



## Maps and Photos

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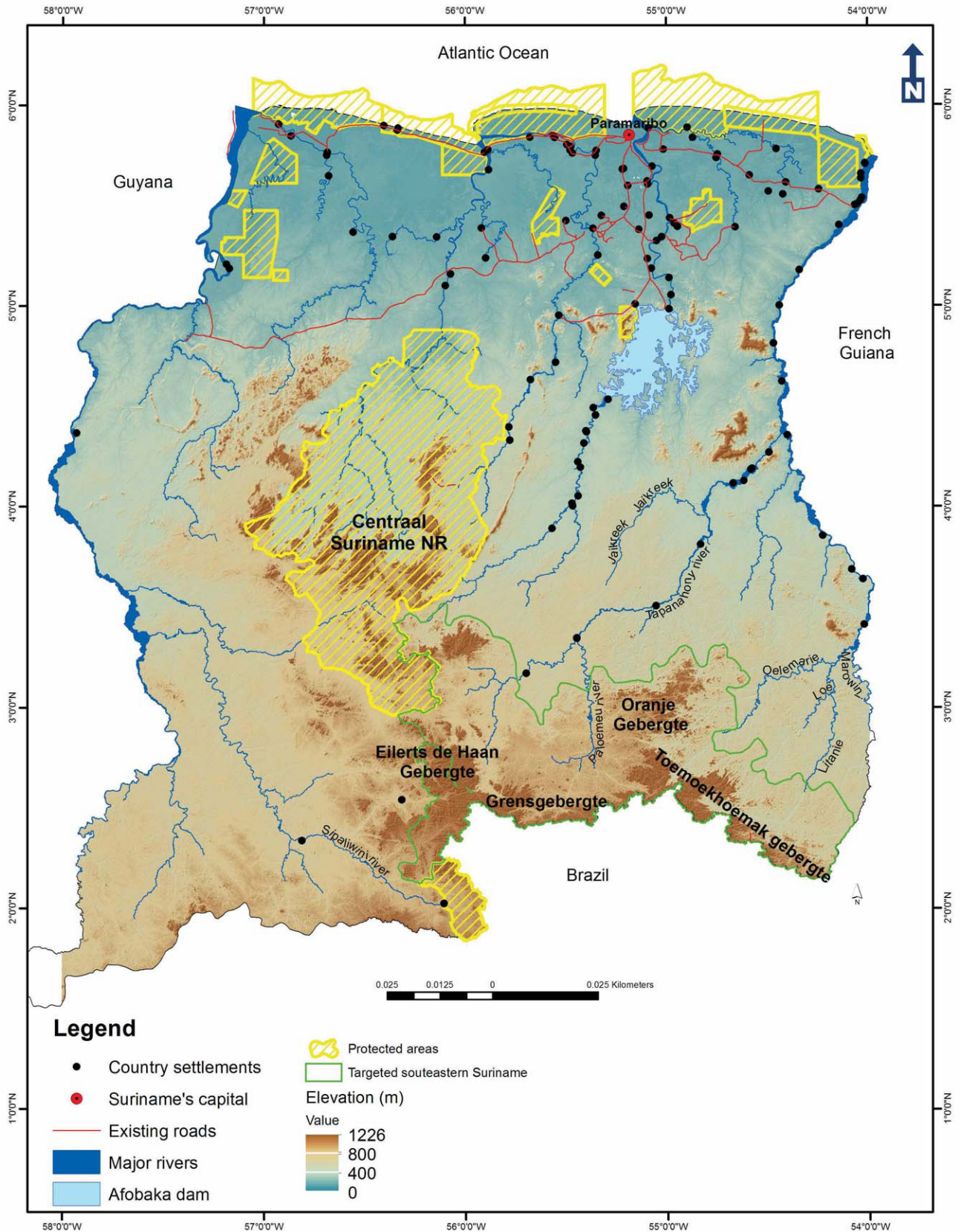
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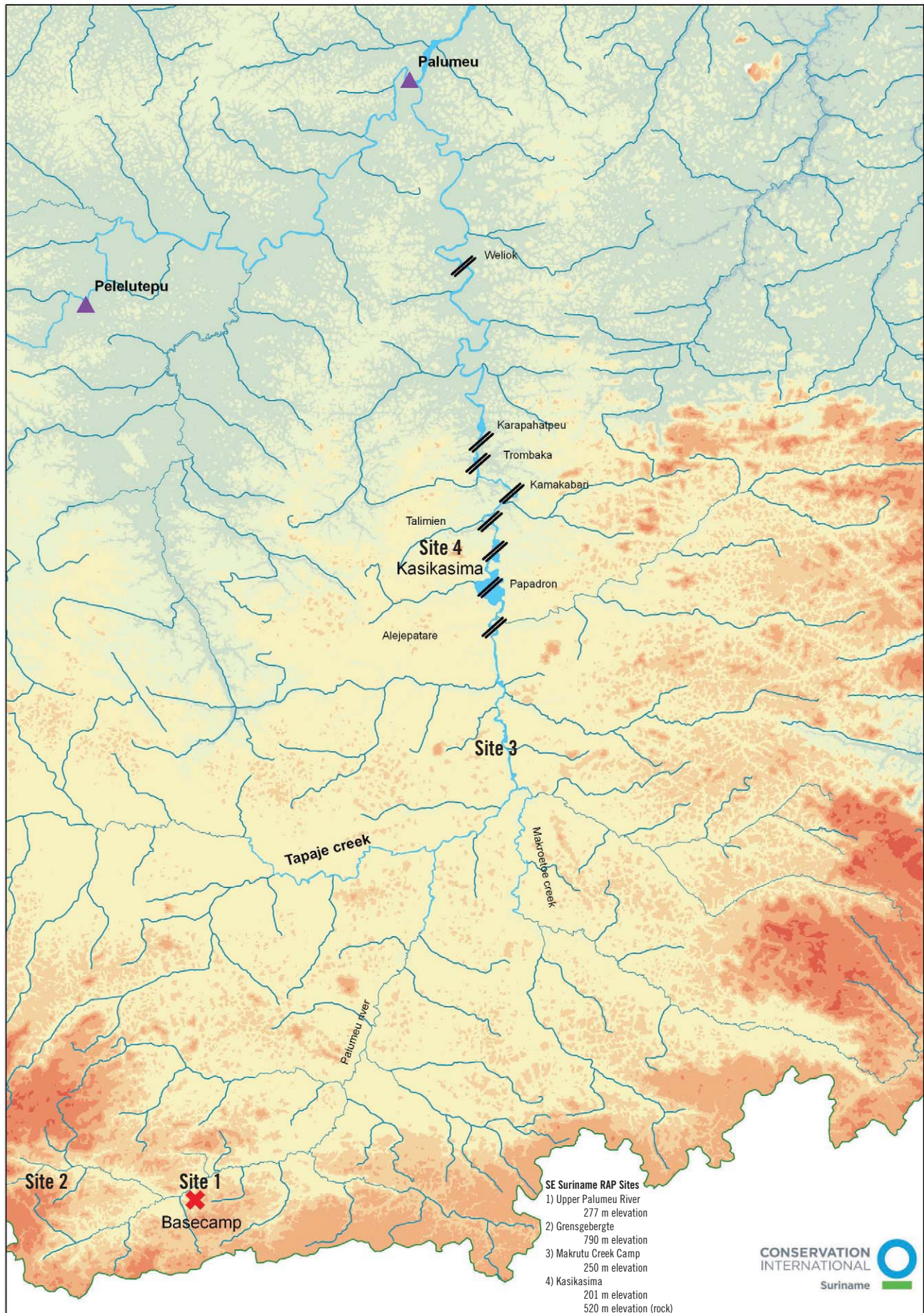
# Maps and Photos

