Riparian Vegetation Communities of the Caura River Basin, Bolívar State, Venezuela

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ABSTRACT
A total of 443 samples were taken during the expedition from a variety of riparian and aquatic habitats in the Caura River Basin. The samples contained 399 (291 from the areas above Salto Pará and 185 from Lower Caura) species of plants, all of which are included in the list of 1,180 species known from the basin. The investigation revealed that there is a large diversity in the composition of floral communities, characteristic of humid climates with low nutrient soils. A gradient of riparian landscapes, structured by the intensity and duration of erosional processes, foster this variation in community structure. Both the diversity of the underlying geology and the climatic gradient associated with altitude (40–2,350 m) contribute to the exceptional species richness of the Caura River watershed.
The proportion of endemic species is low in the lowlands and in the flooded forest ecosystems of the Caura River Basin. This region is dominated by palms: *Euterpe precatoria, Attalea maripa, Socratea exhorriza, Genoma baculifera* and *Bactris brongniartii*. The species richness is relatively high in comparison to values for similar forest environments in Amazonia and Guyana. The diversity and species richness of the flooded ecosystems of the Erebato, dominated by *Oenocarpus*, and the Upper Caura, dominated by *Mauritiella*, are also similar to values of other riverine corridors on the Guayana Shield. A variable set of unique floral assemblages associated with riverine islands are found in the Erebato and middle Caura Rivers. These islands have both *terra firme* forests and often, dense aquatic forests of Podostemonaceae attached to boulders in rapids.

INTRODUCTION
The knowledge of florisitic diversity and plant community structure in the Caura River Basin, especially in the riparian forests, is relatively complete. Studies of the flora and plant communities in the basin have been carried out over two extended periods of geographical and scientific exploration (Huber 1996). The first extends from the sixteenth to the nineteenth century during which missionaries and naturalists published important observations characterizing forest ecosystems. The second period began in the twentieth century, during the 1930's, with geographical explorations to the Guayana Shield Region culminating in studies by Williams (1942) and Veillon (1948). More recently, studies within the Caura River Basin have focused upon regional development plans and the conservation of the biological diversity (Steyermark and Brewer-Carias 1976; Lal 1990; CVG-TECMIN 1994; Berry et al. 1995; Briceño 1995; Huber 1995, 1996; Bevilacqua and Ochoa 1996; Marín and Chaviel 1996; Rosales 1996, 2000; Aymard et al. 1997; Briceño et al. 1997; Dezzeo and Briceño 1997; Huber et al. 1997; Knab-Vispo et al. 1997; Rosales et al. 1997; Salas et al.1997; Knab-Vispo 1998; Vispo 2000; Bevilacqua and Ochoa 2001; Rosales et al. 2002a,b; Knab-Vispo et al. in press; Vispo et al. in press).

Approximately 90% of the Caura River Basin is covered by inland and mountain forests, while the remaining area contains riverine flooded forest and savannahs. The basin has high vegetation formation diversity, typical of communities that develop in humid climates, on low-nutrient soils and in a gradient of landscapes structured by continuous and intense erosional processes. The combination of humidity,soils and erosion along with the underlying geological diversity and an altitudinal (40–2,350 m) climatic gradient contribute to the exceptional floristic diversity in the basin. A large scale perspective (1:2,000,000) permits us to characterize the inland forest (*terra firme*) in four categories:

1) semi-evergreen/deciduous (tropophilus macrothermic) forests, exhibiting marked seasonal changes and usually found in the lowlands in the northern sector of the basin; 2) evergreen humid (ombrophilus macrothermic) forests, distributed primarily on great expanses of lowlands in the middle to high elevations of the basin that have high temperatures and precipitation; 3) evergreen humid premontane (ombrophilus mesothermic) forests, associated with the Guayana Shield landscapes at premontane elevations; and 4) evergreen humid montane (ombrophilus submesothermic) forests, associated with the physiographic landscapes of the Guayana Shield highlands.

