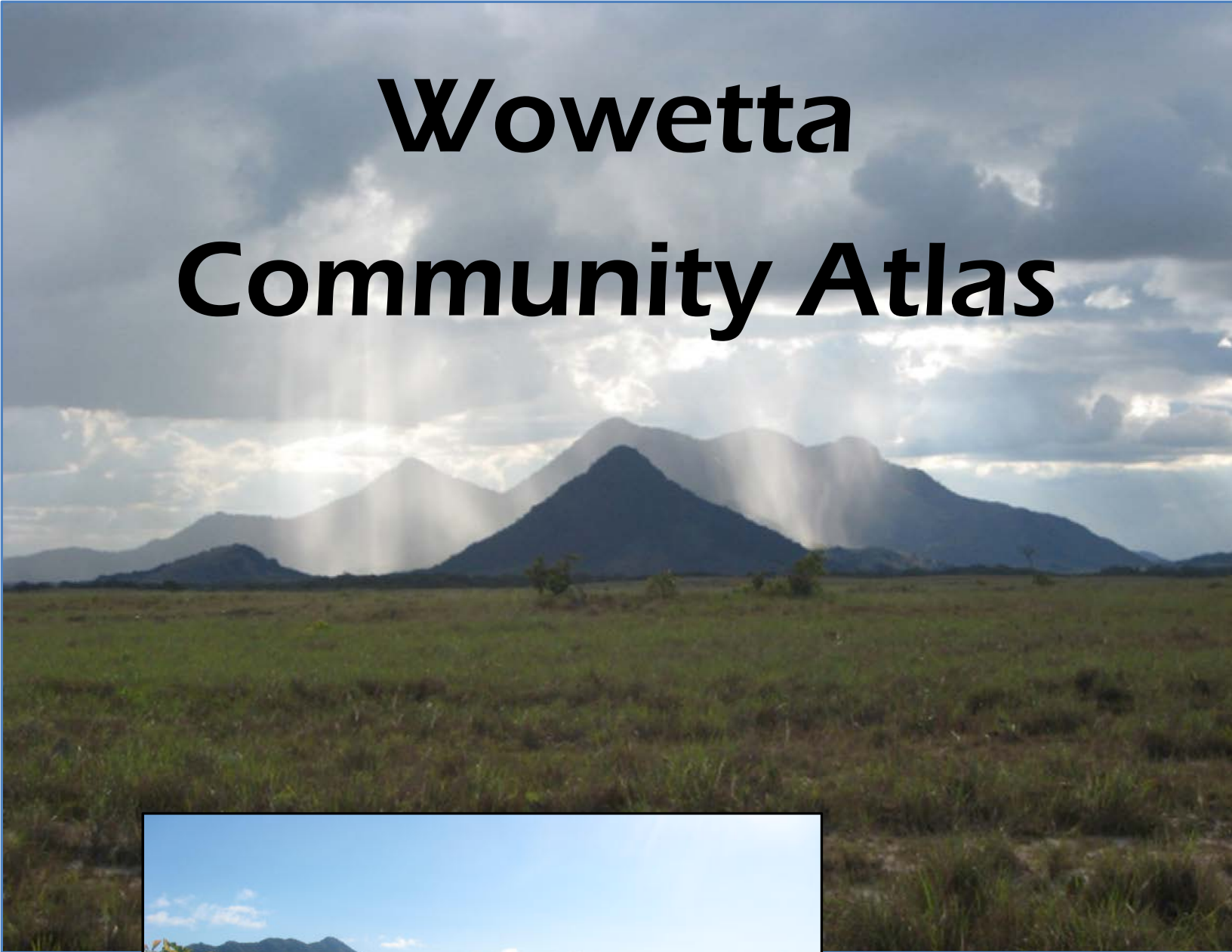


# **Wowetta Community Atlas**



**Rupununi  
Guyana**

**Project Fauna  
January 2013**



Atlas credits: Jane M. Read, Syracuse University; Jose M.V. Fragoso and Jeffrey Luzar, Stanford University; Han Overman, State University of New York – ESF.

Layout, design, and maps: Paul G. Kloster and Philip G. Curtis.

Photo credits: Jose M.V. Fragoso , Jeffrey Luzar, Jane M. Read, Sean Giery, Maayan Gadisman, Anthony Cummings

Based on data gathered by Project Fauna from 2007-2010. Images based on Landsat Thematic Mapper scenes acquired 1<sup>st</sup> October 2005 combined with Aster GDEM elevation data (ASTER GDEM is a product of METI and NASA).

Project Fauna is the field name for U.S. National Science Foundation award DEB 0508094 (2005-2011)  
“Biodiversity dynamics and land-use changes in the Amazon: multi-scale interactions between ecological systems and resource-use decisions by indigenous peoples”, directed by Principal Investigator Jose M. V. Fragoso.

This atlas was created in the Integrated Spatial Dynamics (ISD) Laboratory, Dept. Geography, Syracuse University, Syracuse, NY, USA.

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## Acknowledgments

This atlas was created by Project Fauna as part of U.S. National Science Foundation-funded research to investigate biodiversity dynamics and cultural practices by the indigenous peoples of the Rupununi. It provides a summary of the major datasets that we created using data gathered in the field from 2007-2010 at 23 study communities, focusing on information that can be of immediate use by the communities.

Project Fauna gratefully acknowledges the Wowetta and Iwokrama Control para-biologists and para-anthropologists Danford Moses, Marcus Moses, Persaud Moses, Fonso Francis and Urbie Francis along with their substitutes who included Bruce Moses, Deolal Moses, Ernie Moses, Orin Francis, Roy Benjamin, Jessie Domingo and Silas Moses for their dedicated service to their community and this project. Without their hard work and dedication, as well as the logistical and technical assistance of the community leaders, the study and this atlas would not have been possible. In Guyana, William Andries, Mike Williams, Sydney Allicock, Emily Allicock, Bryan Allicock, Kid James, Nick Fredericks and Wilson Laurantino, among others, provided strong moral and logistical support for all our efforts and we thank them for their commitment to the project. We also thank the North Rupununi District Development Board, the Bina Hill Institute, the South Central and Deep South District Toshias' Councils. Thanks also to David Singh of Conservation International-Guyana; Raquel Thomas, Dane Gobin and other members of the Iwokrama International Centre; the Guyana Environmental Protection Agency; the Regional Democratic Council of Region 9 (RDC); and the Ministry of Amerindian Affairs for supporting the project, and the latter two for permitting the work. A special thanks to Shirley Melville for her friendship and support, and to Duane de Freitas of Dadanawa Ranch. We are grateful for the help of a number of volunteers throughout this effort.

A week-long conversation between José Fragoso and Jacir de Souza during a visit to Jacir's community of Maturuca, in Roraima, Brazil, inspired the quest to understand the relationship between indigenous culture and the environment that ultimately gave rise to this project. We thank all the Macuxi, Wapishana and Wai Wai leaders in Brazil who supported the initial development of the project, especially Marinaldo Trajano, Joênia Batista de Carvalho, and Jacir José de Souza.

