



FIELD STATION PROFILES

BIOLOGICAL RESEARCH STATION AND PRIVATE CONSERVATION AREA PANGUANA

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NAME OF FIELD STATION

Biological Research Station and Private Conservation Area Panguana (Area de Conservación Privada Panguana – ACP) – ACP

GEOGRAPHIC LOCATION

- Peru, Department of Huánuco, Province of Puerto Inca, Elevation ~230 m
- Lat. 9.62° S, Long. 74.93° W; 507254.59 Easting, 8937089.04 Northing, UTM Zone 18L

HABITATS

The vegetation of the ACP Panguana is extremely diverse and directly connected to virgin upland forests within the neighboring indigenous community lands to the east and, ultimately, to the pristine uplands and montane cloud forests of the Cerros del Sira (Fig. 1; Valenzuela et al. 2015, Niessner et al. 2020). The regional climate is tropical humid with a mean temperature of 26°C and a precipitation of about 2400 mm/year. Rainfall from December to March usually exceeds 300 mm/month, whereas from June to August only between 50 and 100 mm is received (Niessner et al. 2020). The vegetation within the area of Panguana can roughly be differentiated into the following types:

Terra firme forest: The station and most of the private conservation area represents non-flooded *terra firme* habitats on high and low alluvial terraces. Elevations range from 230 to 350 m and the terraces are dissected by temporary creeks, which give them their characteristic relief

– the so-called *quebradas* ('broken') landform. Large round river stones can be found throughout the area along the trails, reflecting the steady change of the Yuyapichis (also found on maps as Lullapichis) riverbed during the Pleistocene and Holocene. The old-growth forests in Panguana are characterized by large emergent trees (e.g. *Ceiba* spp., *Dipteryx* spp., *Hura crepitans*) exceeding 40 m in height and frequent tree-fall gaps dominated by pioneer trees (e.g. *Cecropia* spp.). There is a great abundance of lianas, which normally bloom in the canopy and frequently reach a diameter (dbh) of more than 10 cm. The most eye-catching with their brightly colored tubular flowers belong to the Bignoniaceae family such as *Handroanthus impetiginosus* and *Xylophragma pratense*. The forest above the alluvial terraces is extremely diverse but relatively poor in epiphytic plants. The epiphyte assemblage is dominated by the Araceae. The forest understory on these terraces is quite easy to pass through, in contrast to the riverine vegetation.

Riverine vegetation: The frequently flooded bank of the Yuyapichis River is dominated by *Salix humboldtiana* and *Calliandra angustifolia*. The vegetation is mostly composed of herbs growing among rocks that are occasionally relocated by the river. The cut-off meanders are bordered by riparian forests comprising trees that endure high ground water levels for longer periods, such as *Cecropia* spp. or *Guarea guidonia*. These forests are extremely hard to walk through as the nutrient-rich alluvial soils support an impenetrable undergrowth of small shrubs and lianas.

Swamp forests: There are temporary bodies of water, some dominated by the *Mauritia flexuosa* palm (called *morichales*



