

# Sangay '89 Preliminary Expedition Report

Paul Ramsay

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## Members:

**Paul Ramsay.** Leader, Páramo phytosociology.

**Joel Creed.** Limnology.

**Ian Whitehead.** Forest studies.

**Lynn Evans.** Mosses and páramo studies.

**Nicola Legg.** Soil studies.

**Michael Bassett.** Treasurer, limnology.

Approximate cost of Field Work: £6,800

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Sangay National Park is situated 25km to the east of Riobamba in the Andes of Central Ecuador and covers an area of some 540,000ha. It stretches 90km from north to south and 80km from east to west, and encompasses lofty snow-capped peaks (5,000m high) and sub-tropical rainforest at less than 4,000m. (For more detailed summary of the area see Armstrong and Macey 1979).

The object of the expedition was to conduct important scientific research in a number of different habitats within the park. This was to be the first study of its kind in this UNESCO World Heritage site.

Access to the park is difficult. Study sites were chosen based on information obtained from park sources. However, this information proved unreliable and, for example, the first study area around Laguna Quindecocha had to be abandoned because the estimated 5 hours to reach it was in fact more like 5 days. The trail to Huamboya was in poor condition and estimates for clearing the path increased from the initial 3 days to one of 10 days. For this reason the planned visit to Huamboya was also abandoned. These factors called for immediate revisions of study sites and fieldwork programmes. However, important progress was made in all the disciplines studied and these are summarized below.

## Páramo studies

**Páramo Phytosociology** - At six elevations in the area of Laguna Estrellada/Laguna Verde the páramo vegetation was quantitatively sampled using three 5m x 5m quadrats. All vascular and cryptogram species were recorded and voucher specimens collected only where necessary for identification. Environmental assessments of burning, trampling, grazing, overall disturbance and exposure were recorded along with details of aspect, slope and substrate categories. In addition, more general observations of páramo flora were noted for the Alao-Magdalena páramo and for the species at the snowline of Chizapucutul.

**Morphological Assessments of Páramo Plants** - Eleven species were studied in the area around L. Estrellada-L. Verde at six elevations (corresponding with the quantitative survey described above). Morphological parameters were selected appropriate for each species (eg cushion size, tussock dimensions, mid-stem thickness, plant height, leaf width, leaf length and leaf thickness). The species studied were: *Bartsia* spp., *Huperzia crassa*, *Calamagrostis* spp., *Neurolepis elata*, *Loricaria ilinissae*, *Valeriana bonplandiana*, *Oritrophium peruvianum*, *Eryngium humile*, *Hypochaeris sessiliflora*, *Plantago rigida* and *Werneria humilis*. A comparative study was carried out at six altitudinal levels on Volcan Chimborazo (4,100-4,600m), a dry páramo on the Cordillera Occidental, about 50km northwest of the study site in the Sangay National Park. Mostly different species were studied here: *Hypochaeris sessiliflora*, *Calamagrostis* spp., *Loricaria thuyoides*, *Nototriche jamesonii*, *Geranium ecuadoriense*, *Werneria humilis*, *Oritrophium peruvianum*, *Culcitium nivale*, and *Chuquiraga jussieui*. Biochemical analyses of two of these species over the altitudinal gradient will be conducted.

## Limnology

**Lakes** - Three lakes were involved in the study (L. Estrellada, L. Verde and L. Negra [Alao]). At the first two lakes a preliminary assessment of lake features, mapping of lake bathymetry and morphology and physical measurements of dissolved oxygen, pH, water temperature, conductivity, nitrate and phosphate concentration and Secchi depth were carried out. Qualitative and quantitative collections of phytoplankton and benthic microalgae were made, along with observations on macrophyte distribution and sediment characteristics. Phytoplankton productivity was also measured. At L. Negra, some mapping and a preliminary assessment of lake features were carried out. Benthic microalgae and phytoplankton samples were collected for comparison with the other two lakes.

**Rivers** - Four river systems were studied. At the river between L. Estrellada and L. Verde, river profiles were drawn and water velocity measured. At 50m intervals of elevation, a number of physical parameters were measured. Benthic microalgal samples were taken. At the rivers at El Placer, Magdalena and Río Llushin Grande, profiles were constructed and water velocity measured. Physical parameters were recorded over a five hour period and benthic microalgae collected.

**Hot Springs at El Placer** - Mapping and bathymetry were conducted and associated with temperature characteristic. An assessment was made of inflow and emergent temperature and benthic algal samples taken.

## Forest studies

Data was collected from seven forest sites:

- Polylepis incana forest, Chañag valley, 3,680m.
- Forest between Magdalena and El Placer. 4 plots (3,240; 3,800; 2,760 and 3,100m)
- Upper montane forest, Alao valley, 3,500m.
- Lowland forest, Río Llushin Grande, 900m.

In total over 550 trees were involved in this study and measurements were taken of each tree's height, bole height, dbh and canopy area. Its co-ordinates within the plot were also recorded.

## Soils

In conjunction with the forest studies, six soil profiles were recorded during the course of the forest work around El Placer and the Río Llushin Grande. Soil samples were taken from the profiles are being analysed in Great Britain.

Reference: Armstrong, G D and Macey, A. 1979 Proposals for a Sangay National Park in Ecuador.

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## Sponsors

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## Products, Contributions and Discounts

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