Expedition Report

Proyecto Ashaninka
Peru, Summer 2004

Patrons: Mark Collins, Sir Ranulph Fiennes

Biological Field Expedition
to the Ashaninka Communities of
Coriteni Tarso (Rio Tambo) & Camantavishi (Rio Ene)

Members:
William Yupanqui Cuadros, Michael FitzPatrick,
Jessica Rodrigo López, Kim Maynard,
Mago Medina Müller, Jessica Bravo Paico,
Matt Shreeve, Emilie Stephenson.

www.srcf.ucam.org/ashaninka/
Contact Email Address:
Proyecto.Ashaninka (at) gmail.com

Above photo: Osteocephalus nov. sp., a species of the family Hylidae, discovered by the Expedition (TBC). Cover photo: Cochranella parijarensis, discovered by the Expedition. Below Left: Hardwood tree stump left by loggers, framed by Parijaro waterfall. Below right: The Ashaninka community of Coriteni Tarso, leading to the plateau and eventually the Ashaninka Communal Reserve.

Abstract

The expedition to the Ashaninka communities of Coriteni Tarso, Camantavishi and Shirampari in the summer of 2004 carried out a number of studies; primarily herpetological surveys but also vegetation, soil and hunting surveys. The work was carried out in little known areas where no previous systematic studies had been completed.

The expedition recorded frogs and a snake not previously found in the department of Junín[1]. The expedition discovered at least one new species (to be registered as Cochranella parijarensis).

Future Research Opportunities

There is great scope for follow up work in this area. This expedition has shown the potential for collaborative work between the Ashaninka, Peruvian organisations and universities and others. Developing ongoing partnerships would be of benefit to all.

Further work could be done for any of the studies outlined in this report. In particular:

- Since there is evidence of endemic species, species capture and recording is likely to be a fertile area for further work. More surveys need to be conducted at specific sites over long timescales, to compile complete species inventories.
- Studies comparing several different areas and habitats need to be conducted to examine the nature of the community heterogeneity that our results hint at. These studies could have important implications for management of the area, and for wider amphibian conservation efforts.
- With changes in land use, development and ecotourism likely in the area in the coming years, comparative studies need to be conducted to examine the effects on herpetofaunal communities. Our work can be used as a simple baseline for certain comparisons.
- Water quality analysis is an interesting and important area for further work; the use of such analysis for signs of illegal activities[2] is a stated need, and our results from inside the community areas were of considerable interest.
- Understanding Ashaninka hunting activities and animal stocks of the area would provide input into management plans and guidance for the communities.

There is a need for an analysis of the economic activities of the Ashaninka communities as well as potential opportunities, assessing their long-term viability and impact.

Coupled with economic analysis, research into natural resource management (including hunting activities and animal stocks as above) for the Ashaninka

[1] Frogs: Eletutherodactylus altamazonicus, Eleutherodactylus fenestratus, Eleutherodactylus ockendeni (not previously published), Phyllomedusa camba, Phyllomedusa tomopterna, Allobates femoralis, Epipedobates macero, Hyla rhodopepla and Ischnocnema saxatilis. Snake: Leptodeira annulata.

[2] Such as cocaine production.

community areas and Ashaninka Communal Reserve would be of great benefit to the people that live there.

Well-funded and longer expeditions should aim to enter the Ashaninka Communal Reserve for biodiversity studies. Leading up to a 3000m plateau, the flora and fauna are expected to be very different. In the region called mayoventi there are supposed instances of 1000m deep canyons and natural bridges which would be of interest to kast specialists.

Contents

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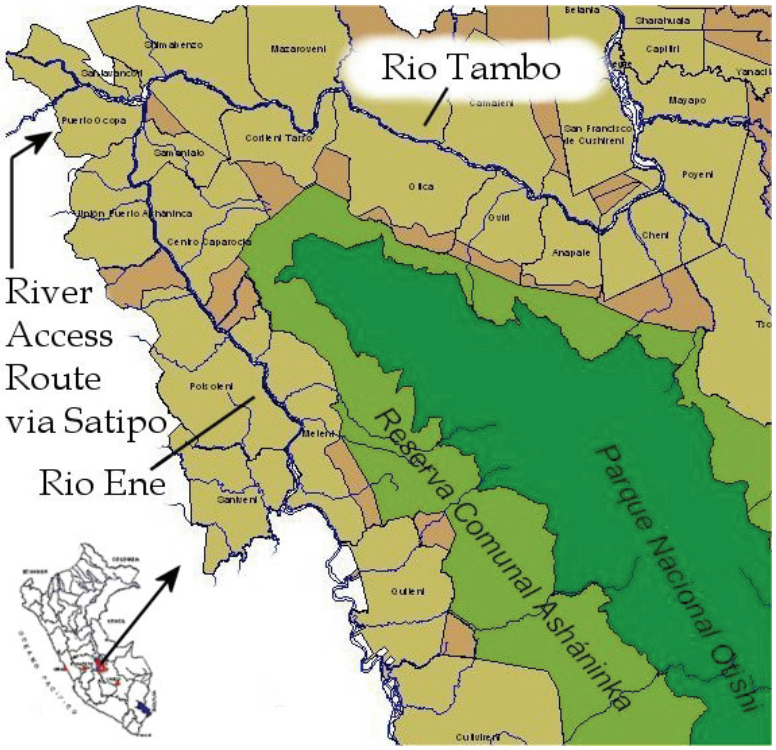
Introduction

The expedition destination and aims arose out of discussions between Dr Cath Long of the Rainforest Foundation UK (RFUK) and Matt Shreeve in July 2003. Early interest called for a 'worthwhile' project to complete in South American rainforest, ideally involving an adventurous or exploratory element, probably involving scientific research. The intention was to plan and fundraise during the academic year 2003/04 and complete the expedition during that summer. One of the peoples that the RFUK works with and for is the Ashaninka, and their under-studied homelands met the requirements as outlined above. It was clear there were real tensions on the societal and environmental aspects from recent and ongoing change, such as the demise of terrorism, rise of logging and arrival of colonists.

After a long campaign to fighting for land rights for the Ashaninka and Machiguenga people, the Ashaninka and Machiguenga Communal Reserves and Otishi National Park were established in January 2003. The Communal Reserves surrounded the National Park, and themselves surrounded by the Ashaninka and Machiguenga communities. Each community, encompassing villages and farming and hunting land, is termed a community area. The scope of the expedition included the possibility of providing scientific input to the Ashaninka Communal Reserve Management Plan, which was being developed to establish the expected usage and demands on these lands.



Map 1: Otishi National Park (ONP) and Ashaninka Communal Reserve(ACR), the communal areas (light brown) and free settler land (pink), and their relation to the Rio Tambo and Ene. Insert: Peru showing the location of the ONP and ACR

Initial expedition ideas were developed further once a team had been found through the Cambridge University Expeditions Society. A multi-disciplinary team was

recruited to provide biological and geographical expertise, as well as experience of Peru and tropical forest expeditions. This was particularly important for the development of the project, since the project's aims had to evolve from general aims of baseline biological fieldwork to firm, realistic plans whose outputs would be useful.

Since we were proposing the first, systematic study in the Ashaninka Communal Reserve area we faced constant uncertainty as to what would be possible within the limited amount of time and resources that we expected we would have. We were aided by being introduced to an RFUK part-funded organisation, 'Asociación para la Conservación del Patrimonio del Cutivireni' (ACPC), a Peruvian non-profit-making NGO, with well established relationships with the Ashaninka.

Since the Communal Reserve covers an enormous area of almost 184500 hectares it was proposed to survey two sites in great detail, rather to try and cover more area but do less survey work. Access to the two sites would be via Ashaninka community areas. A full study in all habitats in the region was far beyond our scope, but two sites would allow some sort of comparison. The selection of interesting and important sites was our major concern, as this would increase the legitimacy of our work. We had been informed that there was great potential for Ashaninka communities to develop environmental and social tourism ventures, utilizing their culture, the remote rainforest and geological features, such as waterfalls. These aspirations were being supported as an alternative to potentially more destructive forms of activity such as legal and illegal logging, slash and burn agriculture for cash crops and growing coca. We could therefore select rainforest sites seen as potential ecotourism destinations and which might experience significant use and/or development in the foreseeable future. Given a fixed site in the rainforest it was possible to design a survey that might then be replicated in the future and results compared. This approach could become the basis of environmental impact assessments which might measure damage or degradation of the rainforest over time.

The expedition's aims were to perform systematic, systemic surveys and inventories of the frog and reptile communities at two sites in the Ashaninka Communal Reserve. Additional surveys were planned, including vegetation and geological, to provide a contextual basis to the frog and lizard relative abundance surveys.

With a clearer plan Peruvian counterparts were recruited on the basis of interest and aptitude in our aims. Very quickly a team formed that provided much greater clarity on what we expected the expedition to achieve.

We were advised by ACPC that suitable sites were available via the community of Coriteni Tarso on the Rio Tambo, and the community of Camantavishi on the Rio Ene. Waterfalls were the ecotourism attraction, which meant that surveys could be completed both at the waterfall and upstream to account for change not caused by tourism, but rather natural change over time.

As envisaged, our plans changed in the field. Capabilities offered by counterparts enabled the collection of voucher specimens of the species we encountered, and all frogs and lizards to be identified. We were also able to collect and identify some plant

species in the area. The expedition actually remained within the community areas, although the second site bordered the Ashaninka Communal Reserve, in order to target sites with better accessibility, which in hindsight was logistically a valid reason.

Summary of Surveys Completed

Coriteni Tarso (Waterfall Site)	Frog and Lizard Surveys – Diurnal and Nocturnal, Riparian and Randomised Forest Transects Vegetation Surveys Soil Surveys River Cross-sections and Flow Measurements Mapping Project Water Quality Surveys
Coriteni Tarso (Community)	Initial study into the hunting practices of the Ashaninka [1]
Camantavishi (Waterfall Sites)	Frog and Lizard Surveys – Diurnal and Nocturnal, Riparian and Randomised Forest Transects Vegetation Surveys Mapping Project Water Quality Surveys [2]

[1] The hunting surveys were conducted in response to observing few small and large mammals, yet a high propensity for the Ashaninka to hunt whatever is found. Understanding stocks of birds and mammals, and hunting dynamics, would enable understanding of the impact of hunting on longer term animal populations.

[2] The water quality surveys were conducted using a kit with a standard range of tests. These water surveys were extended to include significant waterways leading into the Rio Ene, as part of a new project by ACPC in an effort to determine the extent of ongoing illegal cocaine production by colonists.

Field Methods – Frog and Lizard Surveys

Background

No scientific research had been done in either the ACR or in the community areas, and ACPC, through the Rainforest Foundation, requested that we conduct baseline biological surveys to form the scientific basis for the management plans of the ACR and the communal areas, and to guide future research in the area.

With such a wide original remit, and considering the remote locations and the relative lack of local resources, it was necessary to narrow down the work to just a few taxa, and a couple of locations. We decided to focus primarily on herpetological surveys, for several reasons. Amphibians are relatively poorly known compared to other vertebrates, and due to their dependence on water for reproduction, their distribution can be confined to a small locality. The permeability of their skin and the aquatic larval stage seems to make them vulnerable to changes in microhabitat, and the introduction of pollutants. Global declines in amphibian populations has raised massive concern, particularly the spread of chytridomycosis (Young et al., 2001).

It was also important to be able to identify the species, both rapidly in the field and in a museum. For this reason invertebrates were not chosen. The avifauna of nearby regions has been well studied in long-term projects (Terbough, 1971) and a short-term study would add very little to what is already known. Tropical forest mammals are relatively well known, but widely dispersed, and the short timescale combined with the difficult and unknown terrain would make searching for mammals a time consuming and possibly fruitless experience. Several keys of Neotropical amphibians and reptiles exist, although there is no specific Peruvian guide.

We were aware that we would need specialist help, and were able to work with two Peruvian herpetologists, Margarita Medina, a frog specialist, and Jessica Rodrigo, whose interest lies in reptiles.

We requested and received advice on the project from a number of people. Robin Foster, Ivan Brehaut and Professor Oscar Tovar were able to inform us about the area and previous scientific work, and suggest the best paths for research. Dr. Michael Roy and Dr. Timothy Bayliss-Smith gave advice on the overall project aims. Dr. Stefan Lötters (Universität Mainz, Germany) gave advice and references regarding Neotropical amphibians. Dr. Edmund Tanner (Cambridge University) helped us develop the project, and gave invaluable advice.

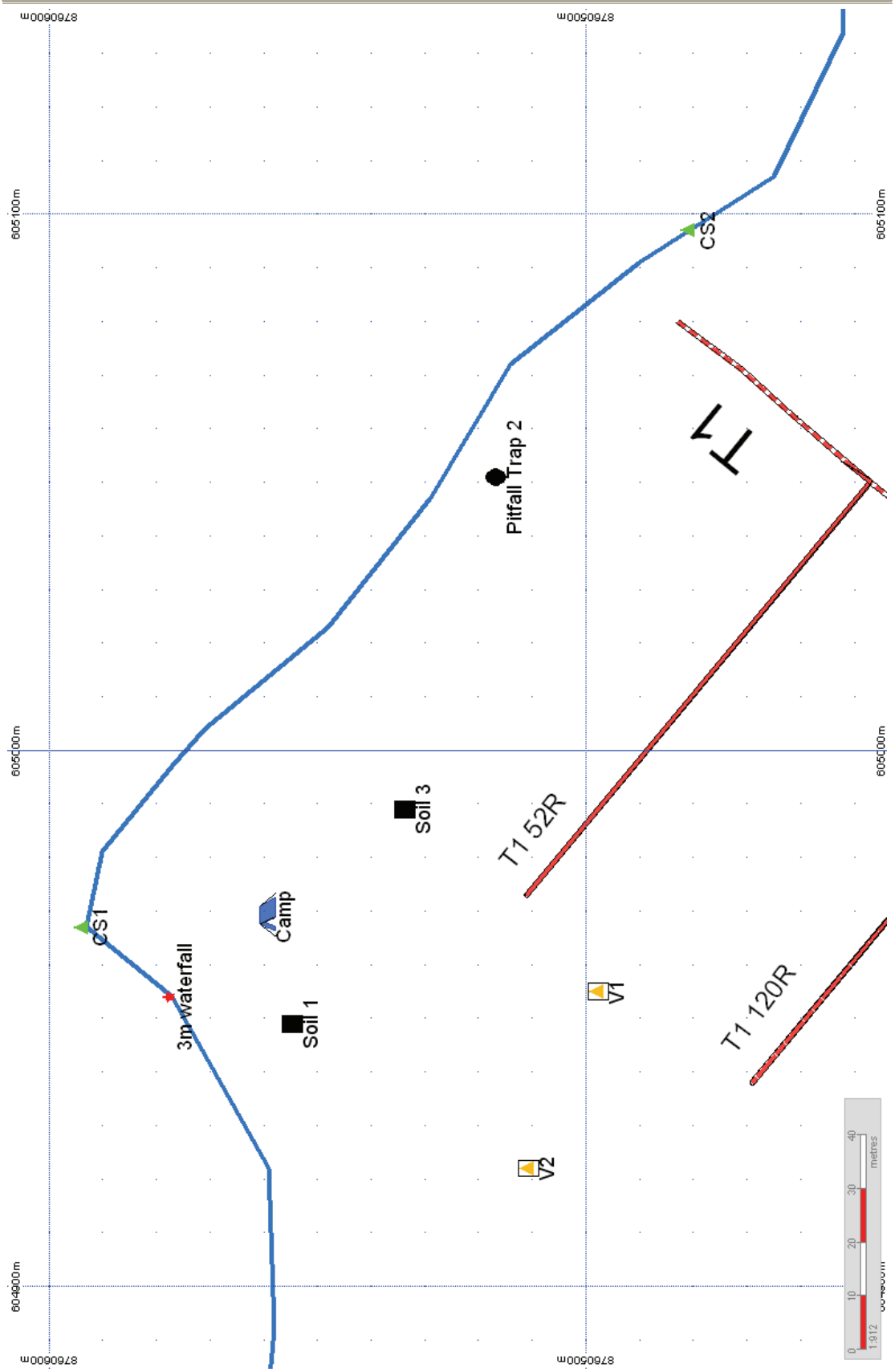
Frog and Lizard Surveys

Visual Encounter Survey (VES) Transects

Our original plan was to have paired transects beside the stream and in from the river around the potential ecotourism location, as well as transects in a control region upstream of the site, which would allow meaningful assessments of impact in the future as this control region would show the natural changes with time. Unfortunately the terrain was far steeper and rockier than we had prepared for, and our original

method was not practical or possible. We decided to conduct a semi-quantitative survey technique concentrating on the riverbanks of small streams, and cut transects in the forest.

