

16. Conservation of freshwater ecosystems in Suriname

K. MOHADIN

- Freshwater ecosystems;
- Suriname

1. Introduction

The conservation of freshwater ecosystems cannot be viewed separately from other components of nature conservation in Suriname. The Nature Preservation Law (Government Bulletin 1954, No. 26) provides the Government with the means to identify wildlands of special importance by designating them as Nature Reserves and, at the same time giving them full protection. Article 5 of this law states that it is forbidden to undertake any kind of activity in a nature reserve which will affect the integrity of the reserves in a detrimental way. It is also prohibited to camp, make fire, cut wood or make charcoal, and to hunt or fish, unless written permission for this has been obtained from the Head of the Suriname Forest Service, and then only on the conditions stipulated in the permit. On the basis of this law, thirteen nature reserves have already been established (Fig. 1; Table I). Nine of these are in the freshwater region of the country, which is roughly located south of the road connecting Albina at the east border, with Nieuw-Nickerie at the west border (the so called Oost-West Verbinding), and which extends all the way to the south border with Brazil. It covers part of the Young Coastal Plain and the three other geomorphological regions, the Old Coastal Plain, the Savanna Belt, and the Interior, the latter being the hilly and mountainous region of the country. One nature reserve, the Galibi Nature Reserve, comprises both brackish-water and freshwater ecosystems. Two other areas, also situated in the freshwater region in the west of the country, await Government approval to be designated as nature reserves. Wildlife outside the nature reserves is protected by the Game Act (Government Bulletin 1954, No. 25), and fish by the Fish Protection Act (Government Bulletin 1961 No. 44), as amended in 1963, (Government Bulletin 1963, No. 153). The Game Act fully protects all mammals, birds, sea turtles, and other species mentioned, except those that are designated as game animals, cage birds, and predominantly harmful species. Of the reptiles, two caiman species, *Palaeosuchus trigonatus* and *P. palpebrosus*, and the iguana, *Iguana iguana*, are also protected. The Fish Protection Act protects eight species of fish, by setting limits on the size to be captured. The law also prohibits collecting or destruction of eggs or nests.

