

FLORA of the PÁRAMO of CAJAS, ECUADOR

Danilo Minga · Raffaella Ansaloni
Adolfo Verdugo · Carmen Ulloa Ulloa

Translated by Diana Lee Rodas

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UNIVERSIDAD DEL AZUAY | Casa Editora
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FOREWORD

When talking about the environment, ecology, and other related topics, most people agree with the criteria that give fundamental importance to forests, *páramos* (moorlands), and green areas in general to ensure the survival of the predominant species, the human species. In fact, the quality of water and its adequate supply, the air and the ways to avoid its pollution, the right of animal and plant species to exist and to be respected and cared for, as required by the current Constitution, in addition to the need to establish clean production mechanisms in cities and productive rural areas, are ideas that are internalized in the culture of most of the population of Cuenca. Having a guide to the flora of a place, in this case the Cajas National Park, means putting into the hands of all people a learning and communication tool that allows the recognition of the vast and abundant flora present in this ecosystem of grasslands, moorlands, and forests.

Except for some attractive plants cultivated and planted in gardens and cities, tropical plant species, especially neotropical ones, when talking about Ecuador, are little known, undervalued, and not cultivated. Walking through the forests and grasslands of the Cajas National Park and looking for books to learn more about the vegetation and its details, one will immediately realize that there is little documentation to enter this botanical world, and if it exists, it may be very technical or expensive, or with few illustrations or photos of the plant of interest. In the absence of sufficient information, the only way to proceed in this case would be to collect a sample of the plant and take it to a specialist or herbarium to find out the necessary information. In this sense, a plant guide comes to solve these problems through the easy and quick identification of plant organisms, their identity, while learning about their uses, their geographic distribution, their life habits, and, above all, their ecological relationships with other organisms and with man.

The present *Flora of the Páramo of Cajas, Ecuador,* is therefore an effective way of making available to the community of Cuenca, Ecuador, and the world, the great plant wealth of the Cajas National Park, which responds to a process of change and renewal of species in the thousands of years that have passed from a geological and climatic point of view. During the last decades, the efforts of many researchers and conservationists have accumulated a great deal of information about the past and present forms of plant life in the Cajas National Park, which species exist at the moment, where they come from, which are the most common, which are the rarest and therefore endangered, and what will happen to them in a predominantly polluted planetary future. Although there are still many unexplored areas in and around the Cajas National Park and, of course, much to be learned, there has never been a reference work that provides both a summary of the current knowledge of the flora of the Cajas National Park and a guide to the identification of this flora, classified according to the most important and diverse ecosystems of the entire protected area.

With this book, the non-specialized reader, as well as the specialized reader, will also be able to increase their understanding of the *páramo* ecosystem as such, and will be able to infer the importance of the Cajas National Park from the singularities that differentiate it from the rest of the ecosystems. These singularities are the most interesting ecological aspects; for example, the plants that inhabit the *páramo* have unique adaptations to extreme cold, high solar radiation, and low atmospheric pressure. Of the 175 species of wild plants that inhabit the park and are presented in this book, 39 are endemic to Ecuador; they are not found anywhere else in the world. Of these, 10 are exclusive to Cajas.

The totality of the plants, together with the soils and their environment, determines the fact that between 80% and 90% of Ecuadorians depend on the water that comes from the *páramos*. However, although much has been done for the conservation of *páramos*, legal protection, the production of new knowledge and examples of good practices are still insufficient and additional studies, efforts and allocation of resources are still needed to achieve real conservation and continuous application of its mandate, especially when the classic and well-known threats such as overgrazing, crop invasion, intentional fires and plantations with exotic species are still present, in addition to new threats such as mining, climate change, excessive opening of roads, etc.

To adequately address the pressures on the biodiversity of the *páramos*, the best strategy is to establish natural protected areas, which is called in situ conservation, as opposed to ex situ conservation in botanical gardens, conservation centers, germplasm banks, etc., as a conservation objective in the Convention on Biological Diversity, to which Ecuador is a signatory. Through the efforts of the City of Cuenca and its Municipal Public Company of Telecommunications, Drinking Water, Sewage, and Sanitation (ETAPA), the Cajas National Park has been included in the National Heritage of Natural Areas. Consequently, the *páramo* ecosystem of this region of the country is fortunately protected. It is annexed to a larger area known today as the Biosphere Reserve of the Cajas Massif, and therefore, this categorization allows the integrative management of several jurisdictions that will generate changes according to the quality of life aspirations of the people who inhabit these landscapes, while preserving the natural values and ecological processes that will lead to a sustainable future.

The responsibility is everyone's, although the University will make it possible to establish the before and after of these efforts through education and research. Finally, it remains to reflect that in order to preserve, it is necessary to know, because what is known is appreciated, understood, respected, and, above all, managed and monitored…

Gustavo Chacón Vintimilla
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INTRODUCTION

THE *PÁRAMO*

The northern and central Andes are defined by some authors (Myers et al. 2000) as the "Tropical Andes" bioregion. This biogeographic region represents a subset of the Andean mountain range. The ecosystems that occur above the natural tree line, in the strip between the montane forest and the perpetual snow line (about 3000 to 5000 m asl), are called "*páramos*" (moorlands) or "Andean grasslands". *Páramos* are found between 11°N and 8°S latitude, mainly in the humid zone of the equatorial Andes from the Mérida mountain range in Venezuela, across the mountain ranges of Colombia and Ecuador, to the Huancabamba depression in northern Peru. The term tropical grasslands includes the mesophytic grasslands of the northern Andes (*páramos*), the mesophytic and xeric grasslands of the central Andes (punas), and the transitional regions between the *páramos* and *punas* in northern Peru, locally called *jalcas*.



