

# Project Las Piedras

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Preliminary Report

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## Abstract

We have investigated the ecological consequences, as well as socio-economic drivers of illegal logging activity and its associated subsistence hunting, on large mammals, along the Las Piedras river, Madre de Dios, Peru.

Standard un-bounded line-transect census techniques were used to assess abundance, density and community structure at six sites. In total 1104 km were censused. The logging and hunting history at each site was assessed using interviews with timber personnel and allocated to three categories, active, loggers left three and five years ago. For the largest monkeys, i.e. *Ateles paniscus*, *Alouatta seniculus* and *Cebus apella* a strong increase in animal numbers after cessation of the impact was recorded.

The socio-economic reality of illegal logging along the Las Piedras river was investigated by collecting 97 interviews in different camps during May and June 2002. The total number of people living in the visited camps was 811. 18.3% of the interviewed timber personnel had encountered voluntarily isolated Indians. During the month prior to the investigation 254 Spider monkeys (*Ateles paniscus*) and 219.5 White lipped peccaries (*Tayassu pecari*) were consumed in the 97 camps.

The activity of boats and balsas (floats consisting of tropical timber used to transport logged wood to Puerto Maldonado) travelling in Las Piedras as well as the extraction of tropical timber, such as Mahogany, was recorded from May until September 2002. During the month of July a minimum of 679,365 feet of mahogany was extracted. 2164 men passed our camp.

The market niche for bushmeat in Las Piedras was examined using interviews with intermediaries in the market. We collected 40 interviews showing the species and the amount available, as well as prizes and different actors in the market.

## Team

### **Mammal census & boat survey**

#### **Björn Schulte-Herbrüggen (Project Co-ordinator), 27 years, German**

Björn has a BSc with Hons. in Ecology from the University of Edinburgh. He spent four months prior to the field period in Madre de Dios organising the project logistics and setting up contacts with NGOs and loggers. He has gained exhaustive experience in mammal census during field work in Europe and is experienced in experimental design.

#### **Helfrid Rossiter (Medical Officer), 23 years, British-Swedish**

Helfrid is a 3<sup>rd</sup> year undergraduate student of environmental chemistry at the University of Edinburgh. She participated the RGS course in “Wilderness Medicine” and prepared herself intensively for her task with the help of Dr. Wolfgang Kaymer (University Hospital Bielefeld). Her experience regarding group dynamics gained while leading youth camps for the Salvation Army proved to be invaluable during the course of the field period.

#### **Jake Charles Dunn (Mammal specialist), 22 years, British**

Jake is currently enrolled as a 4<sup>th</sup> year student of Zoology at the University of Edinburgh. He has volunteered for many years at the “Monkey House” of the Twycross zoo and is familiar with Neotropical mammals.

#### **Tina Mills, 26 years, British-German**

Tina is a 4<sup>th</sup> year undergraduate student of Wildlife Management at the University of Edinburgh. She worked as a tourist guide in Venezuela and through this gained valuable experience of working with the local population.

#### **Marcos Manuel Maguiña Paredes, 26 years, Peruvian**

Marcos already graduated with a BSc course in Biology at the University Peruana Cayetano Heredia in Lima (Peru) and is currently enrolled in Veterinary Medicine at the same university. He is planning to work with Helfrid in an environmental education project the summer 2003.

#### **Guillermo Martin Montoya Mordes, 26 years, Peruvian**

Guillermo graduated from his 4<sup>th</sup> year of Biology at the Universidad Peruana Cayetano Heredia in Lima (Peru). He has participated in many research projects in a variety of fields throughout Peru. He is specialized in marine fish ecology and fishery management and is looking forward to a master in marine biology.

**Margaritha Medina Müller, 25 years, Peruvian**

Margaritha has finished her 4<sup>th</sup> year in Biology at the University Agraria La Molina. Her interest in amphibians led her to conduct fieldwork with her university and INRENA (Department of Environment, Peru) in the Peruvian rainforest.

**Patricia Teresa Salizar Vasquez, 28 years, Peruvian**

Patricia is currently finishing her Bachelor in Biology at the Universidad Nacional Mayor de San Marcos. She has worked as a research assistant at the marine biology station in Paracass, Peru, and gained extensive experience in scientific data collection, including line-transect methodology. She is looking forward to a Master in Marine Biology.

**Guides****Andres Berra, 43 years, Peruvian**

Andres has worked for more than 20 years in logging and gold mining camps in Peru and Bolivia. He is experienced in scientific data collection due to his participation in ecological projects in Madre de Dios, e.g. Project Tambopata (TReeS). His experience, enthusiasm and friendship with many of the loggers was invaluable during the data collection.

**Orlando Javier Pacaya Alvarez, 34 years, Peruvian**

Javier is a native from a community close to Puerto Maldonado. He is primary school teacher without employment, since he did not have enough money to finish his degree. At the moment he does hand craft work, and also works with fishing and logging. We could not have done without his expert spotting of animals during transect walking.

**Manuel R. Yumbato, 40 years, Peruvian**

Manuel has worked all his life in mining and logging camps in Madre de Dios. However, during the last years he has become involved in guiding, e.g. photographers of the National Geographic, and conservation work. He has participated in a variety of field projects, e.g. Project Tambopata.

**Trail cutters**

**Rudolfo Rolin, Lewis Rolin and Fernando Belinda** have been loggers for many years. Currently, they work in the port of Puerto Maldonado and on their farms and are in general always open for new jobs.

**Interview study**

**Manuel R. Yumbato**, see above

**Victor Yumbato, 52 years, Peruvian**

Victor is Manuel's brother and shares a similar career with him. He is often employed as a boat driver for tourist lodges and works as a logger when no other job can be found.

**Julio Canaciri, 45 years, Peruvian**

Julio has worked for many years in logging camps in Madre de Dios but decided to start a university degree in forestry. He finished at the University of Puerto Maldonado in 2002 and is looking forward to gain field experience in scientific data collection. Project Las Piedras was a start.

**Market study****Victor Berris, 23 years, Peruvian**

Victor Berris is a 3rd year forestry student at the University Nacional San Antonio Abad del Cuzco in Puerto Maldonado. He has volunteered in several field projects of Conservation International in Madre de Dios and proved his capacity by collecting the interviews for the market study independently.

**Nek Yuri Monroy Huarcaya, 23 years, Peruvian**

Nek is a 3rd year forestry student at the University Nacional San Antonio Abad del Cuzco in Puerto Maldonado. He shared responsibility for the market study with Victor.

**Medical advisor**

**Wolfgang Kaymer:** Mr Kaymer is assistant medical director at the University Hospital of Bielefeld (Germany) and lecturer at the University of Bielefeld. He has conducted several expeditions to Africa and Europe and gained invaluable experience in wilderness medical skills, which we could discuss in full detail with him prior to our departure.