**Map 1.** Suriname and its protected areas. This RAP survey focused on the Grensgebergte Mountains in the South, as well as Kasikasima Mountain. Other mountain ranges of Southeastern Suriname remain almost completely unknown to scientists. Map by Sara Ramirez.

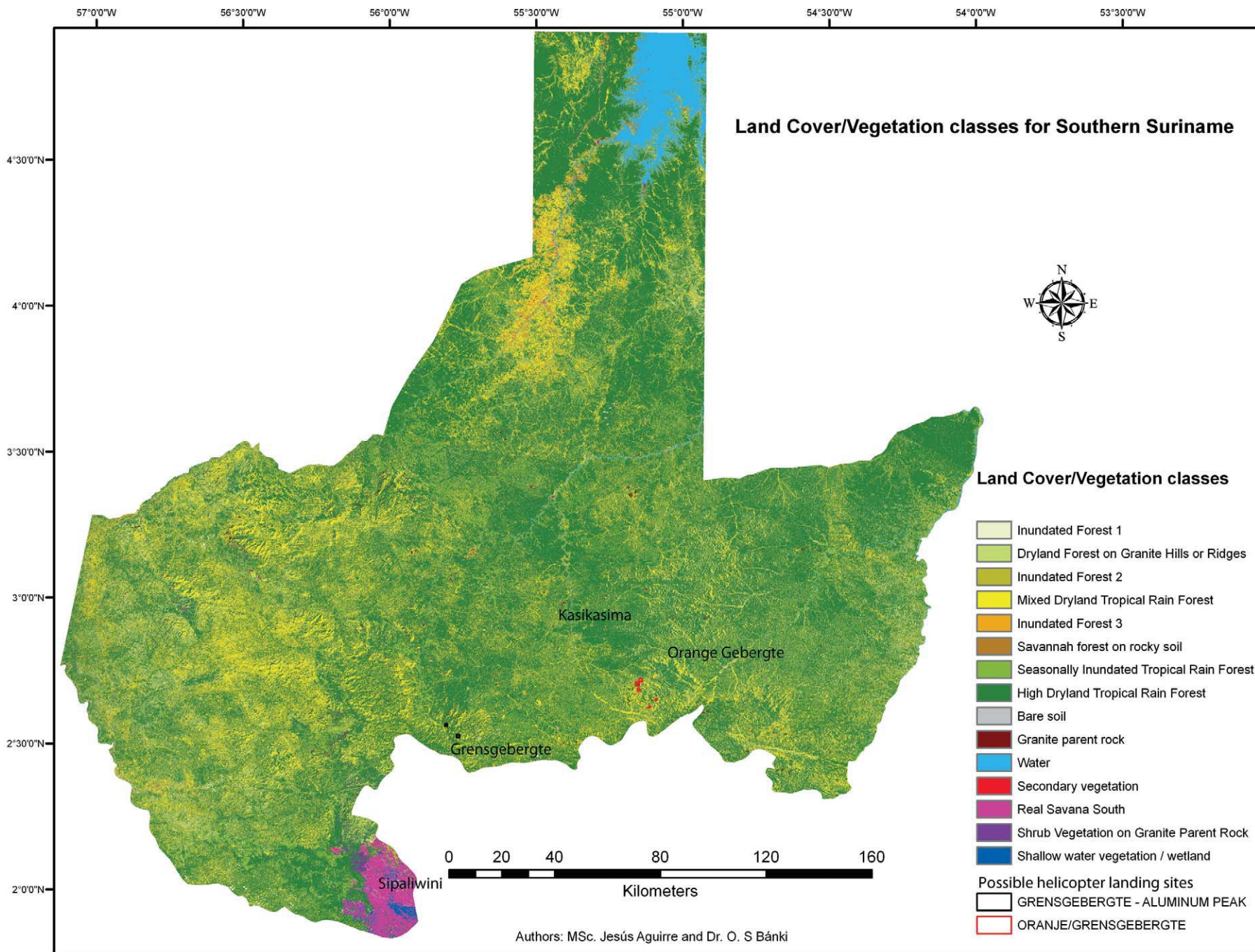




**Map 2.** Map of RAP survey route and camp sites. Color indicates topography (orange/red high); diagonal lines across rivers indicate rapids (many of which required porting boats through the forest). Map by Priscilla Miranda.