Figure 1: Elevation map showing the distribution of the *páramos*.
(Taken from Consiglio in Luteyn, 2013)

These ecosystems take their name from the predominance of tufted grasses in the vegetation physiognomy, in addition to sclerophyllous shrubs, cushion grasses, prostrate grasses, caulescent, and acaulescent rosettes. The dominant vegetation in these environments is an indication of the climate (rainfall, humidity, temperature, wind), which regulates many of the processes and functions that take place in them. The tropical Andes show a gradient of decreasing humidity from north to south, with the exception of Venezuela, which is exposed to convergent winds from the Atlantic and the Caribbean, generating a markedly seasonal system with sub-humid to dry rainfall characteristics.

The vegetation varies according to altitude and local edaphoclimatic conditions. Thus, near the forest line, tufted grasses and erect shrubs with evergreen leaves, many of them microphytes, dominate. The shrubs and tufted grasses disappear along the elevation gradient and are replaced in importance by cushions, acaulescent rosettes, prostrate shrubs, and short-stemmed herbs. As in other tropical mountains, the *páramos* are floristically rich and usually present considerable values of endemism. Several studies show that high mountain ecosystems are the richest on the planet due to their high diversity and endemism (Sklenář et al., 2011; Luteyn, 1999; Ramsay & Oxley, 1997).

In Ecuador, *páramos* are distributed almost continuously from the upper limit of the forest in the western (above 3300 m a.s.l.) and eastern (3500 m a.s.l.) Andes. According to Beltrán et al. (2009), the *páramo* ecosystem occupies a total area of 1,337,119 ha (5% of the national territory) and is present in 18 of the 24 provinces. Above 4200 m, vegetation is scarce: the number of species and their coverage decrease rapidly with altitude, and only a few species, whose distribution is limited to this environment, reach the snow line (4800-4900 m) (Ministerio del Ambiente del Ecuador 2012).

Environmental Conditions

The *páramo* landscape has been largely shaped by glaciations and interglaciations. It is irregular and uneven, rocky, and often has many small lakes and streams. The *páramos* are the source of the tributaries of all the major rivers of northern South America. The *páramos*, along with the Andean forests, regulate the water systems by absorbing rainwater and slowly releasing it to feed rivers and lagoons.

In this ecosystem, there are unique plant species adapted to the particular climatic, ecological, and edaphic conditions that dominate this area. Prevailing ecological conditions include: low atmospheric pressure, low temperatures with dramatic daily fluctuations, intense ultraviolet radiation, strong winds, seasonal rains, hail, and snow. These conditions favor the growth of rosette or cushion-shaped plants, with reduced, tough leaves, some of which are covered with a dense layer of white or silvery hairs (Sklenář et al., 2005).

In addition to topography and extreme climatic and atmospheric conditions, edaphic (soil) characteristics and human activity have also strongly influenced *páramo* ecosystems.

Most of the *páramos* are located in areas with soils of volcanic origin, in which carbon accumulates due to the slow rate of decomposition, characterized by a generally dark or black surface horizon, called "andic" or "melanic epipedon", with an acid pH, rich in organic

matter, often in non-crystalline clays. The specific physical and chemical composition of these soils depends on their location along the mountain range, their proximity to active volcanoes, and also on the topography of the soil, with shallow soils found on steep slopes and deeper soils in valleys and hollows (Soil Survey Staff, 2014).

On the other hand, some authors agree in affirming that the *páramos* have registered the presence of humans since early times, setting fires to facilitate hunting, and later adapted part of the land for cattle ranching and agriculture. Some studies argue that the woody vegetation of the *páramo* has suffered a decrease in its surface area and an increase in the area of grasslands and other herbaceous vegetation, due to fires and human pressure (White, 2013). However, other authors state that the greatest weight in determining the type of vegetation is given by the topography, soil, and exposure to winds (Coblentz & Keating, 2008).

CAJAS NATIONAL PARK (CNP)

Location

Cajas National Park (CNP) is located west of the city of Cuenca, in the province of Azuay, and covers an area of approximately 28544 hectares, between the coordinates of 2º42' to 2º58' south latitude and 79º05' to 79º25' west longitude, with altitudes between 3160 m and 4450 m above sea level. It is the closest continental watershed to the Pacific coast in all of South America.

General features

The CNP is particularly important for the city of Cuenca and Ecuador as a whole, not only because of its aesthetic beauty, the high biodiversity it contains and the natural spaces it offers, but mainly because its lagoons are the source of almost all the water consumed by the city; in addition, the rivers that feed the main system of hydroelectric power plants in Ecuador, which are located along the Paute River, originate there.

In the CNP, Pleistocene glaciers have shaped the landscape, creating 767 bodies of water, 165 larger than one hectare. From the eastern slopes, three rivers flow towards the city of Cuenca and two towards the Pacific Ocean.

The history of the National Park began in June 1977, when it was declared Cajas National Recreation Area, and its boundaries were established. Finally, on November 5, 1996, it was elevated to the category of Cajas National Park. In 2000, the Ministry of Tourism and Environment signed a decentralization agreement with the Municipality of Cuenca for the management and administration of Cajas National Park. Since 2005, ETAPA (Empresa Pública Municipal de Teléfonos, Agua Potable y Alcantarillado [Municipal Public Company for Telephones, Drinking Water, and Sewerage]) has been responsible for its management and administration. The park's status as a national park does not exempt it from the effects of human activities: grazing and burning have degraded some areas of the park. In addition, the construction of the highway that connects Cuenca to Guayaquil has had and continues to have strong impacts: noise, accumulation of garbage, air pollution, night lighting, diversion of watercourses, drainage and drying of the moorlands, and possible introduction of exotic species into the park.