## Site description

The study sites were situated along the Las Piedras river (13°08'10''S, 69°36'40''W) 50 to 100 km northwest of Puerto Maldonado. The department of Madre de Dios is sparsely populated. With 80.000 people living in the department and over half of the living in Puerto Maldonado the population density is about 1/sqkm and the rural population about 0,4/sqkm.

At approximately 200 m above ground level, lowland forest is the dominating vegetation type with variation due to different hydrological regimes found in the seasonally flooded alluvial flood plains along the river, and undulating hills characterise the adjacent landscape.

The area lies in close proximity to protected areas, well known for their biological diversity, such as Manu National Park and Bahuaja Sonene National Park. Pristine and semi-pristine areas, due to their favourable ecological location within the transitional zone between humid tropical and subtropical rainforest with an average annual precipitation of 2,400 mm. Its putative role as a Pleistocene refugium and the great variety of different ecosystems contribute to an exceptional biodiversity, arguably one of the richest hotspots worldwide, which has been revealed by biological inventories that have been undertaken since 1976. Tambopata is home to approximately 7% of the world's bird species (~600), and up to 4% of the world's mammal species (~160) have been found, including endemics and vertebrates that are considered highly endangered by IUCN [(e.g. Giant anteater (*Myrmecophaga tridactyla*) and Yellow-spotted side-necked turtle (*Podocnemis* spp)].

Economic development of the region has been slow. Since the early 20th century exploitation of natural resources, rubber, Brazil-nut, and hardwood, has been reported in Madre de Dios. Commercial exploitation of gold began 1940. Until the late 1980s governmental support for the conversion of forest into pasture for cattle, combined with the encroachment of human settlements around Puerto Maldonado, has been a major threat to the area. The major industries of Madre de Dios include tropical timber, gold, Brazil-nut, tourism, and tinker (Groom 1991).

## Maps of the study areas



Fig. 1 & 2: Figure 1 shows Peru with the department of Madre de Dios highlighted. Fig. 2 the area, in which the investigation was conducted is shown, as well as protected areas in the department.



## Introduction

Large mammals provide vital ecological services and play an important role in forest ecology through seed predation and dispersal, pollination, folivory and frugivory (*e.g.* Terborgh 1983). Strong evidence exists that even in areas where forest is still intact, hunting can lead to extermination of large mammal populations (Bodmer *et al.* 1994; Alvard *et al.* 1997; Peres 1999a). Overhunting can cause an ecological inversion of mammalian biomass and can lead to landscape-level changes in habitats and faunal assemblages (Rylands *et al.* 1997; Cullen *et al.* 2001).

No rigorous mammal population censusing has been carried out to date along the Las Piedras river. The only existing investigation into the status of mammals in this area was relatively minor and consisted of simply a pilot investigation of which mammal species, and how many, were being hunted (Velasquez, V. 2000). The conclusion of this study was that a maximum of 86,016 wild animals, including 54,190 black spider monkeys (*Ateles paniscus*) and red howler monkeys (*Alouatta seniculus*), were likely killed in 1999 in Madre de Dios. Local extinction is inevitable for some species if the *status quo* is maintained.

In recent years Las Piedras has experienced a strong inflow of illegal loggers, due to the increased market value of mahogany (*Swietenia macrophylla* King). The prize per foot at the time of the investigation was US\$ 1.86 (6.5 Nuevo Soles) in Puerto Maldonado. With an approximate mean amount of 2000 feet wood per mahogany tree the economic value sums up US\$ 3720, providing a great incentive for the Peruvian people who lack alternative work opportunities. Unofficial estimates regarding the number of people working in Las Piedras heavily vary but a maximum of 5000 people were often heard.

In 1999, the Peruvian government signed the “International Tropical Timber Agreement“ of the ITTO (International Tropical Timber Organisation) and therewith agreed to prevent the export of tropical timber, such as mahogany, from unmanaged areas. In 2000 a new law (No. 27308) came out stating that the extraction of tropical timber outside managed timber concessions is illegal. Timber concessions were assigned in 2002 and action taken to force the illegal loggers (*pequenos*) out of the forest. However, many illegal loggers did not agree with the new law and put at disadvantage. In June and July 2002 illegal loggers organised a strike in Puerto Maldonado, which paralyzed all activity, and destroyed many official buildings, such as INRENA (Instituto Nacional de los Recursos Naturales).

Madre de Dios is one of the last places worldwide where Indians can be found who live without any contact to civilization (voluntarily isolated Indians). These Indians do not share the same diseases with people who live in civilization and therefore their immune system can not deal with viruses transmitted for example by illegal loggers. Many Indians have died during the last years after encounters with loggers in their natural habitat (Alfredo Garcia, pers. comm.). A reserve for uncontacted Indians (Zona Reservada Alto Purus) in the

headwaters of Las Piedras has long been in place and a new protected area further downstream the Las Piedras river was established (Area Establecida por el Estado para Indigenas Aislados) in 2002. The urgent need for this second reserve became obvious after the reports about sightings of “calatos” by loggers in the upper parts of Las Piedras increased, as well as at the border to Brazil, which presumably was used as a refuge (Alfredo Garcia, pers. comm.).

The problems Madre de Dios is facing at the moment are that a large number of illegal loggers still work in the forest of Las Piedras, supposedly causing a large environmental impact and destroying the basis of the life of the worlds last uncontacted Indians.

## Mammal - Census

### *Objectives*

- provide the first mammal list for Las Piedras
- investigate the impact of loggers and the development of the mammal populations after the impact has ceased

### *Methodology*

#### *Site identification*

Six study sites (see Appendix I for GPS positions) situated along a gradient in logging history were identified during May and June. Information obtained from timber personnel during the interview study (see below) proved to be valuable for the selection. Where possible we contacted additional people who had worked in the area and interviewed them regarding the presence of loggers at sites that we considered appropriate for the census.

#### *Site classification*

The sites were roughly classified according to the time that loggers have not been present, because of the problems arising with uncertain logging regime, hunting history and rate of game recovery, which may be effected by habitat productivity (Peres, C. A. 1999). Two sites that were impacted during the time (B&E) of the field period were compared with two sites that the loggers left three years (C&F) and two sites that the loggers left five years ago (A&F). Confirmation of the preliminary assigned impact categories was reconsidered during the field period using the following techniques:

- direct evidence of hunting activity
- physical structure of the wood
- recovery of vegetation close to logged sites

Special attention was paid to information necessary to refine the impact categories, e.g. duration of impact, presence of brazil-nut collectors and machinery used.