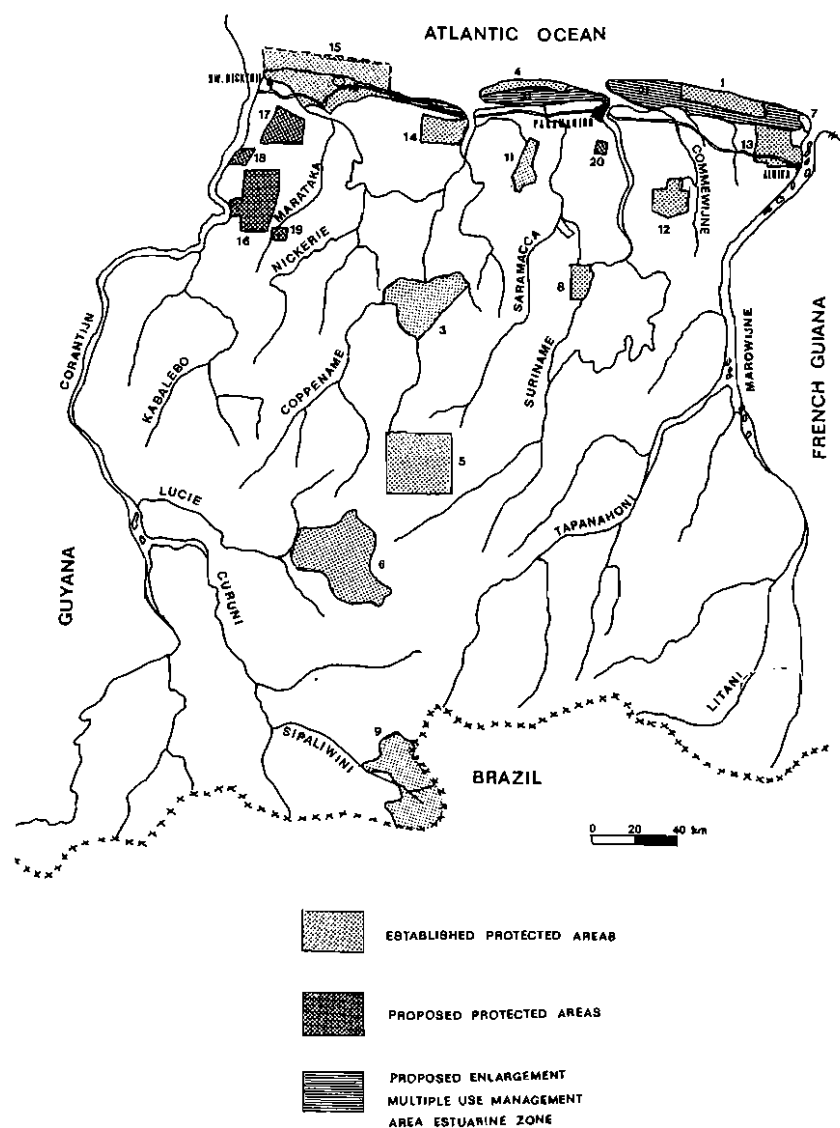


Figure 1. Existing and proposed protected areas in Suriname (for names see Table 1)

At present plants outside the nature reserves are also protected, but in a very limited way. The Timber Act (Government Bulletin 1947, no 42), as amended by Government Bulletin 1952 no 103, regulates logging and prohibits the logging

Table 1. Established and Proposed Protected Areas.

Established protected areas	Area
1. Wia Wia Nature Reserve	36,000 ha
2. Brinckheuvel Nature Reserve	6,000 ha
3. Raleighvallen/Voltz Berg Nature Reserve	78,170 ha
4. Coppename Monding Nature Reserve	12,000 ha
5. Tafelberg Nature Reserve	140,000 ha
6. Eilerts de Haan Gebergte Nature Reserve	220,000 ha
7. Galibi Nature Reserve	4,000 ha
8. Brownsberg Nature Park	8,400 ha
9. Sipaliwini Nature Reserve	100,000 ha
10. Hertenrits Nature Reserve	100 ha
11. Boven Cusewijn Nature Reserve	27,000 ha
12. Copi Nature Reserve	18,000 ha
13. Wane Kreek Reserve	45,000 ha
14. Peruvia Nature Reserve	31,000 ha
15. Bigi Pan Multiple-Use Management Area	68,300 ha
subtotal	803,970 ha
Proposed protected areas	Area
16. Kaburikreek Nature Reserve	68,000 ha
17. Nani Nature Reserve	54,000 ha
18. Mac Clemen Forest Reserve	12,000 ha
19. Snake Kreek Forest Reserve	3,000 ha
20. Lelydorp Forest Reserve	500 ha
21. Multiple-Use Management Area Estuarine Zone	121,000 ha
subtotal	259,000 ha
total	1,063,670 ha

of certain tree species. Furthermore a permit is required for collecting forest by-products. The Forest Management Act, however, which will replace the Timber Act of 1949, will provide the possibility for maintaining forests that could have special scientific, educational, cultural, or recreational value because of their location, composition of flora and/or fauna, their aesthetic value, or their stabilizing effect on the natural environment – especially on soil and watershed.

The Acts on the Issuance of State-owned Lands ("Agricultural Act" of 1937 and Decree L-2 of 15 June 1982) also have mechanisms to protect certain wildlands. Based on these laws, part of the Brownsberg region (8,600 ha) in the Interior, was given to the Foundation for Nature Preservation in Suriname (STINASU) on long-term lease. STINASU manages this area as a National Park. Furthermore, the Planning Act (Government Bulletin 1973, No. 89) also provides for the creation of special management areas. The establishment of the Bigi Pan Multiple-Use Management Area in the estuarine zone is an example.

2. Nature Preservation in Suriname

Protection of nature in Suriname started in 1915 already, with the provision in article 44 of the Police Penal Code of 1915 (as amended in 1942), which requires a permit from the Director of the Ministry of Natural Resources in order to hunt or to capture wildlife in certain areas of public land. Based on this article, the first sanctuary was established by Government Resolution (Government Bulletin 1953 No. 12) on 15 February 1953 in the estuary of the Coppename River to protect breeding colonies of the scarlet ibis (*Eudocimus ruber*). Later, as a result of the Nature Preservation Resolution of 22 April 1966, this sanctuary became the Coppename Monding Nature Reserve (on the basis of the Nature Preservation Act). The Law knows only one type of protected area: nature reserves.