However, these activities have not prevented the CNP from obtaining several recognitions, among which, in 2013, the Cajas Massif, of which the CNP is the "central nucleus", was declared a "Biosphere Reserve" by UNESCO. The main motivation for this declaration is that "it constitutes a physical space where efforts have been made to conserve biodiversity, to use natural resources in a sustainable manner, and to take advantage of learning and research processes for the benefit of the local population, which also contributes to reducing the impact of human activities on the planet".

Soil

The topography of the mountains in the CNP is mainly due to post-glacial erosion, with U-shaped valleys (where glacial ice used to be), moraines, frequent gullies, and steep ridges. The soils of this zone have very high levels of organic matter deposited on the surface, high sponge-like porosity, acid or very acid pH, low available phosphorus and potassium, and low resistance to trampling and tillage. The depth of the soil depends on the topography and the vegetation, being greater in the valleys under woody vegetation, for example, in Llaviucu, and less in the peaks under herbaceous vegetation, for instance, in the upper part of the CNP. The characteristics of porosity and, therefore, water retention capacity, combined with the speed of infiltration, make these soils real water reservoirs, as shown by numerous studies, which also report a significant decrease in the water retention capacity of these soils when they are under pine plantations or other introduced woody species, outside the Park boundaries.

Generally, the organic matter content of these soils often exceeds 20%, determining a high retention of organic carbon, making these soils true carbon sinks and playing an important, although not sufficiently quantified, role in counteracting climate change.

These soils have been defined as non-allophanic Andosols, which distinguishes them from the soils of the *páramos* in the north and center of the country, with variable amounts of ancient volcanic ash. This characteristic substantially differentiates the vegetation type of the CNP from the other *páramos* of the western mountain range and makes the area an important center of plant endemism. Undoubtedly, the soil characteristics are added to the particular climatic conditions of the area, which is wetter than the *páramos* in the center and south of the country, including those very close to the Jubones basin.

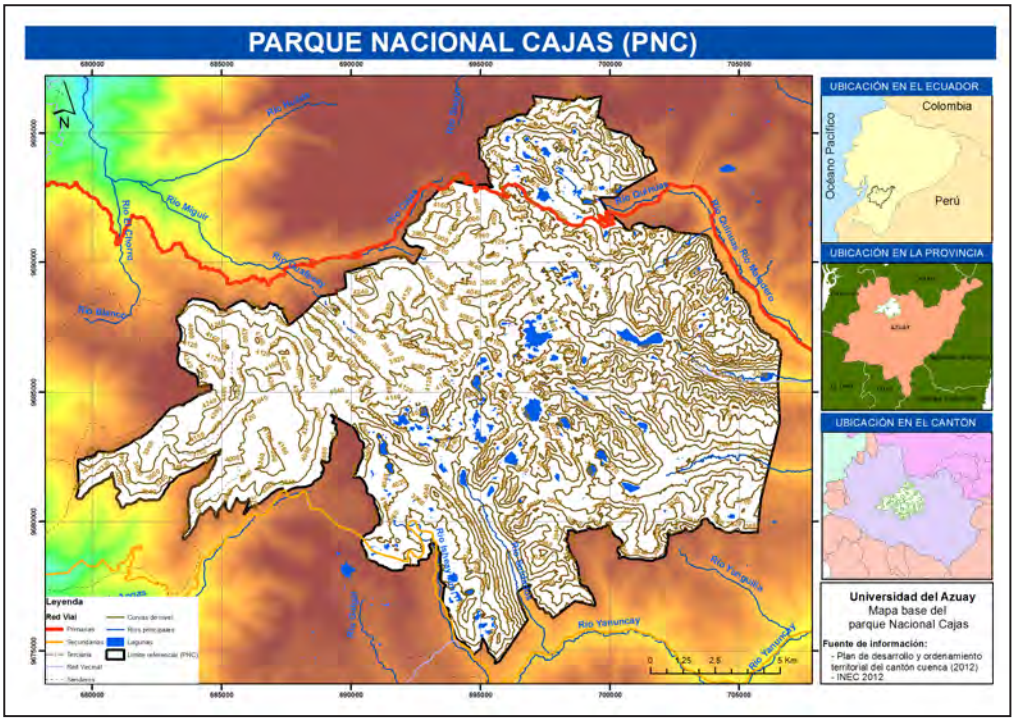


Figure 2: Base map of the CNP (UDA, 2012)