All sites were chosen in terra firme (non inundated) forest in order to minimise the differences in soil and forest structure in between sites, which can cause distinct patterns of mammal assemblage (Emmons 1984). Although, this factor can not be excluded, we assume that the presence of loggers is the dominant factor influencing species composition, since the species under investigation have broad ecological tolerances. The transects did not cross different habitat types or run parallel to physical or biological boundaries (e.g. streams), to avoid skewed and unrepresentative data respectively.

Stakeholder groups such as FENAMAD “Federacion Nativa del rio Madre de Dios y Afluentes” and FEPEFMAD, the “Federacion de Pequeños Extractores Forestales con Manejo Sostenible de Madre de Dios” were informed about the study from the beginning and their cooperation obtained to ensure good relations during the course of the project.

### *Census Techniques*

Assessments of the impact of loggers on diurnal mammal species was conducted using standardised line transect census techniques (Bodmer et al. 1997; Peres 1999b). Two transects per site (three in total) were utilised. At each site we had one transect on each side of the river. The transects were situated randomly. Where no other option available, e.g. due to otherwise impassable terrain, logging trails (transect D & E) were used for the census. In total 1104 km were walked with distances on individual transects reaching from 130 km to 232 km.

The method involved the measurement of perpendicular distances from the transect to those animals detected whilst censusing, and the counting of numbers of individuals per social group. The density of animals is calculated using software developed especially for the purpose - DISTANCE (<http://www.ruwpa.st-and.ac.uk/distance/>). This analysis of density is very effective and compatibility between data sets generated by this method is simple (Buckland *et al.* 2001).

Each census period was undertaken by two observers (one guide and one student), this was for safety reasons and also to ensure that all data during contact with desired species was collected efficiently. Each transect was censused daily with the aim of achieving the recommended minimum number of 40 detections per species and transect. The maximum possible number of transects were censused, to enhance comparability of mammal density estimates, and decrease sensitivity to statistical variance, which is a function of the total number of independent detections (Peres 1999). Data collection was carried out in both directions when walking the transect. The groups started monitoring at 6:00 am. In accordance to the standardised methodology, data collection finished at 11:30 am, since activity patterns and therefore encounter probability differ in the morning to that of midday (Peres 1999). Daily rotation of observer and sites minimised observer dependent bias. Observers walked slowly and quietly along the centreline

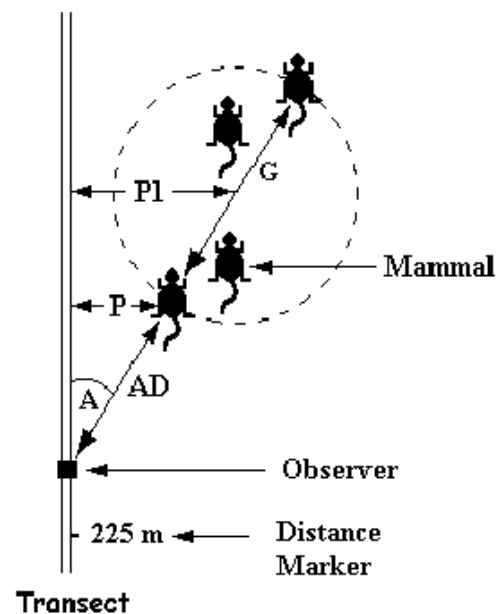


Fig.3: schematic picture of the data collection. An observer is walking on a transect, encounters a group of animals and measures the perpendicular distance (P1) from the transect to the centre of the group, plus the group width and the distance on the transect.

of a transect at a rate of approximately 1-1.5 km/h. They stopped every 100 m for 10 sec to listen for animals and to ensure that they were aware of any animals before they themselves were noticed. During an encounter, up to 5 min, or until visual contact was lost, were spent recording data using a standardised recording sheet. In order to get more detailed information about the group characteristics, observers moved up to 25 m in reverse to obtain a better view. The distance to an animal or group was measured to the nearest 10cm using a 50-m foresters tape. Only accurate counts of animals were considered for analysis.

*The following data was recorded:*

- Species
- Number of individuals encountered
- Perpendicular distance (m) to the first animal seen and the animals at the extremes of the group
- Number of juveniles
- Behaviour: e.g. eating, playing etc.
- Time of day
- General visibility
- Weather: precipitation, temperature, wind
- Principal detection method (visual, auditory or smell)
- Signs of human activity: e.g. logging

#### *Transect cutting*

Transects were prepared during July using a standardised technique, following White 2000 and Peres 1999b. A minimum of four people were involved. One person walked in front cutting the trail, guided by a second person who carefully monitored the linear development of the approximately 5 km long transect using a compass. The two following people completed the trail cutting and cleaning the trail thoroughly at the same time. Slight detours around natural obstacles like fallen trees and dense regenerating undergrowth had to be passed, due to time and personnel limitations. However, Peres (1999) states that this method does not change the overall objectives of the survey as long as the original compass bearing is resumed immediately after the obstacle is passed. This was the case. The transects were measured with a 50-m foresters tape and marked with coloured tape every 50 m for distance localisation during mapping. New litter was removed during the course of the census to avoid unnecessary noise and disturbance. Time needed to cut one transect of 5 km varied, depending on the habitat, but a good approximation is three days. Transects were not used the day after they had been cut to allow for the effects of disturbance during cutting. Where logging trails were used for the census, they were checked for their general linearity and special attention paid to whether or not the loggers had followed animal trails, since this would introduce a bias in data collection.

*Training*

A preliminary week of orientation, first aid training and familiarisation, including species identification by sight and sound, paired with the species behaviour and escape response, training of rapid counts of individual animals and standardisation of measurements, provided all participants with the same level of experience. By the end of this process, everybody in the team could identify animals (by sight and sound) and habitat types reliably and consistently.

Very valuable during this initial period were our guides who have lived in the forest for many years and have great experience in encountering and identifying animals.

## Results

From the 15.07.02 until 21.09.02 six transects with different logging history were censused. A total of 1104 km were walked and data collected. The distance walked on individual transects varied between 130 km (transect D) and 232 km (transect E).

The number of group sightings per 100 km walked at sites of different logging history showed a trend in animal abundance for the three large monkeys: spider monkey, howler monkey and brown capuchin monkey. At the 3 and 5 year sites more animal groups were observed than at the 0 years sites. The 3 year treatment showed a higher number of group sightings for most species. White capuchin monkeys were less encountered in the sites that were not logged during the time of census than at the impacted sites. Equatorial saki monkey, grey brocket deer and the group classed “deer” had low sighting rates at the 3 and 5 year transects but no sighting at all at the 0 year sites. The number of group encounters decreased from 0 to 5 years for white lipped peccaries and collared peccaries. No clear trend was found for the other species.