In contrast to the *terra firme* forests, the flooded forests cover a relatively small portion of the basin. The flooded forests are distributed in the flood plains and main channels of the Caura and Erebato Rivers. Despite their small extent, the flooded forests play a critical role in the transference of energy and nutrients to the adjacent aquatic and *terra firme* forest ecosystems. Moreover, the flooded forests are reservoirs of great biological diversity, have high landscape value and are resources for the local indigenous populations (Rosales 2000). The proportion of endemic elements is low in the lowlands and in the flooded forest ecosystems. However, the diversity is relatively high and comparable with values registered for similar forest environments in Amazonia and the Guyanas (Klinge et al. 1995; Knab-Vispo 1998; Rosales et al. 1999; Rosales 2000; ter Steege 2000).The non-forest plant communities are dominated by shrubs and grasses, associated in aquatic communities with rivers and lagoons. The communities are found on alluvial and sandy soils in the savannahs and morichales, located in the lowlands near the Orinoco River. Shrub and grass communities are also found on the tepuys in the Caura RiverBasin. These are highly valuable floral communities, typical of the Guayana Shield (Berry et al. 1995; Huber 1995; Huber et al. 1997).

Our data show that the flooded ecosystems of the Erebato and Caura River corridors manifest a relatively high diversity of ecological plant assemblages that contribute to the uniqueness of the basin. The diversity in community structure and floristic richness is similar to that found in other riverine tropical corridors (Rosales et al. 2001). The biological and environmental attributes of the Caura River Basin, including the great expanses of primary forests, cultural diversity and potential for sustainable development, classify this bioregion as an important area in the western hemisphere (Bevilacqua and Ochoa 2001).

RESULTS

General description of subregions and field stations

I. Upper Caura River Subregion

This subregion is characterized by abundant rainfall throughout the year, with average precipitation varying from 2,600 mm near Raudal Cejiato to 3,758 mm near Entreríos. The lowest precipitation occurs from January to March, and this study (Nov–Dec) was carried out at the end of the rainy season. The bioclime is macrothermic with an average annual temperature of 25$_o$C and an average altitude of 250 m a.s.l. The riverine landscapes are characteristic of rivers structurally controlled by hydraulic gradients (relative slopes), the sediment load and the age and evolutionary grade of the river in the different sectors. Figures 2.1, 2.2 and 2.3 show examples of typical riverine landscapes and their associated vegetations.

1. Kakada River (AC03, AC04). Tributary of the Erebato River, which drains a sandstone system from the Jaua-Sarisariñama (Roraima Formation) Range. Its waters are strongly acid, black and transparent. The predominant inland landscapes are the old floodplain on quaternary alluviums and the hilly formations of the Cuchivero Province. The riparian landscape, on the other hand, has a gentle slope and is dominated by a recent alluvial plain of depositional origin that extends to the confluence with the Caura. The sampling stations included the flooded plain and the damp forest habitats up to the approximate 50-year flood zone. The flooded margins have differential sandy, limic and clay depositions that modify the topographic gradient. The most elevated positions are dikes and banks with Franco-sandy textures and slopes of 3–4 m. These areas precede depressional, convex plains whose irregular microrelief is formed by a combination of dissectional (erosional cavities) and depositional (marginal buckets) processes. The topography