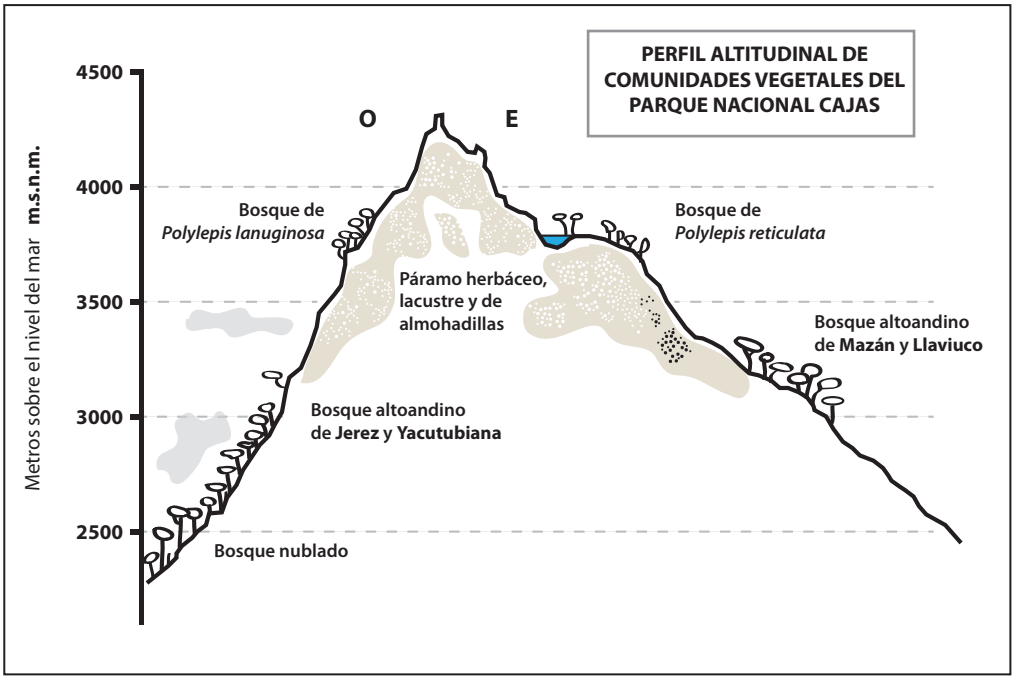


Figure 3: Altitudinal profile of plant communities in the CNP (Serrano & Minga, 2000)

Climate

The climate of the CNP is characterized by abrupt changes and high thermal excursion, as is common in most parts of the *páramos*. The minimum temperature is -2°C and the maximum daytime temperature is 18°C, although there are variations throughout the year, with December historically being the hottest month and July the coldest. The average annual rainfall is 1200 mm. There is considerable variability in the climate, which can change rapidly from light to strong winds, from cloudy skies to intense sunshine, from fog to drizzle and hail, and sporadic snowfall. The wind is strong on the summits and on the most exposed slopes, where it can be a limiting factor for vegetation development.

Ecosystems

The *páramo*, with its lagoons and unique flora and fauna, is the largest ecosystem in the CNP, but it is not the only one, as there are forest areas at lower elevations. The Mazán and Llaviucu forests are integral parts of the CNP. The *páramo* contains the characteristic "paper tree" or "quinoa" forests (Polylepis spp.), small or medium-sized remnants found on cliffs, steep slopes, and areas sheltered from strong winds, often on rocky substrates.

According to the Ecosystem Map of Ecuador (2012), the "types of vegetation or ecosystems" present in Cajas National Park (CNP) are three: High montane and upper high montane herbaceous *páramo*, Subnival ultra-humid herbaceous *páramo*, and High montane and upper high montane herbaceous and shrubby *páramo*. In the classification by Sierra et al. (1999), these categories correspond respectively to: Herbaceous *páramo*, Cushion plant páramo, and High montane evergreen forest.

Tabla 1: Correspondence between the Ecuadorian Ecosystem Classification System (Ministry of Environment, 2012) and the classification systems of Josse (2003) and Sierra (1999).

TYPE OF ECOSYSTEM OR PLANT FOR		
Ministry of Environment 2012	**Sierra et al. 1999**	**Josse et al. 2003**
High montane and upper high montane herbaceous *páramo* CES409.123	Herbaceous *páramo*	High-montane and montane grasslands of the *páramo*
High montane and upper high montane herbaceous and shrub *páramo CES409.124*	Included in the evergreen high-montane forest	High-montane shrub grasslands of the *páramo*
Upper high montane and subnival evergreen shrub páramo CES409.096 CES409.122	Cushion plant *páramo*	Low shrublands and high Andean *páramo* thickets Soil-xerophilous cushion shrublands in the high Andean *páramo*

Vegetation

The Cajas Mountains, like all tropical mountains and especially the *páramos*, have an extremely high biodiversity. The *páramo* in general contains some 3,595 species of vascular plants, while the *páramo* in Ecuador is the most diverse relative to its surface area, with approximately 1,524 species. This figure represents about 10% of Ecuador's flora (Sklenář et al. 2005).

