which include logging, hunting/poaching and small-scale (gold) and large-scale (bauxite and gold) mining. Though a protected area, the BNP has also been impacted by tourism as well. Unresolved conflicts over land rights and poverty, particularly with regards to Maroon communities, complicate the issues of resource use and effective long-term conservation efforts.

THE GUAYANA SHIELD

Suriname is located in the Guayana Shield of northeastern South America, an area of roughly 2.5 million km² (see Map). The Guayana Shield, a 2 billion year old Precambrian geological formation - possibly the oldest on the planet - underlies Guyana, Suriname, and French Guiana as well as parts of northern Brazil, Venezuela, and Colombia. The Guayana Shield is a granitic formation overlaid by the largest expanse of undisturbed tropical rain forest in the world. The region contains high rates of endemism and biological richness, unique tepui formations, and the headwaters of impressive waterfalls.

The population density of the Guayana Shield is the lowest of any tropical rainforest ecosystem (0.6–0.8 people/km) which, coupled with the relative lack of access routes into the interior, contributes to its exceptional degree of intactness, with more than 80% of its ecosystems in pristine or near pristine condition. In addition to its biological richness, the region contains abundant cultural diversity and natural resources. At least 100 Indigenous groups inhabit the

region, as well as groups of Maroons and descendants of African, East Indian, Javanese, Chinese, Portuguese, and other European immigrants. With regards to natural resources, the region has considerable timber, mineral and freshwater resources. All three of these resource sectors, particularly mining and associated small and large-scale extraction, historically have played an important role in the region's economies, and will continue to do so for the foreseeable future. However, national governments in the Guayana Shield lack the institutional capacity to monitor the performance and environmental impacts of these industries, and the lack of environmental monitoring and enforcement facilitates pressure on biological diversity and natural systems. Logging contributes to habitat loss while both large- and small-scale mining threaten water quality within the region's extensive system of rivers, streams, and reservoirs.

SURINAME

Biodiversity

Suriname is situated entirely within the Guayana Shield and supports a rich diversity of flora and fauna (UNDP 1999). Suriname is rich in vertebrate wildlife, including at least 668 species of birds, 185 species of mammals, 152 species of reptiles, 95 species of amphibians, and 790 species of fish. Of the 1,890 known species of vertebrates, at least 65, or 3%, are endemic to Suriname. Over 5,800 species of mosses, ferns and seed plants are found in Suriname, of which an estimated 50% are endemic to the Guayana Shield region. Suriname is also home to such globally threatened and charismatic species as the jaguar, the Harpy Eagle, the blue poison dart frog and the giant river otter, which exist in relatively high numbers in comparison to other similar ecosystems in the Neotropics.

Population

Because of Suriname's low population density, much of the forest within its borders is intact and considered by many to be the most pristine moist tropical forest on Earth. Results from a national population census conducted in 2004 suggest a total population of around 492,000 people, of which approximately 75% lives in urban areas, mostly (70%) in Paramaribo and surrounding areas (GBS 2005). The national average population growth rate is about 1.3% (IADB 2005). The forested interior is the home of Amerindian and Maroon (forest peoples of African descent) peoples, who live in small villages along the major rivers and depend primarily on the forest for their livelihoods. Suriname's population is distributed among 10 administrative districts, with Brownsberg located in the Brokopondo district, and Lely and Nassau in the far eastern part of the vast Sipaliwini district (GBS 2005).

While population density throughout Suriname is very low, the available data offer little insight into actual population pressures in specific areas. The Maroon population of eastern Suriname is comprised mainly of the Ndjuka group,

which numbers about 20,000 people living primarily along Tapanahony and Marowijne Rivers, and the Paramaka, numbering about 4,000 living along the Marowijne River. Moreover, one might reasonably expect that the population may be disproportionately concentrated in and around the eastern plateaus, given relative proximity to transportation arteries, such as rivers and roads, and the high level of small-scale mining activity. Regarding trends over time, pressure on natural resources due to population growth may be of relatively little concern due to combined elements of rural-urban migration and emigration; however, the results of a study by Heemskerk (2001b) indicate that in the Sella Creek area south of Lely, the miner population actually increased from 1990 – 1998. The presence of certain natural resources, such as mineral deposits, may therefore result in population increases.

Economy

Suriname has struggled to develop its economy since the cessation of civil war in 1992. In 2001, 64% of the urban population lived under the poverty line. In rural areas and the interior, this percentage is even higher. The government is by far the largest source of employment (more than 60%). In the non-public formal sector, the services industry dominates (a substantial portion of which relates to the mining sector). Logging and related activities account for an estimated 5% of employment. Agriculture accounts for 13% of GDP and is primarily practiced in the coastal plains area and river valleys. Formal sector mining directly accounts for 3.5–4% of employment, but indirectly supports possibly as much as 20% of employment or more (IADB 2005).