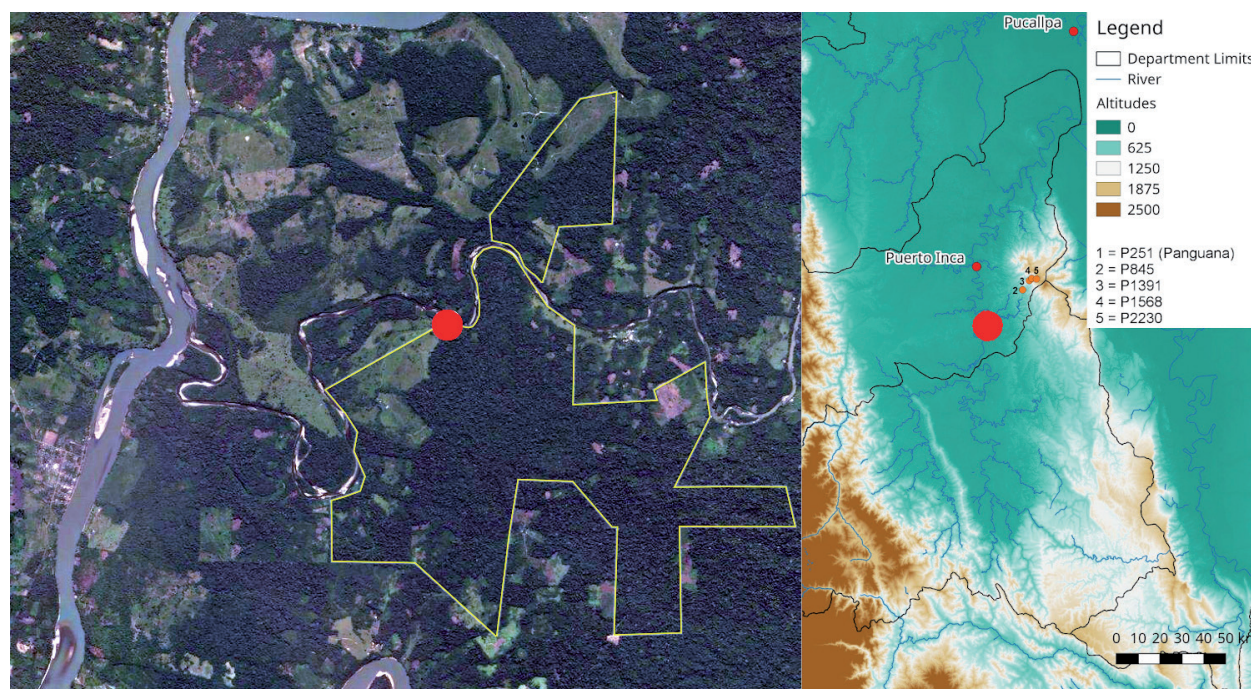


Figure 1. Map of the Panguana area (delimited by the green line, area as of 2018). The location of the Research Station is marked by a red dot. West of Panguana is the Rio Pachitea, which flows north and, on the western bank, is the village of Yuyapichis. The Rio Yuyapichis flows from east to west, mainly north of Panguana, and drains into the Pachitea north of Yuyapichis. The map on the right shows the location of Panguana (red dot) on a larger scale including the Cordillera El Sira in the east and the main Andean Cordillera in the west.

or *aguajales*). Some locations hardly ever dry up, where the rare *Elaeis oleifera* palm with its procumbent trunks can be found. All water bodies of Panguana, except the Yuyapichis River are low in pH and either crystal clear or light brown (like black tea), the latter being rich in tannins. Almost impenetrable swamps dominated by *caña brava* (*Gynerium sagittatum*) several meters high can be found in the meanders of the Yuyapichis River.

Secondary vegetation and open pastures: A small part of the private area consists of pastures, which were left for natural regeneration either recently or two decades ago. The currently open pastures will be part of a managed reforestation project.

Links to lists of fauna and flora:

<https://fieldguides.fieldmuseum.org/guides/guide/1097> Flora of Panguana

<http://dpsgdelrath.bplaced.net/Panguana/Panguana.pdf.html> Fauna of Panguana

<http://www.r-b-o.eu/cgi-bin/PANG/display.pl> Flora & Fauna of Panguana

INFRASTRUCTURE AND FEES

Panguana can be accessed by crossing the Rio Pachitea at the village of Yuyapichis and either travelling by boat upstream on the Rio Yuyapichis (only if the water level allows), being picked up by a tractor or walking across partly abandoned pastures up to the station. Each option takes about one hour. The village of Yuyapichis can be accessed by car from Pucallpa (ca three hours, ca 15 USD). The Station offers space for up to 25 researchers or other guests, which allows the hosting of student field courses or summer schools (Fig. 2). Fees include all meals and transportation at arrival and departure (Tab. 1).

Table 1. Daily station fees, including accommodation, all meals and transportation at arrival and departure.

STATION FEES	Per day (Peruvian Soles)	Per day (approx. in USD)
Students (national/foreign), and national researchers	40	~ 12
Foreign researchers (working on a scientific grant or project)	50	~ 15
Guest (without scientific grant)	60	~ 18
Laundry service (flat rate for a month)	35	~ 10



Figure 2. View of the Research Station Panguana with its landmark, a 55 m tall kapok tree (*Ceiba pentandra*) in the background. © Konrad Wothe

- Four houses with twelve rooms in total serve as accommodation. Each house has a veranda with workplaces and an office/laboratory is attached to one of the houses.
- A round house (locally called *maloca*) serves as dining, meeting and class room.
- A newly built kitchen and washroom is attached to the house of the local family and can also be used for dining.
- Sanitary areas: there are two bathrooms, each with a shower and a flush toilet. Several showers and sinks are attached externally. In addition there are two separate composting toilets.
- River transportation: the Station has two wooden motorized canoes (8 m, 8 person capacity each).
- There is a network of over 34 km of trails in an area of about 15 km².
- All houses have solar powered 220V sockets and led lights
- A mobile network (4G) and two online weather stations:
 - <https://panguana-station.herokuapp.com/>
 - https://www.bayceer.uni-bayreuth.de/meteo/de/klima/gru/html.php?id_obj=153614
- The Station has a small library with scientific and popular literature
- Laundry service is available

LEGAL REQUIREMENTS

The following permits are strictly necessary for scientific research in Peru.

(Please contact the corresponding institutions directly for official information or contact us for advice on these procedures).

Research / collecting permit: At the time of writing, less than 50% of the area is legally protected in the form of a private conservation area. In this case, the Peruvian National Forest and Wildlife Service (SERFOR) is the government office in charge of issuing research permits. The documents required to apply for a research/collecting permit are as follows: A. filled application sheet in the required format, B. a personal data sheet of the researchers, C. a research plan containing the species to be studied / collected, the duration of the project, the methodology, etc. All documents have to be submitted in Spanish. Furthermore, a scientific cooperation agreement must exist between the scientific institution of the applicant and a Peruvian research institution.