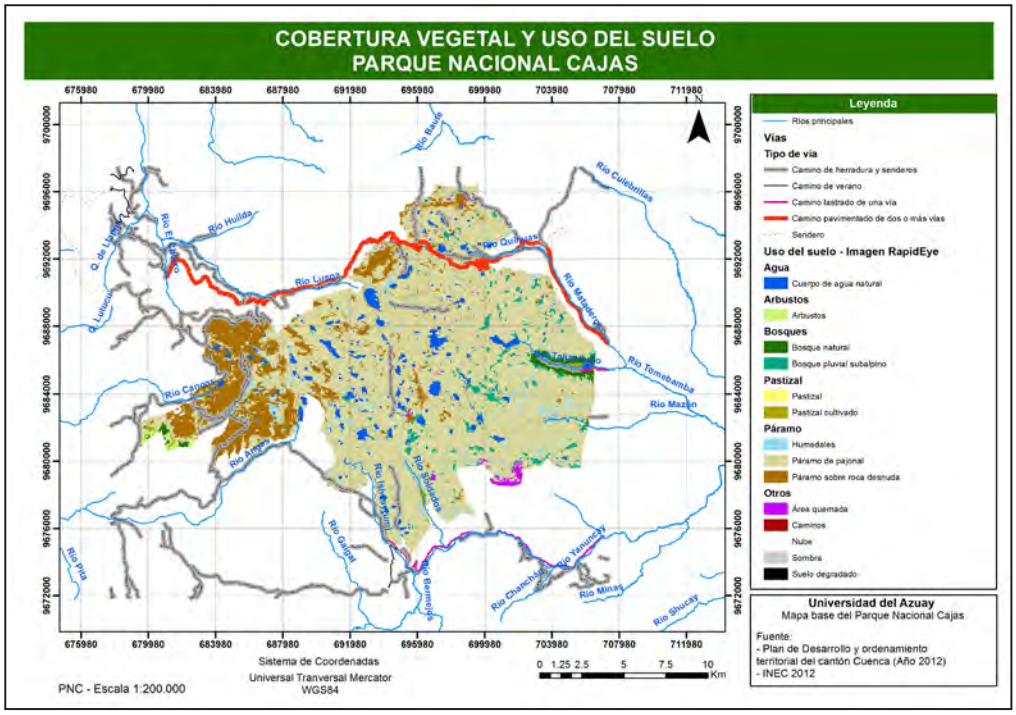


Figure 4: Land cover and land use of the CNP (UDA, 2012)

Cajas National Park is a *páramo* area notable for its high diversity and endemism, where more than 500 species of vascular plants have been recorded, of which 71 are considered endemic to Ecuador, and 19 are known only from the Cajas Massif, that is, within the CNP and its surrounding area of influence.

In the Cajas *páramos*, there are approximately 243 genera in 70 plant families. The most prominent family is the composite family (Asteraceae or Compositae), followed by the Pteridophytes (ferns), the grasses (Poaceae or Gramineae), Rosaceae, Cyperaceae, Apiaceae, Gentianaceae, Juncaceae, and Valerianaceae.

In this ecological environment, plants show a variety of morphological and physiological adaptations, which can be seen in the different habits or life forms. Thus, in a páramo we can observe rosette plants such as *Hypochaeris sessiliflora*, *Werneria nubigena*, *Orithrophium peruvianum*; cushion plants such as *Plantago rigida*; grasses that form tussocks such as Calamagrostis intermedia, Festuca subulifolia; microphyllous shrubs: *Loricaria ilinissae*, *Chuquiraga jusseui*, and creeping shrubs such as *Vaccinium floribundum*, *Pernettya prostrata*, *Gaultheria amonea*, *Baccharis alpina*, among others. The forest patches scattered around the lagoons, on the slopes, and in the ravines are mainly composed of species of the genera *Polylepis and Gynoxys*. The *Polylepis* forests (quinoa or paper tree) may be the remnants of a vegetation type that used to occupy larger areas. These stands serve as a refuge for the birds characteristic of the *páramos*, as well as small mammals. Aquatic plants such as *Potamogeton paramoanus* and semi-aquatic plants such as *Isoëtes novo-granatensis* are found in the lagoons.

PLANT COMMUNITIES OF THE CAJAS
CAJAS NATIONAL PARK PÁRAMO

Forest

In the lower parts of the CNP, both to the east and west, there are vegetation communities that fall into the category of high Andean forest. This book does not describe these communities and is limited to *páramo* vegetation. The two types of forest vegetation are:

a. Mazán and Llaviucu High Andean Forest

This plant community is located to the east of the CNP and covers a large part of the area of the Llaviucu and Mazán micro-watersheds, between 2900 and 3400 m above sea level.

The plant diversity includes about 300 species of vascular plants (+ 1/3 of the total number of species in the CNP), of which about 50 are trees, 60 are shrubs, 3 are lianas, 7 are vines, 40 are epiphytes (orchids and bromeliads), and 140 are herbs.

In the undisturbed forest areas of the Mazán micro-basin, the canopy (the area formed by the tops of the tallest trees) can reach 15 to 20 m in height.

In the secondary forest, there are no distinct layers; the vegetation is dense and reaches a height of 5 to 8 m. In terms of floristic composition, many of the (primary) forest species can also be found in this habitat, accompanied by other shrub and tree species.

Endemic shrubs are common on the margins of the secondary forest, in open areas, and along paths.

b. Jerez and Yacutuviana High Andean Forest

It is located west of the CNP, mostly outside its current boundaries, and occupies the Jerez and Yacutuviana micro-basins, between 2900 and 3400 m a.s.l.

The remnants of the forest are mainly found on steep slopes, along the banks of streams and creeks.

The average height of the trees in the canopy is 12 m, with sinuous and highly branched trunks, where a great variety of epiphytes grow, mainly orchids and bromeliads. Among the most common tree species are *Freziera verrucosa*, *Saurauia bullata*, *Abatia parviflora*, *Symplocos sp*., *Cletra revoluta*, *Myrcianthes sp*., *Ocotea sp*., *Persea sp*., *Brunellia goudottii*. The subcanopy is characterized by species such as *Palicourea heterochroma*, *Solanum nutans*, *Oreopanax sp*., *Siparuna sp*., *Sessea crassivenosa*, among others. In the clearings and along the edges, the following species are common: *Monactis holwayae*, *Ferreyranthus verbascifolius*, *Tournefortia scabrida*, and *Gynoxys sp*.