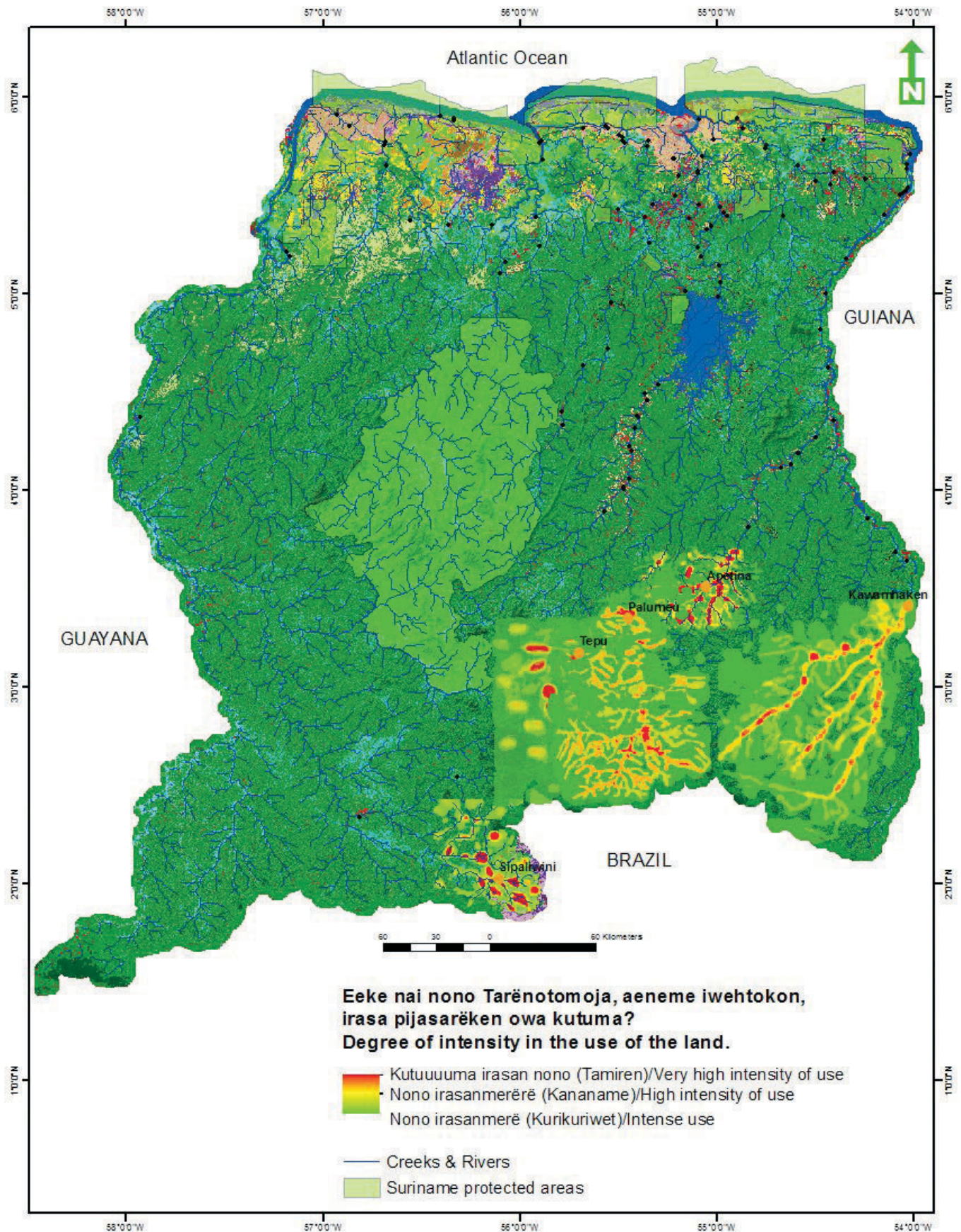






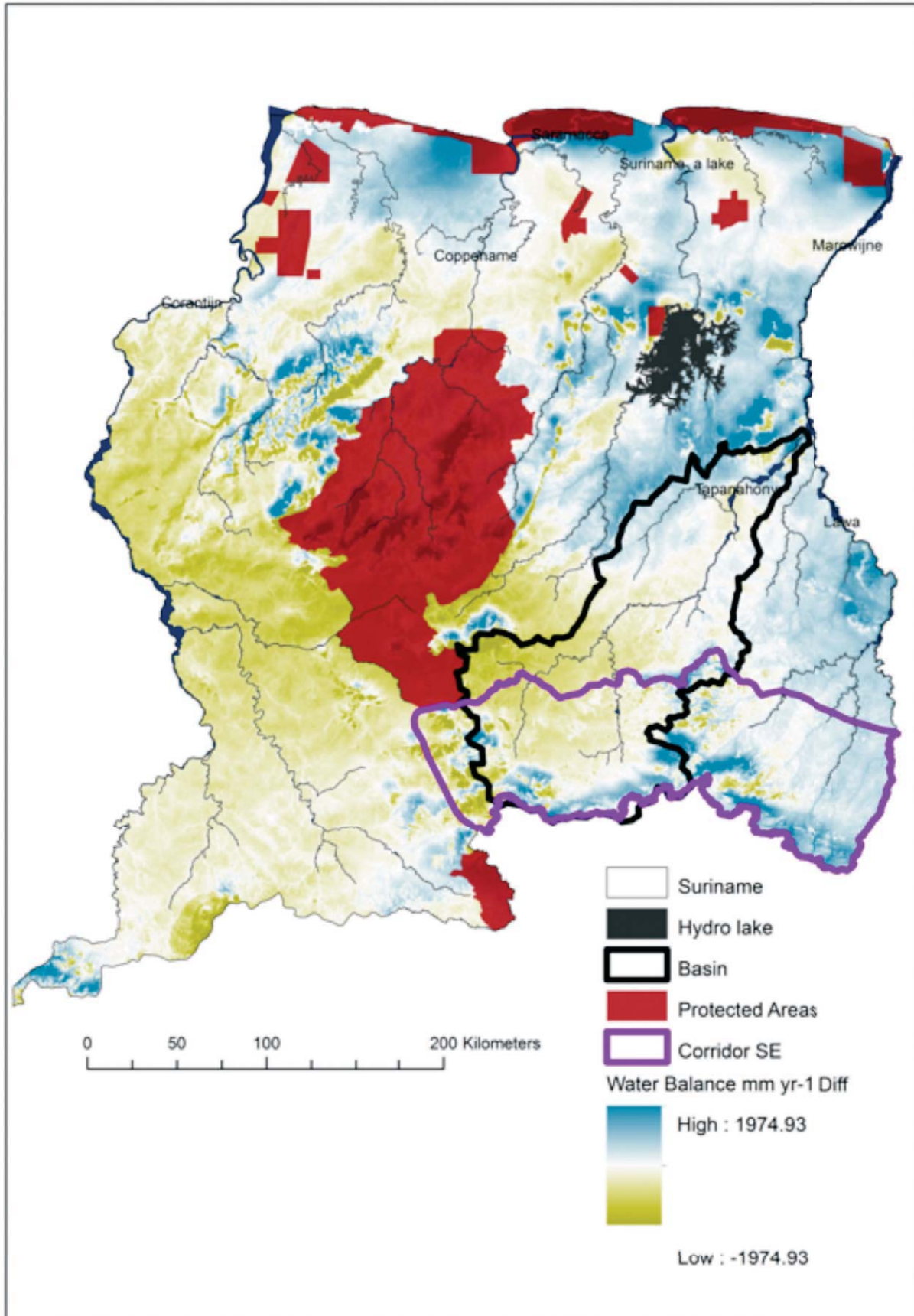


**Map 4.** Natural resource use map demonstrating the importance of ecosystem services for communities in Southeastern Suriname. Colors ranging from green to red illustrate the relative overall value of ecosystem services. Landscape features, such as rivers and mountains, and a diversity of habitat types provide a range of important services people depend upon (orange and red areas). Map by Sara Ramirez.