With the same resolution an additional five nature reserves were created: the Wia Wia Nature Reserve (expanded in 1969), approx. 36,000 ha in the Young Coastal Plain, the Brinckheuvel Nature Reserve, approx. 6,000 ha, the Raleighvallen-Voltzberg Nature Reserve, (enlarged in 1986), approx. 78,170 ha, the Tafelberg Nature Reserve, approx. 140,000 ha and the Eilerts de Haan Gebergte Nature Reserve, approx. 220,000 ha, all situated in the Interior of Suriname.

In 1969 the Galibi Nature Reserve, approx. 4,000 ha in the Young Coastal Plain, was created by Government Resolution of 23 May 1969, and in 1972, also in the Young Coastal Plain, the Herttenrits Nature Reserve, approx. 100 ha. The Sipaliwini Nature Reserve, approx. 100,000 ha in the Interior at the border with Brazil, was established by Government Resolution of 31 January 1972.

Until then, no nature reserves had been established in the freshwater region of the Young Coastal Plain, the Old Coastal Plain, or the Savanna Belt, although it was known that unique ecosystems are located in these areas. The establishment of nature reserves here might be a problem because of human activities such as urban development, agriculture, mining and industry. The Government knew that caution should be exercised in conserving those areas, because of the rights and interests of local people, planned development strategy, and future urban development (Teunissen 1979). The need for conserving these unique ecosystems, however, led to a survey and mapping program of the ecosystems in the lowland area. This was initiated by the Foundation for Nature Preservation in Suriname (STINASU) and the Surinam Forest Service (LBB) and was conducted by P.A. Teunissen between 1976 and 1978. The result was the publication of "Recommendations for enlarging the system of nature reserves and forest reserves in the Suriname Lowlands" and of a "Reconnaissance Map of Suriname Lowland Ecosystems: scale 1: 200,000" (Teunissen 1977). Ten areas were selected for consideration for protection: six areas for the status of nature reserve and four areas for the status of forest reserves. In 1986, because of the Government Resolution of 26 August 1986, four of the six proposed nature reserves received legal status: the Peruvia Nature Reserve, approx. 31,000 ha, in the Young Coastal Plain; the Wanekreek Nature

Reserve, approx. 45,000 ha, in the Old Coastal Plain; the Copi Nature Reserve, approx. 28,000 ha, and the Boven-Cusewijn Nature Reserve approx. 27,000 ha, both in the Savanna Belt. The two other proposed nature reserves, the Nani Nature Reserve, approx. 54,000 ha, in the Young Coastal Plain, and the Kaburikreek Nature Reserve, approx. 68,000 ha, in the Old Coastal Plain, still await Government approval.

Until 1976, the establishment of nature reserves was based mainly on the presence of important flora, fauna, geological and cultural features, rather than on a systematic and scientific inventory of the area. This was indeed entirely in accordance with art. 2 of the Nature Preservation Act 1954, which states that for an area to be designated as a nature reserve, it should meet certain requirements, namely that it deserves protection by the Government because of its varied nature and landscape beauty and/or because of the presence, from a scientific or cultural point of view, of important flora, fauna, and geological objects.

Although several expeditions to explore the interior took place before 1976, none of them was specifically conservation-oriented. The main purpose of these expeditions was to map the areas visited. As a matter of fact, usually the physician who accompanied these expeditions was incidentally entrusted with the collecting of zoological and botanical specimens.

After 1976 the selection for the establishment of nature reserves took place on the basis of a sound inventory and mapping of ecosystems, and previously established guidelines. One of the criteria was that, with the selection of these areas, the conservation aspects of the sites selected had to be taken into account. During the selection process, the development plans in adjacent areas were taken into account as much as possible to ensure that the activities, which are taking place (or will take place there) do not have a detrimental effect of the areas.

The wildlands have been selected as much as possible on larger tracts of public lands, including the upper reaches of creeks or rivers, in order to safeguard them from pollution caused by development activities in surrounding areas.