## Contents

Location of the research

The research design

Rupununi vegetation, topography and socioeconomic information

Wowetta community

Transects

Hunting

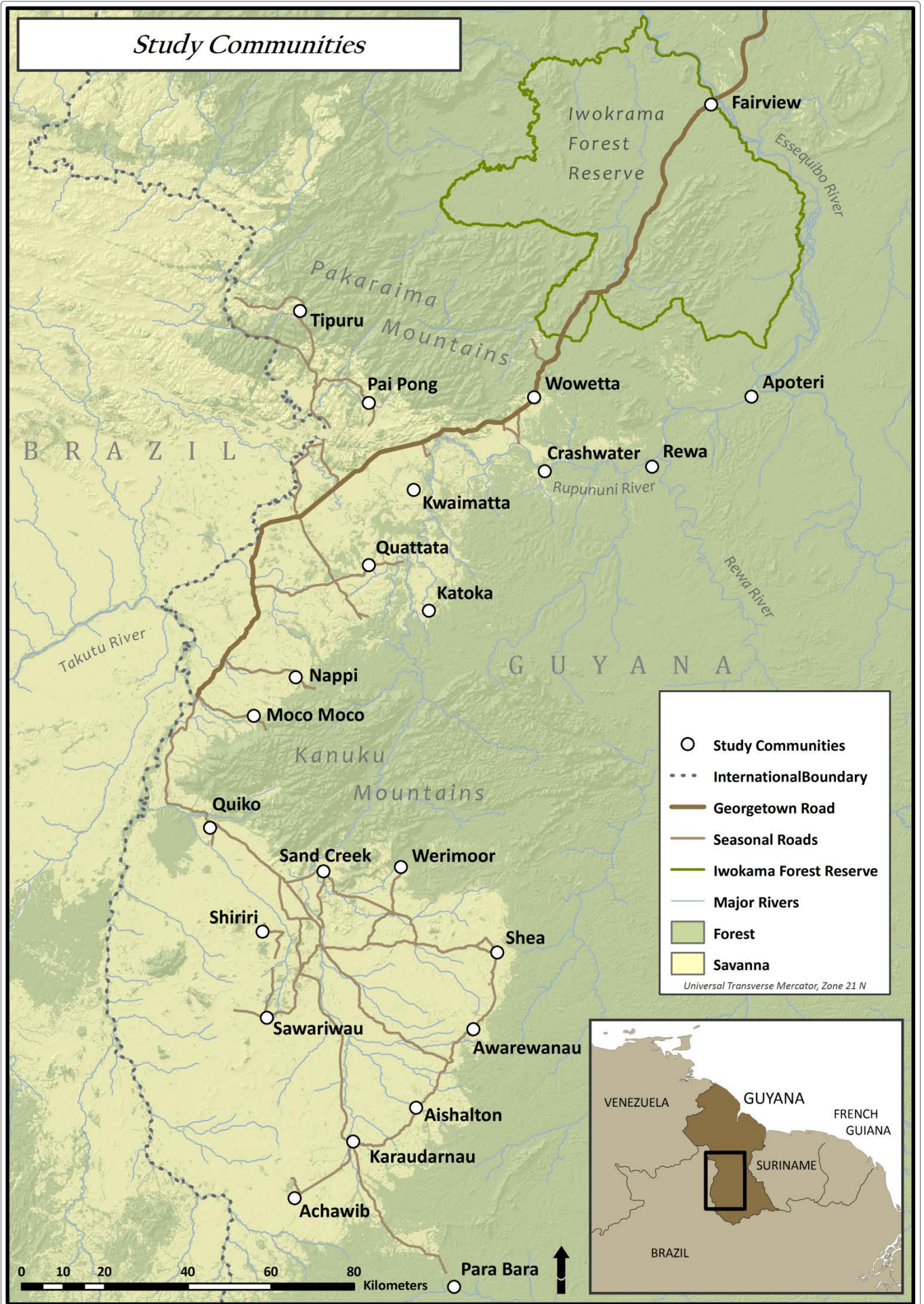
Socioeconomic data summaries

Total carbon per transect

Fruiting trees



# Study Communities



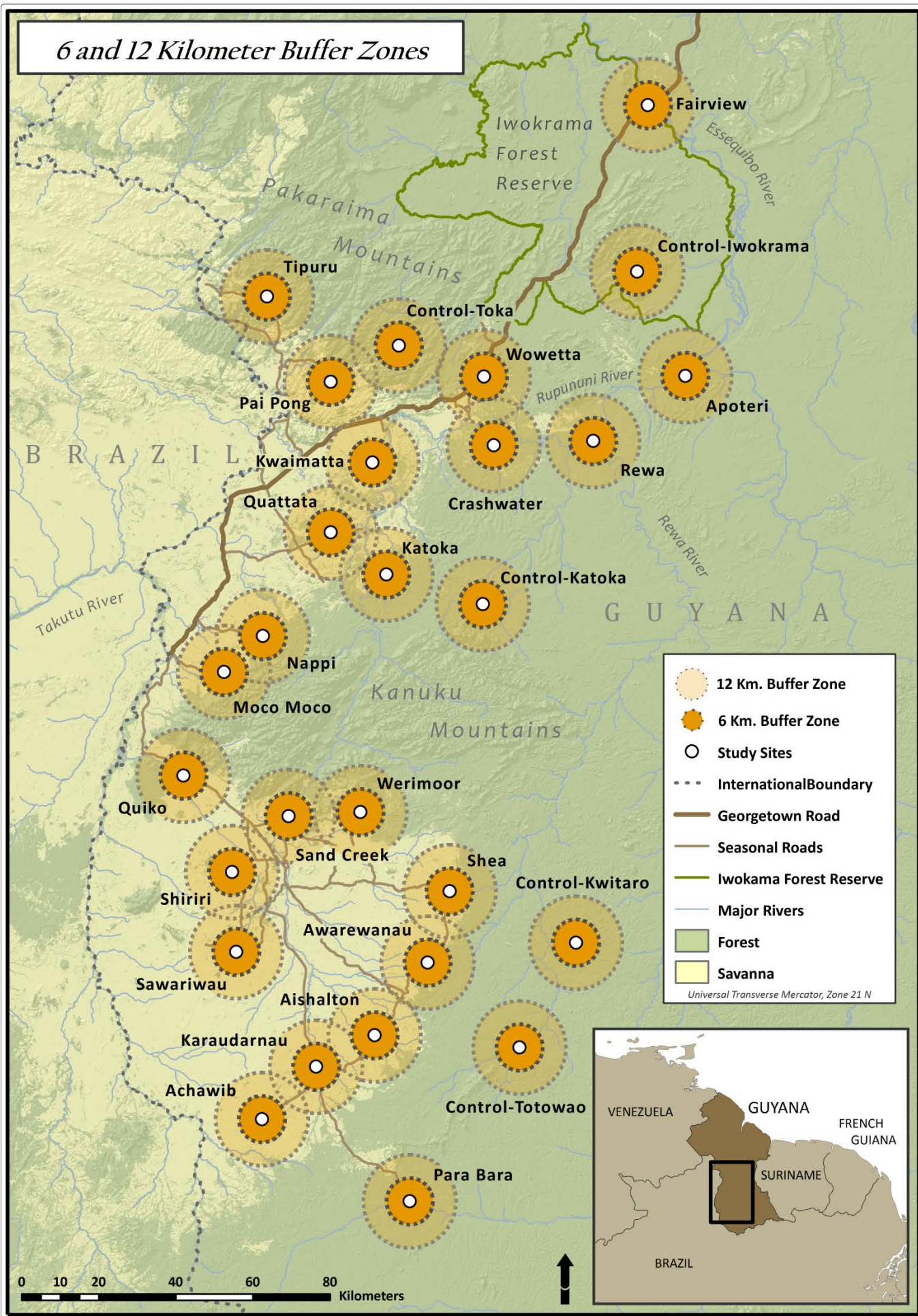
## **The Research Design**

Project Fauna focused on 23 communities and five control sites throughout the Rupununi. The communities were selected based on their distribution in the study area, their representative location with respect to vegetation type and topographic characteristics, proximity to other communities, and willingness of the community members to participate in the project.

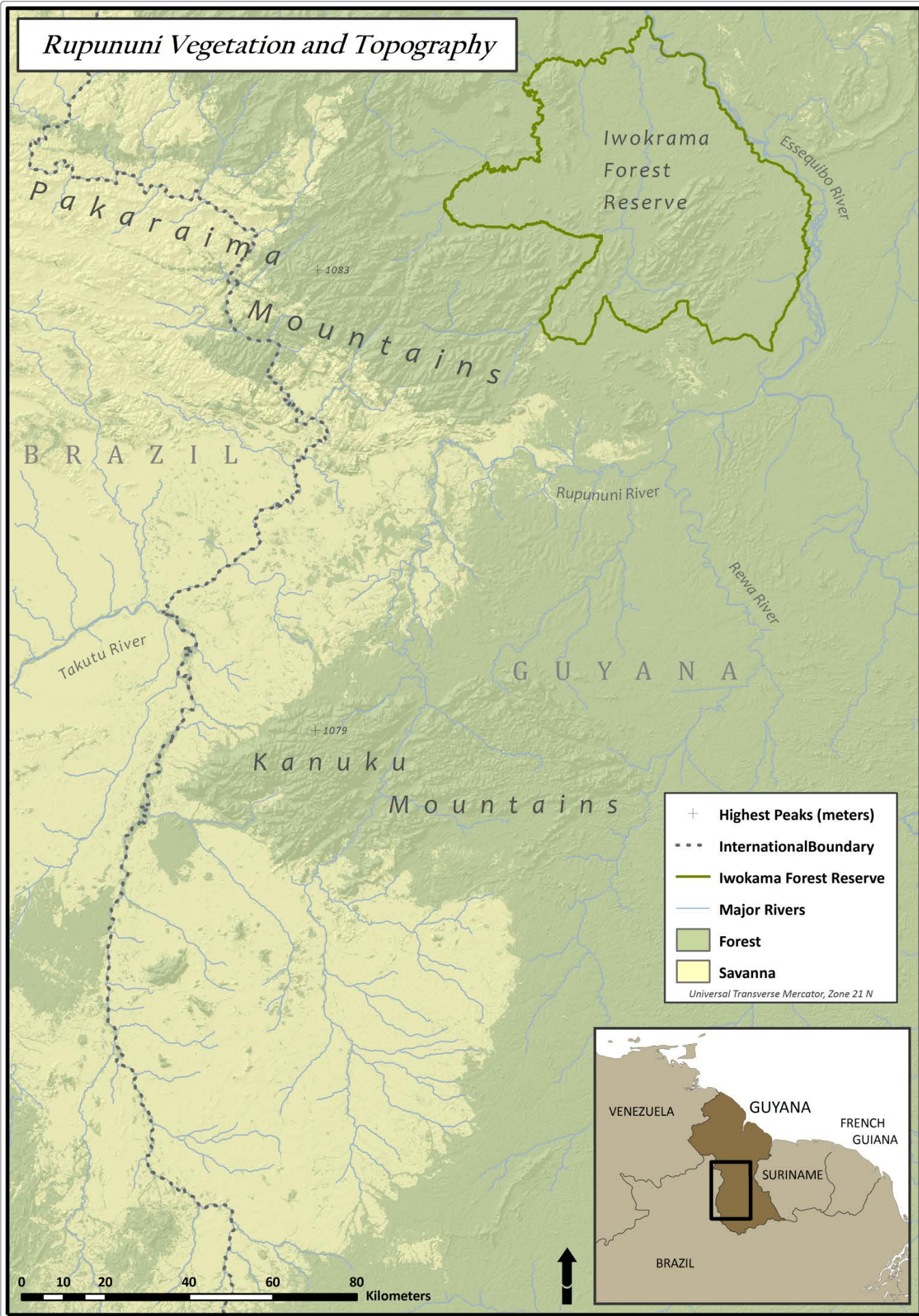
Eight transects were opened around each study site. At each site, four transects were opened within a 6km radius ('near') from the center of the site, and four within a 6-12km radius ('far') of the center. The map opposite shows the locations of the 6 and 12km buffers around the study sites. This design allows us to determine whether the number of animals changes with distance from the community.

Within each buffer, the starting location of each transect (start coordinates and bearing) was determined randomly, from which trained field technicians from the communities used global positioning system (GPS) units, compasses, and tape measures to cut 4km-long straight transects. In the case of meeting impassable obstructions (cliffs, rivers), the technicians followed rules for turning and continuing the transects until they reached 4km in length.