of the riparian zone is formed by alluvial depositions. This zone takes the form of long, narrow, sinuous bars, oriented laterally to the River, with sandy substrates and abundant depositions of organic material coming from the root mat and leaves. On the other hand, at the confluence of Caño Suajiditu, the low area behind the bank is a lateral bar of clay. Just upstream from the confluence there is a series of bars formed by the meander of the river that alternates. The slope of the shore is about 2–3 m high. The bed of the Caño has layers of gravel and sand in addition to accumulations of organic material in different stages of decomposition. 2. Erebato River (AC05, AC06, AC07). Principal tributary of the Caura River that drains parts of the Roraima (Jaua-Sarisariñama Mountain Range), Pastora and Cuchivero (Maigualida and Uasadi Mountain Range) Provinces. The predominant *terra firme* landscapes along the Erebato are old plains and low, frequent hills. An aspect worth noting, the Erebato River is largely confined and structurally controlled by steep banks and rocks with high downstream gradients and many rapids. The River's narrow flood plain suggests that this is a young drainage system. Both riverbanks are steeply carved and there are more erosional habitats than depositional habitats. There are few marshy areas in the riparian zone, however, marshy areas are present in the confluence of caños with the Erebato River forming narrow, sinuous bands that are elevated 2–3 m above the shores. The bottom of the caños present layers of gravel and sand mixed with abundant organic material. The Erebato River has many rapids and rocky islands. The islands are variable in size and are predominantly elongated downstream. The islands have rocky beaches in addition to lateral and frontal bars that form sandy beaches of rough texture. The hills towards the centers of the islands have flat or convex tops with irregular microrelief. 3. Caura River, Entreríos-Raudal Cejiato (AC01, AC02, AC08, AC09, AC10). Origin in sandstone and igneous systems of the Roraima (Ichún and Roraima Group Formation) Province. The waters are acid, similar to those in the Erebato River. However, the Caura River has higher amounts of suspended material and nutrients. The drainage basin of the Caura River has more tributaries than the Erebato River.
The *terra firme* landscape comprises high hills on the western margin of the River and lower hills on the eastern margin. The Caura has a relatively high heterogeneity of habitats due to the development of the floodplain. This indicates that the River basin is relatively mature. There are erosional margins with active slopes. There are also depositional areas in the meanders with bars of sand, clay and organic material. The major forms in the floodplain include: i) levees and elevated banks formed during periods of high waters; ii) zones of swails and troughs that drain off surface waters; iii) depressions that form pools; and iv) lateral depositional bars in the riparian zone. In the caños and tributaries the substrates include exposed rocks and gravels as well as leaves and detritus. There are also island and rapids complexes similar to those described above.
4. Caura River, Entreríos-Salto Pará (AC11, AC12, AC13, AC14). The fundamental characteristics are determined by the confluence of the Caura and Erebato hydrologic systems. In general, waters are acidic, slightly brown and well oxygenated, resembling those in the Upper Caura.
This whole area has many rapids and islands with exposed rocky patches and backwater areas. Salto Pará is a mixture of rapids and cataracts that drop 50 m in only 2 km. The floodplains and islands are similar to those described above. *II.*
The Lower Caura subregion manifests a bioclimatic gradient principally due to variation in precipitation which increases from north to south: 1,500–1,900 mm from the Mato River to the mouth of the Caura River; 2,500–3,000 mm in the Nichare River; and 2,970–3,400 mm near Salto Pará. Temperature maintains a macrothermic regime that is similar to that described for the Entreríos area, except that the temperature fluctuates 1–2 degrees higher. The riverine landscapes from Salto Pará to Raudal Cinco Mil are typical of structurally controlled rivers with variations related to altitudinal gradients, sediment load and age or state of evolution.
In contrast, meandrous riverine landscapes are found in the Nichare and Icutú Rivers and below Raudal Cinco Mil to the mouth of the Mato River. 1. Caura River, El Playón–Raudal Cinco Mil (BC01, BC02, BC03, BC15, BC16, BC17). This area is characterized by the presence of rocky rapids, turbulent channels and backwaters. Geologically, this area is dominated by the Imataca Province formation with gneiss, anphybolites and ferruginous quarzites in the hills and the Cuchivero Province with igneous and granite rocks in the peneplain. Similarly to the Upper Caura, the dominant riverine landscape is the recent alluvial plain. As in the Upper Caura, the riparian zone also has lateral depositional bars.

2. Nichare, Tawadu and Icutú Rivers (BC04, BC05, BC06, BC07, BC08, BC09, BC10, BC11). In general the waters have lower pH, higher oxygen, less turbidity and conductivity and have lower temperatures than the rest of the Caura River. There are two types of riverine landscapes.

The first is the meandering alluvial plain within a valley developed over quaternary and recent alluvia. These plains are located in the Nichare River from the Icutú River to the mouth of the Tawadu River. The variety of terrains includes lateral bars, meandric bars and shore complexes of levees, pools and oxbow lakes. The substrate generally includes clay-lime organic material and organic muds, in addition to aggregations of leaves. The second riverine landscape is found in the Tawadu River. This is a landscape of steep banks carved through hills with granites of the Cuchivero Province. In this area the substrate contains gravel, sand and rocks of different sizes.

3. Caura River from Raudal Cinco Mil to the mouth of the Mato River (BC12, BC13, BC14). The recent alluvial floodplain in this area is the most highly developed of any area that we studied. This area represents the southern limit of flooding in the Lower Caura River due to the damming effect of the Orinoco. The development of alluvial islands is common, as is the development of channel bars and meandric bars in the riparian zone. In the floodplain there are lagoons formed by abandoned river channels or dead arms, oxbow lakes (in the Mato), levees, banks and pools. The floodplain contains quaternary and recent alluvia.