Forest Transects (Crump and Scott, 1994; Bennett, 1999; Halliday, 1996)
At Coriteni 2 transects were made, one on each side of the stream [N605080 E8760483]. For each a 500m main access trail was cut perpendicular to river. It was cut just wide enough for easy access at night. 6 survey trails of 100m were cut perpendicular to the main access trail at chosen random distances along it. These were cut sufficiently to allow safe access and to give good visibility at least 2m to each side. The main access trail and survey trails were marked with fluorescent marker tape at 10m intervals, and the distance for the start and the name of the trail were marked on the tape. After cutting and marking the trails, they were left undisturbed for at least two days before surveying, to allow the animals to become accustomed to the disturbance caused by cutting the trails. In Cutivireni we only had time to cut trails at the Parijaro site. There was only a narrow strip of forest between the river and the cliffs of the mesita and we wanted to limit trail cutting as much as possible. We cut 6 shorter transects of 25-50m from an existing, but overgrown jungle path, and surveyed these.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T1
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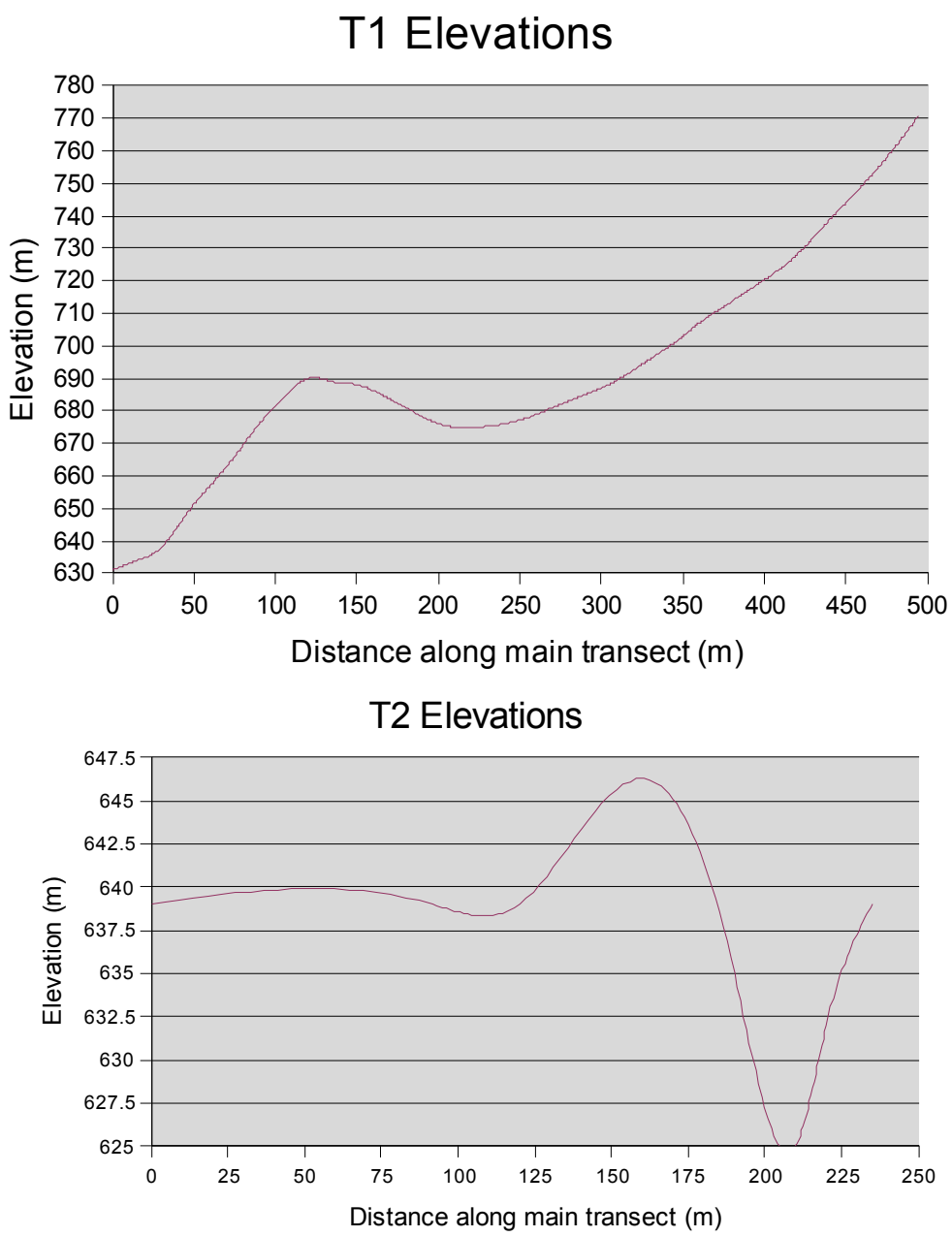


Coriteni Tarso diagrammatic maps (complete area and inset) and transect elevations.

Each of the Coriteni transects was surveyed 3 times, 1 diurnal survey (starting between 10.20 and 17.10) and 2 noctural ones (starting between 19.36 and 23.15). We had originally planned to survey each transect twice during the day, but almost nothing was found in the first set of diurnal surveys, and we deemed it a poor use of our time to repeat these. A pair of searchers conducted each survey, typically each searching one side of the trail. The searchers were equipped with powerful headtorches and backup handheld torches for night surveys.

Before each survey began the temperature and humidity were measured using a digital pen-type thermo-hygrometer, the presence of cloud or precipitation were noted along with the start time. The searchers then moved slowly and quietly along the trail,

looking on all leaves and stems up to two metres above the ground, and through the leaf litter using a stick. We aimed to cover a 100m transect in about an hour.

Once a frog or reptile was seen, it was captured by hand. The exception was snakes, which were not captured, except by Margarita Medina and Jessica Rodrigo, who were confident in their ability to discriminate poisonous from harmless species. When an individual was captured, it was placed inside a plastic bag with some leaves for cover, a little water to avoid dehydration (but not sufficient to allow drowning) and the bag was tied with air inside. The time of capture, the substrate the individual was found on and the height above ground (nearest 10cm) were recorded. At first we measured distance with a tape measure, but found that after some practice that distances under 2m could be estimated to the nearest 10cm, which also sped up transects. The end time of the survey was also recorded. The same transect was not surveyed twice in a day, again to let the behaviour of the wildlife return to normal after the disturbance.

Stream surveys and other locations

The stream sections needed little preparation. The streams were relatively shallow, and it was easy to wade in the water. Access paths to sections further upstream were cut at both Coriteni and Cutivireni, which allowed faster and safer movement at night. At the Parijaro site in Cutivireni we surveyed a large stretch of river, and so 50m sections were marked with fluorescent marker tape to avoid searching an area twice. In Coriteni natural landmarks could be used to recognise areas of the river without the need for marking.

Some of the trails were also surveyed using this protocol, as were several areas where we thought we would find different species, such as a swampy area near the Coriteni camp, and a small stream by the Rio Ongonoshari in the Cutivireni area. These were searched in the same manner, but without any prior cutting in the area, or selecting areas randomly.

Opportunistic captures

Finally we made sure we were constantly searching for frogs and lizards in the day, whilst conducting other activities, or moving along paths. These opportunistic captures augmented our final species list, particularly for the reptiles. We arbitrarily assumed that each opportunistic capture was as a result of 1 person-hour searching, which allowed us to factor in these finds into our species-effort analysis.

Pitfall Traps (Bennett, 1999; Halliday, 1996; Corn, 1994)
These traps can augment species lists from visual encounter surveys, particularly in species which dwell in the leaf litter, which can be harder to spot, and are therefore underrepresented by VES methods. We planned to position a trap system at each camp, though we decided not to use the traps in Cutivireni because of their poor success in Coriteni.

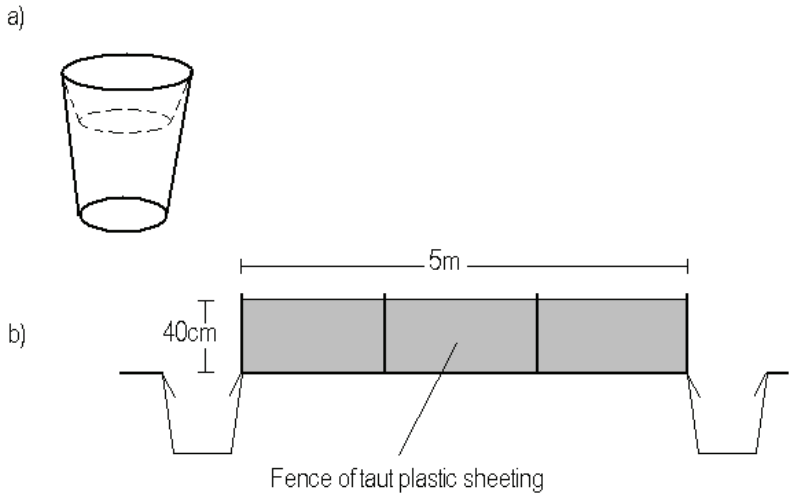


Figure 1: a) The bucket design with a plastic basin inserted to stop caught animals escaping. b) A lateral profile of the pitfall design, showing the fence between two sunken buckets.

The traps were made from plastic buckets 40cm in diameter, and 60 cm deep. A plastic basin 15cm deep, with the base cut out was placed in the top, which formed a lip which animals would not be able to climb up past (Fig 1a). These were sunk until the tops were level with the ground. Between each bucket a 5m length of 0.5m wide translucent plastic sheeting supported by sticks and pegs formed a fence, flush with the ground, which would stop the movement of small animals, and encourage them into the traps. There were 4 buckets in each trap system, which were arranged in either a 3-pointed star formation (Corn 1994), or a zigzag pattern depending on the space available (Fig 2b). These were placed near water, where the ground was soft enough to dig, and where we thought frogs might be present [N605223 E8760392]. Once the trap system was set, it was checked every morning between 8 and 10.

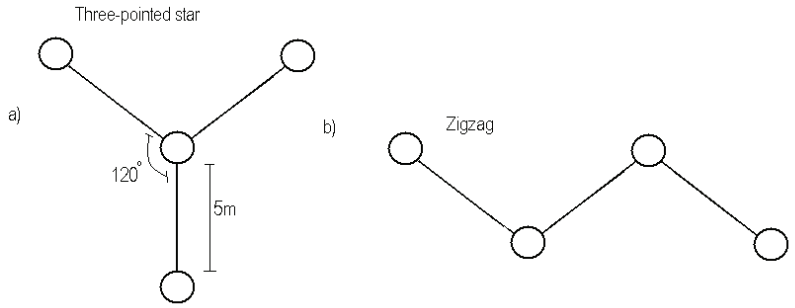


Figure 2: a) a bird's eye view of the "three-pointed star" trap system. b) a bird's eye view of the "zigzag" trap system

Individual analysis

Each individual that was caught was brought back to camp for further processing. The weight was measured with either a 30g or 100g pesola (to the nearest 0.25g), and the SVL was measured with dial calipers (to the nearest 0.1mm). The sex was determined where possible by the presence of nuptial pads, vocalisations, or egg-laying.

There is no definitive key or field guide to the frogs and reptiles of Peru, so individuals were identified using keys and annotated checklists for the Iquitos region (Rodríguez and Duellman, 1994) and Tambopata region (Cocroft, Morales and McDiarmid, 2001) of Peru, and for Amazonian Ecuador (Duellman, 1978). We described each species following the format set out in Guide to the Frogs of the Iquitos region (Rodríguez and Duellman, 1994).

If the individual was thought to be a new species for the area, a specimen was taken. First a photographic record was taken to capture colours in life, using a Canon EOS 30 with a Sigma 105mm macro lens, and a Centron MR20 ringflash. Print film was used because of the ease of printing in Peru, and the extra exposure latitude afforded by the film was advantageous with such close-up work in dark environments. Dorso-lateral and ventral pictures were taken of frogs, and Dorso-lateral and dorsal pictures were taken of lizards, was well as close-ups of male dewlaps. The animals were then anaesthetised and killed using Orajel® Maximum Strength Gel (benzocaine 20%) rubbed onto the head and back for the frogs, and an injection of ketalar (0.1ml of ketamine hydrochloride) for the reptiles. Specimens were then arranged in a weak formaldehyde solution for 2-3 days, before being transferred to 70% alcohol. Although we had reservations about fixing specimens in formaldehyde, a potent carcinogen (Bennett, 1999) it was the preferred method of the Museo de Historia Natural de la Universidad de San Marcos, and so we adhered to this protocol. As a safety procedure, all work with formaldehyde was conducted with latex gloves, and in a well ventilated area.

Specimens were taken to the Museo de Historia Natural de la Universidad de San Marcos, where they were identified by Margarita Medina and Jessica Rodrigo, with help from Dr Víctor Morales (Texas A&M University), Dr Lily O. Rodríguez (CIMA – Cordillera Azul), César Aguilar (Museo de Historia Natural de la Universidad de San Marcos) and Karl-Heinz Jungfer (Germany).

Analysis

Excel was used to arrange the raw data, and generate the variables of search time (person hours) and cumulative species total. Species individual and species effort accumulation curves were plotted to estimate the completeness of the inventory. Catch per unit effort was calculated to give an estimate of relative abundance between different areas. Histograms of the relative abundance of different species in Coriteni and Cutivireni were plotted to compare the community structure in the two areas.

Field Methods – Plant Sampling, and Vegetation, Storm Hydrographic and River Transects

Tropical forest structure is highly heterogeneous due to the many plant forms that can be present, which make it difficult to categorise. Our study area as a whole can be loosely categorised as humid to premontane tropical forest. However, humidity, soil type, soil moisture, and exposure to sun and wind vary widely, due to the steep terrain. This is mirrored in variations in the forest structure in the area, and even in the few kilometres square that we studied; we noticed a wide range of distinct environments. We expect that this variation is widespread, and may be an important factor affecting the distribution of animal and plant species.

We wanted to categorise the structure of the forest using a quick and simple survey that could be represented in a pictorial form, so that the key differences between these micro-habitats could be examined. Sites were chosen that were felt to be representative of the habitat type, and were near areas where herpetological surveys had been carried out.

Plant samples

Tropical plants are notoriously difficult to identify due to the myriad of species present, and the wide variety of families with convergent growth forms. However we were able to secure the services of "Miguel Chocce", a Peruvian plant taxonomist. We therefore decided to opportunistically collect samples of plants in our survey areas.

Plants were only collected if there were fruits or flowers present, as these aid identification. The height was recorded for small plants and saplings, and the height was estimated and the diameter at breast height (dbh) measured for trees. A description of the growth form, bark and location were made, and a sample of the flower or fruit, the leaves and the stem were brought back to camp. The samples were described by Michael FitzPatrick and Mago Medina, with particular attention to the colours of the reproductive structures in life, and the arrangement of delicate parts. The samples were then pressed between newspaper for several days, before being soaked in 50% alcohol.

There were logistical problems carrying equipment to the Cutivireni sites, and so the plant sampling was limited, and focused mainly on the flora surrounding the Parijaro waterfall. The Parijaro stream drains the mesita (tabletop hill) to the south of the Rio Cutivireni, and over time has cut a bowl-shaped canyon about 300m high. The stream spills over the edge into a large pool surrounded by bare boulders. This area is almost constantly wet from spray. For 200m around the pool there are no trees, instead there are dense patches of low lying bushes, grasses, and stunted trees. The vegetation forms a dense matt, 60-80cm high, with trees in sheltered positions reaching 2m. The habitat here is unique, as the waterfall and surrounding rock walls make this a wet and cold location, and seasonal flooding create regular disturbance. We decided to focus an afternoon characterising the vegetation and collecting plant samples in this very different, and (as waterfalls of this magnitude are uncommon) rare location.

Interestingly, the vegetation at the top of Parijaro was not noticeably different to that 300m below, and certainly not 'Andes mountain vegetation'. This contrasts with anecdotal evidence received prior to the trip.

Vegetation Transects

A twenty-five metre tape measure was laid along the ground in a straight line (by observation). In each metre the substrate and any plants present were recorded. Plants were classified by type, leaf size, height, circumference, and any other plant life present[3].
Type – Herbs, Ferns, Palms, Saplings, Trees. By observation.
Leaf Size – Small (0-15cm along long axis), Medium (15-30cm along long axis), and Large (>30cm along long axis).
Height – Using a metre rule up to 2m.
Circumference – Using a tape measure.
Other plant life present – Moss, Lichen, Climbers, Lianas, Epiphytes. By observation.

At a randomly selected point along the transect, leaf litter was collected from a 50x50 centimetre area, dried if necessary, and weighed. The height of the canopy was measured using a clinometer. On transect number 5 due to the individual nature of the dense vegetation; a new classification was introduced to give an idea of the amount of "thicket" present.

Data Sample:

Distance (m)	Substrate	Under storey plants							
		Herbs		Ferns		Palms		Saplings <2m	
0-1	Leaf litter with rocks	25	s					25	s
								85	s
1-2		20	s	45	s			90	s
		15	s	15	s				

Etc…

The following transects were completed:

Label	**Site**	**Location**	**Bearing (degrees)**
V1	Coriteni Tarso	Behind Camp	258
V2	Coriteni Tarso	Behind Camp	344
V3	Coriteni Tarso	T1@249L	50
V4	Coriteni Tarso	T1@249L+20m	16
V5	Coriteni Tarso	T2 Scrub	330
V6	Coriteni Tarso	Parallel to trail to Pitfall Trap 1	340
V7	Coriteni Tarso	Pitfall Trap 1	282
V8	Coriteni Tarso	T1@52R+10m	20
V9	Coriteni Tarso	T1@52R+90m	191

[3] Circumference and other plant life were not recorded in all cases.

V10	Coriteni Tarso	Perpendicular to River, near start to T1	227
V11	Coriteni Tarso	Near Camp, between Clay Soil pit and Swamp	276

Storm Hydrograph

Creating a storm hydrograph consists of measuring two elements during a storm event; precipitation, and river discharge. Unfortunately we did not have the apparatus to determine the water velocity as it changed. Instead, we measured the rise in water level during and after the storm event.

Precipitation: Using a rain gauge, accurate to 1mm, placed in a location along the river where access to the sky was clear so that measurement of rainfall would not be distorted by interception by vegetation. Precipitation was measured every 30 minutes and the rain gauge was emptied regularly due to the accuracy of the gauge decreasing with an increased amount of precipitation.

Water Level: Using a long stick marked with centimetre intervals, firmly fixed in the river bed, the water level was measured every 30 minutes.

Data Sample:

Time from start (hrs)	Water Level (cm)	Precipitation (mm)
2.0	142	4.25
2.5	142	3.50

River transects

A tape measure was stretched across the transect to be measured and firmly fixed at either end ensuring that the tape measure was horizontally level by the aid of a spirit level. Every 10 centimetres a measuring rule was used to measure the distance from the tape to the river bed, and the depth of any water present. The nature of the substrate was also noted, along with any vegetation present.