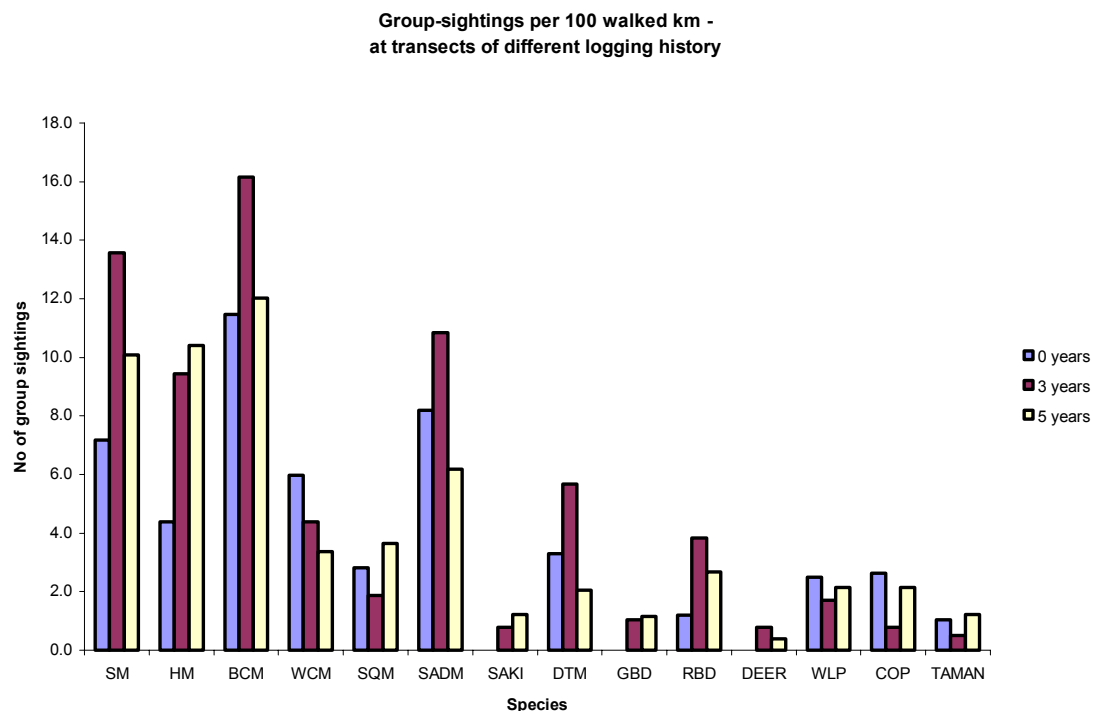


Figure 4: The number of group sightings per 100 walked km for all large mammals is shown. The three bars of different colour represent different treatments, i.e. 0 years = loggers were present at the time of the census; 3 years= loggers left the site three years ago; 5 years= loggers left the site 5 years ago. Two sites of equal treatment were grouped together.

SM: black spider monkey (*Ateles paniscus*), HM: red howler monkey (*Alouatta seniculus*); BCM: brown capuchin monkey (*Cebus apella*), SQM: common squirrel monkey (*Saimiri sciureus*), SADM: saddleback tamarin (*Sanguininus fuscicollis*), SAKI: equatorial saki monkey (*Pithecia aequatorialis*), DTM: duski titi monkey (*Callicebus moloch*), GBD: grey brocket deer (*Mazama gouazoubira*), RBD: red brocket deer (*Mazama americana*), DEER: grouped individuals of GBD and RBD that could not be identified accurately (*Mazama* spp), WLP: white lipped peccary (*Tayassu pecari*), COP: collared peccary (*Tayassu tajacu*), TAMAN: southern tamandua (*Tamandua tetradactyla*).

The above identified pattern was found as well for the number of animals encountered per 100 km walked. Spider monkeys, howler monkeys and brown capuchin monkeys were found in higher abundance at the 3 and 5 years sites than at the 0 years site. Squirrel monkeys decreased from 0 years towards 3 years but were represented with their highest abundance at the 5 years sites. White capuchin monkeys, squirrel monkeys and white lipped peccaries showed a higher abundance at the 5 years sites than at the 0 years sites but at the 3 years sites least animals were encountered. Less collared peccaries were encountered at the 3 and 5 years site than at the 0 years sites. The remaining species were found only in low abundance and the differences between the sites can not be regarded as significant.

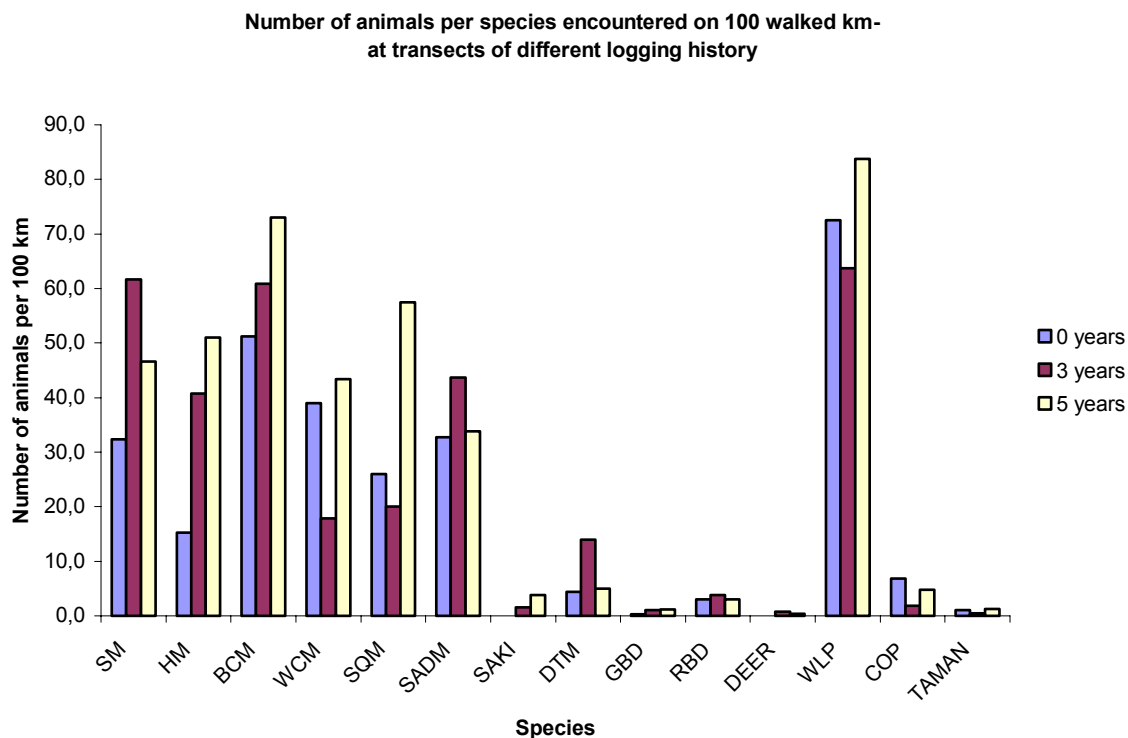


Figure 5: Total number of animals encountered at sites of different hunting history during the census. The three bars of different colour represent different treatments, i.e. 0 years = loggers were present at the time of the census; 3 years= loggers left the site three years ago; 5 years= loggers left the site 5 years ago. Two sites of equal treatment were grouped together.