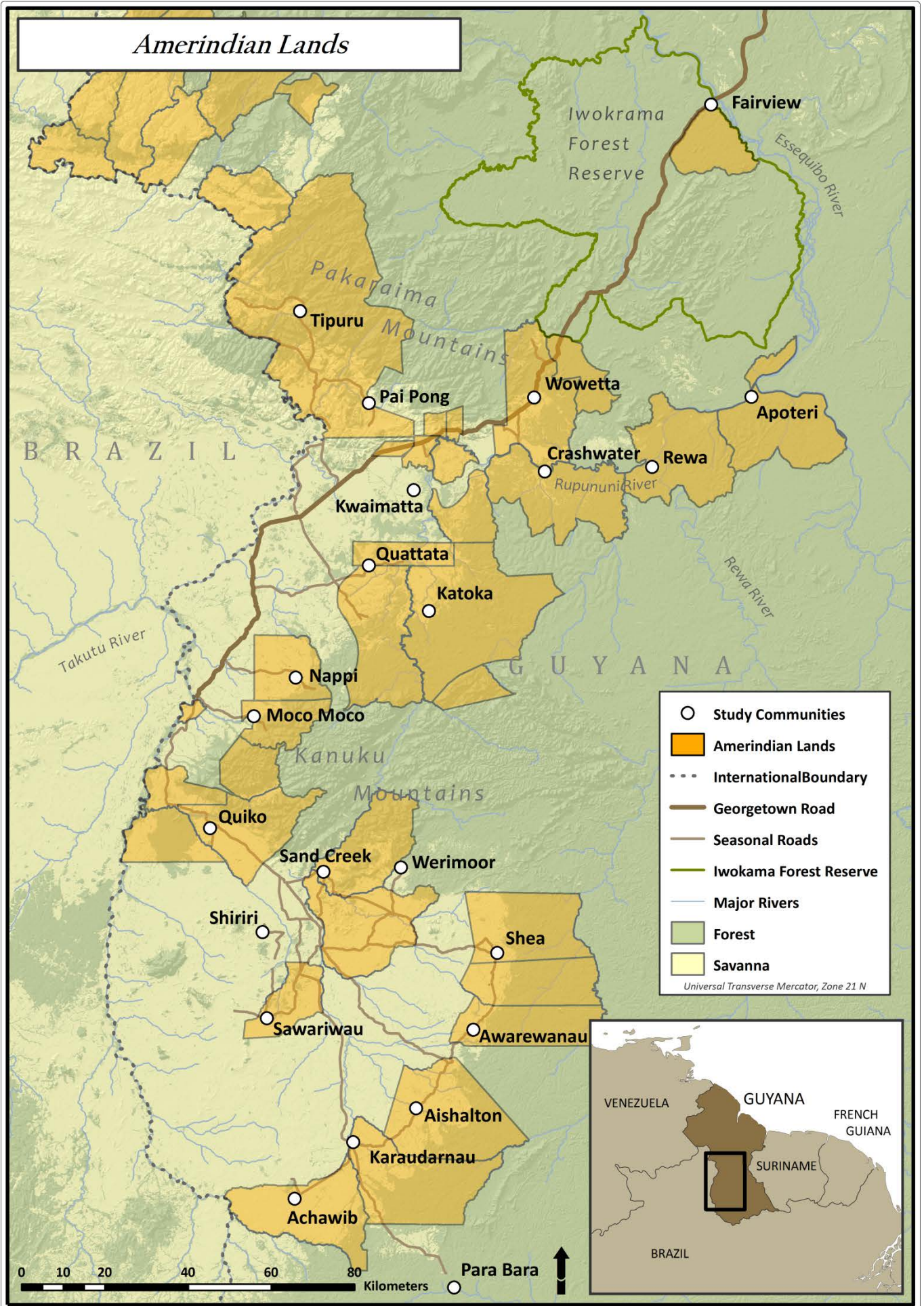
# 6 and 12 Kilometer Buffer Zones



## Rupununi Vegetation and Topography



# Amerindian Lands



| Community        | Village Population | Distance from Village to Gtown Road (km) |
|------------------|--------------------|------------------------------------------|
| Achawib          | 620                | 122.5                                    |
| Aishalton        | 1076               | 111.8                                    |
| Apoteri          | 311                | 41.9                                     |
| Awarewanau       | 621                | 103.9                                    |
| Crashwater       | 191                | 15.3                                     |
| Fairview         | 197                | 0.1                                      |
| Karaudarnau      | 1053               | 113.1                                    |
| Katoka           | 649                | 37.0                                     |
| Kwaimatta        | 122                | 10.7                                     |
| Moco Moco        | 393                | 13.5                                     |
| Nappi            | 578                | 15.7                                     |
| Pai Pong         | 494                | 12.1                                     |
| Para Bara        | 147                | 154.4                                    |
| Quattata         | 212                | 19.5                                     |
| Quiko            | 428                | 31.8                                     |
| Rewa             | 245                | 32.8                                     |
| Sand Creek       | 649                | 51.9                                     |
| Sawariwau        | 453                | 78.9                                     |
| Shea & Marurunau | 1192               | 94.8                                     |
| Shiriri          | 68                 | 58.6                                     |
| Tipuru           | 193                | 38.8                                     |
| Werimoor         | 323                | 63.9                                     |
| Wowetta          | 199                | 0.0                                      |

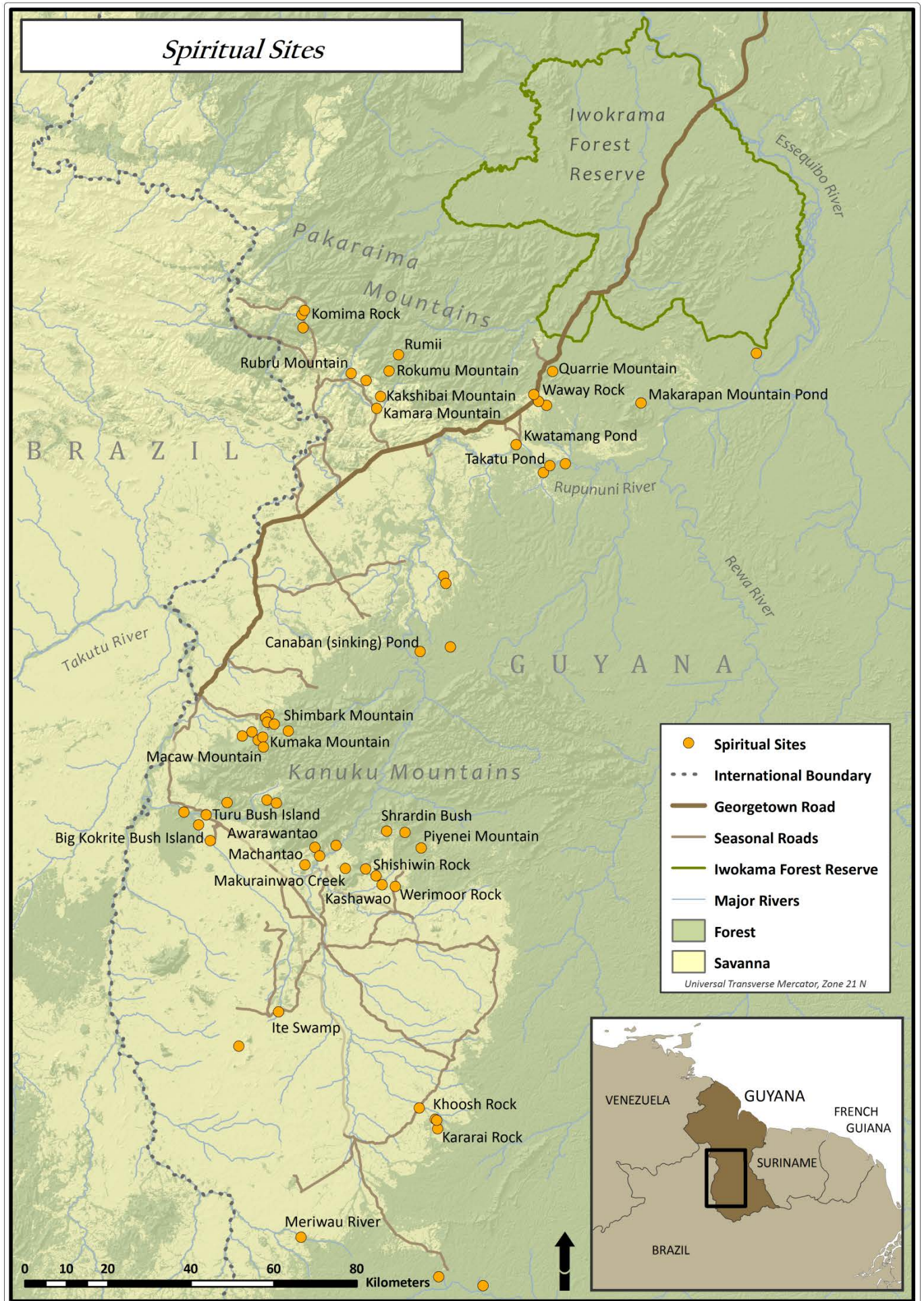
## Spiritual Sites

The map of spiritual sites on the opposite page shows locations of sites identified by community members as having special meaning.

Data were gathered by local technicians or the project anthropologist through one-time surveys with the principal hunters of each community (as identified by the community leaders and/or hunting return surveys). Questions were asked about places that hunters avoided or in which they had to use extra caution. In addition, interviews were conducted with knowledgeable members of each community including the elderly, *toshao* (community leader), and/or *piaiman* (shaman) about places generally known to be sacred and/or dangerous.

Details and locations of sites were determined and mapped based on information gathered from the surveys and interviews, as well as from supplementary information provided by project technicians. Locations of sites were marked on topographic or hardcopy satellite images and later digitized and stored in GIS (geographic information system) format as points.

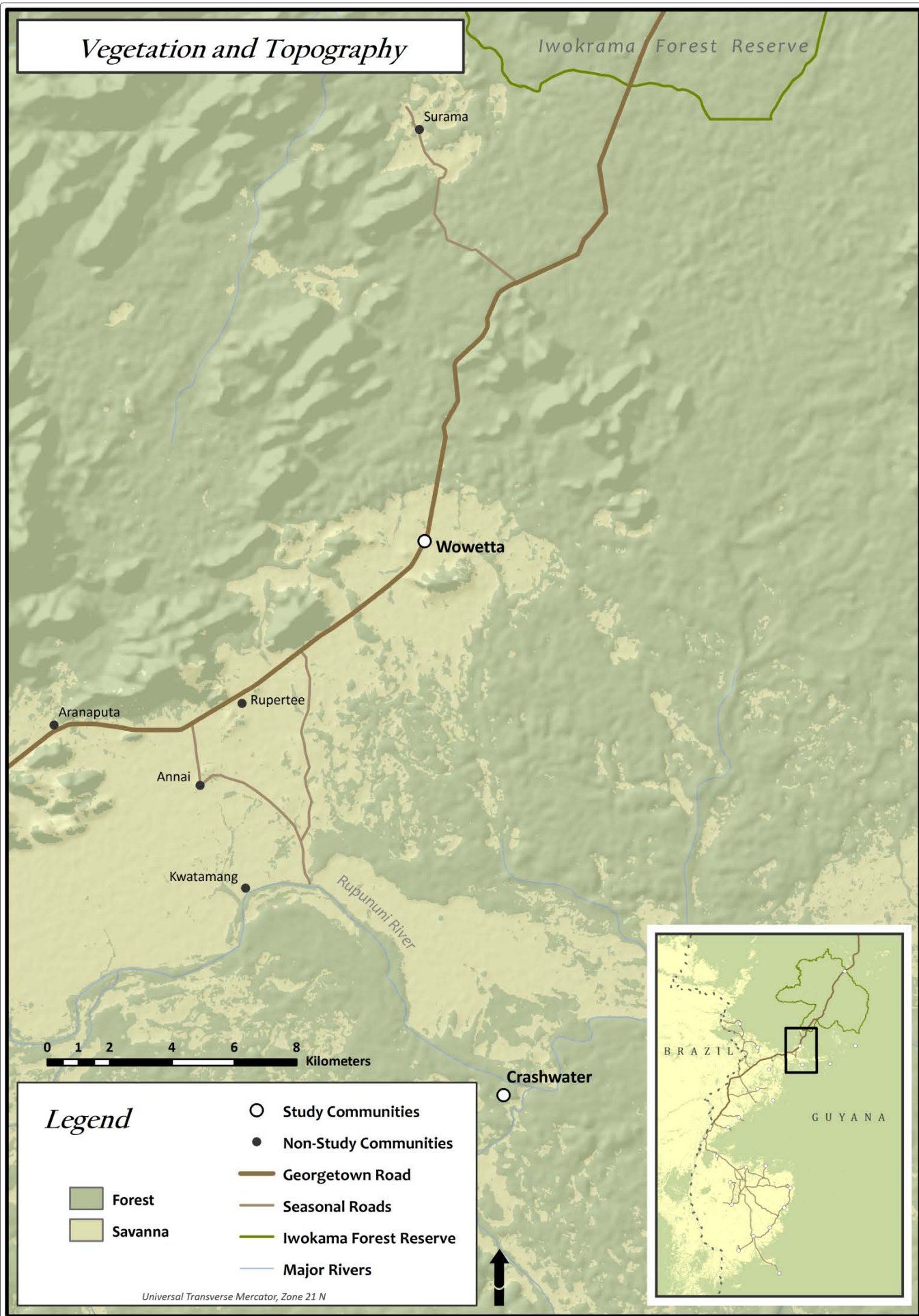
# Spiritual Sites



# Wowetta



# Vegetation and Topography



# Community Buffers and Transects

Iwokrama Forest Reserve

Surama

Wowetta

WOW1

WOW2

WOW3

WOW4

WOW5

WOW6

WOW8

WOW7

Aranaputa

Rupertee

Annai

Kwatamang

Rupununi River

Crashwater

0 1 2 4 6 8 Kilometers

## Legend

12 Km. Buffer Zone

6 Km. Buffer Zone

Forest

Savanna

Major Rivers

Study Communities

Non-Study Communities

Transect

Georgetown Road

Seasonal Roads

Iwokrama Forest Reserve

Universal Transverse Mercator, Zone 21 N



## Vegetation

We calculated forest and savannah cover for Annai district's entire current (2011) titled area. 48716 ha of these lands were forested and 13274 ha in savanna in October 2005 (based on classified Landsat-TM data).