Data Sample:

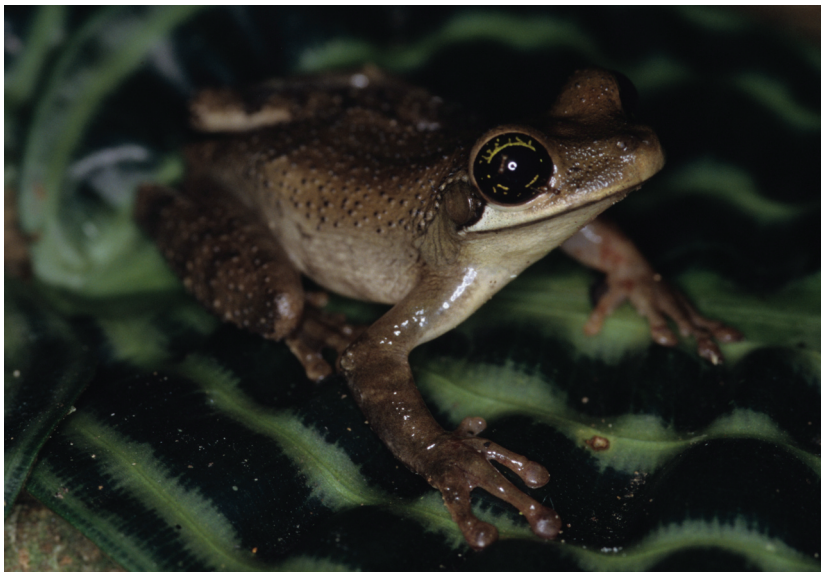
Distance along transect (cm)	Distance to river bed (cm)	Depth of water (if present) (cm)	Nature of substrate
270	110	45	Small pebbles
280	115	50	Small pebbles

Results – Frog and Lizard Surveys

Specimens and the species inventory

We took a total of 73 specimens from Coriteni, and 39 from Cutivireni. Most of these were thought to be different species in the field, although after comparison with voucher specimens in the Museum, many specimens, particularly the Eleutherodactylids, were found to be of the same species (mainly Eleutherodactylus altamazonicus and Eleutherodactylus peruvianus). We deliberately took more specimens of a number of species which showed extensive intra-species variation (Bufo typhonius group, Ischnocnema saxitilis, Anolis fuscauratus, Kentropix altamazonica), and species which we believed to be new to science (Osteocephalus nov. sp., Osteocephalus sp., Juvenile Hylidae sp.). Although most of the specimens had been classified by January 2005, 17 (12 of the genus Eleutherodactylus, and 5 of the genus Osteocephalus) have not been identified to species as yet.

We have identified at least 31 species from the samples we took from the field; 21 anuran species, 6 lizard species, and 4 species of snake. This number may increase as the 17 unidentified specimens have been assumed to be of only 2 species in our analysis (Eleutherodactylus sp. and Osteocephalus sp.), and further examination may reveal that these preliminary groups are formed of several species. A list of the species and specimens taken is included in Appendix 7. Of the species positively identified, 2 of the anuran species may to be new to science, and are currently being described. Osteocephalus nov.sp. will be confirmed by Dr. Karl-Heinz Jungfer, a recognised expert in the genus, and Cochranella sp. was confirmed a new species from our photograph by Dr Lily O. Rodríguez and Margarita Medina.



Osteocephalus nov. sp., what is thought to be a new species of tree frog found in Coriteni Tarso

One species, Ischnocnema saxitilis, is new to the Junín region. César Aguilar and Dr Morales confirmed Margarita Medina's preliminary identification. Previously this species had only been documented in the San Martín region, 350km to the North (Duellman, 1990).

Other frogs species new to the Junín region are:

- Eletutherodactylus altamazonicus
- Eleutherodactylus fenestratus
- Eleutherodactylus ockendeni (found, but not previously published)
- Phyllomedusa camba
- Phyllomedusa tomopterna
- Allobates femoralis
- Epipedobates macero
- Hyla rhodopepla

One species of snake, Leptodeira annulata, is thought to be new to the Junín region.

Species accumulation curves

To estimate how complete our inventory was, we calculated species effort curves, using person searching hours as a measure of effort, and assuming that each opportunistic capture of an animal was from an effort of one person hour. We also calculated species individual curves as another measure of the completeness of the inventory. These were smoother and clearer relationships, as some noise in the species effort curve was due to surveys in areas where no individuals were found at all.

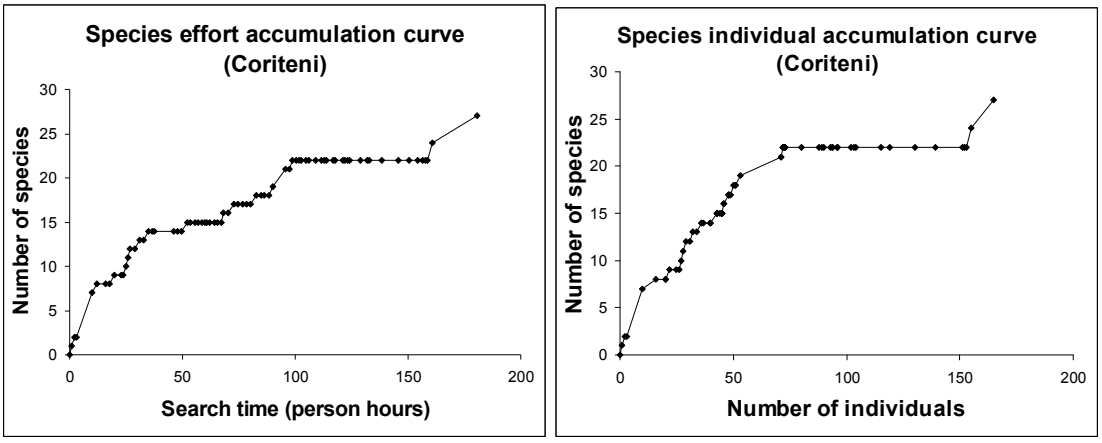


Figure 3: Species effort and species individual accumulation curves for the Coriteni Area. Both show a roughly asymptotic shape, indicating that the majority of the species present at that time of year were found. The sharp rise at the end of the graph is from 2 nights of surveys at a different location, next to the Rio Tambo.

Figure 3 shows the species accumulation curves from the Coriteni area. The total number of species approaches an asymptote, indicating that most of the species present at that time were found. The sharp rise at the end of the graph is from 3 species found by the Rio Tambo, next to the community of Coriteni, after we had left the main study location. This has been included to show that although most species at the study site were found, different species can be found in the different littoral environment only a few kilometres away.

Figure 4 shows the species accumulation curves from the Cutivireni area. There is no indication that the relationship has reached an asymptote, indicating that the true number of species in the area is much greater than the 15 found. More survey time would have allowed us to find more of the species there. We had planned to spend 20 survey days in the Parijaro region, however due to logistical and political problems,

we were only able to survey for 8 days in Parijaro, and 4 days at Ongonoshari, our second choice location in the region.

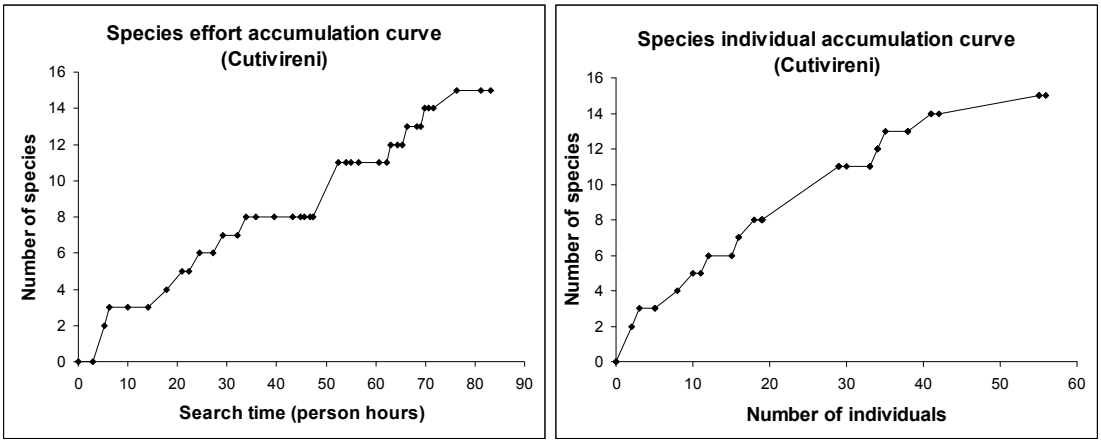


Figure 4: Species effort and species individual accumulation curves for the Cutivireni area. Neither curve is approaching an asymptote, indicating that more than the 15 species found are present in the area, and that further work will discover more species in this locality

One important factor affecting species inventories and diversity is the area surveyed. A species area accumulation curve would show the effect of area on α diversity, but due to the number of opportunistic captures, where there is no measurement of the area searched, the curve would not be informative. However, the β diversity can be examined by combining species accumulation curves of 2 different habitats, which will indicate the increase in the total number of species when a new area is added. The sharp rise at the end of the curve of Figure 3 shows the affect of additional sampling by the shore of the Rio Tambo, and the mouth of the Rio Pietini, less than 2 kilometres downstream of our study area. The two areas are separated by steep hills, and a waterfall along the Rio Pietini.

Figure 5 shows the species accumulation curves of the Coriteni and Cutivireni sites combined. Over a quarter of the species found in the Cutivireni site were not found in our near exhaustive inventory at Coriteni, 85km away. These both indicate that slightly different habitats relatively close to one another can contain very different species.

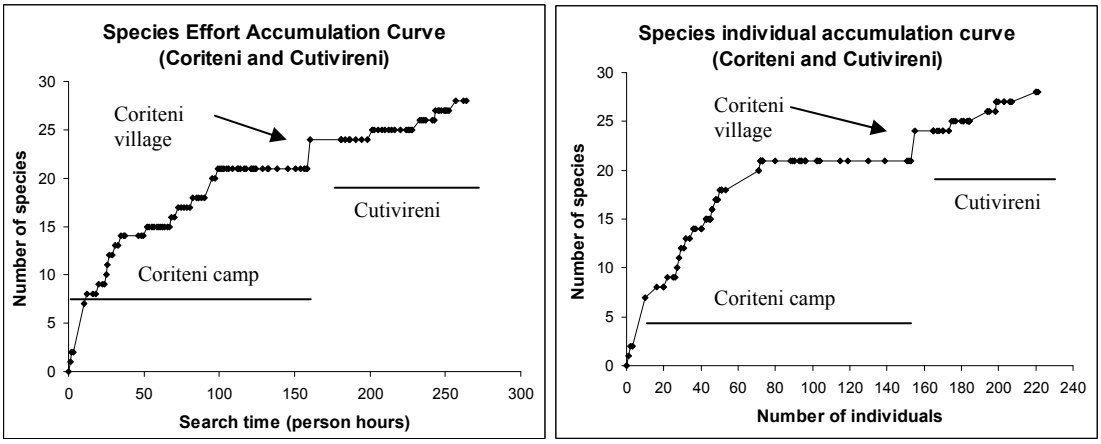


Figure 5: Species effort and species individual accumulation curves for both the Coriteni and Cutivireni areas. The Coriteni species are shown first, and the

accumulation curve is roughly asymptotic to 160 person hours or 155 individuals. There is then a sharp rise from the short surveys in Coriteni village. The addition of the Cutivireni data increases species number, and there is no sign of the curve reaching its asymptote.

Surveys

12 100m transects were surveyed in Coriteni, twice in the day and once in the night. The mean survey length was 52.4minutes, indicating searchers were moving at about 2m/minute, a suitably slow speed to notice most of the animals along the transect. Surveys were conducted in the day and in the night, and surveys were also conducted along trails, streams and other areas. To compare these different sites, Catch per unit effort was calculated for the different types of transect in Coriteni (Table 1), which gives an estimate of overall population densities in the areas.

Area	Transect Type	Catch per unit effort – CPUE (individuals/person hour)
Coriteni	TrA (day)	0.10
	TrA (night)	0.57
	TrB (day)	0.08
	TrB (night)	0.26
	Stream (Coriteni)	1.57
	Opportunistic Capture	1.05
	Other surveys (trails, etc)	0.70
	All types	0.91
Cutivireni	All types	0.67

Table 1: Catch per unit effort (CPUE) in different sample types gives a measure of the relative abundance of herpetofauna in different areas, and compares the efficiency of different search methods.

Nocturnal surveys were more successful than diurnal surveys in the forest transects, although surveys along the streams were the most successful. The opportunistic capture figure is similar to other survey types, suggesting that the assumed search effort of 1 person-hour for each opportunistic capture used in our analysis is not unreasonable. Only an overall figure for all transect types is given for Cutivireni, as only a few surveys of each type were conducted, and little could be interpreted from the data. The Cutivireni CPUE is lower than at Coriteni, which we believe is an artefact caused by a number of fruitless surveys conducted in the dry riverbed in Ongonoshari before good survey locations had been chosen, rather than to a true lower population density in the area.

Pitfalls

From the 16 nights that the pitfall system was used in two places in Coriteni, only one individual (Epipedobates macero) was caught. The traps were well set up, following procedures laid out in Bennett (1999) and Corn (1994), and placed in locations we thought suitable for terrestrial frogs. The dry season may have contributed to the low success, as the forest floor would be drier and less hospitable to amphibians. However the locality itself may mean that there are fewer frogs on the forest floor. The steep

hills and underlying rock seems to drain well, leaving the ground naturally quite dry except along the rivers. Moreover on the steep slopes there is little understory vegetation, which may reduce both shelter and arthropod prey, leading to lower densities of terrestrial frogs. Pitfall trap studies should be conducted in the wet season in future studies, and terrestrial amphibians surveyed using different techniques, such as intense quadrat sampling of the forest floor (Doan and Arriaga, Project Tambopata website).

Species composition

With a total of 165 individuals found in Coriteni, and 56 found in Cutivireni, the community structure can start to be examined. Figure 6 shows the number of individuals of each species found in the two areas, ranked by their abundance in Coriteni. From this we can see that in Coriteni a few species have relatively large populations (7 species with over 10 captured individuals), whereas for the majority of species, only a few individuals were caught (17 species with less than 5 captured individuals). The Cutivireni community seems to be lacking in the rarer species, which is expected as the species accumulation curves indicated that not all species were found, and rarer species will be harder to find.

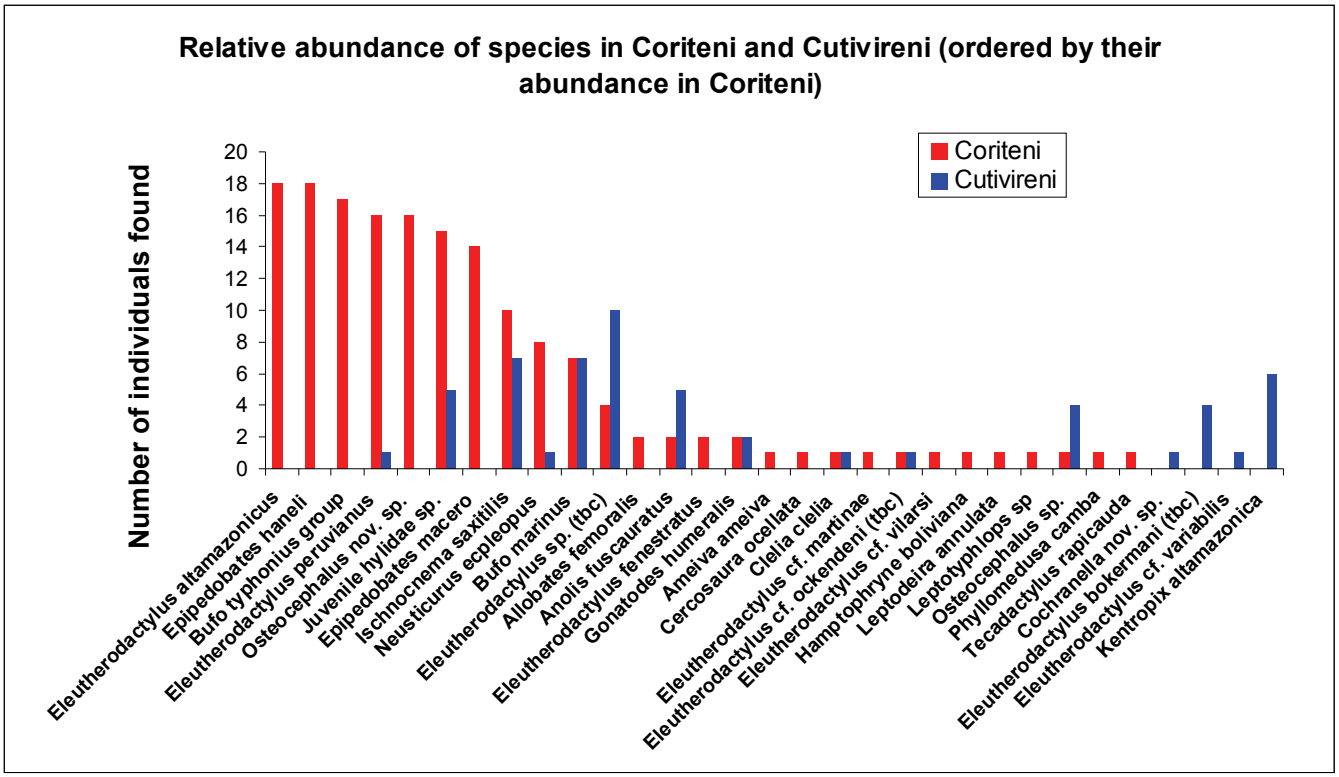


Figure 6: The number of individuals caught in each area provides an estimate for the relative abundance of the different species. For the Coriteni data the expected pattern of a few numerous species and more rare species emerges, whereas this is not so evident with the Cutivireni data. This suggests that there are rare species still to find in the Cutivireni area. Of particular note is the marked difference between the pattern of relative abundances of species between the two areas. This suggests that although many of the species are the same, the structure of the community is markedly different in these two areas.

Of particular note is the difference in the rank order of species. Although about 75% of the Cutivireni species were found in Coriteni, the 5 most common species in each site were completely different, and there is no correlation between the relative abundance of species in the 2 areas. This suggests that not only are different species found at each site, but the community is differently structured, with the common key species differing, even though these locations are 85 km apart, linked by a river system, at similar altitudes, and in superficially similar, undisturbed habitats. It may be that amphibian communities and species assemblages show more β diversity and variation between sites because of their small size, and their ties with water for breeding.

Conclusions

We have completed a preliminary inventory in two previously unstudied regions of the Cordillera de Vilcabamba, discovered 2 new species of frog, and extended the range of another species. These inventories are not complete, as surveys need to be conducted throughout the year to count all species. Also the Cutivireni species accumulation curves indicate that we did not find all species present at that time of year.

The individual data we collected shows how different these areas are in terms of species composition and community structure, and indicate that even quite similar habitats may contain very different animal assemblages, with implications for management. Species may be more vulnerable to habitat loss than would be predicted by species area relationships if these patterns are widespread.