The presence of important populations of animal and plant species (although not necessarily endangered species), has also contributed to the selection of protected areas, as is the case with the Copi Nature Reserve, the Boven-Cusewijn Nature Reserve and the proposed Kaburikreek Nature Reserve. For the Peruvia Nature Reserve, which is located in a brackish-water region, the presence of large populations of possentri (*Hura crepitans*) was the main reason for establishing this reserve. Large population of the spectacled caiman (*Caiman crocodilus crocodilus*) are found in the Casewinica Creek in the Copi Nature Reserve. There is also a small population of the giant otter (*Pteronura brasiliensis*) in this creek. Unlike the caiman, this endangered species is fully protected by the Game Act.

The spectacled caiman is common and abundant in the entire coastal region of the country, and is only protected within a nature reserve on the basis of the Nature Protection Act. A large population of the spectacled caiman is found in

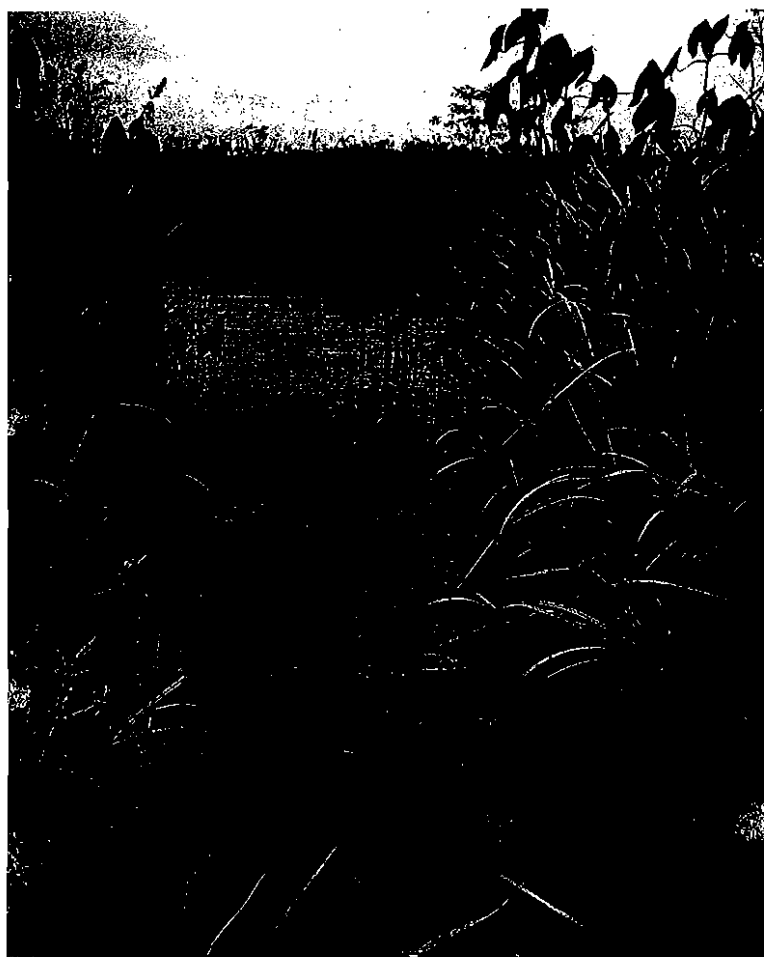


Figure 2. A group of giant otters (*Pteronura brasiliensis*) at Nani Creek (Photo P.A. Teunissen)

the Cusewijn River in the Boven-Cusewijn Nature Reserve (Ouboter and Nanhoe 1983). The river also has populations of manatee (*Trichechus manatus*) and giant otter. Another caiman species, *P. palpebrosus* is also present in this river (Ouboter and Nanhoe 1983). The manatee is fully protected by the Game Act.

The population of giant otters in the Kaburi Creek (Fig. 2) has contributed considerably to the selection of this area as a nature reserve. The establishment of this reserve has not yet been realized; nor has the proposed Nani Nature Reserve, which harbors large populations of manatee and spectacled caiman.

This area is predominantly a swamp, the water of which is used for the irrigation of the rice fields in the District of Nickerie. It is also for this reason that the area has been proposed as a nature reserve.