There is a transitional strip between 3300 and 3500 m a.s.l., where there is a low, dense forest and a closed canopy that reaches an average height of between 5 and 8 m. The dominant species is *Polylepis lanuginosa*.

Páramo

In the highest parts of the park and throughout the entire Cajas Massif, there are several vegetation formations, of which the following seven communities have been selected for the description of their main species:

a. Grasslands
b. *Plantago rigida* wetlands and mats
c. Polylepis forests
d. *Loricaria ilinissae* thickets
e. *Arcytophyllum vernicosum* thickets
f. Rocks
g. Lacustrine

THE GUIDE

The guide is organized into chapters by vegetation type, environment, or habitat. The vegetation types considered are only the seven mentioned above. For each environment, the main vascular plant species present are listed, illustrated, and described, without implying that the species are exclusive to the habitat in which they are included and that they cannot be found in different environments or even throughout the CNP. For each vegetation type, the plants are presented in alphabetical order by family, genus, and species. The common or vulgar name (V.n.) is given when available. Families follow the APG III system (Angiosperm Phylogeny Group III 2009). Names were checked against the Tropicos® database of the Missouri Botanical Garden. A total of 175 species are described and accompanied by photographs to aid identification. For each plant, morphology, distribution, and basic ecological data are described. There is also a section explaining how to distinguish it from similar species. Only similar species found in the Cajas are mentioned, and an attempt has been made to use distinguishing characteristics that are easy to observe and/or measure.

Tabla 2: Number of species described by environment or plant formation

Environments	N° of species described
Grasslands	58
Plantago rigida wetlands and	33
Polylepis forests	22
Loricaria ilinissae thickets	19
Arcytophyllum vernicosum thickets	17
Rocks	14
Lacustre	12
Total	**175**



GRASSLANDS

The herbaceous or grassland *páramo* is the most abundant plant community in the CNP and is distributed in all micro-watersheds, both on the eastern and western slopes. Physiognomically and structurally, it is quite homogeneous, with a predominance of "tussock" plants that form an herbaceous layer under which a number of other small species grow. Associated with the "grasslands, there is also a large number of small shrubs. Where there is greater humidity, there is abundant moss at the base of the clumps. The term "straw (*paja*)" does not define a single species, but rather several species of grasses with the characteristic clumping habit.

The grasslands are found on steep slopes as well as in the valleys, on organic soils of variable depth and with moisture levels that vary with the season, topography, and drainage, but are almost never waterlogged. The height of the vegetation seems to depend on natural factors such as topography, soil depth, exposure, and altitude, but above all, it is influenced by human activities such as grazing, burning, and trampling.

The most frequently observed animals are rabbits, which find their best living environment amongst the grasses in the grasslands.

ALSTROEMERIACEAE

Bomarea glaucescens (Kunth) Baker




Herbs erect, up to 60 cm tall, stiff. Leaves alternate, up to 3 cm long, linear, hard, with toothed margins, white trichomes on the underside, the veins very distinct and parallel. Inflorescences with up to 12 hanging flowers at the top of the stem. Flowers tubular, up to 2.5 cm long, with 3 sepals, deep pink on the outside and yellow on the inside; petals 3, yellow with a pink stripe on the outside and greenish-yellow with purple spots on the inside; stamens with yellow filaments and prominent purplish-grey anthers. Capsules globular to triangular, leathery, and whitish, eventually opening; the seeds are about 4 mm, red.

Distribution

From Ecuador to Bolivia. In Ecuador, it is distributed in the Andean region from Pichincha to Loja.

Ecology

In the CNP, it is commonly found associated with grasslands or in shrub-dominated areas, particularly those dominated by *Gynoxys cuicochensis* or *Chuquiraga jussieui*.



APIACEAE

Azorella biloba (Schltdl.) Wedd.





Plants forming compact cushion-like structures. Leaves crowded at the end of branches, up to 1 cm long, elliptic to lanceolate, somewhat fleshy, glossy, the apex entire or divided into 2-3 lobes, glabrous to densely strigose; petiole widened at base. Small inflorescences, in umbels about 1 cm, up to 10-flowered, surrounded by small bracts with ciliate margins. Tiny flowers, up to 3 mm long, greenish-white or yellowish. Fruit about 2.5 mm, ovoid, glabrous, 3-ribbed, with oil-secreting vesicles.

Similar species

Azorella pedunculata, from which it is easily distinguished by its leaves, which are divided at the apex and have spiny lobes, while A. Biloba has leaves that are usually entire or sometimes have two lateral lobes, but never spiny.

Distribution

From Costa Rica to Argentina and Ecuador, it is distributed in the Páramo from Carchi to Loja.

Ecology

A species that prefers to grow in grasslands and rocky places.

APIACEAE

Azorella pedunculata (Spreng.) Mathias & Constance.




Hard, cespitose herbs, often growing in cushions up to 2 m in diameter. Leaves arranged at the top of branches, spatulate, 6-8 cm long, base blunt, the apex deeply lobed, with 3-5 pointed lobes, usually glabrous or sometimes with scattered hairs; petioles pulvinate, 10 mm long. Inflorescences in sessile umbels, surrounded by an involucre of 9 lanceolate bracts with hairy margins. Flowers 8 to 15 per umbel, borne on pedicels 8 to 12 mm long; calyx absent, corolla actinomorphic, consisting of 5 creamy or greenish-yellow petals. Fruit an ovoid schizocarp, 2 mm long by 1.5 mm wide.

Distribution
From the south of Colombia to the south of Ecuador, where it has been registered in all of the provinces of the Andes.