## Transects

| Transect ID | Near/Far Buffer | Start X-coordinate (UTM m) | Start Y-coordinate (UTM m) | End X-coordinate (UTM m) | End y-coordinate (UTM m) | Azimuth* | Compass Bearing* | Length (m) |
|-------------|-----------------|----------------------------|----------------------------|--------------------------|--------------------------|----------|------------------|------------|
| WOW1        | Far             | 280478                     | 447771                     | 276796                   | 446208                   | 247      | 262              | 4000       |
| WOW2        | Far             | 279992                     | 444630                     | 276494                   | 442691                   | 241      | 256              | 4000       |
| WOW3        | Far             | 279850                     | 440267                     | 276225                   | 438577                   | 245      | 260              | 4000       |
| WOW4        | Far             | 283295                     | 445871                     | 282669                   | 441920                   | 189      | 204              | 4000       |
| WOW5        | Near            | 266119                     | 448429                     | 269773                   | 450056                   | 66       | 81               | 4000       |
| WOW6        | Near            | 272405                     | 445366                     | 273100                   | 449305                   | 10       | 25               | 4000       |
| WOW7        | Near            | 272151                     | 442361                     | 271525                   | 438410                   | 189      | 204              | 4000       |
| WOW8        | Near            | 269101                     | 443933                     | 265367                   | 445366                   | 291      | 306              | 4000       |

\* Azimuth = bearing from true North in degrees; Compass = bearing from magnetic North in degrees (magnetic declination = 15 degrees).

Transects were walked by two field technicians twice a month. On the first pass each month, the technicians recorded data on animal sightings. On the second pass, they recorded information on animal signs as well as fruits. For the majority of transects, we obtained two years, and in many cases three years, of data. Analysis of these datasets is ongoing and not yet completed, and so we do not present summaries here. These will be made available at a later date.

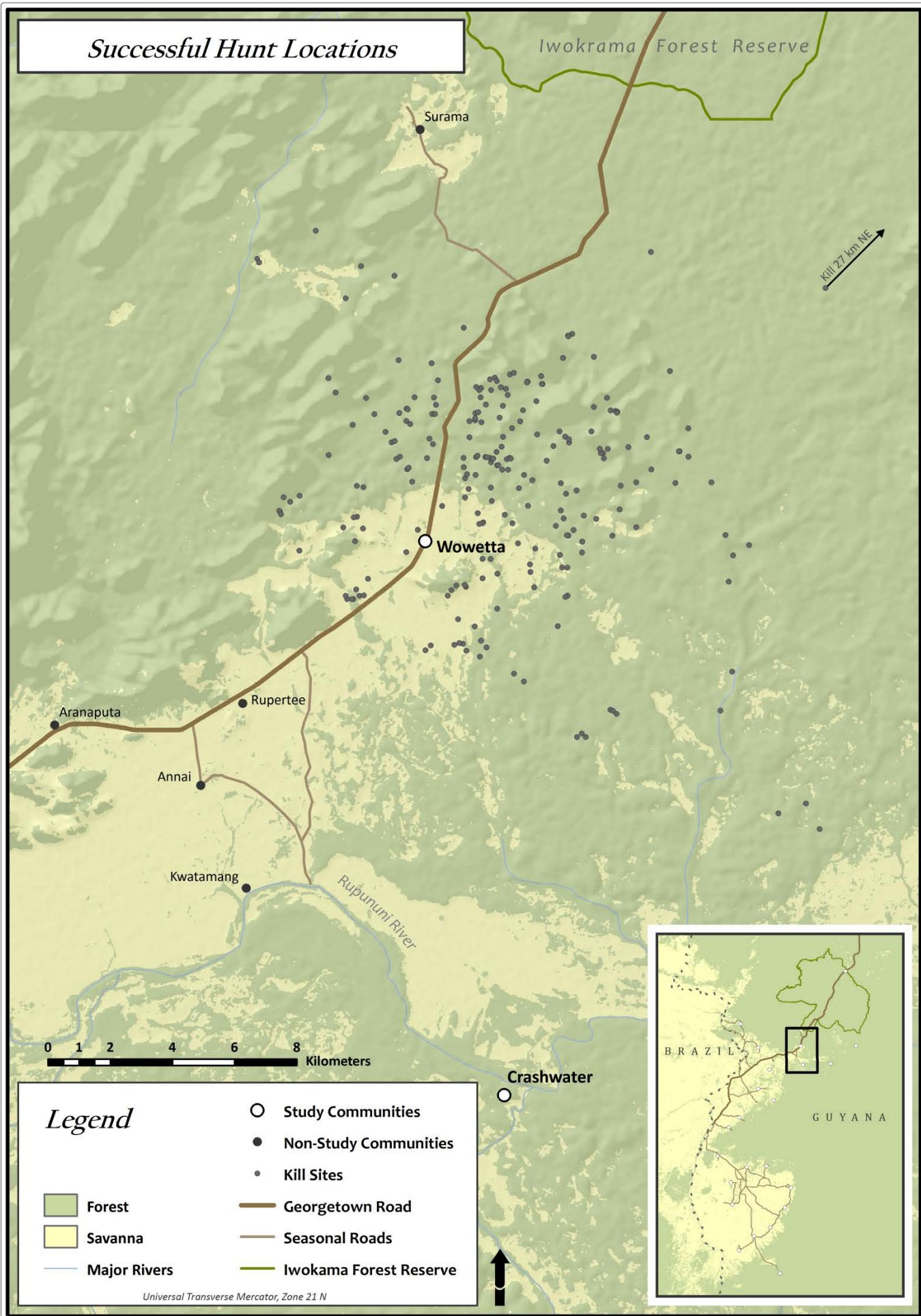
## Hunting

Surveys on hunting activities were administered to every household in each study community by field technicians who were residents of each community. The surveys were conducted weekly to ensure that hunters did not have to remember details of their hunting activities over long periods of time. The hunters were asked to mark an 'X' of the location of the kill on a hardcopy topographic map (1:50,000) or printed Landsat-TM satellite image centered on their community. Locations of hunt kill sites were digitized and stored in GIS format. The map opposite shows the locations of all reported kill sites.

The species maps on the following pages show the kill locations of the top five most frequently killed species for the community. They also show the directional ellipses for each species. The directional ellipse shows the mean center (the central point around which successful hunts for a species were concentrated) and directional trend of a community's hunting activity for that species. The mean center can be compared with the location of the community center in terms of distance away and direction from the center. In addition, the shape and size of the ellipse adds information about the spread of distribution of kill sites. Directional ellipses were mapped using 1 standard deviation (representing 68% of the points) from the mean center in the x- and y-directions (east to west and north to south) to define the axes of the ellipse.

Hunting returns and household surveys were conducted in Wowetta village only.