The Coppename River in the Raleighvallen-Voltzberg Nature Reserve consists of a system of rapids and waterfalls. It contains a number of plant and fish species adapted to the fast running water habitat. A number of species of the family of the Podostemaceae are common here, of which the species *Mourera fluviatilis* is very abundant and striking. In addition, the endangered species *Apinagia marowijnensis* of the same family has been recorded here (see also Werkhoven and Peeters, Chapter 5). Well-known fish species are the electric eel (*Electrophorus electricus*), several species of piranhas of the family Serrasalminidae, and members of the families Erythrinidae and Characidae.

3. Protection of Freshwater Ecosystems in the Interior

A detailed inventory of the ecosystems in the Interior has not yet taken place, due to the lack of qualified personnel and necessary funds. Biological surveys of the mountainous areas of the south have just started, and are likely to yield some interesting additions to the flora and fauna. It might be necessary to change or extend the system of protected areas on the basis of these future results. In addition, the development planned for the Interior, in particular logging, gold mining and bauxite mining, makes a detailed survey of the ecosystems here a high priority.

Important ecosystems must be protected because some of the planned activities could be detrimental to the integrity of these areas, and have a negative impact on their natural functions.

Table 2. Freshwater ecosystems in existing and proposed protected areas.

Name of protected area.	Ecosystem	Exceptional flora and fauna elements
2. Brinckheuvel NR	Subgraywacke landscape and conglomerate ridges and hills, with flat colluvial areas between, with one-layered sedge grass, xerophytic woods, and mesophytic forest.	
3. Raleighvallen-Voltzberg NR	Tropical lowland rain forest, Upper Coppename River with rapids and waterfalls.	<i>Mourera fluviatilis</i> , <i>Apinagia marowijnensis</i> , <i>Electrophorus electricus</i> , several Characidae, Erythrinidae, Serrasalminidae, <i>Paleosuchus trigonatus</i>
5. Tafelberg NR.	Scrub savanna of the Tafelberg type. Lowland and montane rainforest, and marsh forest.	

Table 2. (continued)

Name of protected area.	Ecosystem	Exceptional flora and fauna elements
6. Eilerts de Haan NR	Lowland and lower montane rainforest.	
7. Galibi NR	Grass swamps with <i>Typha angustifolia</i> and <i>Cyperus giganteus</i> Mixed mesophytic dryland and marsh forest.	Leatherback (<i>Dermochelys coriacea</i>), green turtle (<i>Chelonia mydas</i>), olive ridley (<i>Lepidochelys olivacea</i>).
8. Brownsberg Nature Park	Mesophytic tropical rainforest.	
9. Sipaliwini NR	Savanna of the Paru type. Gallery forests, freshwater swamps.	
11. Boven Cusewijn NR	Marshy clay savanna of Wanekreek type. Mixed mesophytic dryland- and marsh forest. Grass swamps, dominated by <i>Lagenocarpus guianensis</i> . Xerophytic dryland- and marshland woods. Dry white sand savannas of Cassipora type: short grass savannas with scattered shrubs. Marshy white sand savannas of Zanderij type: short grass savannas with scattered shrub and <i>Mauritia flexuosa</i> palm galleries. Cusewijn River.	Fish species: <i>Hoplias malabaricus</i> , <i>Hoplerthrinus unitaeniatus</i> , <i>Serrasalmus spilopleura</i> . Spectacled caiman (<i>Caiman crocodilus</i>), smooth-fronted caiman (<i>Palaeosuchus palpebrosus</i>). Several species of waterfowl, manatee (<i>Trichechus manatus</i>).
12. Copie NR	Dry savannas of Welgelegen type (clay savannas): short grass savannas with scattered gnarled treelets and bushes. Scattered <i>Pterocarpus</i> - bushes in grass and fern swamps. Mixed mesophytic dryland- and marsh forest.	Giant otter (<i>Pteronura brasiliensis</i>). Spectacled caiman (<i>Caiman crocodilus</i>). smooth-fronted caiman (<i>Paleosuchus palpebrosus</i>).
13. Wane Kreek	Ombrogenous peat swamps (incl. swaying swamps with floating peat layer, dominated by <i>Lagenocarpus guianensis</i> . Mixed mesophytic dryland- and marsh forest. Marshy clay-savanna of Wanekreek and Welgelegen type.	