Further work

More surveys need to be conducted at specific sites over long timescales, to compile complete species inventories.

- Studies comparing several different areas and habitats need to be conducted to examine the nature of the community heterogeneity that our results hint at. These studies could have important implications for management of the area, and for wider amphibian conservation efforts.
- With changes in land use, development and ecotourism likely in the area in the coming years, comparative studies need to be conducted to examine the effects on herpetofaunal communities. Our work can be used as a simple baseline for certain comparisons. Little is known about the amphibians and reptiles of the area, and without monitoring, species may disappear before they have even been found, and communities may shift without us noticing.
- The Ashaninka should be included in long-term monitoring projects. This is the only practical and financially feasible way of completing the aims listed above.

Results - Plant Sampling, and Vegetation, Storm Hydrographic and River Transects and Soil Profiles

Plant Sample Results

From the 75 identifiable samples collected, a total of 70 species from 38 families were found. Of these, 20 were identified to species, 39 to genus and 11 only to the family level. The majority of samples come from the Coriteni site, and were collected from the forest understory around camp and on both survey transects, and from along the stream. We attempted to collect samples from as wide a range of plants as possible, but only about a fifth of our samples came from trees; an intrinsic bias because their fruits and flowers were harder to see and collect. The full list of plant species and samples, with the location where they were found, can be found in Appendix 6.

Vegetation Transects

The Vegetation transects are provided to give a schematic drawing of the vegetation in various locations around the research site.

A number of different styles of vegetation were noted: Highly structured, layered rainforest vegetation, thicket, fern dominated areas, palm dominated areas, areas with little undergrowth – mainly found on the steep slopes, and areas with dense undergrowth but little canopy plants.

Without further information, such as soil data, it is difficult to classify and analyse these findings scientifically. However, it is interesting to note that several types of vegetation communities are present within a few square kilometres.

Further work would be required by a rainforest vegetation expert, someone who is familiar with rainforest species and different vegetation communities in order to scientifically subdivide and identify our classifications. Valuable additional data would come from soil samples, due to the interdependencies between soil and vegetation. Identification of individual species would aid classification of vegetation communities.

Storm Hydrograph

Characteristics of the Hydrograph:
A relatively long lag time - approx. 5 hours
A slow rising limb
These basic characteristics indicate a number of features of the river catchment basin. However it is important to remember that given the large amount of vegetation present it is difficult to interpret the storm hydrograph using conventional methods.
Catchment Area
It has a relatively large catchment area indicated by the lag time - i.e. the length of time that it takes for the rain to enter into the river system
Slope Profile
The relatively drawn out rising limb suggests shallow slopes (and a large catchment area). (N.B. From observation the slopes were extremely steep - approx 35-40 degrees

- this is an example of how the large amount of vegetation present can distort the results)

Rock Type

The long lag time and shallow rising limb could be due to extremely permeable rocks resulting in rapid infiltration, ergo little overland flow. However on this occasion the storm event was not measured for long enough to see if there was a secondary peak, or if peak flow was maintained, as would be expected if this were the case.

Soil Type

From observation, the average depth of the soil was relatively shallow, especially on the slopes (in some cases only a few centimetres). In theory this would result in a fast run off time leading to a shorter lag time and a steeper rising limb due to the lack of infiltration into the soil. However, this is not illustrated by the data. Once again the amount of vegetation is distorting the results as given the density of the canopy it is likely that the amount of precipitation actually reaching the soil was negligible.

Drainage Density (total length of streams ÷ catchment area)

The results suggest that the drainage density is low given the lag time and shallow rising limb. This is because there would have been little direct rainfall into watercourses and because it would have taken any precipitation a long time to move down slope into the nearest watercourse. This also fits with observation.
Given the high vegetation density it is difficult to draw any firm conclusions from the results alone. However, by using the results, alongside observation and background knowledge, an outline of the characteristics can be concluded:
The catchment area is relatively large, with a low drainage density, surrounded on all sides by steep slopes with thin soils.

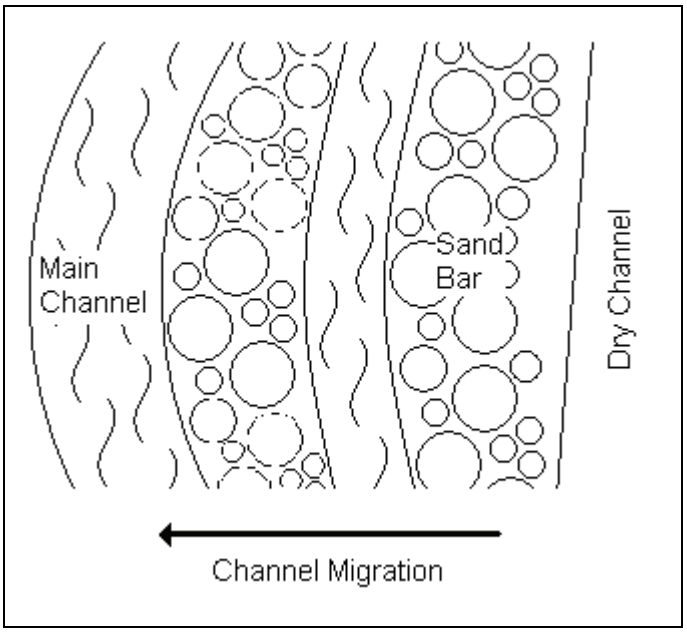
The effect of high-density vegetation

The high-density vegetation affects a storm event by increasing the amount of time that the precipitation will take to enter the watercourse, as it is intercepted by the vegetation. Once a watercourse has reached peak flow during a storm event, it will be maintained for a relatively long amount of time, even after the rain has stopped, as it will be sustained by the residual water still in the vegetation. It is expected that the falling limb will be slow and gradual, although this was not measured in this survey.
As well as intercepting precipitation and delaying it's entry into the watercourse, much of the precipitation held in the vegetation will evaporate directly from the vegetation given the high temperatures in the rainforest, thus never reaching the watercourse.

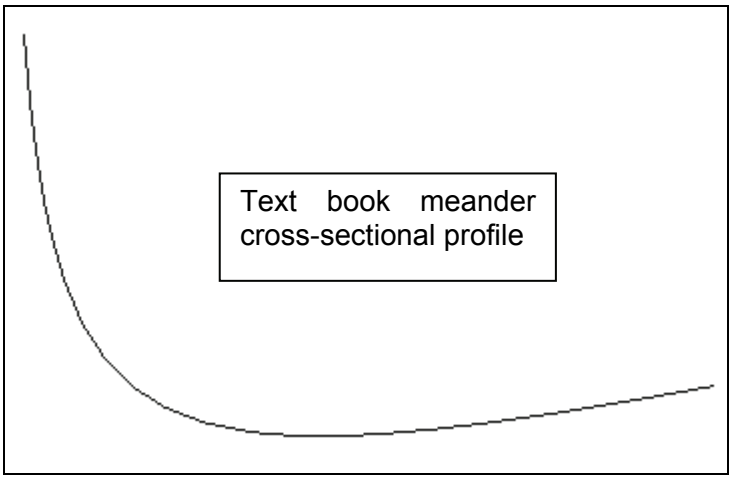
River Transects

River Transect 1 - Meander

Bird's Eye View:



General Cross Section Pattern:



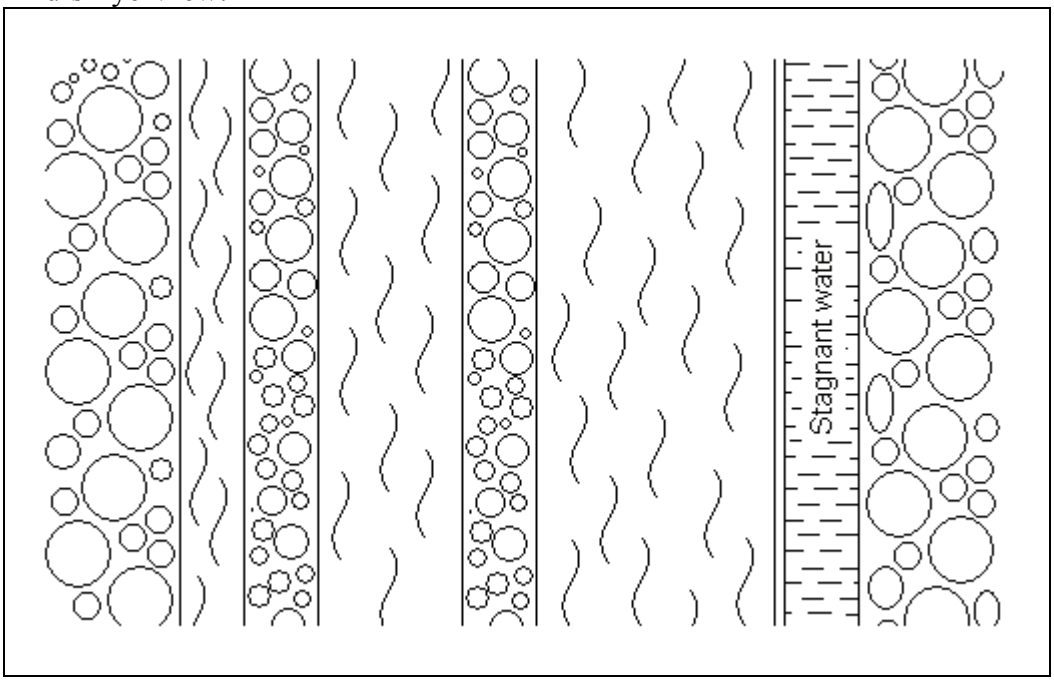
From the evidence, it would appear that the third channel, on the inside of the meander is an old river channel and as such would previously had water flowing through it. The middle channel still contains water but it is travelling at a slower rate than the outside channel and this supports this hypothesis. The hypothesis is also supported by the steep outside edge of muddy cliff, which in theory is slowly being eroded by the river as it migrates outwards.

By examining the vegetation on the inside of the meander (anecdotal evidence), it would appear to be relatively young – say 5-10 years old - suggesting that channel

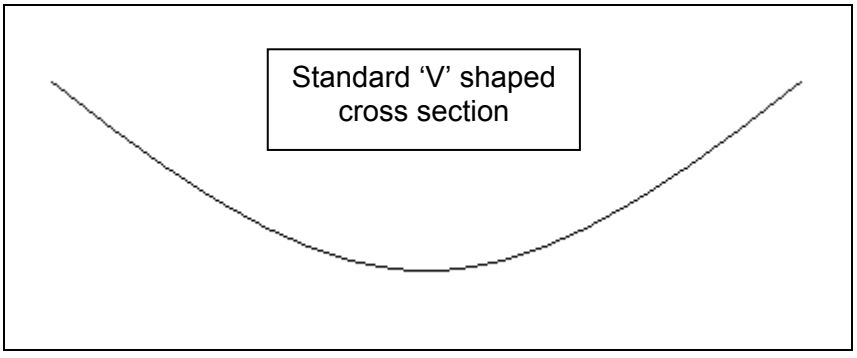
migration must be relatively rapid. If this is the case then it is a high energy river. This theory is supported by the high number of small pebbles etc, suggesting that erosion is also fairly rapid. The presence of some large boulders and also the level of debris on the river banks deposited by previous floods go on to imply that during flood events the river reaches considerably higher levels over it's every day trickle.

River Transect 2 – Straight Section

Bird's Eye View:



General Cross Section Pattern:



This transect is much more standard than the first, although it displays a high degree of braiding. This supports the conclusions drawn above that the river is high energy, and it also appears that it floods regularly.
There were also some large boulders present; reinforcing the idea that when in spate the river carries far above its bank full capacity.
The cross section displays the standard 'V' shaped cross sectional profile, confirming that is was created by river erosion.
The rate of flow is much slower than on the meander, likely to be due to the wider channel.

Soil Profiles

Methods

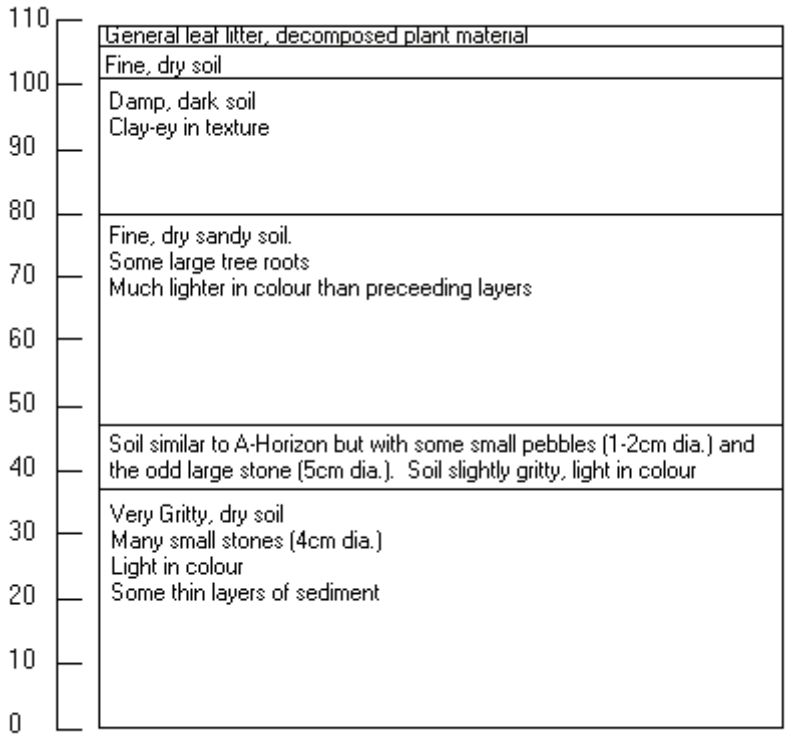
Soil Pit dug in locations along existing vegetation transects, approximately 1m x 1m
Soil Pit's dug as deep as possible until prevented by impassable rocks.
Readings taken by observation and by using a measuring rule.

Results

Soil Profile #1 – Behind Coriteni Tarso Camp @ Bottom of Slope (Sandy Soil)

Correlates to Veg. transects # 1 & 2

Diagrammatic representation:

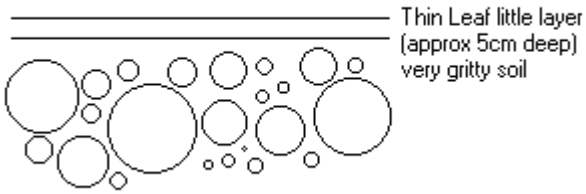


NB: Profile does not reach bedrock – Prevented by large, impassable rocks.

- A Horizon: Damp, Clay texture, Dark in colour
- A Horizon mixing with B Horizon over 48-80cm depth
- B Horizon: Dry, Sandy, Gritty, Light in Colour
- Excellent drainage at this site – No water-logging recorded.

Soil Profile #2 – Steep Slope on Veg Transect 1

Diagrammatic representation:

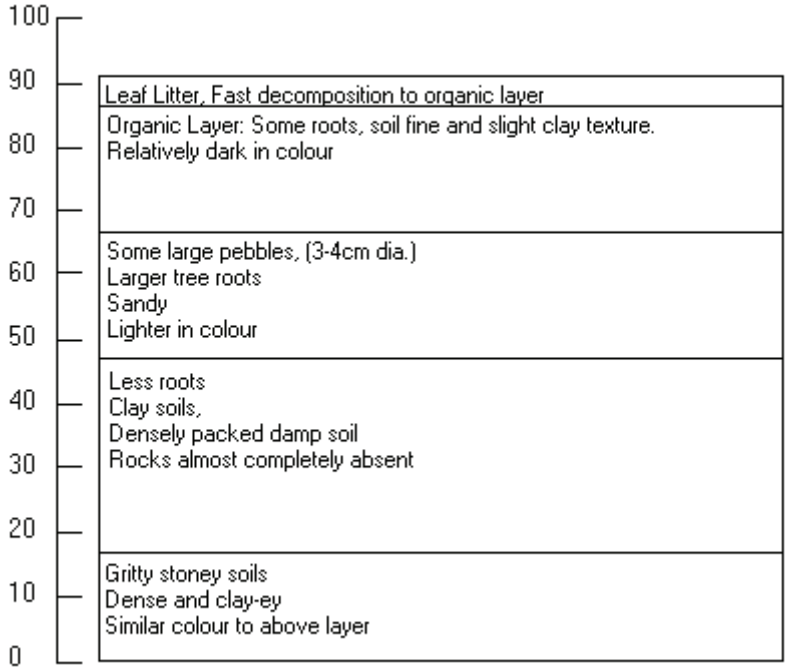


Soil Profile on very steep slope, hit impassable rocks after only 5cm.
Very thin leaf litter layer suggesting fast decomposition/soil runoff.

Soil Profile #3 – Top of Veg Transect 1

Correlating to Veg Transects #3 and #4

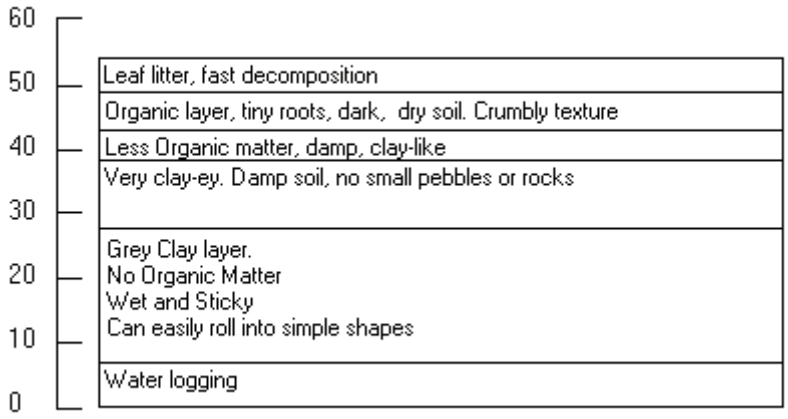
Diagrammatic representation:



- Hit impassable rocks – bed rock not reached
- 4 Distinct Layers:
  1. Clay
  2. Rock
  3. Clay
  4. Rock
- Very fine soil, clay texture.
- Obvious possibility of waterlogging

Soil Profile #4 – Bottom of Camp near clay lick

Diagrammatic representation:



- Distance from Swamp = 3m
- Distance from River = 15m
- Water level in river approximately 5 metres below ground level at soil profile site.