Export permit: For the export of biological material an export permit issued by SERFOR is required. The documents needed to process the export permit are as follows: A. a completed online application form containing the names of the researchers, their research institutions, the destination of the biological material abroad, shipment data, etc. (<https://www.serfor.gob.pe/portal/servicios-de-investigacion/exportacion-de-especies-con-fines-cientificos>), B. a research / collecting permit(s) and C. a certificate of deposition of 50% of the collected material in an officially recognized Peruvian collection (usually the “Museo de Historia Natural de la Universidad Nacional Mayor San Marcos”).

Genetic resources contract: A contract on the access to genetic resources is not needed if research is related to ecology, taxonomy, conservation and other basic aspects. A contract is needed if there is potential economic application or if it involves genetic modification. Details can be found at:

<http://sinia.minam.gob.pe/normas/decreto-supermo-que-aprueba-reglamento-gestion-forestal>
and
<http://sinia.minam.gob.pe/normas/decreto-supermo-que-aprueba-reglamento-gestion-fauna-silvestre>

KEY RESEARCH

The Panguana project was initially planned by the German couple Hans-Wilhelm and Maria Koepcke over 5 years, starting in 1968. They very soon realized that one human life would not be enough to document the manifold diversity of this environment (Fig. 3). The primary forest of Panguana and its fauna and flora have now been researched for 52 years, and about 300 publications by authors from around the world have been produced, including many diploma and doctoral theses. However, we are still only at the



Figure 3. Impressions of Panguana's biological diversity (from top left to bottom right: *Philodryas argentea*, *Staheliomyces cinctus*, *Catasetum schunkei* and *Dendropsophus saracuyensis*). © Amelie Höcherl

beginning of unveiling this complex ecosystem, especially inasfar as the vast, rich insect world is concerned. Every year Panguana's biodiversity presents us with a different aspect and new, previously unknown species. Panguana has one of the highest diversity of ant species ever reported (Verhaagh 1990). The entomological research includes work on Lepidoptera (Geometridae, Sphingidae, Saturniidae and several families of Microlepidoptera), aquatic beetles, dragonflies, Hymenoptera (especially Euglossini), Cerambycidae, Buprestidae. Apart from the biodiversity of insects, there are ongoing projects recording the herpeto-, avi-, mammalian and aquatic fauna, continuing historical observations

of the 1970's and 80's by the Koepckes. Panguana also hosts two permanent 1-ha vegetation plots, established and frequently revisited by the RAINFOR project (University of Leeds, Jardín Botánico de Missouri Oxapampa, Peru). The 1-ha plots are part of an elevational transect in the western slopes of the Cerros del Sira (TAYSira) created in 2011 in order to monitor long-term changes in forest structure/composition, tree growth and climate. Even the ongoing project *Florula de Panguana* is still at an early stage because botanists are seldom seen in Panguana and the high trees are only accessible to tree climbers. First results of this project are the *Field Guide* and *Flora and Fauna of* (see above).

FIVE SELECTED PUBLICATIONS

- Hausmann A, Diller J, Moriniere J, Höcherl A, Floren A, & Haszprunar G (2020) DNA barcoding of fogged caterpillars in Peru: A novel approach for unveiling host-plant relationships of tropical moths (Insecta, Lepidoptera). *PLoS One* 15: e0224188
- Hutterer R, Verhaagh M, Diller J & Podlousky R (1995) An inventory of mammals observed at Panguana Biological Station, Amazonian Peru. *Ecotropica* 1: 3-20
- Martel C, Gerlach G, Ayasse M & Milet-Pinheiro P (2019) Pollination ecology of the Neotropical gesneriad *Gloxinia perennis*: chemical composition and temporal fluctuation of floral perfume. *Plant Biology* 21: 723-731
- Pašukonis A, Loretto MC & Rojas B (2019) How far do tadpoles travel in the rainforest? Parent-assisted dispersal in poison frogs. *Evolutionary Ecology* 33: 613-623
- Schlüter A, Icochea J & Pérez J (2004) Amphibians and reptiles of the lower Río Lullapichis, Amazonian Peru: updated species list with ecological and biogeographical notes. *Salamandra* 40: 141-160

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- Niessner A, Küppers M, Graham J, Valenzuela L, Güney A, Remmele S & Zimmermann R (2020) Climate and seasonal rainfall anomalies along an elevational gradient in the El Sira Mountains, Peru, and their impacts on tree radial growth. *Journal of Forestry Research* 31:1521-1538
- Valenzuela L, Vásquez R, Rojas R, Villalba MI, Phillips O, López G, Chama V, Monteagudo A, Bellota D, Huillca Y & Pallqui NC (2015) Línea base para el monitoreo de la vegetación en la Reserva Comunal El Sira (RCS). *Arnaldoa* 22:243-268
- Verhaagh M (1990) The Formicidae of the rainforest in Panguana, Peru: The most diverse local ant fauna ever recorded. In: Veeresh, G.K., B. Mallik & C.A. Viraktamath (eds.): *Social Insects and the Environment. Proceedings of the 11th International Congress of IUSSI, 1990* (International Union for the Study of Social Insects). pp 217-218

Link to a list of all Panguana publications:

<https://panguana.de/publikationen/>

Website link:

<https://panguana.de/>