## Successful Hunt Locations



# White-Lipped Peccary Kill Distribution

Iwokrama Forest Reserve

Surama

Wowetta

Aranaputa

Rupertee

Annai

Kwatamang

Rupununi River

Crashwater

0 1 2 4 6 8 Kilometers

## Legend

Directional Ellipse

Forest

Savanna

Major Rivers

○ Study Communities

● Non-Study Communities

○ Kill Sites

Georgetown Road

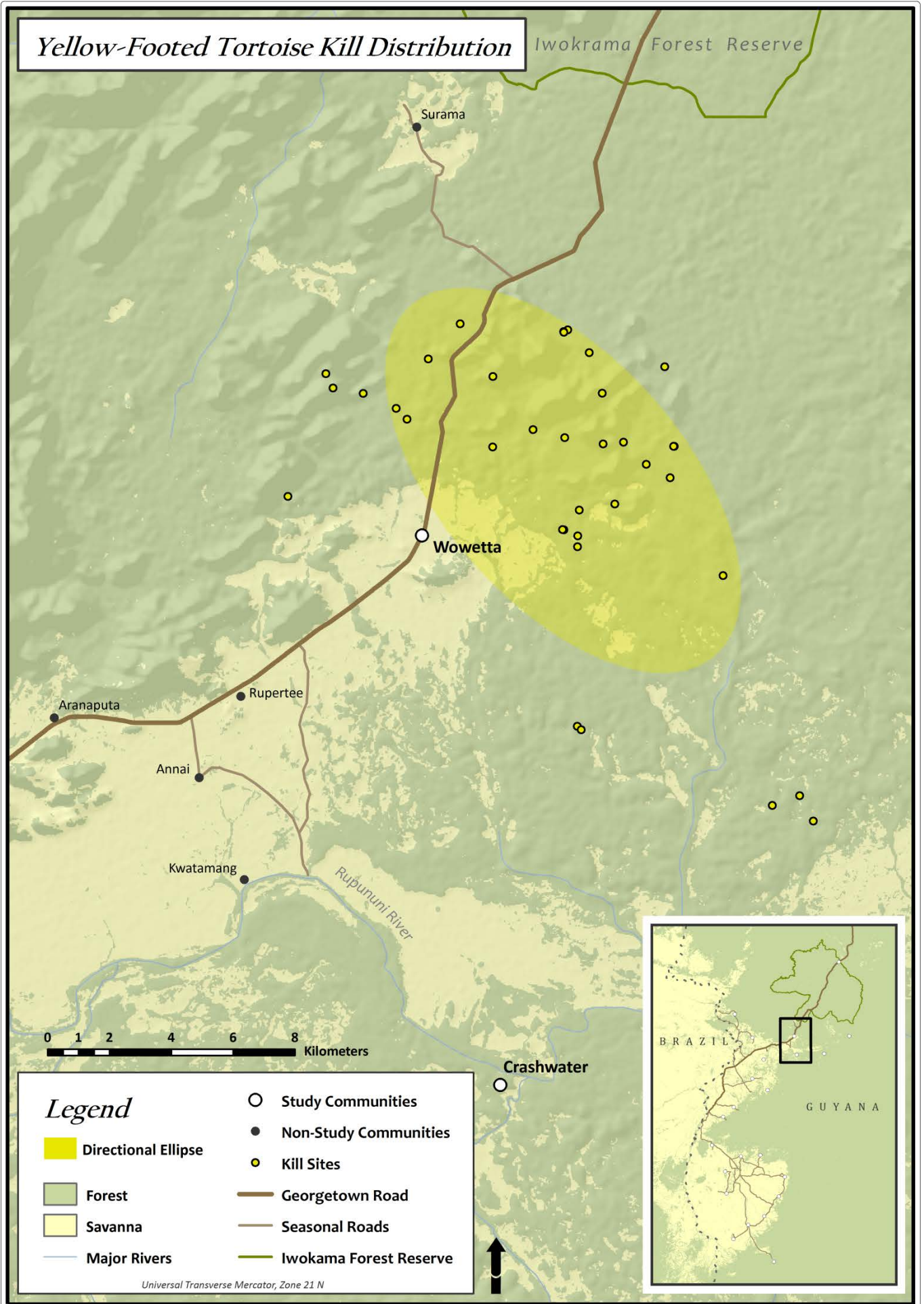
Seasonal Roads

Iwokrama Forest Reserve

Universal Transverse Mercator, Zone 21 N



# Yellow-Footed Tortoise Kill Distribution



# Agouti Kill Distribution

Iwokrama Forest Reserve

Surama

Wowetta

Aranaputa

Rupertee

Annai

Kwatamang

Rupununi River

Crashwater

0 1 2 4 6 8 Kilometers

## Legend

Directional Ellipse

Forest

Savanna

Major Rivers

○ Study Communities

● Non-Study Communities

● Kill Sites

Georgetown Road

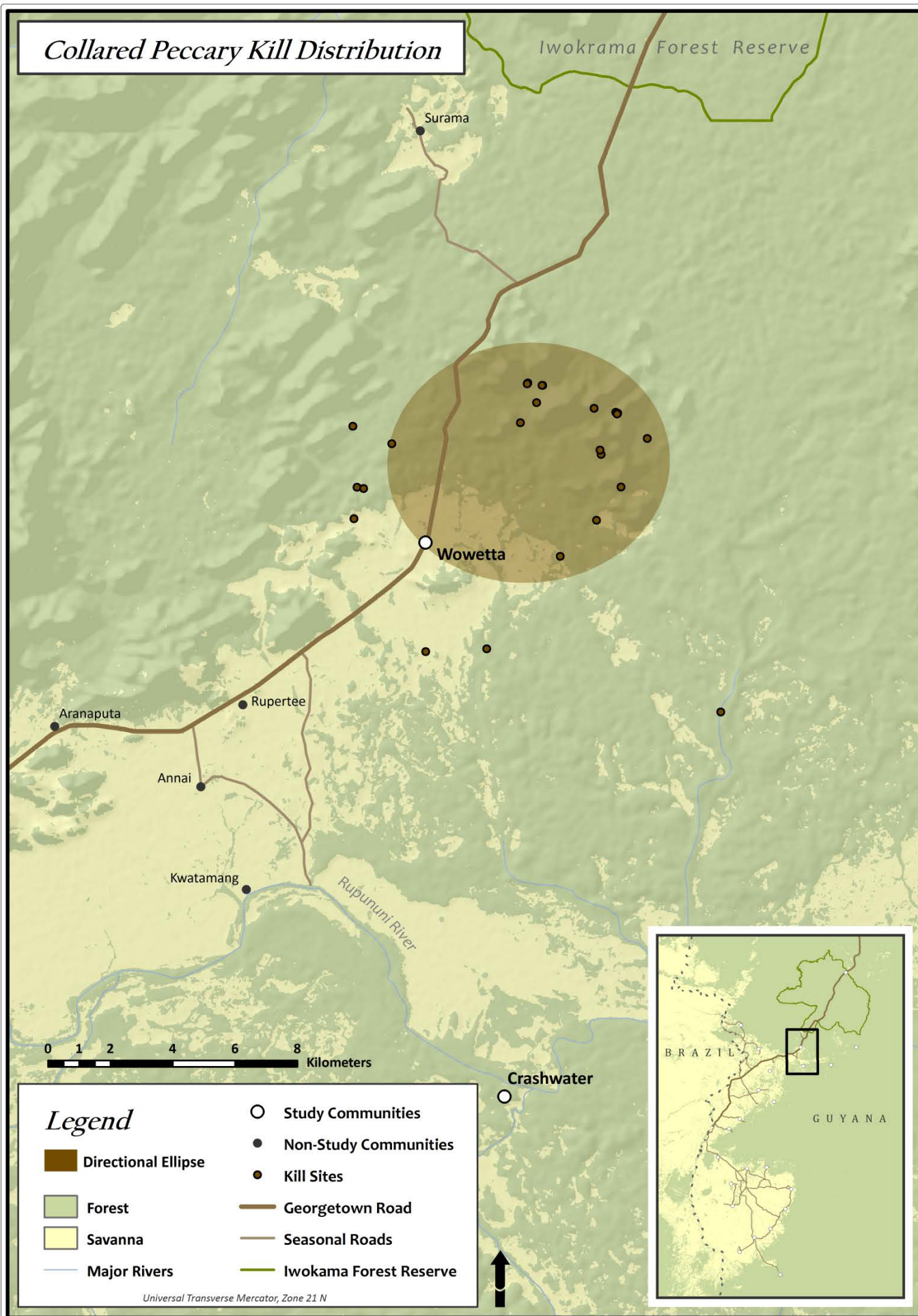
Seasonal Roads

Iwokrama Forest Reserve

Universal Transverse Mercator, Zone 21 N



# Collared Peccary Kill Distribution



## *Paca Kill Distribution*

Iwokrama Forest Reserve

Surama

Wowetta

Aranaputa

Rupertee

Annai

Kwatamang

Rupununi River

Crashwater

0 1 2 4 6 8 Kilometers

### *Legend*

Directional Ellipse

Forest

Savanna

Major Rivers

○ Study Communities

● Non-Study Communities

○ Kill Sites

Georgetown Road

Seasonal Roads

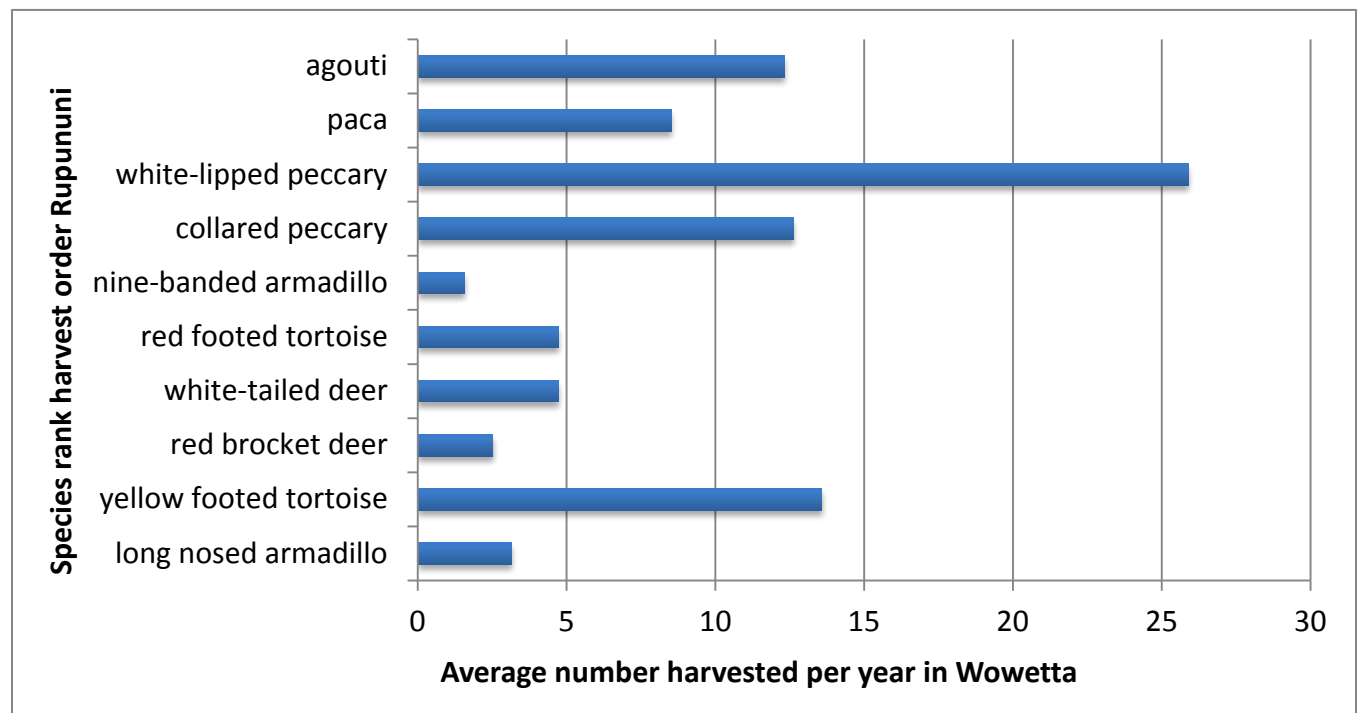
Iwokrama Forest Reserve

Universal Transverse Mercator, Zone 21 N

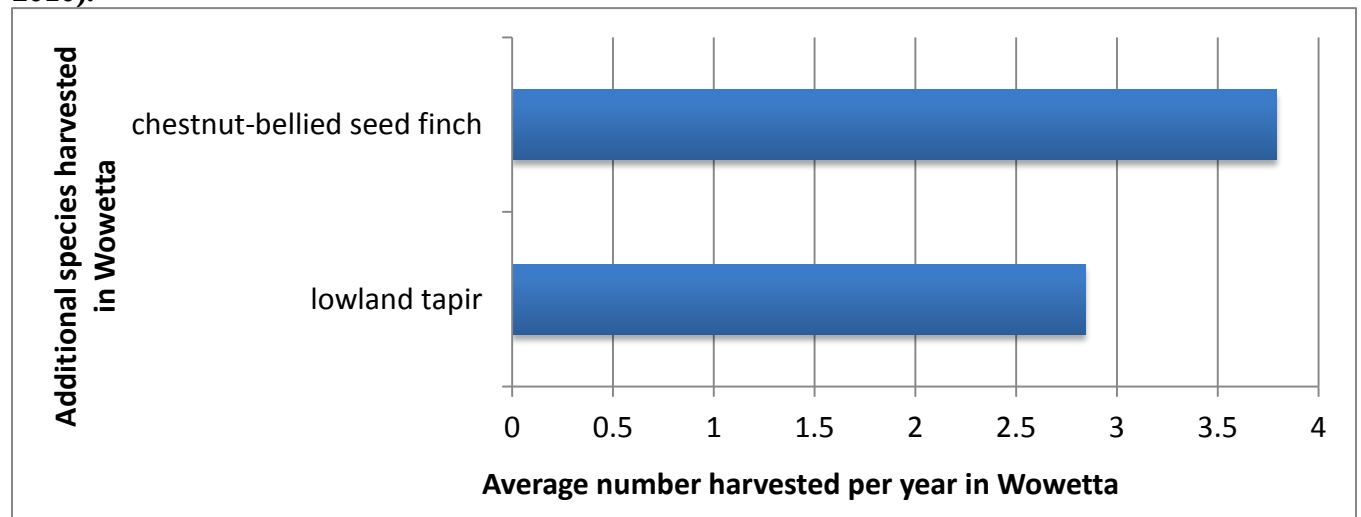


| Wildlife harvested by Wowetta hunters<br>(monitoring period May 2007 - June 2010) |          |           |
|-----------------------------------------------------------------------------------|----------|-----------|
| Species                                                                           | Per Year | Per Month |
| All species<br>(in kilograms)                                                     | 3249     | 271       |

The 10 animal species most commonly harvested in the Rupununi by rank order, and the number harvested by Wowetta hunters (monitoring period May 2007 - June 2010).