Analysis

- All 4 soil profiles show distinct characteristics mirrored by the variety found in the vegetation growth at the soil profile sites.
- Profile #4 the most distinct due to the strong clay presence, although all profiles contain some element of clay
- Effects of water-logging clear in profiles #3 and #4
- Thin soil layer in profile 2 due to steep incline
- No soil samples taken due to practicality of transporting them back to the UK for analysis thereby preventing in depth mineral/moisture/organic matter analysis of the profiles.
- A more in-depth analysis of these results by academics with specialist knowledge is welcomed by the team

Hunting practices in the Ashaninka community of Coriteni Tarso

The expedition was based in the community of Coriteni Tarso and the surrounding forest between the 19th of July and the 20th of August. Like many of the communities on the major rivers, the people of Coriteni Tarso grow "Yucca" (manioc) and oranges for their own consumption, as well as small quantities of coffee, cocoa and black-eye beans to sell. The only food they purchase are luxury goods such as soft drinks "gaseosas" and sometimes meat (typically canned tuna). They primarily rely on the forest and the river to provide them with meat.

In the rural communities of the Tambo and Ene, hunted wild animals form the majority of the meat eaten. Farmed beef and poultry is prevalent in the towns (such as Satipo), but Ashaninka communities rarely have cattle (a single cow was present in Coriteni Tarso) and the ever present village chickens are for eggs as well as meat. Bushmeat is commonly found in restaurants in larger towns like Satipo, as well as in smaller outposts like Puerto Ocopa. Peccary, Deer, Agouti and wild game birds are available in these places.

During our 4-week stay in the community of Coriteni Tarso in the late dry season, we witnessed or heard of the killing of two red brocket deer (*Mazama americana*), one peccary (probably a collared peccary, *Tayassu tajacu*), one night monkey (*Aotus* sp.), a guan and a Red and Green Macaw. Our guide and field assistant had also also tracked what sounded like a Giant Anteater, although he did not manage to kill it.

A red brocket deer being prepared for consumption. Meat is shared between the hunters' families, and if there is surplus, amongst the community.

We were interested by the presence and concerned by the hunting of the threatened Macaw, and decided to spend four days at the end of our trip to interview some of the community about their hunting and fishing practices. We also wanted to find out what changes they perceived had occurred in recent years, as a result of the Ashaninka living in larger communities, and with the increase in firearm use. One of ACPC's recent projects was to introduce education about endangered species in the school, so we also planned to talk in the school about the local species and our findings.

Information Gathering

We decided to survey men or groups of men in the community of Coriteni Tarso. We asked questions about hunting trip frequency, success rates, whether shotguns or arrows were used, and how the seasons affected hunting. We showed the men illustrations of mammals from "Neotropical Rainforest Mammals: A Field Guide" (Emmons and Feer, 1997), and asked which ones they recognised and which they hunted. We also asked how often they thought a particular animal was killed by the community in a year.

We conducted about 12 interviews, although many were with groups of several men together, often during the afternoon while they drunk masato. Much of this information was not precise enough to be included here, however, several interviews with individuals were most useful. Jorge [surname??], the chief, explained about the hunting and farming in the village, and his information is presented in the section on the Ashaninka. Jonas Jorge Rosario, and Hector told us of their hunting experiences, and Wilmer Ingo Marcos, 16, discussed his and his father's hunting. Teresa Tamaihii and Nancy talked to us about the meat eaten and the hunting as well.

The surveys proved to be much less informative than we had originally hoped. One reason was the difficulty in finding a suitable time to interview the men. Most would work in their farm plots 'chacras' in the morning and early afternoon. During the rest of the afternoon the men would typically socialise and drink 'masato', the fermented, yucca-based drink of the Ashaninka. The men were often quite drunk, and by the end of an interview, where we were always obliged to drink ourselves, our own judgement was somewhat clouded! We asked the women about the hunting as well, but they were typically more reticent and would defer to their husbands.

The other major difficulty in quantifying the level of hunting was the difficulty in communicating concepts of number and frequency with the Ashaninka. They could not communicate (or we could not understand) how often they hunted a particular species, and had problems understanding our questions about an "average" hunting trip. This is understandable, and shows up our lack of expertise in this type of study, and the shortness of the period in which we were able to conduct the study. Even when shown pictures of mammals, there was disagreement about which species were present in the area, and which were hunted, with some men pointing to species which are not known to occur in Peru. We tried to ask open questions, as leading questions would almost always be answered with a "yes".

We were able to extract some useful information from eight of the interviews we conducted. Each interview took between one and three hours, and often several Ashaninka would participate. Two or three interviewers would take part, and some of the interviews were recorded onto a tape recorder.

General Hunting Practices

According to these testimonies, men go hunting between once and twice a week throughout the year. Women do not take part, and boys start hunting in their early teens. Some said they hunt at night, others leave on a trip at first light. Men go hunting alone or in groups of two or three, although they are not always successful. Typically they will walk 2-3 hours to get to good hunting places, whereas in the past good hunting was found half an hour to an hour away, when there were more animals. Sometimes the men will stay in the hunting area overnight. Men will also take their weapons with them when going to their 'chacras' for an opportunistic shot.

If the hunt is successful, the meat is shared between the hunters' families, and if there is surplus, it is shared amongst the community. Although the men primarily hunt to eat, they do sell meat opportunistically to passing boats (especially Paca and deer) and big cat skins are also sold if one is killed.

Some of the men have single barrel shotguns bought in the towns, whereas others, such as Hector, use the traditional bow and arrows, as they cannot afford a firearm, and Jonas also uses a sling for killing small monkeys. Traditionally the Ashaninka have used bows and arrows to hunt. The arrows are light, dry palm or bamboo shafts fletched with feathers and with a long serrated point made of a particularly hard palm wood. However, in recent years some of the men have done paid work and have bought single barrel shotguns (about £40 each). There are now 16 shotguns in the community. These weapons also serve another purpose, they are used when the "Ronderos", the Ashaninka defence militia, are patrolling their territories to protect against settlers and the threat of 'narco-trafficantes' (drug related terrorism).

Fishing is more seasonal, with 2-3 trips a week in the dry season, and little fishing when the river is in dangerous spate in the wet (consequently more hunting is done). The men prefer to fish as it is easier, and the women both said they preferred the taste of fish to meat. Though only the men hunt, sometimes women are involved in fishing. A mix of traditional and modern techniques is employed. Woven nets are used for fishing, as well as nylon throwing nets which can be purchased in the towns.

Hunted species

To discover which mammals the men hunted, we showed them the excellent colour illustrations found in Louise Emmons' and François Feer's Neotropical Rainforest Mammals – A Field Guide (Second Edition). The results between different people were similar, suggesting they are valid. The following animals are hunted to some extent by the community, and details are given if available. Spanish (sp.) and Ashaninka (ash.) names used in the community are given.

Red brocket deer (*Mazama americana*, venado (sp.), maniro (ash.)).These are easy to hunt, and at least two were killed during our stay. Between one and ten are killed each month by the community.

White-lipped peccary (*Tayassu pecari*, huangana (sp.), piratzi (ash.)). These are easy to hunt, and are seen in groups of 20-30. One to three are killed each month.

Collared peccary (*Tayassu tajacu*, sajino (sp.), shintari (ash.)). These are regularly and easily hunted, and are found alone or small groups. One to three are killed each month (one during our stay).

Brazilian Tapir (*Tapirus terrestris*, sachavaca (sp.)). These are very rare, and not often hunted as they are too big to carry home.

Capybara (*Hydrochaeris hydrochaeris*, ronsoco (sp.)). Some men have seen and hunted Capybara, although not in the community in their memory.

Paca (*Agouti paca*, majaz (sp.)). Preferred due to its good flavour. One was seen near the camp above Coriteni.

Agoutis and/or Acouchys (some disagreement about the exact species, most likely the brown agouti (*Dasyprocta variegata*) and the green acouchy (*Myoprocta pratti*))

Marmosets and Tamarins (monitos (sp.)). were recognised, although not specific species, and two to six a month are killed.

Night monkey (*Aotus* sp.). One was killed during our visit.

Common squirrel monkey (*Saimiri sciureus*, mono bolsillo(sp.)). These are harder to find, and one to three a month are killed.

White faced capuchin monkey (Cebus albifrons, mono blanco(sp.)).

Red uakari monkey (*Cacajao calvus rubicundus*). Some disagreement about its presence; it is rarely killed.

Red howler monkey (*Alouatta seniculus*). Not all men had seen it, but Wilmer imitated its call, suggesting his sighting is genuine.

White-bellied spider monkey (*Ateles belzemuth*, mono negro(sp.)). Mainly hunted between February and May, when they feed nearby on fruit. Two a week are killed in season.

Common woolly monkey (*Lagothrix lagothricha*, choro (sp.)). Hunted all year round.

9-banded long-nosed armadillo (*Dasypus novemcinctus*, carachupa (sp.), etini (ash.)). Sometimes hunted (two a month).

Giant armadillo (*Priodontes maximus*, carachupa maman (sp.), quintaro (ash.)). Occasionally seen and hunted. One was sighted by our guide at the camp above Coriteni.

Cats: Either margay (*Leopardus wiedii*) or ocelot (*Leopardus pardalis*) are regularly sighted in the area. Jaguar (*Panthera onca*) have also been seen, but Puma (*Puma concolor*) are absent. They are not hunted, but, if seen, may be shot for their pelt, which can be sold. Wilmer (16 years old) has seen a cat three times in his life. The

Ashaninka words for these cats are mishi for smaller species and maniti for the larger species.

Several other species were seen by us or recognised by the community, but are not hunted. Southern tamandua (*Tamandua tetradactyla*, zorillo, oso hormijero (sp.)) is known, but is not eaten or hunted. The brown-throated 3-toed sloth (*Bradypus variegatus*) has also been seen, but not hunted. A water rat (*Nectomys squamipes*) and a water opossum (*Chironectes minimus*) were seen in our camp above Coriteni.

Hunting changes

Hunting is easier with shotguns than it was when everyone used arrows. The older men commented that hunting trips had to go further away than they did 20 years ago, and that hunting trips were several hours now rather than half an hour in the past.

Conclusion

Interesting and potentially useful information was captured from this opportunistic and 'ad-hoc' study. Clearly hunting has an impact on the distribution, levels and diversity of animals in the area. In particular, there are issues of sustainability for Ashaninka communities and the loss of endangered species and biodiversity in general. At present, animal stocks (endangered and other) are unknown. With larger communities and the proliferation of shotguns the 'drain' on the region is increasing, as indicated by clear agreement that hunting trips involve longer distances. Whilst the Ashaninka are unable to buy in meat from outside the communities this trend is likely to continue. Important questions about how this will affect the Ashaninka, their way of life and their homelands remain unanswered. It is hoped that our short study may guide and be the basis of further research which aims to provide some answers. The Ashaninka are aware of the problems but admit they may need help with a solution.

Administration and Logistics

Destination area

The Ashaninka Communal Reserve is located in the middle part of the western flank of the Vilcabamba Mountain Range, in the district of Rio Tambo, county of Satipo, department of Junín.

The destination region of Peru

Close-up of the destination region.
Note that the Rio Ene is actually marked as 'Amazon'.

The Communal Reserve is between 500 and 2000 metres above sea level. The vegetation at this height is primary premontane and lower montane tropical forest. The Vilcabamba range is a karst structure and part of the hydrological basin that

supplies the Ene, Tambo, Apurimac and Urubamba rivers, headwaters of the Amazon basin. The Vilcabamba range is characterized by massive plateaus and the presence of many waterfalls. The 184500 hectare Communal Reserve contains mostly igneous and sedimentary rock. The sedimentary rocks form the largest proportion of the geologic structure of the region and are constituted mainly by calcareous, quartz-containing grit and rocks of clayish constitution that take the shape of big structures. Maximum rainfall is approximately 3000mm per year in the uppermost regions, but varies widely with height and vegetation. The wet season generally starts in September. The area is part of the Vilcabamba Amboro Conservation Corridor, and on a wider scale, the Tropical Andes Biodiversity Hotspot. Further background information on the Ashaninka Communal Reserve is available from www.otishi.org.

Surrounding the Communal Reserve to the North and West are the Ashaninka communities of the Rio Tambo and Rio Ene, including community areas protected for subsistence farming and hunting. Most community settlements are located directly on the Rio Tambo or Rio Ene, with the community areas stretching from the river to the boundary of the Communal Reserve. The community areas contain similar rainforest to the low altitude parts of the Communal Reserve, but are more intensively used.

Travel to the survey sites was via the Ashaninka communities of Coriteni Tarso and Camantavishi, in order to obtain permissions and to recruit guides and porters. All three survey sites were located alongside streams or rivers. The Coriteni Tarso site was on the escarpment that forms the start of the Cordillera Vilcabamba. All but one of the Camantavishi sites were along the Rio Cutivireni (approximate altitude 500m) which leads deep into the Cordillera Vilcabamba at altitudes of over 15000m. The exception was a single night's survey at the top of the Parijaro waterfall (884m). All were inside the Community areas, not the Communal Reserve, though the Camantavishi sites did border with the Communal Reserve. It had been originally intended to enter the Communal Reserve for surveying, but the additional time and difficulty in terms of transport and logistics meant it was not worthwhile for an expedition aiming to cover two survey sites in two months. It would be possible to aim to complete one site survey deep inside the Communal Reserve in two months since the ratio of productive to non-productive days would be tolerably high.

Itinerary

The expedition was conducted over the months of July, August and September of 2004. A detailed itinerary is given below:

10 July	Arrival in Lima of advance European team
11 July to 14 July	Meetings with counterparts and ACPC Purchase of additional equipment
15 July	Arrival in Lima of rest of team
16 July	Registration with British Embassy Final packing and travel of entire team to Satipo
17 and 18 July	Purchase and packing of food and equipment
19 July	Travel to the community of Coriteni Tarso
20 July	Travel to survey site
21 and 22 July	Camp construction

	Initial exploratory surveys completed
23 July to 14 August	Survey work
15 August	Return to Coriteni Tarso
16 to 20 August	Work in Coriteni Tarso
21 August	Return to Satipo
22 to 25 August	Meeting new team, purchase and packing of food and equipment
26 to 27 August	Travel to the community of Camantavishi
28 and 29 August	Travel to camp Onconoshari
30 August to 2 September	Survey work at Onconoshari
3 September	Travel to camp Parijaro
4 to 12 September	Survey work at Parijaro
13 September	Return to Camantavishi
14 September	Preparations for departure
15 September	Return to Satipo
16 September	Preparations for departure
17 September	Return to Lima
18 to 20 September	Final preparations for departure
21 September	Expedition Time in Peru Completed

Research materials and information sources

The Instituto Geografico Nacional (IGN) in Lima proved to be the most straightforward source of maps that were difficult to obtain in the UK. Their 1:100000 series is an inexpensive overview of the Vilcabamba region. ACPC has a series of maps with greater detail, often designed in partnership with indigenous communities, which may be available for purchase. Of course, in the rainforest there is no substitute for local guides with excellent knowledge of the trails which no map displays.

There are few useful books covering the area and people. The best information came from people who have visited the area, the team at RFUK and the photographer Angela Birch. Free satellite images are available from GLCF[4], but were not used due to the local nature of our project.

The RGS is a superb resource for planning an expedition and their EXPLORE event is particularly recommended. Much was learnt by talking to previous expedition organizers and reading the stock of reports from Cambridge University expeditions, kept in the University library.

Permission and permits

Official permits were obtained from the Instituto Nacional de Recursos Naturales (INRENA) via ACPC. Copies of certain official documents were required (for example evidence of Royal Geographic Society support facilitated the application) as

[4] GLCF: http://glcf.umiacs.umd.edu/

was at least one partnership with a Peruvian institution. An early application is recommended (one month prior to arrival, if only to minimize worries), especially if it is not possible to go through a local organization such as ACPC. There was no physical permit provided by INRENA, though because our application was made in the week prior to arrival in the Vilcabamba region this may not be normal practice.

Perhaps more important when indigenous support is necessary is the acceptance and approval of indigenous communities. Time taken to explain the project and establish good relationships had a great effect on how quickly things get done. The difference between our first community of Coriteni, in which an ACPC member had been present for a week prior to the teams arrival, and Camantavishi, where the only prior contact was via radio, was significant. An early morning community meeting for introductions, explanations, the passing of gifts and requesting permissions was held in both communities visited.

The reason for a split research in the second stage of the expedition, between Onconoshari and Parijaro, was due to the need for permission to be obtained from unrepresented communities upstream of Camantavishi who have much greater use of the survey site in question. Permission was granted approximately a week after arrival, yet some useful work was performed from the camp at Onconoshari.

Between Puerto Ocopa and Cutivireni on the Rio Ene there are four army bases with which passing boats must register. A pre-prepared list of names, national identity numbers and dates of travel included in a letter from ACPC, and a gift of a recent newspaper, seemed to smooth the way with these remote checkpoints.

Our permit application included biological specimen removal to the Natural History Museum in Lima, though not the UK. This did not present any problems, but again the indigenous communities' permission was equally important – and not just through prior permission.

Finances

A NatWest Business and Societies account was used during the fundraising and pre-expedition expenses phase. Because this type of account did not support a debit card the expedition funds were transferred to the expedition leader's personal account prior to departure. A 10% contingency, unused, was supplied by the expedition leader's savings. Expenditure in Peru was of an ad hoc nature due to the impossibility of tracking the many small cash transactions. ATMs were available throughout Peru, though only one was available in Satipo, where food and hardware were bought. As the bank in Satipo had recently stopped accepting travelers cheques, and debit card withdrawals have a daily limit, money was also withdrawn from another team member's account, and subsequently reimbursed. Further cash flow problems were caused by occasional power cuts and machine breakages. It is recommended to bring a healthy supply of cash from Lima commensurate with the associate risk of robbery and insurance compensation limits.

The expedition accounts to-date and actual expenditure are included elsewhere in this report.

Insurance

Insurance was via AON's RGS-IBG policy which is reliant on having Royal Geographic Society approval. Otherwise obtaining suitable insurance would have been a problem (we were rejected by AON prior to confirmation of RGS approval and no alternatives were suggested). AON proved helpful and the policy sufficient. Fortunately we did not have to make any claims.