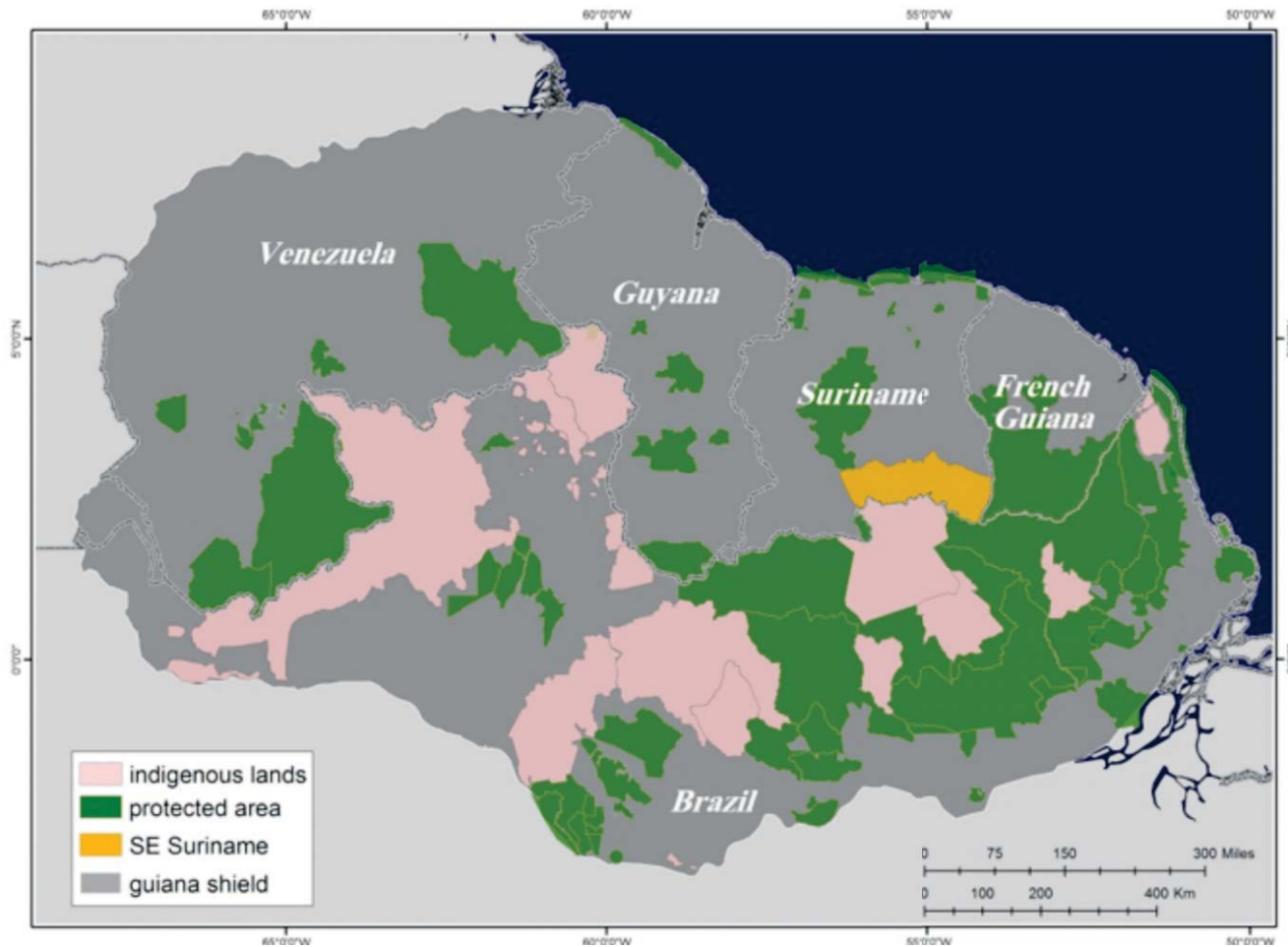


**Map 5.** Predicted impacts of climate change on water resources in Suriname. 1 km change in water yield for Suriname (mm year<sup>-1</sup>) using an average of all climate models for the a2 emissions scenario and using the model FIESTA /WaterWorld (Mulligan 2012; Saenz 2012a). Climate resilience of water resources ranges from low (yellow), especially in western Suriname, to high (blue) in eastern Suriname. Southeastern Suriname, with its multiple mountain ranges, is one of the most climate resilient parts of Suriname and will be disproportionately important for supplying water to the country in the future (Sáenz 2012b) (for list of references, see Chapter 1). Map by L. Saenz.