Table 2. (continued)

Name of protected area.	Ecosystem	Exceptional flora and fauna elements
14. Peruvia NR	Mixed mesophytic dryland- and marsh forest. Hydrophytic swamp forest with possentri (<i>Hura crepitans</i>), mierenhout (<i>Triplaris surinamensis</i>), watrabebe (<i>Pterocarpus officinalis</i>), panta (<i>Tabebuia insignis</i>), pruimen (<i>Chrysobalanus icaco</i>), zuurzak (<i>Annona glabra</i>), and maurisi (<i>Mauritia flexuosa</i>). Tall grass swamp dominated by langa-grasi (<i>Typha angustifolia</i>), praso-ro-grasi (<i>Cyperus giganteus</i>), babun (<i>Virola surinamensis</i>). Grass and fern swamps. Ombrogenous peat swamps, also swaying swamps.	Possentri (<i>Hura crepitans</i>).
16. Kaburikreek NR	Scattered <i>Pterocarpus</i> -bushes in grass and fern swamps. Xerophytic swamp forest and woods with <i>Crudia glaberrima</i> and <i>Macarobium acaciifolium</i> .	Giant otter (<i>Pteronura brasiliensis</i>), Guiana otter (<i>Lutra enudris</i>). Manatee (<i>Trichechus manatus</i>).
17. Nani NR	Mixed mesophytic dryland- and marsh forest. Scattered <i>Mauritia flexuosa</i> palms in tall grass and fern swamps. Closed xerophytic palm swamp forest, dominated by <i>Mauritia flexuosa</i> . Floating aquatic vegetation.	Spectacled caiman (<i>Caiman crocodilus</i>). Manatee (<i>Trichechus manatus</i>)

NR = Nature Reserve

Summary

There is a solid legal basis for the protection of ecosystems and wildlife in Suriname. Thirteen nature reserves, one nature park and one multiple-use management area, have already been established, totaling an area of approx. 803,970 ha. Ten nature reserves are situated in the freshwater region of the country. Contrary to what was done prior to 1976, the selection of the new protected areas took place after a sound inventory and mapping of ecosystems, and on the basis of, previously established guidelines. The presence of the

and on the basis of previously established guidelines. The presence of the spectacled caiman (*Caiman crocodilus*), the giant otter (*Pteronura brasiliensis*) and the manatee (*Trichechus manatus*) has contributed considerably to the selection for protection of wildlands.

With the anticipated development, there is a great need for a further inventory of ecosystems in the Interior, which will form the basis for setting aside protected areas in order to mitigate the detrimental effects of the human activities.

Acknowledgements

I want to thank Mr. Henri A. Reichart for reviewing this paper. Many thanks also to Mrs. Ch. Kalika for the wordprocessing.

References

- Baal, F.L.J., 1991. Legal aspects of protected areas in Suriname. Report prepared for the IV World Congress on National Parks and other protected areas, Caracas, Venezuela, February 1992.
- Held, M.M. and H.A. Reichart, 1991. Managing Protected Areas in Suriname. Report prepared for the IV World Congress on National Parks and other protected areas, Caracas, Venezuela, February 1992.
- Ouboter, P.E. and L.M.R. Nanhoe, 1983. An Ecological study of *Caiman crocodilus crocodilus* in Northern Surinam. Department of Animal Ecology, Catholic University of Nijmegen, The Netherlands.
- Schulz, J.P., R.A. Mittermeier, and H.A. Reichart, 1977. Wildlife in Suriname. Journal of the Fauna Preservation Society 14 (2).
- Teunissen, P.A., 1977. Reconnaissance Map-Surinam Lowland Ecosystems (Coastal Plain and Savanna Belt). De Walburg Pers Zutphen, Netherlands.
- Teunissen, P.A., 1979. Aanbevelingen tot uitbreiding van het systeem van natuurreservaten en bosreserves in het Surinaamse Laagland. (2e druk)
- Werkhoven, M.C.M. and M.M. Held, 1989. Conservation of Natural ecosystems versus Land-Use in Suriname.