Travel, transport and freighting

A mixture of bus, taxi, boat, raft and foot modes of transport were used to travel to and from the survey sites. Motorised travel to both communities was then followed by trekking on foot with guides and porters to survey sites.

Adequate road transport is available from Satipo to Puerto Ocopa, from where river transport is then available. Slightly east of Puerto Ocopa is the conjunction between the West to East flowing Rio Tambo, and the South to North flowing Rio Ene.

Local bus transport was used for travel between Lima and Satipo. The overnight service was safe for passengers and luggage, though the departure terminal was located in a less desirable area of Lima where it would not be safe to walk through at night. Taxis were hired from Satipo to Puerto Ocopa. Puerto Ocopa is located at the intersection of the Rio Perene and the Rio Panga and is the port of entry to the Rio Tambo and Rio Ene.

A boat provided by ACPC was used to travel to the communities of Coriteni Tarso (Rio Tambo) and Cutivireni (Rio Ene). Both ACPC boats are well maintained with excellent pilots and helpers, though without sufficient life jackets and, on one, protection from the sun. Both boats are large enough to accommodate an expedition team of around eight people, complete with equipment and supplies. Gasoline and boat spares can be purchased from Puerto Ocopa, and payment made in advance from Satipo. There were no problems with the availability of supplies, but the ACPC boats were in frequent use so it is courteous and important to plan in advance. This was especially important when river traffic was blocked during a 'strike'. Disagreements

between the Ashaninka organizations, CARE and CART, and local government had led to a blockade of river traffic by the Ashaninka for over a week in an effort to have their demands met. There was little objective information available but our understanding was that it was a non-violent protest; for example, ACPC negotiated the travel of a group of American students through the blockade. We were told that action of this severity was infrequent and could usually be identified in advance to plan around. Obviously it would have had a major impact on any attempt to evacuate in that time.

Coriteni Tarso

Travel time to Coriteni Tarso was approximately four hours, though depending on water levels it can be an easier or harder journey. ACPC personnel had been present in the community for several days prior to our arrival, and this early explanation of our work and needs ensured rapid recruitment of porters and guides. The 2-3 hour trek first involved a steep climb onto the escarpment overlooking the community and then along well-established paths towards the site. Prior to our visit the trails to the survey sites were not obvious and the guides cut clearer routes through the jungle which will now probably be in more frequent use.

Camantavishi

An early start to the trip to Camantavishi is advisable, since travel time is around a day – in our case we stopped half an hour from the beach of Cutivireni to stay the night with a satellite village of Cutivireni. This was only possible because of the excellent relationships our companion, an ACPC director, had with the Ashaninka communities. It was felt unwise to moor on the beach of Cutivireni and intrude on the tensions at the time between Cutivireni, Camantavishi and ACPC5. The following morning we returned to our southwards journey on the Rio Ene. Due to low water levels it was not possible to pilot the boat fully laden to the community of Camantavishi, but this community is approximately an hour on foot from the beach of Cutivireni.

The survey sites of Onconoshari and Parijaro were located upstream on the Rio Cutivireni, which flows East to West meeting the Rio Ene at several points including the beach of Cutivireni. As the community had little forewarning of our logistical needs, it was not possible to recruit enough porters to transport all our equipment and supplies to the survey site in one trip. Although it was easier to trek in a small group, our inexperience with the difficult terrain meant travel was slow. Trekking from the community to our first survey site, Onconoshari, entailed an unplanned overnight stay on the bank of Rio Cutivireni, and total travel time was approximately 11 hours. The trails were not amenable to carrying large packs, and the terrain was often steep and convoluted involving thick jungle, rocky shoreline and fallen trees. Traveling during the heat of the day is necessary, and it is recommended to start at first light. Ashaninka porters were substantially faster, able to complete the same trek in around

[5] The situation is complex and involved the abuse of logging contracts issued by the Cutivireni community leadership. Loggers had encroached on Camantavishi land to take valuable hardwood, including one tree near to the Parijaro river. There were also issues about access to the Parijaro waterfall since escorting a group of outsiders can be beneficial and can be done via both Cutivireni and Camantavishi land. ACPC were involved in trying to negotiate improved relations.

half the time. Travel onto the survey site at Parijaro took approximately five hours. It should be noted there an alternative route does exist through the Community Area of Cutivireni, on the northern side of the Rio Cutivireni, though similar permissions would be necessary from their community.

The community of Shirampari is situated along the North bank of the Rio Cutivireni upstream of Camanavishi, opposite Parijaro. Shirampari is the Ashaninka word for man, and the chief of the community is also called Shirampari. He is a man of unparalleled experience of the rainforest and has had substantial contact with the founders of ACPC, even before the organization had been formalised, and has a good ongoing relationship. The community of Shirampari is a small satellite settlement of Cutivireni, though seemingly quite independent. They live just inside the border of the Community Area and the Communal Reserve. More communities live further upstream, inside the Communal Area, and obviously much more remote. Official recognition and status of these communities is part of ACPC's continuing work.

A special request was made to Shirampari for guidance and access to the top of the Parijaro waterfall for survey work. Hiring Shirmapari as a guide a small group climbed the mesa by way of a steep trail before circling round to hit the top of the waterfall. The strenuous trek took 2 hours carrying minimal equipment. Enroute Shirampari talked of his old home and settlement on the mesa that had housed the community during the troubles with the Shining Path. The Parijaro river forked immediately at the top and two rivers led higher and deeper into the rainforest. Following these rivers is difficult, though a short trail was cut to a waterfall on the southernmost river.

Parijaro waterfall and river, which flows into Rio Cutivireni. At over 300m tall it is one of the tallest waterfalls in the area.

The top of Parijaro waterfall (884m)

From Shirampari, it was possible to raft back to Camantavishi at the end of the project using rafts made from balsa wood, suitable for 2 Ashaninka pilots, and two passengers (or equipment). Experienced rafters were available to hire from Shirampari. Due to excessive exploitation of the balsa trees, rafting may not always be possible unless sufficient time is spent in the area for balsa wood to be obtained from further upstream.

Food and accommodation

Ample and varied food was purchased and packaged in Satipo. Quantities were estimated from previous experience and generally increased for a degree of flexibility. Produce such as oranges and yucca is available from the Ashaninka villages, but this may be limited and too unreliable for anything but a small group. There is a weekday market at the beach of Cutivireni where limited packaged and fresh food is available at reasonable prices. Water was always taken from the same river supply used by the Ashaninka. Within communities this water was purified, but not at the survey sites, although the silted water from the Rio Cutivireni was filtered with a Milbank bag.

The European members of the team used hammocks and the Peruvian counterparts used tents, both solutions working well within communities and within the field. We were fortunate enough to be hosted whilst in Satipo by the head of logistics of ACPC. In Lima we stayed with friends and in hostels.

Communications

Lima and Satipo have the full range of modern communications. Ashaninka communities along the Rio Tambo and Rio Ene have an effective radio communications system that includes the Medical Post and the ACPC field base in Satipo. Daytime river traffic along these two rivers is probably sufficient to catch a boat a day (indeed there is an organized river taxi along the Rio Tambo). A satellite phone was used for communications from the survey sites, though with a rainforest canopy care must be taken in finding a suitably open site for even semi-reliable use. The use of a home agent as a single point of communications with the UK worked well and we are greatly appreciative of such assistance.

Medical arrangements

Upon arrival in Lima we discovered that there were no stocks of anti-venom in Satipo or Puerto Ocopa, contrary to our previous research. We purchased two vials from the Instituto Nacional de Salud and took them to the Medical Post in Puerto Ocopa in case of a snake bite. On our departure the anti-venom was left at Puerto Ocopa for wider community use.

Airstrips were visited at Mazamari and Cutivireni. We were told that other airstrips are located in Satipo and Puerto Ocopa. The Peruvian army base, located near Satipo, also had a helicopter, which would have been available in an emergency, but was in need of repair and hence should not be relied upon.

Restocking simple medical supplies, such as sterile dressings and rehydration powder, in Satipo was possible. Medical facilities in Puerto Ocopa and Satipo were well equipped and maintained, but extraction to Lima is essential when modern facilities are required.

Environmental and social impact assessment

A pre-expedition assessment was made of the possible environmental and social impacts, using advice and guidance from the British Ecological Society. Refuse was burnt in the field. Used batteries were taken back to Lima for the recycling and disposal facilities there. All non-scientific equipment was left for the communities we had visited, and the scientific equipment was donated to our counterparts and the Natural History Museum laboratories.

The refuse collection work we performed in Coriteni Tarso was a positive impact of our visit. It is difficult to gauge the long-term success of this project, but the men in the village seemed concerned, particularly of the detrimental effects of used batteries. An infrastructure is necessary across villages for proper disposal of non-recyclable items.

Cultural, political and economic impacts are difficult to estimate. The community of Coriteni Tarso is more used to visitors than Camantavishi, including Westerners, and shows some signs of entrepreneurism. Projects to empower women by encouraging the making and selling of jewellery are well developed. The men are keen to earn by acting as guides or workers. Their closer proximity to centres of commerce, Puerto Ocopa and beyond, are undoubtedly influential. We tried to set a positive example in our dealings with the community, for example by running a lesson about our work in the school and always trying to trade for goods instead of simply giving away our excess In response to our observations about their hunting practices we endeavoured to study the impact this might be having on natural resources. This is part of a broader effort to understand the Ashaninka people and their interactions with their environment, with a view to better management.

The community of Camantavishi is much less used to visitors and live in an area that was harder hit by the Sendero Luminoso atrocities. Their dependence on free aid is very apparent, as is their general scepticism about outsiders. Both communities are doubtful of the opportunities offered by loggers. One misunderstanding between the community and ourselves concerned the gift that we had brought as a gesture of goodwill and in return for the support of the community for our activities. The community had been asked via radio prior to our arrival what would be most beneficial, and on that conversation we had bought a fluorescent lamp and rechargeable battery from Satipo intended for the communal shelter. Although the gift was well received during the initial meeting it was only at the final meeting, after three weeks of survey work, that it was stated that the community had been expecting a generator and lighting for each family. We endeavoured to explain that this was out of our means and that we had acted on the radio conversation as we thought best, but the misunderstanding had stood throughout our trip and soured the final meeting which was intended to explain our work and its relevance to the Camantavishi community. We also had great difficulty explain that we were voluntary workers and that the specimens we had collected were for study and not for sale. We feel that previous experiences had led the people of Camantavishi to almost expect exploitation, and explaining why this was not the case whilst our many bags of expensive kit were sitting nearby was immensely difficult.

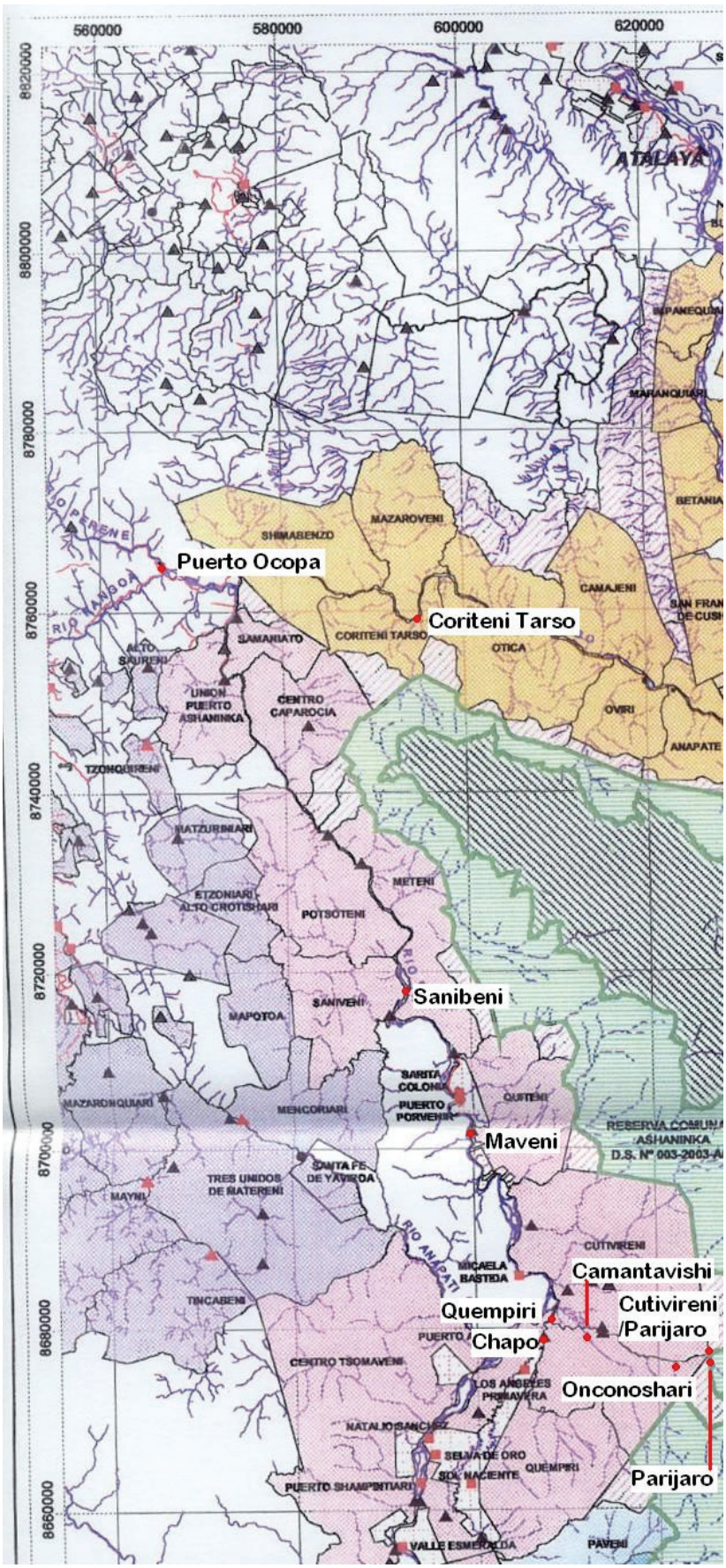
The main recommendation is to endeavour to promote and maintain honest and open communications with indigenous people. Early explanation of the project's objectives, processes, outcomes and relevance is essential. The danger with disparate cultures and languages is not putting enough effort into establishing a common understanding. There is always the risk of mis-communication which if unidentified or left uncorrected can create increasingly large problems or uncertainty and wariness. A strategy of starting by developing social relationships, before the formal work of explaining the project's work is recommended, as is encouraging inclusion and collaboration with the indigenous people at all times. Before leaving a project site is suggested to show the indigenous the early results of the project work as best possible, and to agree on how the project will continue through to the dissemination of a final report and list of recommendations.

Water Quality Analysis

As a part of work on the Otishi National Park Management Plan, work was carried out during the expedition with the purpose of characterising some of the rivers that lie within the basin of the Rio Tambo and Rio Ene. This work was performed and written up by Peruvian counterparts4 in the report entitled “Catacterizacion de los parámetros fisicoquíimicos en tributarios de la margen derecha de la cuenca Tambo-Ene (2004)”.

Within the broad Tambo and Ene basins, the following river sites were sampled:

Sector	Site location	River	Tributary of:
Tambo	Coriteni Tarso	Coriteni	Tambo
	Puerto Ocopa	Perene	Tambo
Ene	Sanibeni	Sanibeni	Ene
	Maveni	Maveni	Ene
	Camantavishi	Camantavishi	Cutivireni
	Cutivireni	Cutivireni/Onconoshari	Ene
	Cutivireni	Cutivireni/Parijaro	Ene
	Cutivireni	Parijaro	Cutivireni
	Chapo	Chapo	Quempiri
	Quempiri	Quempiri	Ene



Map showing approximate locations of river sample sites.
Sites are indicated by a circular red point.

A standard set of tests were conducted at each location. Physical and chemical parameters were analysed in-situ, using tests and equipment from a Hanna Test ® water quality kit, between August and September, in favourable conditions in remote locations like Coriteni, Cutivireni and Parijaro, as well as on larger rivers near population centres.. Many organisms live in or depend on the water, and the quality of the water consequently affects the current biodiversity in the area.

We studied three types of sites according to the physical and chemical parameters. The first group consisted of the communities of Chapo, Quempiri and Camantavishi in the Ene basin, as well as the community of Puerto Ocopa on the Perene. The second group of samples were from the military control posts at Sanibeni and Maveni on the Ene river, and the third was made up of far-away sites that are not influenced directly by man like the Coriteni camp, and the sites at Onconoshari and Parijaro, at the upper reaches of the Cutivireni river.

Results

The ranges of water temperature (20-25^{o}c) and dissolved oxygen concentrations (6.5-8.6mg $[O_2]_{aq}$/L) were very similar to values from the Rio Urubamba in September (Camisea EIA, 2001; Ortega et al., 2004). The lowest values for dissolved carbon dioxide were found by the camp above Coriteni, where the fast moving, small stream has little decaying vegetation, and is upstream of all human habitation. Here the alkalinity, acidity and hardness were high, with a high pH, probably because the water has just run off or through the carbonate rocks of the area.

Higher acidity, alkalinity and hardness, combined with higher levels of dissolved carbon dioxide, were found at Sanibeni and Maveni, the military control posts along the Rio Ene. These sites are downstream from settlements and farmland, and the high concentrations may be due to eutrophication, farm chemicals and waste water from the communities. There may also be other pollutants from the higher boat traffic in these areas. Similar characteristics were found in the Chapo, a tributary of the Quempiri. This is probably related to waste water from the settlement of Los Angeles further upstream, as well as from the coca which is known to be grown in the forests around that area. Both the cultivation and processing of coca involve the use of chemicals.

Conclusions

The areas unaffected directly by man displayed favourable values for aquatic life and for organisms that depend on the water, such as frogs and small lizards, as well as for the consumption and domestic use by the Ashaninka communities.

Higher values of acidity, $CO_{2(aq)}$ and hardness were found in Quempiri, possibly because their waters are influenced by the acid contribution used in the cocaine production waters above and by waste water from human settlement. Eutrophication from the waste water of the native community of Camantavishi is most likely responsible for the water quality in the Rio Camantavishi. Many boats regularly travel along the rivers that serve as control posts, Sanibeni and Maveni, consequently polluting these waterways with fuel residues. Chemical enrichment and pollution is likely to be deleterious both to aquatic life, and to the Ashaninka and settler communities alike.