**Map 6.** Protected areas and indigenous lands of the Guiana Shield. Southeastern Suriname is highlighted in orange, and represents a key wilderness area for connecting and amplifying the effectiveness of neighboring protected areas and indigenous lands. Map by Luis Barbosa (CI-Brazil)



The RAP team at the Juuru Camp along the Upper Palumeu River. (P. Naskrecki)



RAP enthusiasts, from left to right: Trond Larsen (RAP Director), Fabian Oberfeld (RAP supporter), Jeffrey Kapor (RAP supporter), Russ Mittermeier (CI President), Burton Lim (mammalogist), Richard Sneider (RAP supporter), Fred Boltz (formerly CI, now Rockefeller Foundation), Richard Conniff (writer and journalist)





Fabian (game warden), Semmie (tree spotter), and a local guide display several large anyumara fish (*Hoplias aimara*). This is an important food species for local people, and was abundant in the Upper Palumeu where fishing pressure is low. (R. Mittermeier)



The mountains and extensive intact forests of Southeastern Suriname are often shrouded in clouds, and it is one of the wettest areas of the country. (T. Larsen)



The granite outcroppings and mountains of Southern Suriname encompass the headwaters that provide clean freshwater throughout much of Suriname. (R. Mittermeier)



Andrew Short collects several water beetle species new to science on top of a granite rock in the Grensgebergte Mountains. This site contained many species new to science, as well as new and unusual records for Suriname. (T. Larsen)



Sunset over the Palumeu River. (T. Larsen)





The flora and fauna of the Grensgebergte Mountains was very distinct from the surrounding lowlands. Here, a *Clusia grandiflora* fruit lies on a moss-covered liana. (T. Larsen)



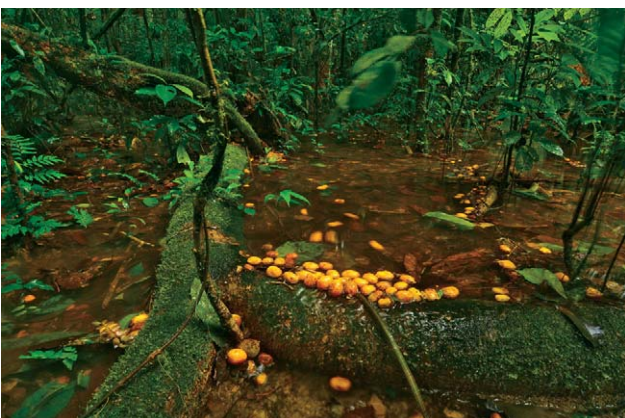
The unusually strong and long-lasting rains caused the Upper Palumeu River to flood its banks, completely inundating our camp, and forcing us to move sooner than planned. (T. Larsen)



The lowland forest near our first basecamp, Juuru Camp, was distinct from the mountains. Understory palms, such as *Geonoma baculifera* (shown here), dominate many parts of the forest, especially in areas prone to flooding. (T. Larsen)



As we hastily packed up our flooded camp, we were forced to travel in boats along the same trails in the forest which we had previously used to hike! (T. Larsen)



As the rains intensified during our visit, *Spandias mombin* fruits are swept across the rapidly flooding forest floor, successfully dispersing their seeds to new locations to grow. (T. Larsen)



Water is a precious resource in Suriname, providing many of the goods and services people throughout the country depend upon, including fish. (B. O'Shea)

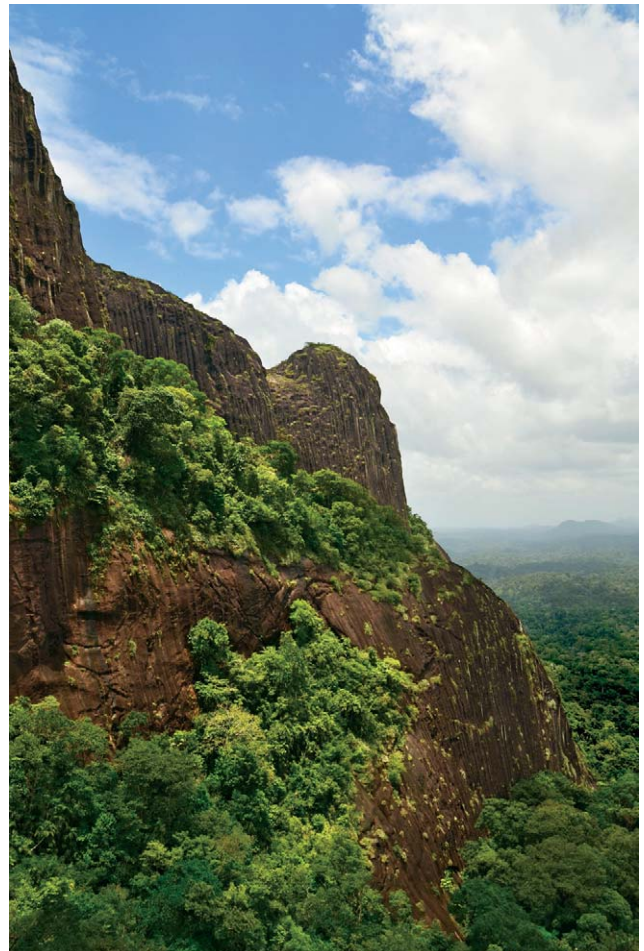




A storm moves over the rapids of the Palumeu River, by the small settlement of Kampu, across from our Kasikasima basecamp. (T. Larsen)



A waterfall near the base of Kasikasima Mountain. (T. Larsen)



View from an outlook of Kasikasima into the lowlands. (T. Larsen)



**SPECIES POTENTIALLY NEW TO SCIENCE**



The RAP team discovered over fifty species that are potentially new to science. This photo shows a new genus of water beetle, discovered on granite seeps. (A. Short)



This species of South American darter (*Characidium* sp.) from the Upper Palumeu River may also be new to science. (S. Raredon)



*Canthidium* cf. *minimum* is a tiny species of dung beetle (<3 mm long) collected in flight intercept traps during this survey that is potentially new to science and may belong in a new genus. (T. Larsen)



A beautiful characin fish with bright red fins (*Bryconops* sp.) that is probably new to science. (P. Naskrecki)



This three-barbeled catfish species (*Pimelodella* sp.) collected during the survey is potentially new to science. (S. Raredon)



This interesting catfish species (*Paratocinclus* sp.), which is potentially new to science, was collected in a tributary of the Upper Palumeu River. It has an unusual pigmentation pattern, similar to *Microglanis* catfish. (S. Raredon)



**ADDITIONAL SPECIES POTENTIALLY NEW TO SCIENCE**



This tetra species (top) which is potentially new to science (*Hyphessobrycon* sp. (heterorhabdus group)) lacks the pigmentation seen in the closely related *Hyphessobrycon heterorhabdus* (bottom), both of which were collected on this survey. (P. Naskrecki)



*Hemigrammus* aff. *ocellifer* is another attractive species of tetra from the survey that may be new to science. It is similar to the head-and-tail light tetra, which is popular in the aquarium trade. (T. Larsen)



The unusual dorsal coloration of this poison dart frog (*Anomaloglossus* sp.) differs from *Anomaloglossus baebatrachus* found at the same sites. It may represent a species new to science, although ongoing molecular work will need to confirm this. (T. Larsen)