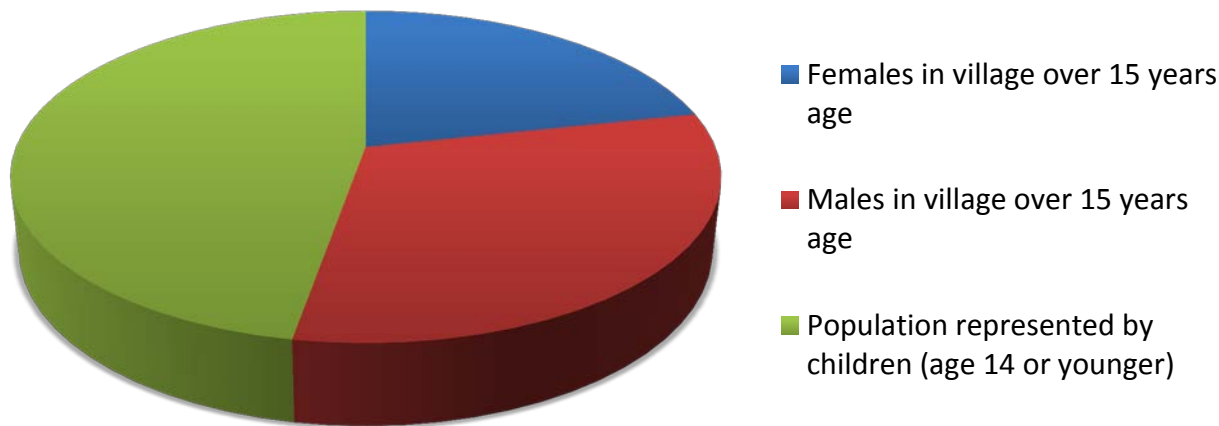


Additional animals harvested by Wowetta hunters that are amongst the 10 most commonly harvested for the village, but not for the entire Rupununi (monitoring period May 2007 - June 2010).

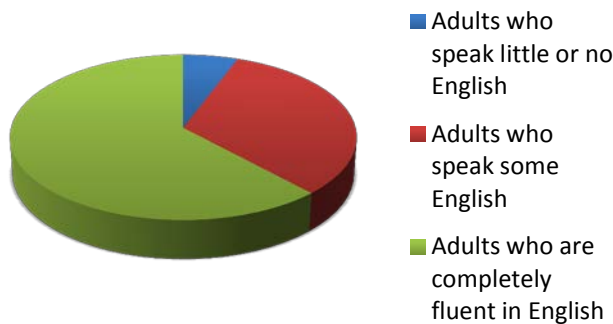


Socioeconomic Data

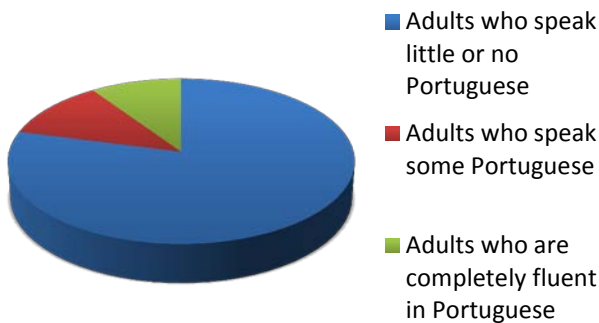
Males, Females and Children in Wowetta



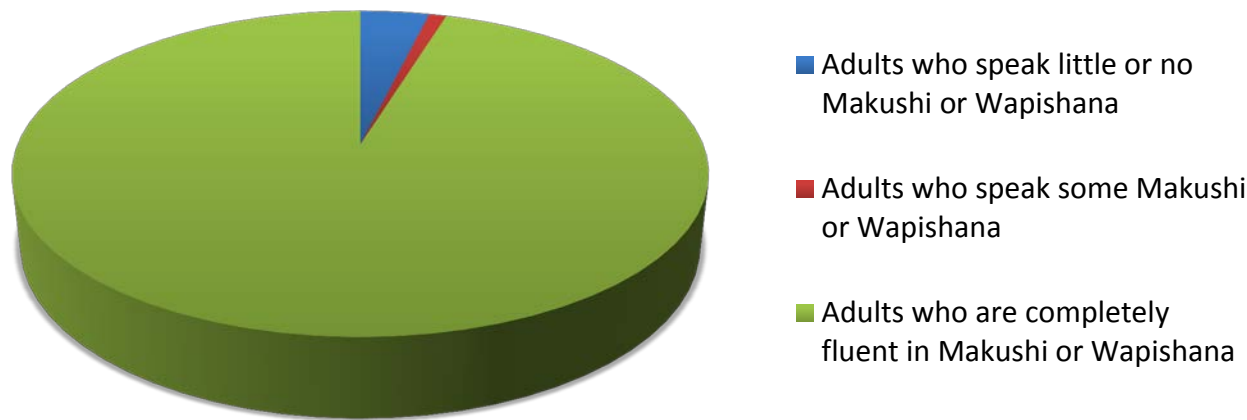
English Fluency Among Adults



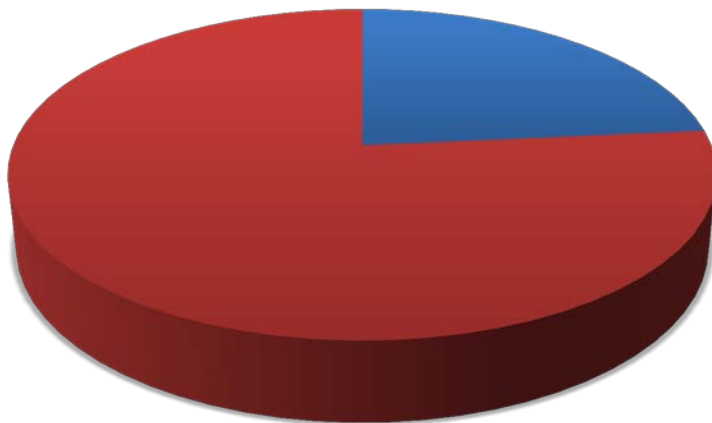
Portuguese Fluency Among Adults



Makushi and Wapishana Fluency Among Adults



## Primary Source of Meat

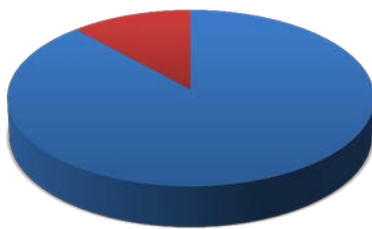


■ Households depending mostly on wild animals for meat

■ Households depending mostly on fish for meat

■ Households depending mostly on domestic animals for meat

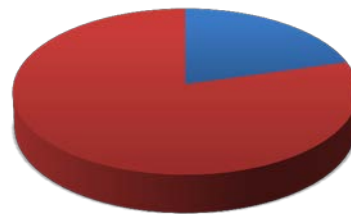
## Cattle Ownership



■ Households that do not own cattle

■ Households that own cattle

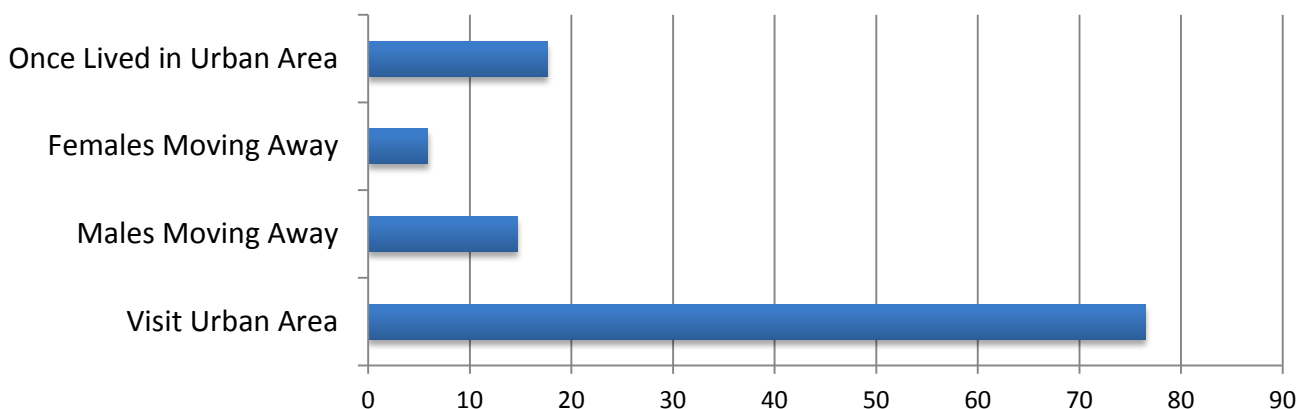
## Monthly Income



■ Households with at least one regular salary, pension or stipend

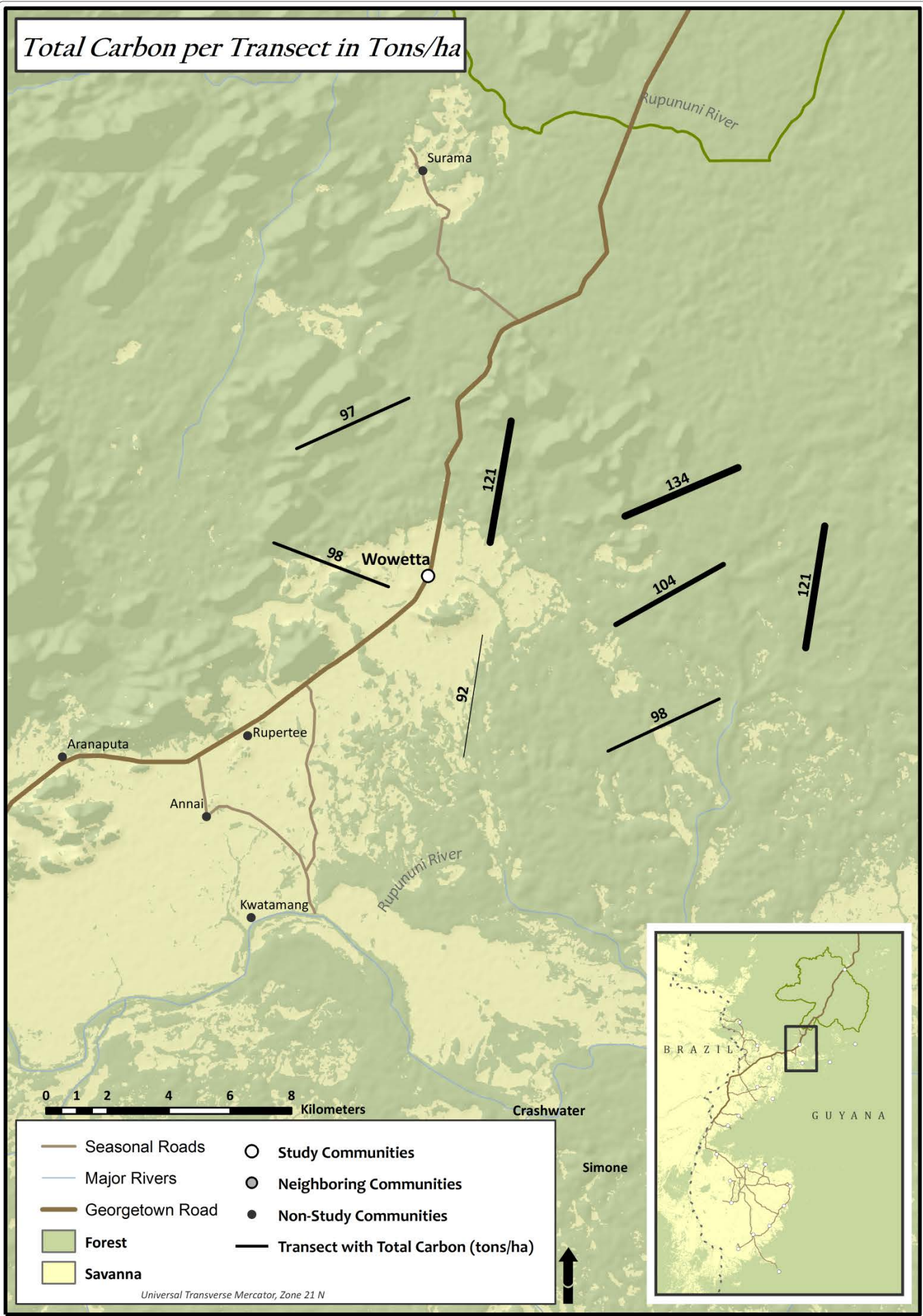
■ Households without a regular salary, pension or stipend