VEGETATION DESCRIPTION

The flooded vegetation can be classified in four types: 1) the herbaceous-shrubby, early successional vegetation of sand bars and backwaters; 2) the flooded forests in margins of caños and rivers; 3) the underbrush-herbaceous vegetation in backwaters; and 4) the rheophylic aquatic vegetation. Each of the four vary in their physiognomy and structure depending upon environmental factors such as flooding periodicity, exposure of rocks and boulders, degree of organic material in alluvial soils, lithological background and topography. The following paragraphs describe each vegetational type: The first type consists of communities closest to the rivers. These mainly include early successional plants that grow on recent alluvial soils of lateral depositional bars. This community comprises herbaceous and shrubby species, as well as prefruiting plants between 1 to 3 m in height such as: *Psidium* sp., *Mabea* sp., *Miconia* sp., *Vismia* sp., *Croton cuneatus*, *Calycolpus goetheanus, Myrcia splendens, Maytenus guyanensis* and a small, shrubby, white-flowered species of Rubiaceae. These belong to the families Cyperaceae, Graminaeae, Rubiaceae, Labiatae and Gesneriaceae. On islands, the early successional vegetation borders a narrow, shrubby ecotone in transition to a poorly developed forest generally located in the center of the island (Figures 2.2 and 2.4). The woody elements in the shrubaceous ecotone are constantly being regenerated because of seasonal flooding. This ecotone is related floristically to the flooded forest. The second type of vegetation is the riparian flooded forest.. This community occurs on elevated areas, such as banks or levees, as well as in depressions of the floodplains. In general, these are evergreen forests of average height (between 18 and 25 m) and with two strata. The upper stratum has either a continuous or irregular canopy and contains species such as: *Pithecelobium cauliflorum, Macrolobium acaciiefolium, M. angustifolium, Eperua jehnmanii* spp. *sandwichii, Homalium guianense, Caraipa densifolia,Jacaranda copaia, Andira surinamensis, Eschweilera subglandulosa, Catostemma comune, Dialium guianense, Parkia pendula,Micranda minor, Virola surinamensis, Scheflera morototoni,Gustavia coriacea, G. poeppigiana, Tabebuia capitata, Pterocarpus* sp., *Chrysophyllum* sp., *Cupania* sp., *Sterculia* sp.,*Lecythis* sp., *Abarema* sp., *Alexa confusa* and *Protium* spp. The lower of the two strata is commonly dense, occupying the zone between 10 and 18 m, with species such as: *Phenakokspermum guyanense, Rinorea flavescens, Swartzia schomburgkii,Cassipourea guianensis, Amphirrox latifolia, Psychotria* spp., *Erythroxylum* sp., *Diplasia* sp., *Alexa* sp., *Mabea* sp., *Chrysophyllum* sp., *Inga* sp., *Sterculia* sp., *Lecythis* sp., *Abarema* sp.,*Alexa* sp., *Protium* sp., *Calycolpus* sp., *Myrcia* sp., *Ficus* sp. and *Zigia* sp. Occasionally, there is a third, lower stratum dominated by a few species with scattered individuals at heights of only 6 to 10 m. A number of species commonly grow above the canopy at heights from 26 to 30 m, including:*Parkia pendula, Micranda minor, Catostenma commune, Ceiba pentandra* and *Tabebuia* sp. The forest floor is an active area of forest regeneration and while occasionally sparse, generally varies in density from medium to high. The forest floor contains many juvenile trees, grasses, shrubs and prefruiting species, such as: *Piper* sp., *Amphirrox* sp., *Costus* sp., *Heliconia* sp., *Renealmia* sp.,*Tabernamontana* sp., *Eugenia* sp., *Miconia* sp., *Psychotria* sp.,