This leaf litter frog (*Pristimantis* sp.) may be new to science, and is a member of the most diverse genus of vertebrates in the world. (S. Nielsen)



This sleek, chocolate-colored tree frog (*Hypsiboas* sp.) may be new to science. (P. Naskrecki)

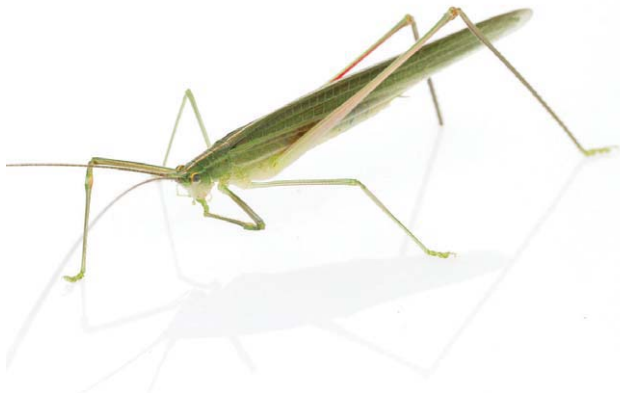


This species of snouted tree frog (*Scinax* sp.) may also be new to science. (S. Nielsen)



**ADDITIONAL SPECIES POTENTIALLY NEW TO SCIENCE**

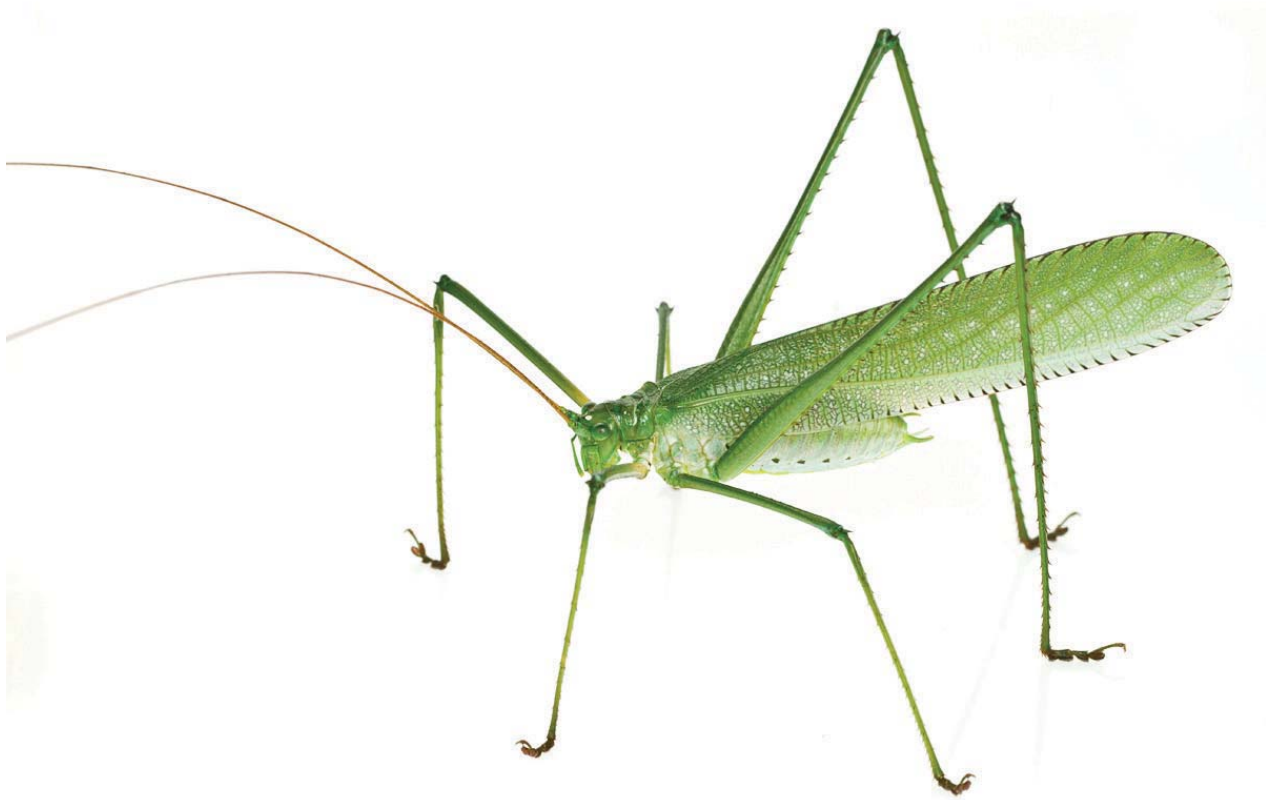
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A genus and species of katydid new to science (Pseudophyllinae: Homalaspidiini n. gen. & n. sp.). (P. Naskrecki)