## Migration



This chart shows the percentage of Wowetta households where 1) at least one current member has once lived in an urban area (Lethem, Normandia, Georgetown, or Boa Vista) 2) at least one female has moved away to an urban area in the last 5 years, 3) at least one male has moved away to an urban area in the last 5 years and 4) where at least one current member has (temporarily) visited an urban area in the past year.

# Total Carbon per Transect in Tons/ha



Universal Transverse Mercator, Zone 21 N

## **Carbon**

The map of total carbon per transect on the opposite page shows the total amount of carbon in tons/ha for each transect calculated using land cover distribution and carbon estimates of each land cover type.

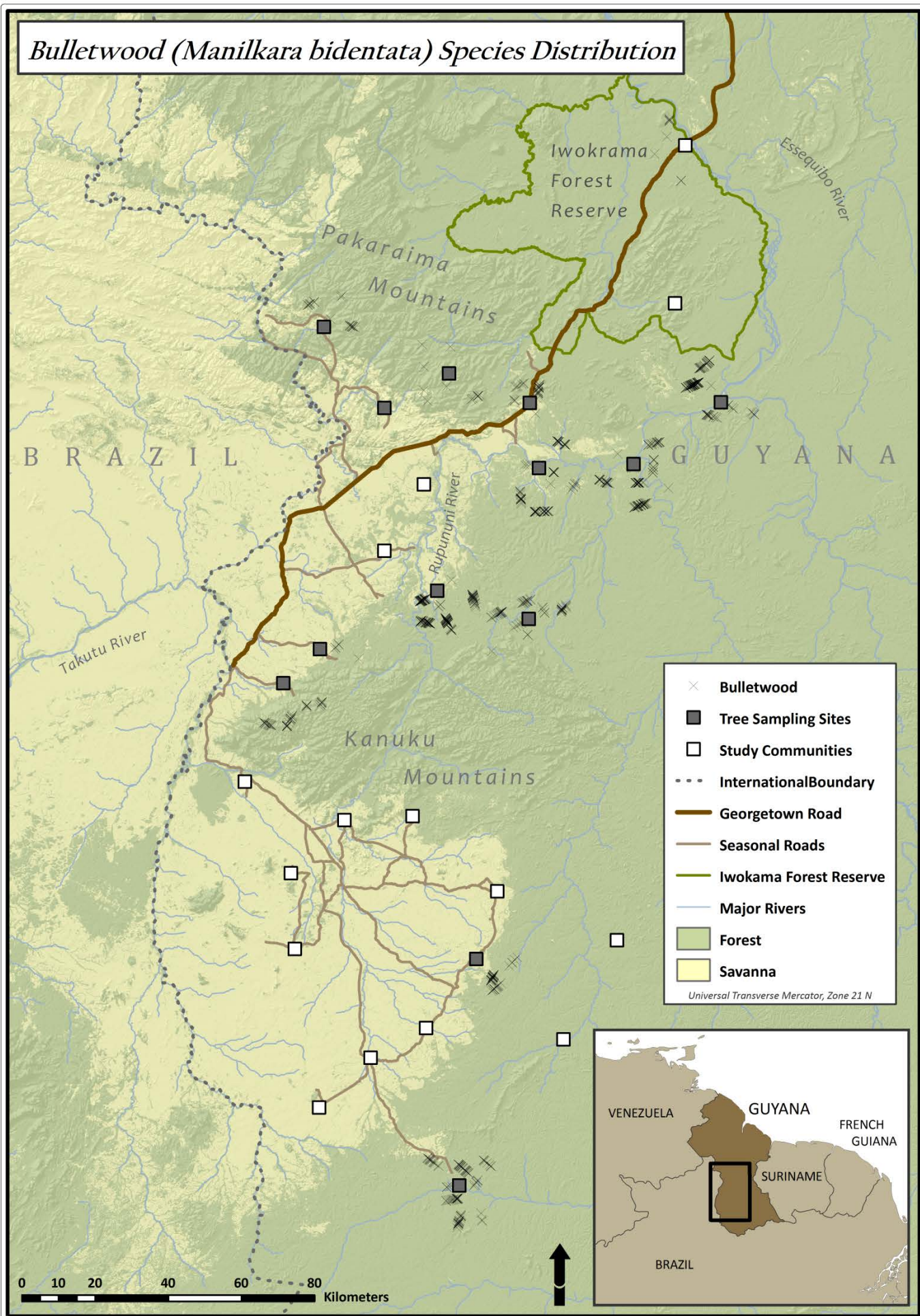
This was calculated based on sample measurements from a 4 ha area derived from a 10m-wide strip centered along the transect. Total Moist Carbon was calculated based on soil, litter, shrub, and tree biomass.

## Fruiting Trees

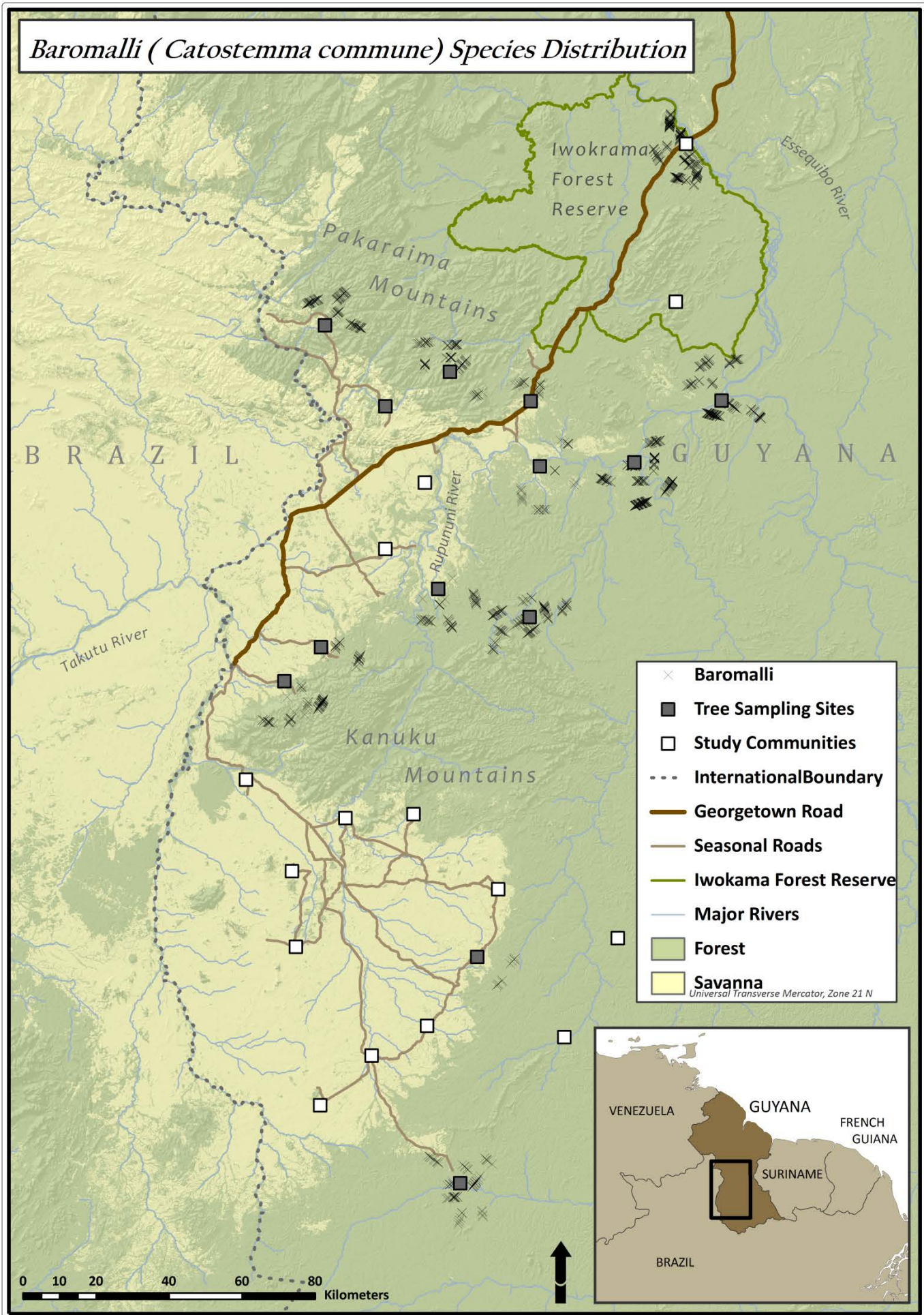
Data on fruiting trees were gathered by Anthony Cummings, Persaud Moses, Ricky Moses, Carro Moses, Stephen Andries, Matthew Alvin, Benedict Joseph, and Han Overman along transects at selected (forested) study sites. On each transect, the following data on all trees  $\geq 25\text{cm}$  DBH (diameter at breast height) and all mature palms were gathered: location along the transect, species name, and DBH. Individual trees were mapped using GIS. The maps opposite show the locations of trees mapped along the transects for four species that are important for the most-hunted wildlife in the Rupununi.