Mining

Mining is the predominant economic activity in Suriname. Bauxite alone contributes more than 15% of GDP and 70% of export earnings. However, the informal mining sector is estimated to account for more than 20% of real GDP, and a large portion of this is accounted for by the unregulated small-scale mining industry. While to date, bauxite has been the mainstay of Suriname's mining sector, large-scale gold mining is of increasing importance to Suriname's formal sector economic activity, with the potential to make an enormous economic impact in the short term. The IMF estimates that the Rosebel operation, which commenced in February 2004, contributed 10% of GDP and 12% of total exports that year while employing around 1,100 workers (Fritz-Krockow et al. 2005).

Eastern Suriname bears the brunt of small-scale gold mining in the country. Small-scale or artisanal (and largely illegal) mining grew from relatively little activity in the early 1980s to a 10–15 ton per year industry today, employing 10–20 thousand workers, mostly Maroons and anywhere from 7,500 to 15,000 Brazilian migrant miners. Following the end of the civil war in 1992, the sector boomed to become the second largest employer after the public sector, and now contributes as much as 15% of GDP. As Maroon communities increase their consumption of goods from the coast, in-

cluding canned fish, sugar, salt, and other processed foods, as well as shotguns, plastic ware, and other manufactures, the need for cash increases as well. This results in spurring the small-scale mining sector (usually the only local economic activity that generates appreciable cash revenues), and is also generating a waste-disposal problem.

The literature survey and site visits have confirmed the presence of small-scale mining activity around the Lely, Nassau, and Brownsberg plateaus, although the precise extent of such activity has not been well documented. One notable exception is the study by Heemskerk (2001b) of small-scale mining activity in the Sella Creek mining area of the Tapanahony region south of the Lely plateau. In the study, Heemskerk noted that until the early 1980s, the number of miners in this area fluctuated, but then began to increase rapidly. The number stagnated from 1986 to 1990, owing probably to the early years of the civil war and subsequent closing off of access routes to the interior. Poor economic performance and options since 1990 led to continuous increases in the number of miners in this region until 1998, the last year for which Heemskerk had data on miner population.

Logging

Approximately 2.2 million ha, or 40% of the Suriname's surface area, are under logging concessions. Available maps suggest that the Lely, Nassau and Brownsberg plateaus do not overlap with existing timber concessions. However, due to the paucity of government monitoring and enforcement, illegal logging remains a threat, particularly given the proximity to timber concessions further east and the potential development of infrastructure, such as roads, to facilitate mineral development.

Agriculture

Communities in the interior of Suriname derive the bulk of their food requirements from shifting agriculture. Cassava and rice are the staple foods, complemented by garden-produced maize, sweet potatoes, yams, squashes, taro, arrowroot, peppers, beans, peanuts, bananas, plantains and sugar cane. Under shifting agriculture, cultivated plots typically produce viable yields for one to two years, after which they are left fallow and cultivation moves to a new plot. As human population densities rise, suitable agricultural land becomes scarcer, and people need to travel further to establish plots and fallow periods tend to shorten. The increased pressure on soils undermines both agricultural productivity as well as the ecosystem's ability to support biodiversity. This phenomenon is readily observed near the larger settlements in the interior; additional information needs to be gathered to determine how far the process has progressed in the plateau areas of eastern Suriname.

Hunting and Fishing

Hunting has been identified as one of the major threats to biodiversity in eastern Suriname. Hunted game species include various birds, monkeys, deer, tapir, sloth, peccaries, ar-

madillos, anteaters, rodents and agoutis. Despite low human populations in the interior, hunting is exerting a noticeable impact on game species. Amerindian and Maroon hunters reportedly have to travel further and longer to find bushmeat and the average sizes of the animals they catch are decreasing. In addition to hunting for subsistence and commercial bushmeat sale, national and international markets for exotic pets also are driving increased wildlife exploitation.

Ouboter (2000) cited fishing and the pet trade as two of the major threats to freshwater species (the others being habitat alteration/destruction, pollution and introduction of exotic species). He notes that fishing in freshwater systems in Suriname tends to focus on two species (armored catfish and giant trahiri), both of which appear to be over-fished.

Regional Conservation Priority Areas: The Guayana Shield

The Guayana Shield Conservation Priority Setting Workshop held in 2002 in Paramaribo, Suriname offers the most comprehensive analysis to date of conservation priorities for the region (Huber and Foster 2003). The priorities represent the results of a year-long process which culminated in a five-day workshop with over 100 experts on the biology and socio-economics of the Guayana Shield. Participants overlaid information regarding biological thematic groups including: floristics, plant ecology, invertebrates, fishes and freshwater ecology, reptiles and amphibians, birds, mammals, and physical geography. This information was overlaid with socio-economic information on non-timber forest products (NTFPs), mining, protected areas and indigenous lands, forestry and infrastructure.

The socio-economic and biological information were combined and resulted in the identification of 41 areas totaling approximately 1.2 million km² that fall into current or proposed conservation units. More than half of the priority areas belong either to the highest category of biological importance or the highest category of pressure, with the entire Guayana Shield being cited as both a global priority for tropical biological and cultural diversity. With regards to the area containing Brownsberg, Nassau and Lely plateaus (designated as "Maroni" in the final report), workshop experts determined the region to be one of the highest conservation priority areas within the entire Guayana Shield, citing extensive ecological diversity and endemism in all taxonomic groups (Huber and Foster 2003).