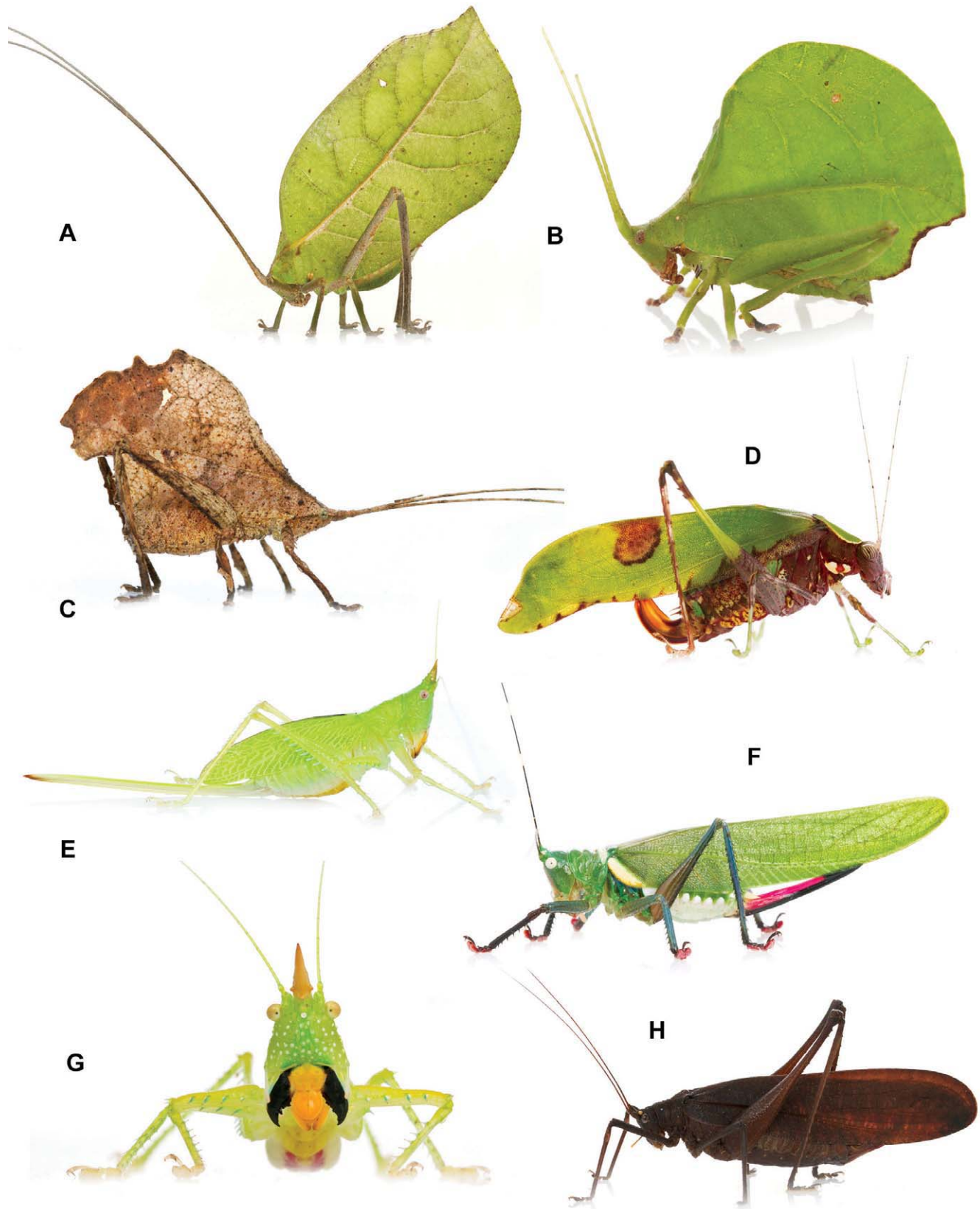
An undescribed katydid species, *Artiotonus* sp. n. (P. Naskrecki)



Another genus and species of katydid new to science (Pseudophyllinae: Teleutini: cf. *Macrochiton* n. gen & n. sp.) (P. Naskrecki)



## ADDITIONAL SPECIES FROM THE RAP SURVEY



Representatives of katydid species recorded during the survey: (A) *Cycloptera speculata*; (B) *Roxelana crassicornis*; (C) *Typophyllum* sp. 1; (D) *Hetaira smaragdina*; (E) *Copiphora* sp. n.; (F) *Monchecha bisulca*; (G) *Copiphora longicauda*; (H) *Chondrosternum triste*. *Copiphora* sp. n. is a species new to science. (P. Naskrecki)





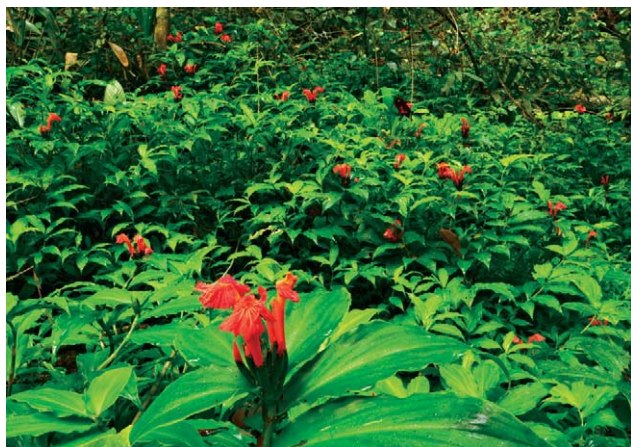
This orchid (*Epidendrum nocturnum*) was common on the granite outcroppings of Grensgebergte and Kasikasima. (P. Naskrecki)



*Clusia flavida*, a new tree species record for Suriname, found in the Grensgebergte Mountains. (C. Bihiki)



Another orchid found on top of the Grensgebergte mountain (*Phragmipedium lindleyanum*) is rare in Suriname. (T. Larsen)



This herb species with showy red flowers (*Costus lanceolatus* subsp. *pulchriflorus*) appears rare and localized in Suriname, and specimens from this survey represent only the fourth collection for Suriname at the National Herbarium of the Netherlands. (T. Larsen)



This survey provides the first species record for *Hirtella duckei* in Suriname. Tiny ants (*Allomerus* sp.) live in symbiosis with this plant. The plant provides shelter and food, while the ants protect the plant from herbivores. (T. Larsen)





The purpleheart tree (*Peltogyne venosa*) forms massive buttress roots which provide support. (T. Larsen)



*Oxyterson festivum* is a brightly colored diurnal dung beetle. These large, powerful beetles are important for burying dung, which helps to disperse seeds and regulate parasites. Males use their horn to battle with other males over mates. (T. Larsen)



Juvenile hopper. (T. Larsen)



Ants are important scavengers, and can be seen here (*Camponotus* sp.) eating a dead insect. (T. Larsen)



Trap-jaw ants (*Odontomachus hastatus*) swiftly snap their mandibles shut to capture prey. They have the fastest moving predatory appendages of any animal. (T. Larsen)