Erythroxylum sp. and *Diplasia* sp. Colonies of cyperaceans are localized in open areas in the forest, as are small patches of musaceans, principally *Phenakospermum guyanense*, reaching heights of 8 m. Palm trees are frequent and characteristic of flooded forests, occurring in all strata. The most frequently encountered palms are *Euterpe precatoria, Attalea maripa, Astrocaryum gynacanthum, Socratea exorrhiza* and *Desmoncus* sp. Occasionally, we found colonies of *Geonoma deversa* and *Bactris brongniarti*. The species *Oenocarpus bacaba* and *O. bataua* are common in the flooded forests of the Erebato River. In response to an increase of relative humidity, there can be abundant mosses, lichens, araceans and epiphytes such as bromeliads and orchids. Ferns also are common and can be either free-living or epiphytic. Lianas (vines) and reeds are found in areas with natural perturbations, such as in forest gaps resulting from fallen trees. In areas with poor drainage, the lianas and reeds often form dense interlaced communities. Flooded forests are shorter and less floristically complex in poor drainage conditions, in long periods of flooding and in soils of depositional-residual origin. In the confluence of caños, or in depressed areas, there are patches of low forests with variable canopies reaching 8 to 15 m. On the other hand, the plant coverage of the forest floor is moderate to sparse. Leaves accumulating on the forest floor are an important source of nutrients for flooded forests. The third type of flooded vegetation is underbrush, dominated ecologically by *Inga vera*, and found in depositional margins and beaches of backwaters and meandric curves. Below Raudal Cinco Mil the same habitats are occupied by other species of *Inga*, frequently along with *Alibertia latifolia* and *Coccoloba obtusifolia*. This type of vegetation can grow to 2 m in height and can be extremely dense, forming an intricate network of branches and strong trunks. Some reeds, vines and lianas of the families Apocynaceae, Vitaceae, Leguminosae, Convolvulaceae and Malvaceae co-occur where the flooded forest makes contact with the underbrush, forming mosaic "reed forests."In an area between the Nichare and Tawadu Rivers we made a transect of this habitat. The area was an exposed depositional bar forming a beach approximately 30 m wide. The substrate of the exposed beach was soft mud due to the high percentage of organic material and clay. The underbrush was totally exposed and contained *Solanum* sp. as the dominant species. This community was ecologically equivalent to the *Inga vera* underbrush. We noted an early-successional herbaceous community in front of the underbrush. This herbaceous community had species of the families Cyperaceae, Graminaea, Rubiaceae, Labiatae and Gesneriaceae, in addition to *Montrichardia arborescens*, the tallest element, which tolerates the cyclical flooding. The location of these communities preceding the underbrush depends upon depositional dynamics, beach exposure and extention of water interface.
In transition toward the riparian forest there was an ecotone of woody plants such as *Genipa* sp. *ruceana*, *Cecropia peltata,Myrcia* sp.*, Corton* sp. and *Macrolobium acaciiefolium.* The fourth type of vegetation is the strictly aquatic vegetation. Aquatic plants are relatively scarce in the main channel of the Caura and Erebato Rivers. Basically, the aquatic vegetation comprises reophilic macrophytes of the Family Podostemonaceae, most often found in rapids. We collected a total of five species; the highest diversity was found in the region from Entreríos to Salto Pará. While few species were present, these macrophytes are important as environmental indicators of water quality because of their fragility. The macrophytic communities also provide critical sustenance and refuge for aquatic organisms.

DISCUSSION

We collected a total of 443 samples from the riparian zone, flood plain, islands and rapids from which we identified 399 species (Appendix 2). We identified 291 species from areas above Salto Pará and 185 from the Lower Caura.In general, the flora of the Caura compares well with the literature for Neotropical forests, principally containing the families: Leguminosae (*sensu lato*), Lauraceae, Anonaceae, Rubiaceae, Moraceae, Myristicaceae, Sapotaceae, Meliaceae, Euphorbiaceae, Chrysobalanaceae and Melastomataceae. Phytogeographically, the flora of the Upper Caura is principally related to the Guayanan and Amazonian floristic provinces. On the other hand, the Lower Caura contains elements from these provinces as well as from the Llanos Province. The gamma or regional vegetation diversity of the Caura River Basin is moderately high. The flooded forests have elements from Amazonian igapos (*terra firme* streams with blackwater), as well as common species of the Amazonian varzea (flooded blackwater forests). These Amazonian elements become more frequent below Salto Pará to the confluence of the Caura and Orinoco Rivers.