National Conservation Priorities: Suriname

A search of the literature revealed no detailed analysis of conservation priorities within Suriname in general, or specifically for the Brownsberg, Nassau and Lely plateaus. Specific analyses such as BirdLife's Important Bird Area analysis and Conservation International's Key Biodiversity Area (KBA) analysis have yet to be undertaken within Suriname. Despite this, there are several other sources that provide insight into conservation priorities in Suriname, including the following:

Conservation International's High-Biodiversity Wilderness Areas: All three plateaus are located in the Amazonia Wilderness Area designated by Conservation International (CI). High-Biodiversity Wilderness Areas are defined by CI as areas that have “more than 70 percent of original vegetation, have low human population densities and are among the last places where indigenous peoples can maintain traditional lifestyles” (Conservation International 2005).

This area encompasses nine countries (Suriname, Guyana, French Guiana, Brazil, Venezuela, Colombia, Ecuador, Peru and Bolivia) and is the largest tropical forest on Earth, housing over 40,000 plant species alone, along with possibly 30,000 endemics throughout the Wilderness Area.

World Wildlife Fund's Global 200 Ecoregions: World Wildlife Fund (WWF) includes all of Suriname within the Guianan moist forest “ecoregion.” With regards to flora, WWF lists 4,500 plant species, including 300 varieties of orchids, 300 types of ferns and 800 tree species that have been inventoried in Suriname. Five hundred of these species are considered rare and 200 endemic to the Ecoregion. WWF also reports for Suriname: 185 mammal species, 668 bird species, 152 species of reptiles, 95 species of amphibians, 338 freshwater fish species, 452 marine fish species and 1,752 invertebrate species to date (Lethier 2002).

IUCN—The World Conservation Union (Red List—Critically Endangered, Endangered, and Vulnerable species): The IUCN has identified a total of 62 Vulnerable, Endangered and Critically Endangered species in Suriname. Forty of these species are terrestrial or freshwater; 22 are marine species (IUCN 2006). Notable species include the following:

- Due to overexploitation, the plant species *Youacapoua americana* is the only terrestrial species listed as Critically Endangered. The baboonwood (*Virola surinamensis*), found in swamp and inundated forest types, is listed as Endangered and twenty four other plant species are listed as Vulnerable.
- The Cara Cara (*Aniba rosaeodora*), giant armadillo (*Pridontes maximus*) and giant Brazilian otter (*Pteronura brasiliensis*) are listed as Endangered and are found in Suriname, along with eight other mammals listed as Vulnerable.
- *Atelopus spumarius* (toad) is listed as Vulnerable because of a projected population decline, estimated to be more than 20% over the next ten years, inferred from declines in other high altitude *Atelopus* species in the same region, probably due to chytridiomycosis.
- The blue poison dart frog (*Dendrobates azureus*) is the only other amphibian listed as Vulnerable as it is known from the vicinity of only one locality and it occurs only in forest fragments that are threatened by

forest fires. There is also some illegal collection of the species for the pet trade.

- The yellow spotted river turtle (*Podocnemis unifilis*), the Brazilian giant tortoise (*Geochelone denticulata*) and the American manatee (*Trichechus manatus*) represent the freshwater species listed as Vulnerable by the 2004 Red List.

Protected Areas: Suriname has 15 existing and five proposed protected areas, varying in degree of protection. These areas cover approximately 2.3 million ha, almost 13% of Suriname's total area (WRI 2003). The Central Suriname Nature Reserve is the most extensive of the protected areas within Suriname, totaling approximately 1.6 million ha and granted World Heritage Site status in 1998 (UNEP-WCMC 2005). While no protected areas are located in or around the Lely and Nassau plateaus, the Brownsberg plateau contains the 11,600 ha BNP. A review of the literature did not reveal any systematic gap analysis to date of the protected area system within Suriname making priority regions for new protected areas impossible to determine at the present time.

National-level Conservation Policies: A reasonably comprehensive national-level guiding framework for environmental policy in Suriname was commissioned by the Inter American Development Bank (IADB 2005). This document lists the following as principal drivers of biodiversity loss in the country: deforestation, mining-related pollution, mercury pollution, sanitation and disposal of solid and liquid wastes, water pollution, excessive use of agricultural chemicals, over-fishing, and coastal-zone degradation. However, the overarching challenge facing biodiversity and the environment in general in Suriname is the lack of legislative, regulatory and institutional provisions and mechanisms for environmental management.

Suriname has yet to adopt a National Biodiversity Action Plan. The principal guiding framework available for environmental policy in the country is the National Environmental Action Plan (NEAP), drafted in 1996, although this framework has not been formally adopted by the Government of Suriname. In 2001 an environmental law was drafted, but this law has yet to be approved by the Minister. Although Suriname has signed several international environmental conventions and treaties, and ratified some of them, these have yet to be integrated into national laws, management structures, and policy-making bodies. To the extent that environmental laws and regulations do exist, adequate monitoring and enforcement is rare due to limited human and material capacity, and low prioritization of environmental considerations by the relevant Ministries (IADB 2005).

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