SM: black spider monkey (*Ateles paniscus*), HM: red howler monkey (*Alouatta seniculus*); BCM: brown capuchin monkey (*Cebus apella*), SQM: common squirrel monkey (*Saimiri sciureus*), SADM: saddleback tamarin (*Sanguininus fuscicollis*), SAKI: equatorial saki monkey (*Pithecia aequatorialis*), DTM: duski titi monkey (*Callicebus moloch*), GBD: grey brocket deer (*Mazama gouazoubira*), RBD: red brocket deer (*Mazama americana*), DEER: grouped individuals of GBD and RBD that could not be identified accurately (*Mazama* spp), WLP: white lipped peccary (*Tayassu pecari*), COP: collared peccary (*Tayassu tajacu*), TAMAN: southern tamandua (*Tamandua tetradactyla*).



The mean group size for the encountered species did not differ substantially between the different treatments for most of the investigated species. However, most species had slightly higher values at either the 3 or 5 years sites than at the 0 years site. A substantial positive trend from 0 years towards 5 years sites was only found for Squirrel monkeys.

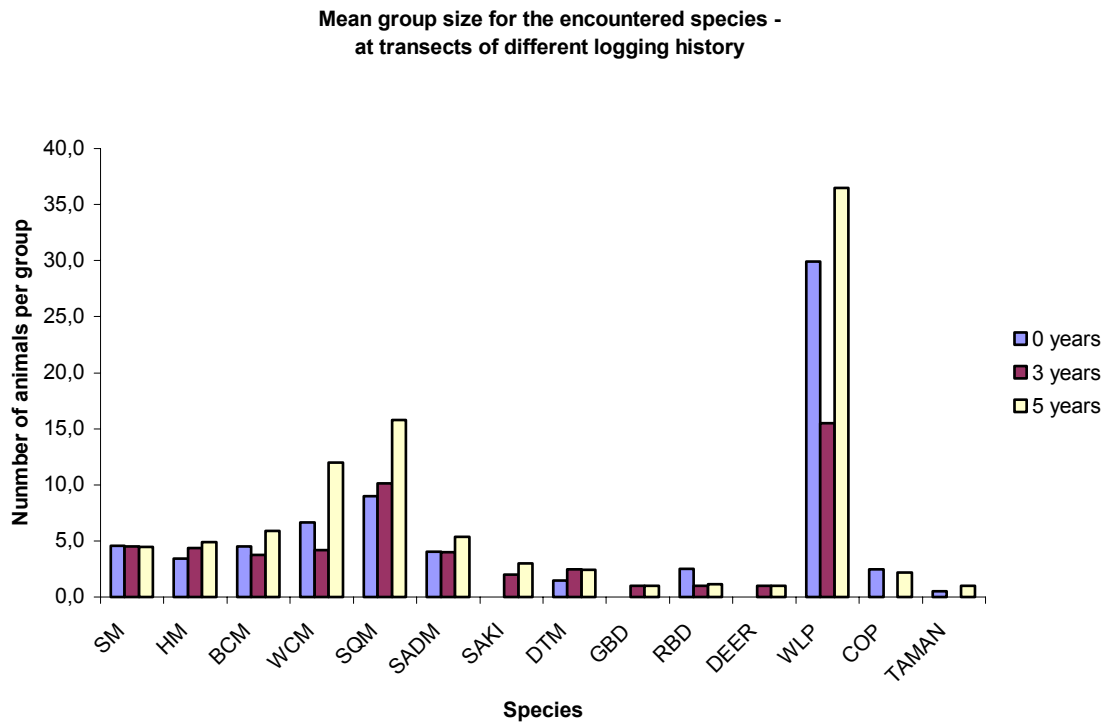


Figure 6: showing the mean group size of mammal groups encountered during the census. The three bars of different colour represent different treatments, i.e. 0 years = loggers were present at the time of the census; 3 years= loggers left the site three years ago; 5 years= loggers left the site 5 years ago. Two sites of equal treatment were grouped together.

SM: black spider monkey (*Ateles paniscus*), HM: red howler monkey (*Alouatta seniculus*); BCM: brown capuchin monkey (*Cebus apella*), SQM: common squirrel monkey (*Saimiri sciureus*), SADM: saddleback tamarin (*Saguinus fuscicollis*), SAKI: equatorial saki monkey (*Pithecia aequatorialis*), DTM: duski titi monkey (*Callicebus moloch*), GBD: grey brocket deer (*Mazama gouazoubira*), RBD: red brocket deer (*Mazama americana*), DEER: grouped individuals of GBD and RBD that could not be identified accurately (*Mazama* spp), WLP: white lipped peccary (*Tayassu pecari*), COP: collared peccary (*Tayassu tajacu*), TAMAN: southern tamandua (*Tamandua tetradactyla*).

## **Socio-economic investigation in logging camps**

### ***Objectives***

- estimate the number of people working in Las Piedras
- investigate the position, number of logging camps and the machinery used in Las Piedras
- investigate hunting preferences and species and number of animals killed
- collect socio-economic data to describe the reality in logging camps in Las Piedras
- describe the new port at the mouth of Curiacu

### ***Methodology***

From 01.05 until 21.06.02 interviews were collected in logging camps along the Las Piedras river. The group consisted of two loggers, Manuel Yumbato and Victor Yumbato, a student, Julio Canaciri, plus Björn Schulte-Herbrüggen who controlled the data collection for the first two weeks. The team travelled with a 12m boat and a 16HP (pekepeke) motor up to the Las Piedras tributary Bolognesi, which is approximately 14 days (pure driving time) upstream from Puerto Maldonado. At this point the investigators returned to Puerto Maldonado due to the low water level in the river, which made it extremely difficult to manoeuvre.

The questionnaires were developed with the help of Alfredo Garcia, an experienced anthropologist who is working for the Tambopata Reserve Society in Puerto Maldonado and has conducted many interview studies with native people in the area. We also asked interested NGO's such as FENAMAD to contribute questions and comment on the questionnaire.