Recommendations

It is considered necessary to make further studies of the chemical and physical parameters physical of the water, to determine the variation in the values obtained during the summer of 2004. In addition, knowing the variation over the course of the year, both during dry and wet seasons, is important. A periodic record of aquatic indicator species would allow the quality of water to be tracked over time, and provide an input into the analysis of species that depend on the water. Initiating and promoting water monitoring programs and cleanup initiatives is important for those species that depend directly on this resource, including man. Future bacterial and parasitological analysis of these waters would be valuable due to the importance of the water resource in the lives of the Ashaninka communities. Many bathe and swim in the rivers, and the presence of water borne diseases and macro-parasites is not well studied.

The Ashaninka

Introduction

The Ashaninka natives are the second largest ethnic group in Peruvian Amazonia. They live in communities along the river valleys of the Ene and the Tambo. In the Ene River Valley in the District of Pangoa, fifteen Ashaninka communities have legal recognition and property titles for an area of over 200,000 hectares. These communities number over 4,000 people, most of whom do not speak Spanish. In the Tambo River District there are 32 communities numbering over 6,500 people. The communities are represented by the following bodies: Ashaninka Central–Ene River (CARE) and Ashaninka Central-Tambo River (CART).

During the last decade the Ashaninka suffered terribly at the hands of the Sendero Luminoso (Shining Path), who committed a terrible genocide against them, but although terrorism has not disappeared completely the area is much less dangerous today.

Coriteni Tarso

We stayed at the community of Coriteni Tarso, and the following description is based on conversations with Jorge Marcial, the chief of the community.

There are 32 families (houses) in the village, with about 200 people. This number is increasing. Since the 1980s, the loggers' influence on the nearby towns has been growing.

Jorge and the Community 'Council'

Jorge is 32 years old and has been the Chief of Coriteni Taso since January 2001. He is from the community of Boca de Cheni and met the community of Coriteni Taso in 1989, when they were in exile in Betaña escaping from the terrorists. He met his wife there and when the situation calmed down he went back to Coriteni with her.

A chief is always elected by all the members of the community over the age of 18. Elections are held every 2 years and a president can be re-elected (as was the case for Jorge).

Other important posts in the Community 'Council' include the Vice-President Ismael, the Treasurer Dionisio, the Secretary Nelvin and two 'Bocales', messengers who relay the information about meetings to the whole village by going from door to door. There is an Association of fathers, the PAFA (padres de familia) with Romero as the President and a Club de Madres for the mothers.

The community has a 'caja común', a communal moneybox or treasury which is used for group equipment such as the radio, the boat or the boat's motor. The money seems to come mainly from the sale of wood, although there is no active logging ongoing.
Education

The teacher is Linder Sanchez Campos, 29 years old. He is an Ashaninka from another community, who has been trained and is paid by the government. All children

are given workbooks for their key subjects: maths, Spanish, natural sciences (which include geography and biology) and religion, and they automatically take part in the 'Vaso de Leche' nutrition programme. The aim of this is to provide each child with enough calcium, as their standard diet is often completely lactose-free. Every month, six litres of powdered milk and one kilo of Quaker Oats are distributed to the communities per child, and mothers are taught how to cook porridge.

Dress

The Ashaninka have now been exposed to money and have stopped wearing their traditional Kushmas (a simple garment rather like a jellaba) on a daily basis because they are 'too hot and heavy'. Instead they can get 'more comfortable' Western clothes from the nearby towns or villages (Satipo is 'only' six hours away and Puerto Ocopa, two).

Language and Communication

In both Coriteni Tarso and Camantavishi a mixture of Spanish and Ashaninka is spoken, and as a result we always ensured that our statements were translated into Ashaninka for those that didn't understand us. The Ashaninka language has sounds which are very staccato, and involve large vocal ranges. In some ways the tonal range resembles the way that Chinese is spoken. As indicated by the village meetings the Ashaninka are diplomatic people, and meetings are inclusive. Direct conversations can be difficult and innuendo plays a part in their communication. We found that slap-stick humour is well received.

A selection of useful words and phrases is included in Appendix 5.

Food and Drink

As with clothes, the members of the Coriteni community no longer only rely on themselves. They eat not only what they cultivate (yucca, oranges and bananas), hunt or fish, but they also buy products such as tuna (which they love), pasta or 'gaseosas', fizzy drinks. They still grow most of they what they eat though, and every family has its own 'chacra' or plot of land. Some villagers grow cocoa, coffee or rice but rarely consume it themselves. They sell it in Satipo or to buyers who travel upriver. The dietary habit which most surprised us was the daily consumption of large quantities of masato, or fermented woman's spit. The women make it in big pots by chewing on sweet potatoes and spitting in boiling water! Everyone drinks masato, but it is fairly alcoholic. We often visited houses where the men were completely drunk on masato in the early hours of the afternoon!

Religion

There is a Catholic Mission in Betaña, but the fathers do not come to Coriteni, and people there are generally not baptised. However, everyone claims to believe in God and religion counts as one of the most important subjects for school children. They celebrate Christmas by giving sweets to the children, but when asked what it represented, only a few seemed to know that it was the birth of Jesus Christ.

Health

There is, on the other hand, a visiting nurse who comes every month on the 15th for general check-ups and vaccinations. The radio is available for emergencies and the 'caja común' has been used for emergency evacuation to the Puesto de Salud (bush hospital) in Puerto Ocopa.

Hunting and Fishing

Men go both hunting and fishing when they need food. There are 16 shotguns (which belong to individuals) in total in the village and these were purchased with money from the loggers. Those who cannot afford guns or ammunition (27 soles, $10 for a packet of cartridges) use the traditional bows and arrows.

There seems to be no regular hunting pattern. Men tend to go out in groups of two or three, either in the evening or very early in the morning. The length of a trip varies according to what they find, but can last up to three or four days. Hunters go out as much in the rainy as the dry season, but they fish less when the rivers get too big and dangerous in the rainy season. The most common animals hunted are, according to Jorge : venados, sajinos, vanganas and choznos. If a fiesta is coming up, then more men will go off hunting.

The meat is distributed between the families of those who hunted it, but when there is enough for more it is shared out amongst the whole community. Jorge remembers that when he arrived in the community ten years ago in 1994, there were many more animals closer to the village. Since then, the village has expanded; more houses and chacras have been built and more children born. Hunting is therefore more difficult and time-consuming.

Our interaction with the Ashaninka

a) Our guides in the forest : Jeraldio and Bernaldo

We were fortunate enough not only to live with the Ashaninka in their community, but also, when we were in the forest, to work on a daily basis with two of their men: Bernaldo and Jeraldio. Bernaldo was from the community of Betaña but worked with us while his wife and four daughters stayed with cousins in Coriteni. Jeraldio was a member of CART, and as well as working for us, had to supervise our work and make sure we were not doing anything illegal. We got on well with both of them and they became more and more open about their lives as the days went by. We were at first surprised at their lack of questions about our habits, which must have seemed strange to them. They accepted the camp rules well (washing only downriver from the drinking point, using the camp toilets, attending regular meals, not going out alone, etc.) and when asked if they were happy always answered in the affirmative. They were very useful to us, particularly for cutting paths with machetes for our transects or digging holes for our soil analysis. They also helped us in our frog search and when the biologists in the group gave little lessons in ranology to the non-biologists, they often took an active part.

Bernaldo was less interested in our meals than his companion; every time we asked him if he preferred our (relatively tasty, in our opinion!) meal or plain yucca, he always replied yucca. Conversely, Jeraldio, who had had more contact with the world

outside the Tambo River Valley, showed interest not only in our food but also in English and we taught him a few words in exchange for Ashaninka lessons.

b) In the village

The main difficulty we had whilst talking, negotiating or working with the Ashaninka in general was understanding what they meant by the word 'yes'. They say 'yes' to everything, whether they mean 'I don't know', 'maybe' or sometimes even 'no'!
Despite many misunderstandings and communication problems, we shared wonderful moments with them, though. We cooked tuna pasta for the whole village (70 people) organised a lesson about frogs for the children in the school, visited many families to share the traditional 'masato', danced around fires in the evening, played (and lost) various football or volleyball matches, organised games for the children, tried fishing, took part in the 'baptism' of a tree. This last event consisted of dancing in couples round a tree with a machete whilst trying to knock it down. Michael was the one who knocked it down, after hours of dancing around and he was officially declared 'padrino del arból'! One of his duties is to come back in a year's time to honour his 'godson' the tree!

We 'hired' six porters to carry our food up to our camp in the jungle, but apart from that we tried to avoid using money in our transactions with them. Instead of buying eggs from Jorge's wife, for example, we would swap them for our surplus of sugar, rice or manjar (milk jam).

Conclusion

I think living with the Ashaninka and adapting to their routines whilst in the village was one of the most novel, exciting and challenging experiences we'd ever faced. It was not always easy, for their way of life is very different from ours, and we often felt frustrated because of communication difficulties and misunderstandings, but in the end we all realised it was more than worthwhile. We hope that they benefited from our exchange as much as we did!

Team Member Biographies

The composition of the Expedition Team changed between the first set of surveys and the second. Below is a complete listing of those who took part in one or both of the halves of the expedition. The Peruvian counterparts were a critical link to the country and partner organisations, and assisted the Cambridge-based team in devising and planning the scientific objectives.

Matt Shreeve, 23, (British), Expedition Leader and Treasurer, was a graduate scholar reading a Technology Policy MPhil. He has experience of leading a summer language camp in Poland including several mountain walks. He took part in a two-month conservation expedition in the Belizean rainforest that included mapping and wildlife monitoring. He then completed self-organised treks and independent travel in Central America.

Michael FitzPatrick, 21, (British & Australian), Scientific Lead and Medical Officer (Camantavishi), was a second-year scholar reading Biological Sciences. Over the last three summers he has trained with the British Army Jungle Warfare Unit in Belize, been involved with conservation projects over a seven-month period in Australia and used his many diving qualifications during a conservation project in the Philippines and participated in a three-week conservation course in Panama that gave practical experience of tropical forest scientific field techniques.

Kim Maynard, 21, (British), Medical Officer (Coriteni Tarso) and Environmental Manager, was a second-year undergraduate reading Geography. She has lots of conservation experience: working for five months in the Atlantic Rainforest in Brazil and another month in Australia. These experiences include GIS mapping, and scientific fieldwork such as soil erosion and water quality analysis.

Margarita Medina, 25, (Peruvian) is a herpetologist who has experience in amphibian fieldwork, including the Tambopata Reserve. She has worked near the area before and is keen to start a research programme in the Communal Reserve.

Jessica Rodrigo, 26, (Peruvian) is a graduate in Zoology from the Universidad San Marcos. She is currently continuing her studies on reptiles in collaboration with the Natural History Museum of San Marcos.

Emilie Stephenson, 22, (British & French), Logistics Manager, was a graduating fourth-year undergraduate Linguist. She can speak fluent French, German and Spanish, and spent her third year in Cusco, Peru, studying anthropology and has worked with indigenous communities in the southern jungle. Prior to University Emilie worked and travelled extensively in Cameroon during her year abroad, and more recently has been a guide for an ecological summer camp in the Chilean Andes.

William Yupanqui (Peruvian) is a graduate biologist from the Universidad Nacional Federico Villarreall. He is a volunteer with ACPC, working on integrating scientific knowledge about the Otishi National Park and Ashaninka Communal Reserve into the Management Plans being prepared. William has a special interest in water-quality research.

Jessica Bravo, 28, (Peruvian) is a graduate biologist from the Universidad Nacional Federico Villarreal. She is a volunteer with ACPC, working on integrating scientific knowledge about the Otishi National Park and Ashaninka Communal Reserve into the Management Plans being prepared. Jessica has an interest in water-quality research and the social aspects of conservation.

Medical Report

Pre-Expedition Preparation

Appendix 1 contains the pre-expedition medical questionnaire completed by all team members.

Vaccinations

All team members needed to ensure they had up to date vaccinations against:

- Diphtheria
- Polio
- Tetanus
- Hepatitis A
- Hepatitis B
- Meningococcal meningitis
- Rabies
- Tuberculosis (BCG)
- Typhoid
- Yellow fever

As recommended by the Cambridge University Occupational Health Services (see below for contact details).

Red Cross Practical First Aid course for British team – 2 days

This standard course teaches key life-saving skills before covering common medical conditions and appropriate treatments for adults, children and babies.

Syllabus:

- Respond to the needs of unconscious casualties: Includes placing an unconscious person in the recovery position.
- Perform cardio pulmonary resuscitation. Programme also covered the different techniques for adults, children and infants.
- Responds to the needs of casualties with major injuries: Significant blood loss, shock, muscular / skeletal injury, burns and scalds.
- Respond to the needs of casualties with common illnesses and conditions: awareness of appropriate treatment for stroke, heart attack, diabetes, epilepsy, anaphylaxis, angina, asthma, febrile convulsions, croup, and meningitis.

Informal training on life-saving skills and emergency response was given to the Peruvian counterparts in the field. We would recommend that as many team members as possible undergo formal training prior to an expedition, and that discussions and lessons are given to others on life-saving skills and the use of any issued medical kit.

Wilderness Medical Training – 2 days

Organised by the RGS-IBG Expedition Advisory Centre in association with Wilderness Medical Training this course is designed for small expedition groups operating in diverse environments without professional medical support in remote areas outside the UK.

Syllabus:

- Assessment, diagnosis and treatment of a variety of conditions, taking a medical history, conducting a physical examination, use of a stethoscope and blood pressure cuff, control of pain and sickness.
- How to stabilise a patient's condition, immediate care of trauma victims (first and second aid), immobilisation of fractures, treatment of soft tissue injuries and burns, recognition and treatment of shock.
- How to manage disease, for example appendicitis, urinary tract and genital infections, diarrhoea illnesses, chest infections, use of appropriate prescription drugs.
- Environmental hazards, diagnosis and treatment of heat problems and wildlife risks.
- Risks and their prevention: ear, nose and throat problems, head and neck injuries, chest and abdominal injuries, psychological management of accident/illness, legal considerations.

Suppliers of Medical Equipment and Support

Cambridge University Occupational Health Service
Fenner's, Gresham Road, Cambridge CB1 2ES
Provided information and advice on travel medicine, including malarial treatments.
Provided travel packs through the student Expeditions Medical Scheme.

BCB Ltd Medical Supplies
Moorland Road, Cardiff, CF24 2YL
Email: sales at bcb.ltd.uk
Provided some antibiotics unattainable through the Occupational Health Service.
Permissions for receipt of supplies, otherwise unavailable without subscription, given through the Wilderness Medical Training Course.

Boots the Chemist, UK
Basic First Aid equipment

The full Medical Kit Listing is given in Appendix 2.

Expected Problems

A comprehensive Risk Assessment was developed during the early stages of planning in liaison between the medical officer and rest of team. It was updated as planning proceeded and new information became apparent. It highlighted risks with high likelihood or high impact, and gave an objective understanding of the threats to our

safety. The risk assessment, although carried on expedition, was not referred to. Its main value therefore was in the planning stages, and showed due diligence to funding bodies and insurance company. It is included for reference in Appendix 3.

A crisis management plan was developed prior to the expedition primarily to meet the requirements of a funding body. It was also useful in forcing a consideration of worse case scenarios and in highlighting areas of uncertainty that needed clarification. This plan was not formally updated in the field, although contingency plans evolved and were put in place as deemed necessary. The crisis management plan is included for reference in Appendix 4.

Much of the planning for problems came from material from the RGS EXPLORE event, and in particular the Trekforce6 guidelines, which are based on a long history of safe expeditions to rainforest environments.

Team Medical Report

Coriteni Tarso

Team Members:

- Kim Maynard – Medical Officer
- Emilie Stephenson
- Michael FitzPatrick
- Matthew Shreeve
- Jessica Rodrigo
- Mago Medina

Minor cases:

All minor injuries sustained were those one would expect in a hostile tropical environment, they included blisters, cuts, scratches, insect bites, and skin infections, especially around the feet, possibly due to daily immersion in water! All of these were easily treatable using Betadine paint and dressings to ensure they remained clean as far as possible and the majority healed without any complications.

Feet were dried and covered in talcum powder and anti-fungal powder after any immersion, where practical, in order to try and prevent problems of cracking, blistering, and infection, especially between the toes.

There were several cases of diarrhoea, constipation and nausea throughout the time at camp. The majority were in the first few weeks, caused most probably by the change in climate and diet. Dioralyte was given in all cases to prevent dehydration, and in cases of constipation senna-based laxatives given. There were no serious complications.

One case of Thrush was easily treated with pessary and cream.

[6] Refer to www.Trekforce.org.uk

Serious cases:

One case of a viral infection as a result of a cut lip, led to swollen glands and severe discomfort. It was left to run its course, with painkillers given. Duration approximately 4 days.

A persisting throat infection led to case of sinusitis. A course of penicillin antibiotic was given. Concerns of Malaria were raised, but proved unfounded. Duration approximately 6 days, 2 of which were spent on bed rest. This had a small negative effect on team morale, because of the reduction in group size.

One team member displayed a serious anaphylactic reaction, of unknown cause, resulting in severe rashes and swelling of the skin on all parts of the body including the face. Oral chlorpheniramine and topical hydrocortisone were taken, with plenty of water. Reaction lasted approximately 24hrs. A policy that no one should be left alone was in place, but the team member was in camp with only the local guide, who was unable to provide assistance. A new policy that team members should always be paired with someone with First Aid training was put into place.

One of our Ashaninka guides had what appeared to be a tooth infection causing the side of his face to swell up causing extreme discomfort. Due to lack of training on dental issues, the Medical Officer decided to treat with a course of Erythromycin antibiotics. (See later notes on health services with the Ashaninka).

Camantavishi

Team Members:

- Michael FitzPatrick – Medical Officer
- Matthew Shreeve
- Jessica Rodrigo
- Jessica Bravo Palco
- William Yupanqui Cuadros

Preparation:

Two new team members joined the Camantavishi expedition, so medical questionnaires were completed before departure. As these members had not received First Aid training, the medical officer ran a short course, including primary care of serious casualties, bleeding and shock, anaphylaxis, emergency procedures and likely minor injuries. The course was a success, particularly for integration of new members into the group, and certainly improved the Medical Officer's Spanish!