Ecology
It grows best in grass *páramos*. It forms small clusters under tussock grasses, but in open places it grows more prolifically and forms large cushions up to 2 m in diameter.

APIACEAE

Eryngium humile Cav.; N.v.: "Cardón santo".





Herbs up to 20 cm tall. Leaves in a basal rosette, ovate-oblong, shiny green, up to 15 cm long, with spiny-serrate margins, the main vein cream-colored on top; petiole sheathed. Inflorescences in globose heads, surrounded by white or silvery bracts, up to 2 cm, spiny, the head initially at ground level until flowering, then the peduncle gradually spreading out until fruiting, green to reddish, up to 5 cm, the heads up to 1.5 cm in diameter, with numerous flowers. Small flowers 3 mm long, calyx with pointed teeth, blue-lilac color, persistent in the fruit. Fruit 2 mm long, covered with small vesicles.

Distribution
From Venezuela to Peru. In Ecuador, it is distributed in the high Andean region and has been recorded in all the provinces of the Andes.

Ecology
It is a rustic species that adapts to different environments; in the CNP, it is mainly found in grasslands and wetlands dominated by *Plantago rigida*.

ASTERACEAE

Aphanactis jamesoniana Wedd.




Small herb, up to 10 cm tall, cespitose, creeping, rooting. Leaves opposite, elliptic-spatulate, up to 1.5 cm, light green, trinerved, with long translucent trichomes, the base sessile, clasping, internodes very short. Inflorescences of terminal heads, small, campanulate, solitary, 4 mm, at ground level until flowering and progressively spreading until fruiting on a raised, reddish, up to 5 cm long peduncle. Tubular flowers with a very short, lemon-yellow ligule; marginal flowers are pistillate, and disc flowers are perfect, covered with long, slender trichomes. Pappus absent.

Distribution
Endemic to Ecuador. It is widely distributed in the *páramos* of Imbabura, Pichincha, Cotopaxi, Tungurahua, Chimborazo, and Azuay.

Ecology
In the CNP, it is a rare species that grows in humid grasslands, under the shade of *Calamagrostis intermedia* and *Festuca subulifolia*.

ASTERACEAE

Baccharis alpina Kunth.




Low, creeping herb that grows carpet-like; the stems are pink. Leaves spatulate, up to 5 mm long, densely packed, fleshy, dark green and glossy, with brown tips. Inflorescences in solitary capitula, up to 1 cm long, are arranged at the tips of the stems. Flowers numerous, 5 mm long, tubular, creamy white. Stamens 8 mm long, with scabrous trichomes of creamy-white color.

They are also known as B. caespitosa and B. caespitosa var. alpina.

Distribution
From Colombia to Bolivia. In Ecuador, in the Andean region from Imbabura to Loja.

Ecology
In the CNP, it is also found in the cushion *páramo* and rocky sites. It is common in sparse grasslands above 3800 m altitude.

ASTERACEAE

Baccharis tricuneata (L. f.) Pers.




Shrubs are up to 2 m tall and densely branched; the branches are ashy, reddish, and serrated, and the stems are rectangular. Leaves alternate, erect, up to 1 cm long, obovate, upper surface is glossy dark green, underside green with dark dots; coriaceous, the margins with 1 or 2, sometimes 3 apical teeth on each side, base subsessile and broadly scarred on the stems, internodes very short, less than 5 mm. Inflorescences axillary, corymbose, up to 1 cm, with 3-4 compact, male and female heads, the bracts ciliate, light green with dark tips, the flowers tubular, 4 mm, pale green to yellowish green. Stamens of straw-colored trichomes, 4 mm long.

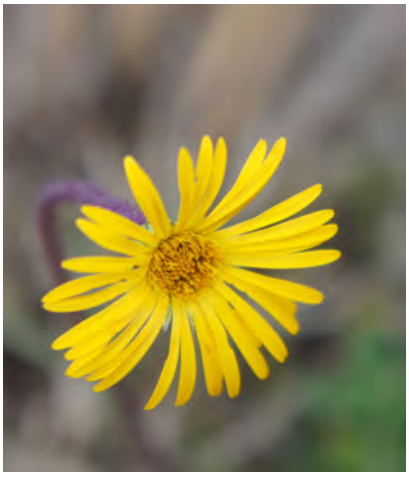
Distribution
From Venezuela to Bolivia, Chile, and Argentina.

Ecology
It is not very abundant in the CNP and grows dispersedly within the grass.

ASTERACEAE

Chrysactinium acaule (Kunth) Wedd.





Perennial, acaulescent. Opposite leaves forming a basal rosette, long spatulate (including leaf base), distal part rhombic, up to 5 cm, base decurrent on petiole, the margins irregularly toothed with black teeth up to 1 mm, underside completely covered with a layer of whitish, woolly tomentum, upper side green, short tomentose. Heads solitary, campanulate, up to 2.5 cm long; scape erect, up to 25 cm, reddish brown, sparsely to densely arachnoid-tomentose; involucral bracts in 5 progressively longer rows, pale green. Flowers of two types: ray-florets to 60, the corollas to 18 mm, ligulate with tiny teeth at tip, bright yellow, styles to 10 mm; disk florets to 100, the corollas to 8 mm, tubular, yellow; stamens to 4 mm, the styles to 9 mm. Pappus bristles to 6 mm, white.

Distribution
From the north of Ecuador to the north of Peru. In CNP, it is in the grassland.