The questionnaire was conducted in logging camps as well as communities and the port of Curiacu. Up to Montesalvado every encountered logging camp was entered and the loggers present were asked if they agreed to participate in an interview. Above Montesalvado the team worked without the Project Co-ordinator and the collected data suggests that not all camps were visited but only the GPS data taken. The work was explained as being part of a thesis that aims to describe the reality in the logging camps and the environmental impact of loggers. When feasible, the nights were spent in logging camps and data collection started after a long period of socialising. The two loggers in the team encountered many friends in the camps, which improved the atmosphere and facilitated data collection. Most loggers asked whether we were working for INRENA (Instituto Nacional de los Recursos Naturales) and were satisfied when we denied this. Björn Schulte-Herbrüggen encountered only one person who did not want to be interviewed during the course of 40 interviews.

The group spent three days in the mouth of Curiacu where at that time approximately 100 loggers stayed. Many of the loggers had been there for several days and suffered from a serious lack of entertainment. Our

presence was welcomed and many loggers approached us for an interview during the nights. We were allowed to take pictures of the loggers while hunting and eating, e.g. spider monkeys (*Ateles paniscus*), and often spent many hours with them in the night, discussing.

The interviews were conducted by two rotating people. The questions were read from a standardised sheet, in order to standardise data collection across people. One person read the questions and one person recorded the answers. Interviews were trained for two days prior to any encounter to ensure successful data collection. One person guarded the boat. The position of the logging camp was recorded with a standard GPS (Garmin Etrex). Unfortunately, problems arose in the use of the GPS after the departure of Björn Schulte-Herbrüggen and not all positions were obtained for the area above Montesalvado. However, the number of camps passed was recorded.

Special care was taken not to collect more than one interview per camp without knowing about it. This was made clear during the initial conversation when loggers were asked about who they worked with and if they had heard of us already being in their camp.

The permission, necessary to enter the native community Montesalvado was obtained prior to our departure from FENAMAD.

## ***Results***

During the course of the interview study in timber camps in Las Piedras a total of 97 interviews were collected. Each interview represented one logging camp.

### **Number of mammals hunted by loggers in Las Piedras**

Timber personnel were asked which species and how many animals were consumed during the last 30 days in their camp. Two groups of different hunting pressure were found showing distinct hunting preferences. Spider monkeys were the most hunted mammal with (254.25 animals), followed by White lipped peccaries (219.50), Collared peccaries (176.83) and Howler monkeys (132.00). The leading species in the second group of hunted mammals is deer (58.00). The number of consumed deer corresponds to only 43.9% of the amount of animals extracted from the population of the least hunted species (Howler monkey) in the first group.

Species	N	Min.	Max.	Sum	Mean	Std. Dev
Spider monkey ( <i>Ateles paniscus</i> )	96	0	15.00	254.25	2.6484	3.0962
White lipped peccary ( <i>Tayassu pecari</i> )	96	0	15.00	219.50	2.2865	2.3861
Collared Peccary ( <i>Tayassu tajacu</i> )	97	0	10.00	176.83	1.8230	1.9176
Howler monkey ( <i>Alouatta seniculus</i> )	96	0	15.00	132.00	1.3750	2.2769
Deer ( <i>Mazama</i> spp.)	96	0	5.00	58.00	0.6042	0.9457
Paca ( <i>Agouti paca</i> )	96	0	6.00	38.00	0.3958	1.1651
Brown agouti ( <i>Dasyprocta variegata</i> )	96	0	10.00	29.25	0.3047	1.2403
Brown capuchin monkey ( <i>Cebus apella</i> )	96	0	10.00	15.25	0.1589	1.0495
Dusky titi monkey ( <i>Callicebus moloch</i> )	95	0	5.00	7.75	0.0816	0.5524
White capuchin monkey ( <i>Cebus albifrons</i> )	96	0	5.00	6.00	0.0625	0.5194
Brazilian tapir ( <i>Tapirus terrestris</i> )	97	0	1.00	1.83	0.0189	0.1175

Table 1: states the minimum (Min.), maximum (Max.), sum and mean number of individuals of several mammal and bird species hunted in logging camps in Las Piedras during the last 30 days. Whereas, minimum, maximum and mean refer to individual interviews (camps), the sum refers to the total number of animals shot in all investigated camps. The standard deviation is given. N refers to the number of interviews collected that contain relevant information.

### Number of loggers and logging camps in Las Piedras

The maximum number of loggers encountered in one camp was 24, although we heard that during times when the wood is carried to the river often 20 people extra were employed. These people might not stay for more than one month but need to be kept in mind when considering the total number of people working in Las Piedras. The total number of loggers working in the investigated camps was 811, with a mean number of 8.45 loggers per camp.

	N	Min.	Max.	Sum	Mean	Std. Dev.
<b>Loggers</b>	96	3	24	811	8.45	3.87
<b>Cooks</b>	96	0	4	102	1.06	0.69
<b>Camp duration (weeks)</b>	94	1	144	-----	16.64	21.28

Table 2: number of loggers and cooks working in the logging camps of which at least one person was interviewed, as well as data for time camps have been present at one place. The sum for camp duration is not given, since this number is not relevant for the analysis. N refers to the number of interviews collected that contain relevant information.

During the investigation 66 active logging camps were recorded in the Las Piedras river. Multiplying this number with the calculated mean number of loggers per camp (8.45; see table 2) results in an estimation of 558 loggers working in the Las Piedras river. This number does not include the loggers working further upstream than the tributary Bolognesi as well as the people working in the tributaries of the Las Piedras river.