In general, the palms *Euterpe precatoria, Attalea maripa,Socratea exhorriza, Geonoma baculifera* and *Bactris brongniartii* are characteristic floral elements of flooded forests of the Caura River. Whereas the genus *Oenocarpus* is common in the flooded forests of the Erebato River, the genus *Mauritiella* dominates flooded areas with sandy soils in the Upper Caura. *Eperua jehnmanii* spp. *sandwichii* is arboreal and very common in the forests of the Upper Caura though not present in the Lower Caura. On the other hand, *Ocotea cymbarum* and *Campsiandra laurifolia* are only found in the Lower Caura. In the Lower Caura below Raudal Cinco Mil we documented a new floristic communitiy that is distinct from those observed above the rapids. The new community contains the species *Campsiandra laurifolia, Piranhea trifoliata,Homalium racemosum, Mabea nítida, Gustavia augusta, Ruprechtia tenuiflora, Symmeria paniculata* and *Simira rubescens.* Whereas the analogous community above the rapids contains: *Simira aristiguietae, Homalium racemosum, Gustavia augusta, Mabea nitida, Luelea candida, Ruprechtia tenuiflora, Macrolobium angustifolium, M. acaciaefolium,Montrichardia arborescens, Podostemonaceae* sp. 1*, Inga vera, Homalium guianense, Caraipa densifoli* and *Croton cuneatus*. The Podostemonaceae are common and diverse in rapids such as Culebra de Agua, Perro de Agua and Dimoshi rapids. We collected five species (*Apinagia ruppioides, A. Staheliana, Mourera fluvilatilis*, *Rhyncoclacys* sp. and *Rhyncholacis* sp.) and possibly a new genus. The macrophyte communities of the Upper Caura are more diverse than those of other rivers of the Venezuelan Guayana Shield.

Riverine Rocky Communities: Ecosystems of High Conservation Value

Data obtained during the AquaRAP expedition demonstrate that there is a relatively high frequency of rocky habitats with unique ecological assemblages in the Erebato River, and less so in the Caura River. These Rivers have exceptional landscape value because of the floral communities associated with rocky substrates, particularly the rheophyllic communities of macrophytes (Podostemonaceae) and the woody vegetation of the islands. The continual transformation of riverine plant communities is dependent upon the intensity of perturbations (inundation, sedimentation, erosion) that derive from the dynamic cycle of flooding. Moreover, the low-nutrient soils and the exposed, non-sedimentary rocks help determine the origin and ecological heterogeneity of the vegetational assemblages. The mosaic of vegetation resulting from the above process, includes: i) the presence of herbaceous and shrubby communities in different degrees of cover; and ii) flooded pioneer forests in different stages of successional sequence. These pioneer forests range from low underbrush to a medium-height, late-successional forest and also have abundant climbing and woody vine species. The structure and richness are, in some cases, comparable with those of riverine and *terra firme* forests. The small islands, situated among the rapids, have patches of low, dispersed forest due to the exposed rocky surface, year-long high humidity and recurring impacts of the hydrologic cycle. In these forests there are important assemblages of epiphytes and mosses, and many woody plants have twisted trunks and small coarse leaves. The physiognomies of these forests are reminiscent of transitional cloud forests or of highland vegetation (>2000 m asl). All of these characteristics confer high biological and landscape values to these islands.

CONSERVATION OPPORTUNITIES

The riparian forests in the Caura River Basin, as illustrated in this chapter, provide the following environmental services: fixation and sequestration of carbon; refuge for biodiversity; conservation of soils; production of water; climatic regulation; and the preservation of food resources to sustain an expanding local human population as well as wildlife (Rosales and Huber 1996; Silva 1996, 1997; Rosales et al. 1997; Knab-Vispo 1998; Bevilacqua and Ochoa 2000; Centeno 2000; Vispo et al. in press). Recent conservation and development initiatives proposed for the region highlight the current and potential use of these services.

Conclusions and Recommendations

- The rocky islands in the Erebato River in the Upper Caura River Basin are ecologically special and require protection.
- Protection should be afforded to the rapids of the Upper Caura River Basin that are covered with the macrophytes of the family Podostemonaceae. These habitats provide refuge for many animal groups that form unique assemblages in the macrophytes

. • Maintenance of the natural hydrologic cycle that produces the intense dynamics within the riparian vegetational communities should be guaranteed. Construction of dams or water diversion projects will endanger riparian plant communities.
• Further agricultural expansion and deforestation within the Caura River Basin should not be permitted and current activities should be regulated. This is especially important in the Lower Caura.

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