Minor cases:

Once again the usual tropical problems were experienced – diarrhoea, nausea, blisters, cuts and scratches. All treated in the conventional way.

The hazardous nature of work in and around the river led to several falls, resulting in twisted and sprained ankles. Although compression and elevation were recommended, these injuries could not be satisfactorily rested as the team had to leave the location on foot, which extended the recovery time and exacerbated the injuries.

Serious cases:

There were no serious injuries amongst the team. Medical aid was given to two Ashaninka of the remote Shirampari community, the details of which are included in the following section.

Health Services with the Ashaninka

Our policy was to treat the Ashaninka team members as fully as possible, and for us to help members of the communities in which we stayed depending on our supplies, the severity of the condition, as well as considering that any treatment might do more harm than good without adequate follow-up care.

In the larger communities we received few requests for medical aid, however in the remote Shirampari community there were two cases worthy of note. A young man of the community had been ill for several months, and we were asked to help. An examination was conducted and a history taken, and dengue fever suspected. Paracetamol was given for the fever, and an immediate visit to a medical post recommended. The second case involved a two year-old boy who was brought to us, having fallen on rocks the day before. He had cuts, grazes and bruises to the scalp, face, arm and leg; though on examination no fractures or neurological problems were apparent, and he was not in distress. The wounds were cleaned and dressed, and dressings were changed daily until all the cuts had closed.

Examinations were challenging, as sometimes a translator was needed to make the author's broken Spanish intelligible to the Ashaninka speaking patients. Moreover, everything had to be clearly explained to both the patient (and the accompanying audience), as simple measurements and diagnostic aids like the stethoscope had never been seen before. Medical aid seemed to have a beneficial effect as a gesture of goodwill, especially in the remote Shirampari community.

Of more general note is the Ashaninka understanding and attitudes to Western medicine, particularly drug therapies. Few have had any contact with doctors, and for them drugs and antibiotics seem to have a semi-mythical "cure-all" power over disease. Along the Ene where there is some access to healthcare, we received several requests for "pastillas", or pills. These were either for malaria, for which we lacked sufficient treatment, or for conditions beyond our skill and equipment, such as an old crush injury to the leg.

Of special note is the case of supposed tooth infection in our Ashaninka guide in Coriteni (see earlier section). It transpired that he had been bitten by an ant on the face, which had caused the swelling. When asked questions about the injury he agreed with our diagnosis of tooth infection, obviously incorrect to him, and did not mention the true cause. Possibly he thought that the "pastillas" would be good for him, even though he knew the swelling would reduce without treatment, and that we might withhold drugs from him if we knew the truth. This shows he did not understand that the drug treatment depended on the condition, and that he thought we might not do what we thought was best for him. In light of this we recommend that it should be

explicitly stated to local team members that their medical problems will be treated and that to do so the nature and cause of the problem must be known. Leading questions should also be avoided when taking a history.

Conclusions

It was extremely difficult choosing the medical equipment, and trying to decide exactly what was and wasn't necessary given the small size of the group, and considering the remoteness of our proposed locations. As it turned out, we were not as remote as we had initially thought, yet luckily due to the breadth of items included in the medical kit we were spared the odd journey to the health centre which might have been necessary given other circumstances.

In hindsight we feel we prepared well and dealt with the situations and circumstances we encountered in creditable manner. The main lessons would be the cautions advised in dealing with indigenous populations. Minor changes to the medical kit list would be recommended:

- Take more paracetamol and ibuprofen as these were in constant demand for various ills. A resupply of dioralyte was required in Satipo after the Coriteni Tarso surveys and more would have been consumed had there been sufficient for those suffering persistent diarrhoea.
- Take fewer eye bath pods (3 instead of 10), and less laxatives (20 as opposed to 60), as the opposite problem was far more common!
- Take more Steristrips as due to the need to change dressings in the humid weather, 2 minor injuries almost finished our supplies
- Ensure that every team member has their own supply of talcum powder due to the sheer quantities in which it was used.

The training provided by both the Red Cross Practical First Aid course and the Wilderness Medical Training was excellent and certainly helped in many ways including building the confidence of the Medical Officer, and indeed the confidence of other team members. We would recommend both courses to anyone considering embarking on a similar expedition.

Financial Budgets

Anticipated

Pre-project Expenses	£
Research/Promotion	200
Training Courses (inc. First Aid, Medical Wilderness, other)	570.12
Visas	50
Insurance	750
Medical Kit/Health and Safety	575
Equipment/Materials	1080
Field Expenses	
International travel	2600
Local travel	500
Living expenses	1890
Local counterparts and guides	1800
Other (gifts and materials)	400
Post-Project Expenses	
Expedition Report	400
Photography	200
Administration	50
Sub-Total	11065.12
10% Contingency	1106.51
TOTAL (£)	12171.63

Actual Budget

Pre-project Expenses	£
Research/Promotion	100
Training Courses (First Aid, RGS WMT)	275
Permits for study in Communal Reserve	80
Insurance	1070
Medical Kit	580
Health and Safety	100
Equipment/Materials	600
Field Expenses	
International travel	2650
Local travel - buses	200
Local travel - taxis	150
Local travel - boats	340
Field food supplies	600
Satellite Phone	130
Living expenses	720
Guides (payments, not expenses)	450
Gifts, maps, materials, other supplies	750
Post-Project Expenses	
Expedition Report	400
Photography	250
Administration	50
Total (£)	9495

Thank you to our Supporters

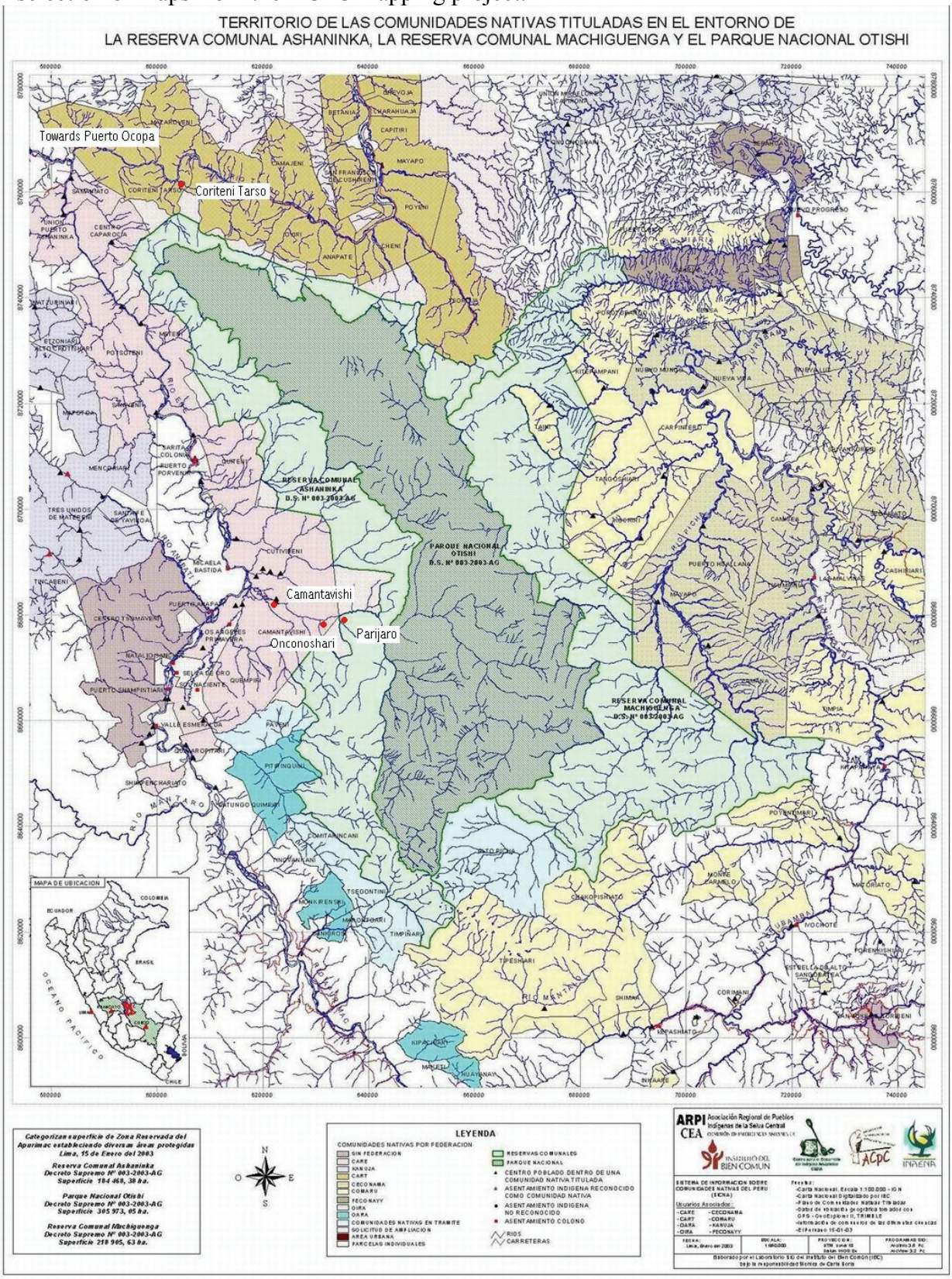
We are deeply indebted to the following trusts for the generous grants which enabled us to complete our expedition:

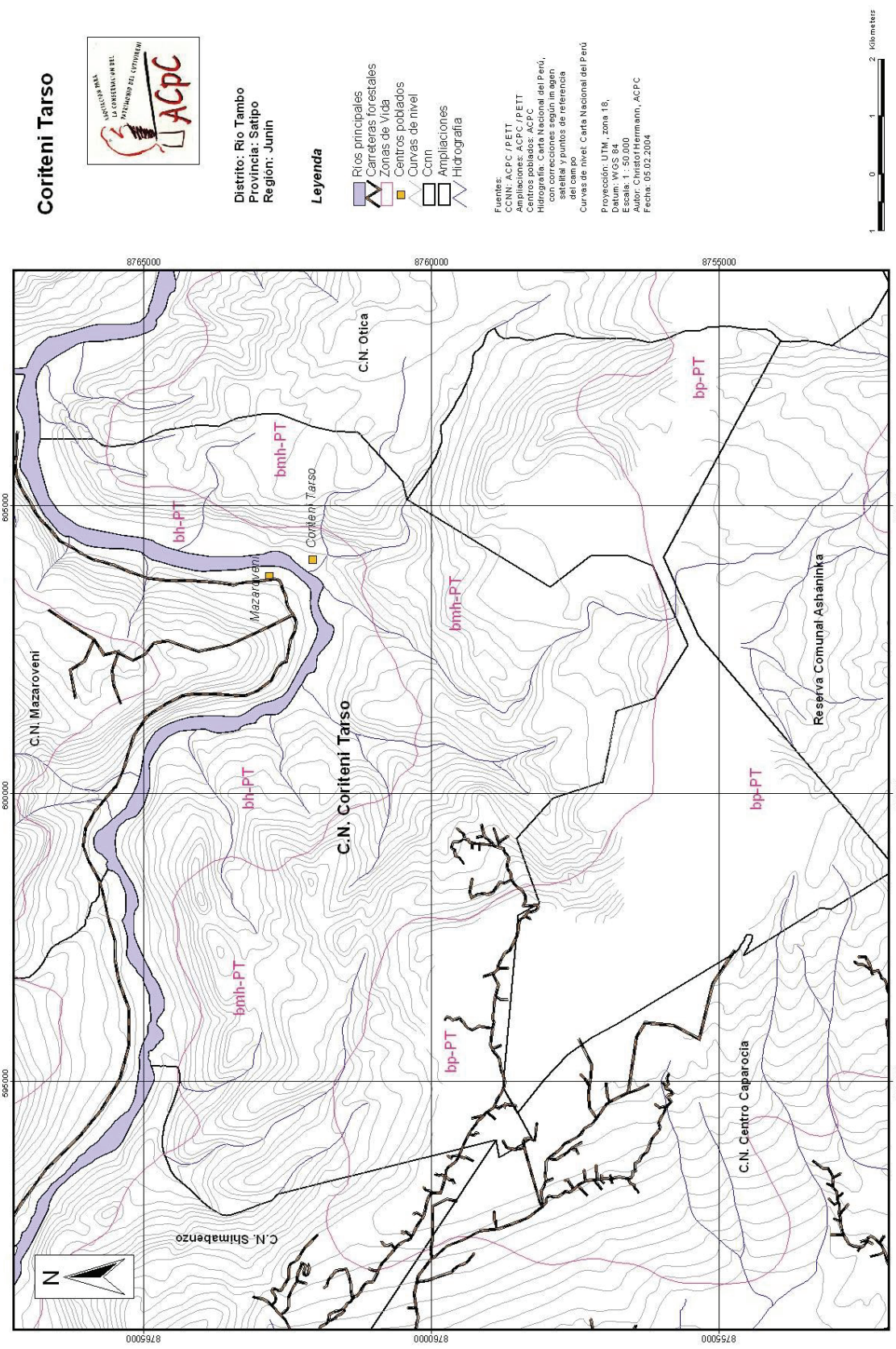
- Anglo-Peruvian Society
- Gilchrist Educational Trust
- Panton Trust
- People's Trust Endangered Species
- Royal Geographical Society
- Simpon's Educational and Conservation Trust
- St Johns College
- John Brooks Award
- Cambridge Expeditions Fund
- Shell Personal Development Award
- Donald Robertson Trust

Finally, our sincerest gratitude to the Expedition Patrons, namely Mark Collins and Sir Ranulph Fiennes.

Maps

A selection of maps from the ACPC mapping project.

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ACPC
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Provincia: Satipo
Región: Junin
Leyenda
Ríos principales
Carreteras forestales
Zonas de Vida
Centros poblados
Curvas de nivel
Ccnn
Ampliaciones
Hidrografía
Fuentes:
CCNN: ACPC / PETT
Ampliaciones: ACPC / PETT
Centros poblados: ACPC
Hidrografía: Carta Nacional del Perú, con correcciones según imagen satelital y puntos de referencia del campo
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Datum: WGS 84
Escala: 1 : 50.000
Autor: Christof Herrmann, ACPC
Fecha: 05.02.2004
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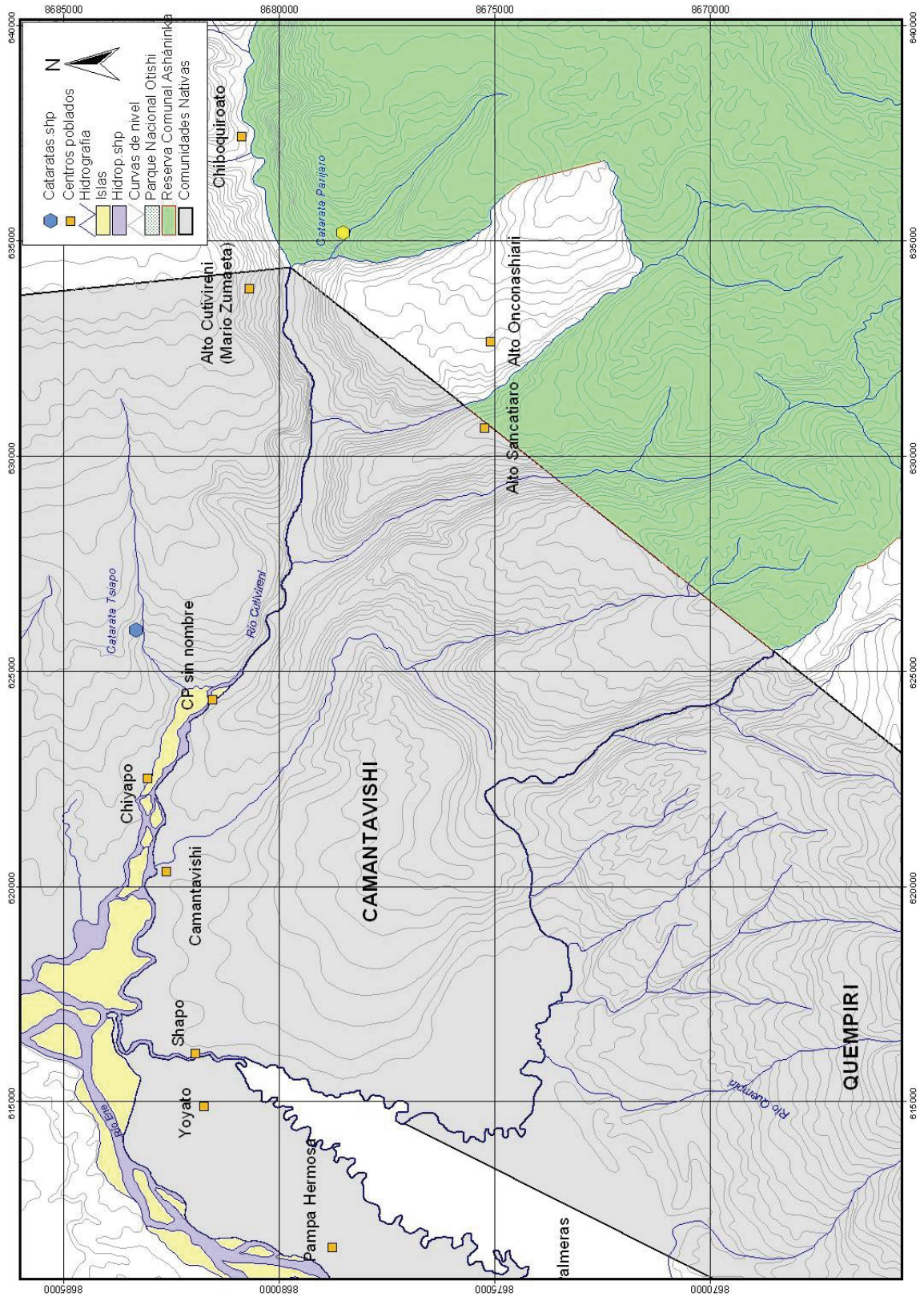
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Camantavishi
CAMANTAVISHI
Shapo
Yoyato
Río Ene
Pampa Hermosa
QUEMPIRI
Río Quempiri
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