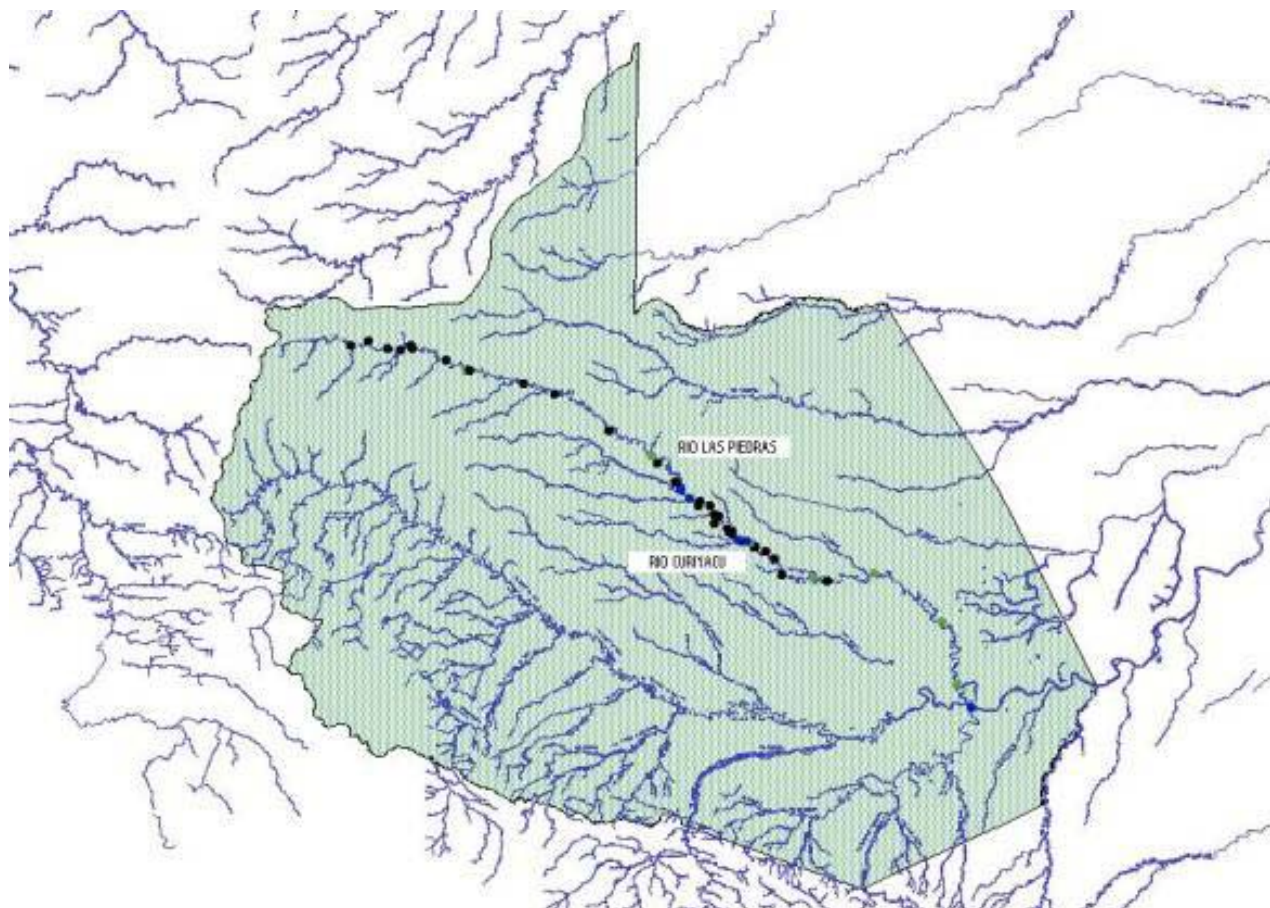


Figure 7: The department of Madre de Dios with GPS positions of encountered logging camps (black spots) in the Las Piedras river. The position of the Curiacu river, where loggers built a new port for timber trade, is shown.

### Mahogany extraction in Las Piedras

The number of balsas leaving the investigated camps per month was calculated as 106.5. 461,170 feet of mahogany are transported to Puerto Maldonado. The mean number of balsas constructed was 1.16 per camp and month and transported a mean of 4906,1 feet of mahogany.

	N	Min.	Max.	Sum	Mean	Std. Dev.
<b>Balsas</b>	92	0	5	106,5	1.16	0.8121
<b>Mahogany (feet)</b>	94	0	22,000	461,170	4906.1	3152.6

Table 3: presented is data for the number of balsas and amount of mahogany leaving the investigated logging camps per month. One foot refers to a piece of wood of 30cm length, 30cm width and 3 cm height. N refers to the number of interviews collected that contain relevant information.

### Loggers and un-contacted Indians

18.3% of all asked timber personnel have had a visual contact with voluntarily isolated living Indians. This is equivalent to 18 independent encounters and an absolute minimum number of total encounters, since the data is far from complete.

	N	Frequency	Percentage
<b>Yes</b>		18	18.3
<b>No</b>		78	81.3
<b>Total</b>	97	97	100

Table 4: refers to the interview question: have you ever seen voluntarily isolated living Indians. We clarified explicitly that we were not asking for camps or traces but actual visual sightings of a person. Frequency and percentage data is presented. N refers to the number of interviews collected that contain relevant information.

### Consider working in a timber concession?

83.3% of all 96 asked loggers explained that they considered working in a timber concession. However, this result can not be extrapolated to the total number of loggers working in Las Piedras, since the interviews were often conducted with the owner of the logging camp, who is likely to have different future plans due to his experience and financial background than the people working for him.

	N	Frequency	Percentage
<b>Yes</b>		80	83.3
<b>No</b>		16	16.7
<b>Total</b>	96	96	100

Table 5: timber personnel working in Las Piedras were asked if they consider working in the management of the forest inside a timber concession. The collected data is stated as frequency and percentage distribution. N refers to the number of interviews collected that contain relevant information.

### Do you like your job and do you want your son to become a logger?

Timber personnel did not have a substantial positive or negative opinion about their work. The mean stated value about how they like their work was 3.21, which is close to the indifferent answer of 3.0 and stays in sharp contrast with their opinion about the future for their sons. The mean value for their sons is 1.27 and strongly emphasized that the majority of loggers did not want them to become loggers as their fathers.

	N	Mean	Std. Dev
<b>Like work</b>	96	3.21	1.27
<b>Like son</b>	94	1.27	0.84

Table 6: timber personnel were asked to state how they like their job and whether they would want their sons to choose the same career. In order to quantify the response the loggers had to answer with a value of either 1, 2, 3, 4 or 5. 1 meaning horrible and definitely no respectively. 5 stating a very good job and definitely yes respectively. 2, 3 and 4 are intermediate values. People who did not have a son were asked to imagine that they have one.

The above stated trend is emphasizes when viewing the percentage distribution of the stated answers. Approximately the same percentage of people answered with 1 (10%) and 2 (17%) compared with 4 (13%) and 5 (22%). 3 (34%) was named most often than any of the other possible categories.

Do loggers like their work?

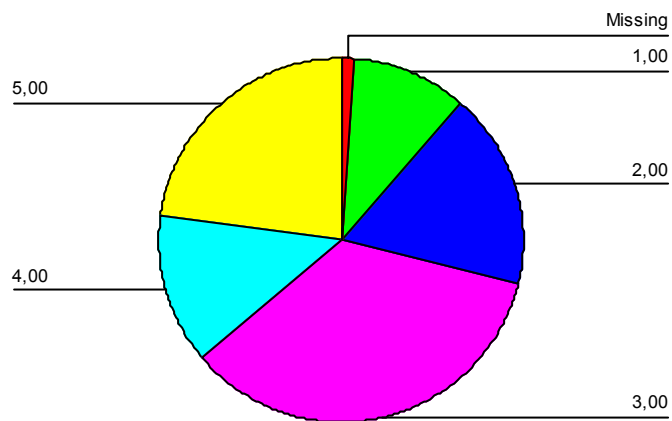


Figure 8: shows the percentage distribution of how timber personnel answered the above stated question regarding how they liked their work in the forest. 96 interviews did include information for this analysis, one interview did not (missing).The values of 1 to 5 refer to a scale, 1 meaning horrible and 5 wonderful. 2, 3 and 4 are intermediate values.