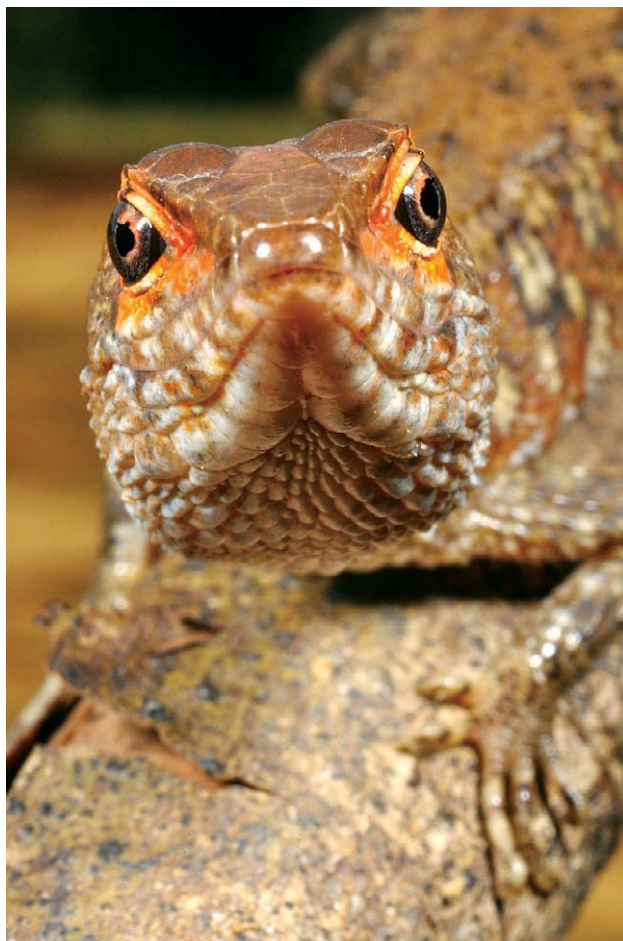
*Rhinatremas bivittata* is a caecilian, an unusual group of primitive, limbless amphibians, most of which live underground and are rarely encountered. (S. Nielsen)



This dwarf gecko (*Gonatodes annularis*) lives in moist primary forest and can be considered a good indicator of forest health. (S. Nielsen)



The worm lizard (*Amphisbaena vanzolinii*) is another rarely encountered species, probably due to its underground lifestyle. (S. Nielsen)



*Neusticurus bicarinatus* is a semi-aquatic lizard found in small pools and streams in the area, and is an excellent underwater swimmer. (S. Nielsen)



The bright colors of the false coral snake (*Erythrolamprus aesculpi*) lend it protection from predators, even though it lacks the deadly venom of the true coral snake. (P. Naskrecki)





The charismatic tiger leg monkey frog (*Phyllomedusa tomopterna*) is indicative of pristine forest habitat. (S. Nielsen)



*Dendrobates tinctorius* is a very large poison dart frog, and different populations exhibit highly distinct color patterns. (T. Larsen)



*Amereega trivitatta* is a poison dart frog that advertises its toxicity with bright coloration. (T. Larsen)



A pair of tree toads (*Amazophrynella minuta*) in amplexus. As in other frogs and toads, the eggs are fertilized externally. (T. Larsen)

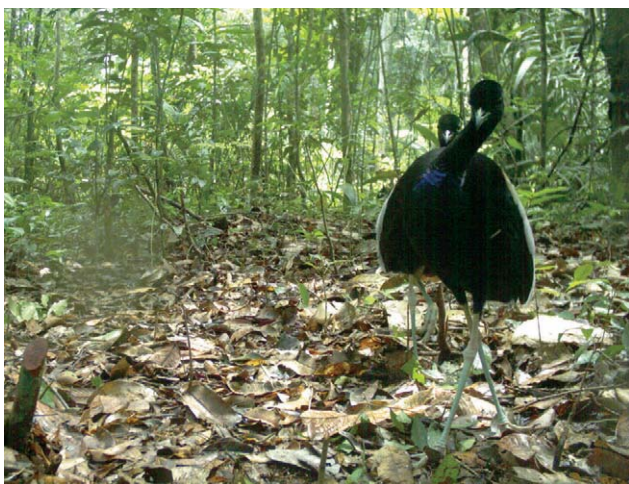


However, the defense of *Amereega trivitatta* is not always successful. Here, a wolf spider feeds on a young individual. (T. Larsen)





Ornithologist Serano Ramcharan holds a juvenile Dusky Parrot (*Pionus fuscus*). The RAP team rescued the juvenile from the river where it had fallen in. After a thorough drying and a few meals in camp, the parrot was able to fly back to the treetops on its own. (T. Larsen)



Camera traps photographed a pair of Gray-winged Trumpeters (*Psophia crepitans*). They are social birds that eat insects and fruit from the forest floor, but also hunt snakes. (K. Gajapersad)



The Black-headed Antbird (*Percnostola rufifrons*) that occurs along the Guiana Shield represents a taxon endemic to the region. (B. O'Shea)



The White-fronted Manakin (*Lepidothrix serena*) is endemic to the Guiana Shield. (B. O'Shea)



The Sooty-capped Hermit (*Phaethornis augusti*) was relatively common in savanna forest and open scrub on top of the Grensgebergte Mountain, but represents an important new record, since this species was previously known in Suriname only from the Sipaliwini savanna. (B. O'Shea)





The White-throated Round-eared Bat (*Lophostoma silvicolum*) is an unusual bat with enormous ears. The species is known to roost inside termite nests. (B. Lim)



The water rat (*Nectomys rattus*) is an unusual and uncommon species which we found only on the Grensgebergte mountaintop. This is a water-adapted species with webbing on its hindfeet. All individuals were caught around ephemeral water sources. (T. Larsen)



The Larger Fruit-eating Bat (*Artibeus planirostris*) was the most abundant bat during the survey. With their sharp teeth, they are capable of grabbing and eating large fruits. (B. Lim)



The bird team spotted this margay (*Leopardus wiedii*) right before dawn, perched on a nearby tree branch. This small, rarely seen cat is one of only two species in the world capable of climbing head-first down trees (the other being the Clouded Leopard). (B. O'Shea)



The Delicate Slender Opossum (*Marmosops parvidens*) is an arboreal species indicative of primary forests, and eats insects and fruit. (P. Naskrecki)



A margay curiously inspects a camera trap. (K. Gajapersad)





An Ocelot (*Leopardus pardalis*), photographed by a camera trap near the caves at the base of Kasikasima. (K. Gajapersad)



Camera traps photographed two species of deer, the Red Brocket Deer (*Mazama americana*) (shown here) and Grey Brocket Deer (*Mazama gouazoubira*). Deer are an important source of food for indigenous people. (K. Gajapersad)



The Puma (*Puma concolor*), photographed by a camera trap, is a large cat, capable of eating prey such as deer. (K. Gajapersad)



Two species of armadillo, the Great Long-nosed Armadillo (*Dasypus kappleri*) (shown here) and the Nine-banded Armadillo (*Dasypus novemcinctus*) were photographed by camera traps. (K. Gajapersad)



The Red-rumped Agouti (*Dasyprocta leporina*) is a large rodent that is common in the area, and is important for dispersing large seeds, which it caches underground and often forgets. (K. Gajapersad)