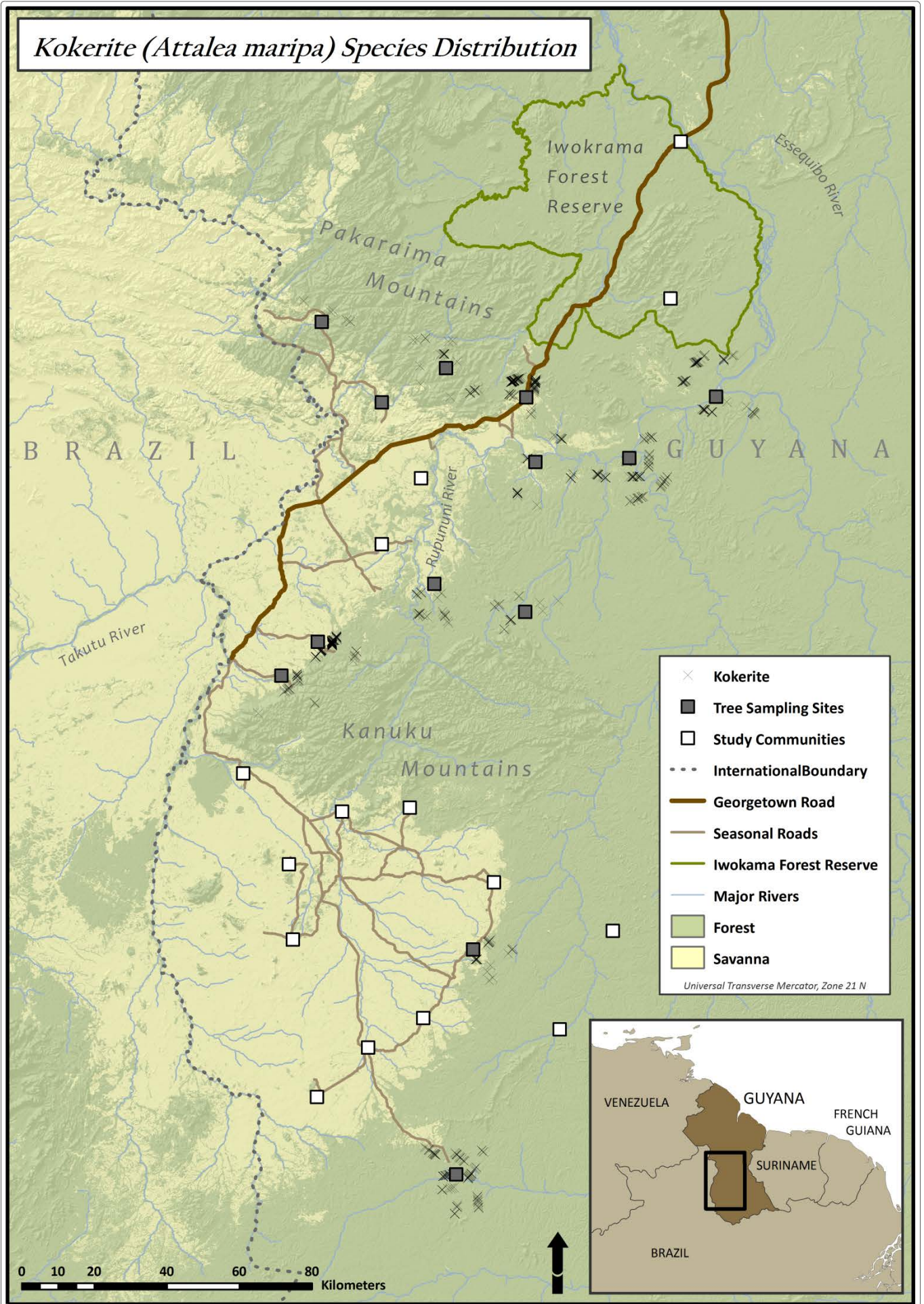
# *Bulletwood (Manilkara bidentata) Species Distribution*



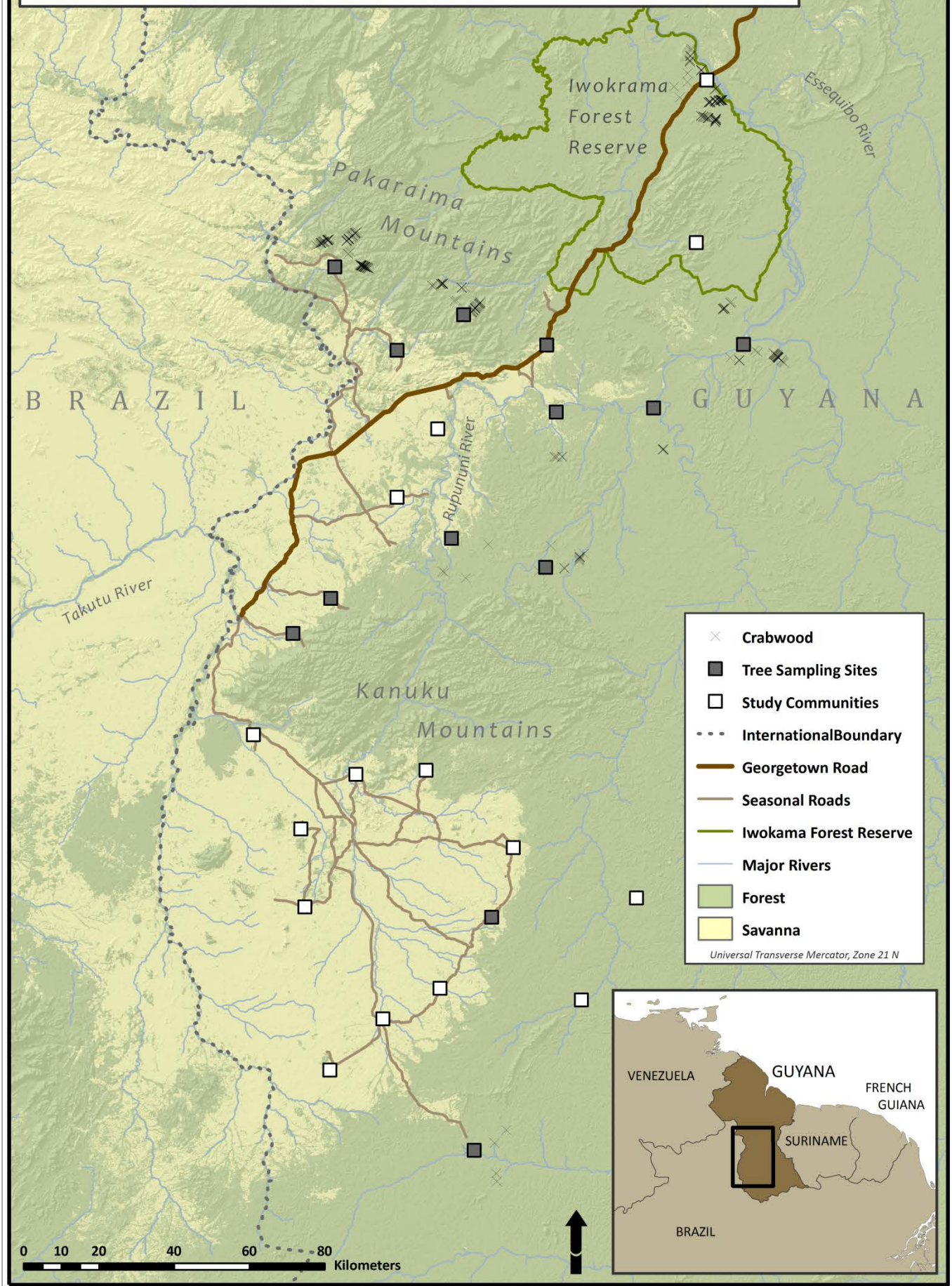
# *Baromalli (Catostemma commune) Species Distribution*



# *Kokerite (Attalea maripa) Species Distribution*



# Crabwood (*Carapa guianensis*, *C. procera*) Species Distribution



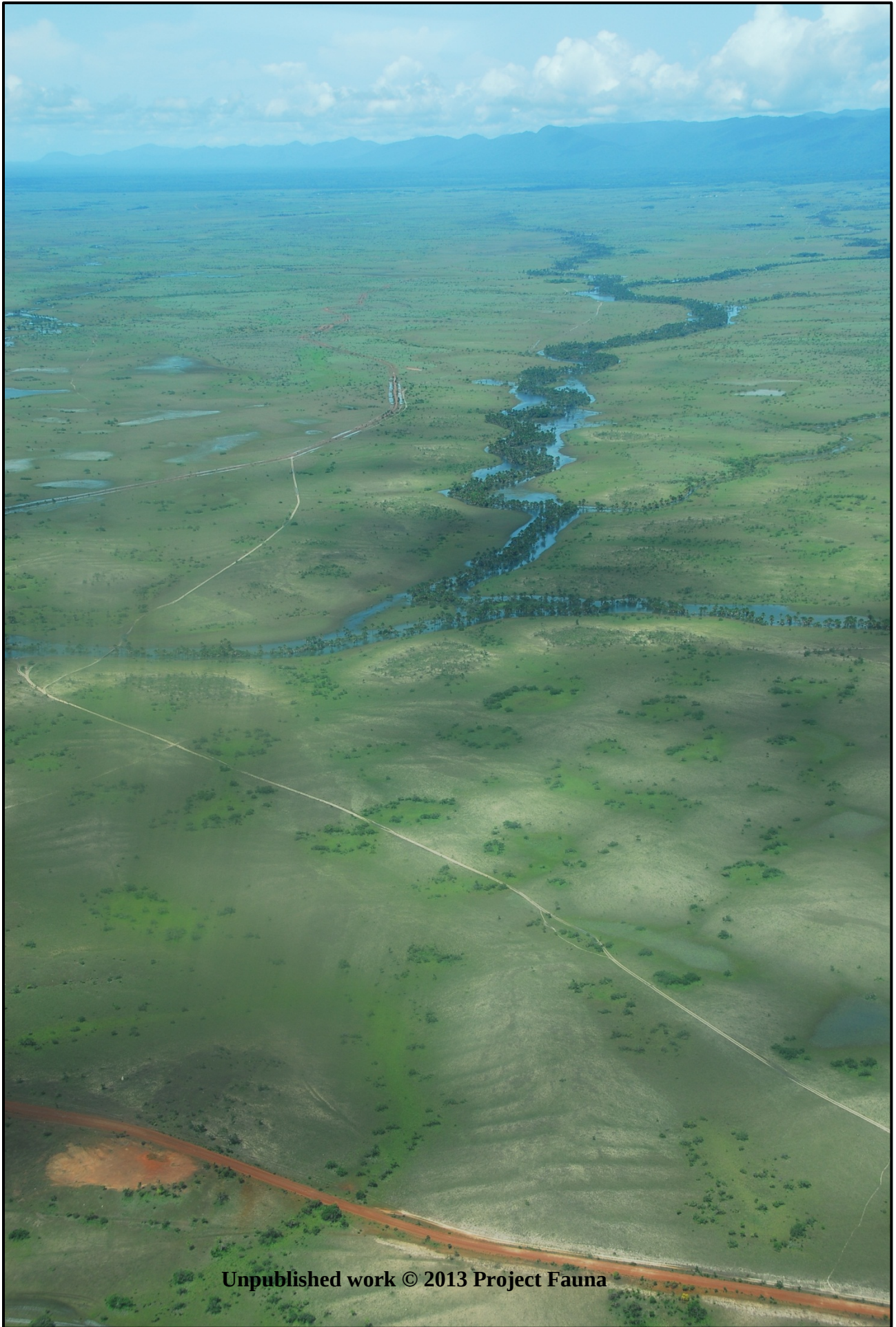
## **Project Fauna Personnel**

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Paul Kloster, undergraduate student: Syracuse University; geographer

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Esther Joseph; Lethem  
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Bertie Xavier; University of Guyana/Wowetta Village  
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