A large majority (88.3%) of timber personnel strongly objected to the idea of their sons becoming loggers. Only a small fraction was in favour of this idea and answer with 4 and 5 (1.0% and 3.1% respectively).

Do loggers want their children to become loggers?

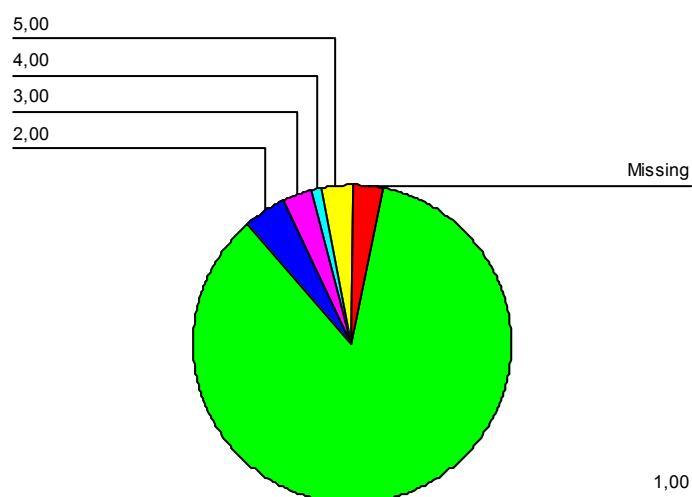


Figure 9: shows the percentage distribution of how timber personnel answered the above stated question regarding whether they want their sons to become loggers. 94 interviews did include information for this analysis, three interview did not (missing). The values of 1 to 5 refer to a scale, 1 meaning definitely no and 5 definitely yes. 2, 3 and 4 are intermediate values.

## Boat activity in Las Piedras

### *Objectives*

- estimate the number of people working in Las Piedras
- investigate the boat traffic in Las Piedras
- estimate the extraction of mahogany and other tropical timber

### *Methodology*

The activity of loggers travelling with boat or balsa was investigated from 01.05 – 21.09.2002. During May and June (Interview study) data was recorded while travelling with a boat. During July, August and September, sightings were recorded from a stationary camp that moved only when the mammal census group changed the sites. Data collection started at 5:30am and terminated at 4:30pm. This period coincided with sunrise and sunset respectively and was assumed to be the main travelling time. Before and after this time no data collection was possible due to lack of light. Motor sounds that were heard outside this period were recorded. The amount of wood transported with one balsa was estimated by counting the number of "tramos" (subunits of a balsa). One tramo was assumed to consist of a mean of 500 feet of wood. This assumption was justified by our guides who asked friends who passed our camp with a balsa about the amount of wood they transport in total and per tramo.

For one observation the following data was collected on a standardised data sheet. Observations were aided by a binocular.

- Time
- Number of boats
- Number of balsas and the amount (foot) of wood transported
- Driving direction
- Number of men, women and children on the vehicle
- Number and type of motor on the vehicle
- Number of cylinders on the vehicle
- Additional information like guns, bushmeat, food or tourists

### *Results*

During July 2002 data was collected at 26 days and 407 boats and 135 balsas recorded. The total amount of mahogany passing our camp was estimated as 569.800 feet. The market value (US\$) per foot mahogany in Puerto Maldonado (PEM) was approximately 7.0 Nuevo Soles (1 US\$ = 3.5 Nuevo Soles; July 2002). The data for the whole of July 31 days was extrapolated from the calculated daily average.



	Boats	Balsas	Mahogany (feet)	Market value in PEM (US\$)	Men	Women	Children
July (26 days)	408	135	569,800	1,139,600	1814	208	94
July extrapolated (31 days)	486	161	679,365	1,358,730	2164	248	118
Maximum (1 day)	20	15	61,500	123,000	161	29	12
Minimum (1 day)	6	0	0	0	22	1	0
Average per day	15.7	5.2	21,915	43,830	69.8	8	3.8

Table 7: Activity of loggers in the Las Piedras river in July 2002. Observations were recorded from a stationary post in front of the project camp.

The average amount of wood transported per balsa was 4220.7 feet. The number of people passing our camp in balsas and boats was counted as 1814 men, 208 women and 94 children. On average 15,7 boats, 5,2 balsas and 69,8 men were recorded every day.

The data for the remaining months is unfortunately not yet analysed and therefore can not be presented in this preliminary report.

## **Market study**

### ***Objectives***

- Investigate the species and amount of bushmeat available in the market of Puerto Maldonado
- Identify the different actors in the market
- Identify the areas from which the meat is extracted
- Create a profile of the actors
- Demand and supply; how they are influenced by the price.

### ***Methodology***

The market for bushmeat in Puerto Maldonado was investigated by Victor Berris and Nek Yuri Monroy Huarcaya from 01.08. until 30.09.02. Intermediaries in the market, people who buy meat from the hunters and sell it to the market, were interviewed either in their houses or at the port when they waited for new supplies.

The investigators were introduced to new actors in the market by a person of confidence who as well sells meat and therefore knows the other people. They introduced themselves as student of a local university and explained that they would collect data for their thesis. They explained the objectives to the people and arranged a date and place for the interview. Most of the interviews were conducted in private houses, which achieved privacy and aided the building of confidence. However, no one wanted their names to be recorded.

Selling bushmeat is an illegal activity, therefore interviews could potentially give biased results, as the actors in the market might fear disclosure of their activities. Yet to our knowledge, no person has been penalised for illegal commercialising and previous experience with interviews suggests such bias will be negligible (Victor Velasquez, pers. comm.). We therefore consider this approach as useful and valuable.

The interviews were discussed with Caesar Ascorra (Conservation International - Peru) who has previously conducted an investigation into the bushmeat market in Puerto Maldonado.

### ***Results***

No data has been analysed so far but will be presented in the final report

## Final Word

We would love to hear your comments on this report to improve the final report via an active discussion about the collected data. Data that has not yet been analysed will be processed soon and as soon as possible given out to interested parties. Please do not hesitate contacting us

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## Appendix I

### GPS positions of camps

Transect A & B:        S 12<sup>0</sup> 03.401'  
                              W 069<sup>0</sup> 31.705'

Transect C & D:        S 12<sup>0</sup> 02.786'  
                              W 069<sup>0</sup> 40.604'

Transect E & F:        S 12<sup>0</sup> 18.976'  
                              W 069<sup>0</sup> 16.270'