Ecology

It grows between clumps of *Calamagrostis intermedia*, on the edges of ravines and along roadsides, forming acaulescent rosettes.

ASTERACEAE

Diplostephium oblanceolatum S.F. Blake; N.v.: "Contrahierba".




Shrubs 0.5 to 2 m tall, densely branched, twigs and undersides of leaves densely woolly-tomentose. Leaves alternate, sessile, crowded on twigs, lamina oblanceolate to spatulate, 7 to 12 mm long and 1.5 to 2.5 mm wide. The upper surface is densely glandular, and the lower surface is woolly tomentose with a recurved margin. Inflorescences in solitary heads about 2.2 cm in diameter, arranged at the end of branches; involucre campanulate, with 5 rows of bracts, outer bracts ovate, inner bracts lanceolate. Flowers of two types: ray-florets about 20, irregular, ligulate; ligule pale purple, up to 15 mm long, with three tiny teeth at the tip; disk florets up to 15, tubular, yellow, with 5 tiny teeth. The fruit has a pappus with a crown of reddish trichomes.

Similar species

Diplostephium hartwegii shrub or tree, up to 8 m tall, with twigs and undersides of leaves covered with cinereous hairs, and lamina elliptic to linear shape.

Distribution

The high Andes of central and southern Ecuador between 3000 and 4000 m asl.

Ecology

It grows on slopes, scattered in grasslands and rocky outcrops, where it forms thickets with *Gynoxys*, *Chuquiraga*, and *Monnina*.

ASTERACEAE

Gamochaeta americana (Mill.) Wedd.





Herb 0.1-0.5 m tall, laxly white-veined, basal and apical internodes very short, more elliptic in the middle of the stem. Leaves up to 5 cm long, tapered distally, oblanceolate to obovate, upper surface dull green, underside whitish-pantone, the margins sparsely toothed, the base clasping. Inflorescences in dense clusters of several heads, terminal, 1-5 cm long, sessile; heads to 4.5 mm, cylindrical, bracts green turning brown. Flowers 2-3 mm long, whitish to yellowish. Fruit 3 mm, white.

Similar species

Gamochaeta purpurea has purple bracts and similarly colored spots on leaves and stems.

Distribution

From Mexico and the Antilles to Brazil and Argentina. In Ecuador, it is widely distributed throughout the Andean region.

Ecology

It is a rustic species, growing in various environments including grasslands, wetlands, and rocky areas.

ASTERACEAE

Gynoxys miniphylla Cuatrec. N.v.: "Tucshi hembra"




Shrubs up to 2 m tall, covered with a dense, woolly layer of gray-white trichomes. Leaves opposite, up to 1.5 cm long, ovate. Inflorescences of several heads, each up to 0.5 cm in diameter. Flowers of two types: marginal flowers, if present (about 5), are irregular and have a short ligule 4 mm long, yellow; disk flowers (about 15) are tubular and 5-toothed, yellow. Pappus formed by a crown of awns up to 5 mm long, straw-white in color.

Similar species

Gynoxys buxifolia has oblong-elliptic leaves and is usually larger than *G. miniphylla*.

Distribution

Endemic to Ecuador, it is distributed in the *páramos* of the western cordillera of the provinces of Chimborazo, Cañar, and Azuay.

Ecology

In the CNP, it grows scattered in dense grasslands and on the edges of *Polylepis* forests.



Gynoxys miniphylla Cuatrec.

ASTERACEAE

Lasiocephalus lingulatus Schltdl





Upright shrub up to 0.5 m tall, densely covered in all parts with a dense layer of woolly achenes, whitish-gray, rounded stem. Leaves alternate, ascending, lanceolate to elliptic, 1.5-3 cm long, with crenate and toothed margins, upper surface dark green with loose indumentation, underside completely covered with whitish indumentation, the base sessile and clasping. Terminal inflorescences up to 8 cm, with 3-4 heads up to 1.5 cm, on long, nutate-shaped peduncles, surrounded by elongated bracts densely covered with indumentum. Flowers are all tubular, lime green. Pappus about 8 mm, with white margins.

Distribution

Endemic to Ecuador. In Ecuador, it is distributed in the Andean mountains between 2900 and 4300 m a.s.l., in the provinces of Azuay, Chimborazo, Cotopaxi, Bolivar, Pichincha, and Napo.

Ecology

It grows scattered among Calamagrostis and Festuca clumps, in well-preserved grasslands and rocky outcrops.

ASTERACEAE

Lasiocephalus ovatus Schltdl.; N.v. "Arquitecta".





Subshrub up to 0.8 m tall, flexuous, with thick arachnoid indumentum, grayish white especially in young parts, glabrescent with age, stems with conspicuous ribs. Leaves arranged in a spiral, the internodes very short, the leaves very close together, patent, ovate, 0.8-1 cm long, entire, thick, tye upper surface bright green, glabrous, the lower surface completely covered by the gray-whitish indumentum, the base sessile and amplexicaulous. Inflorescences terminal, solitary, the heads up to 1.5 cm, sessile, nutant, surrounded by elongated bracts densely covered by the indumentum. Flowers are all tubular, lime green. Pappus about 15 mm, with white awns.

Distribution
Colombia and Ecuador.

Ecology
In the CNP, it grows in humid grasslands, above 3800 m a.s.l.

ASTERACEAE

Loricaria ferruginea (Ruiz & Pav.) Wedd.



Shrubs up to 1.5 m tall, much branched; branches in a single plane, giving the shrub a flattened appearance. Leaves alternate, small and hard, up to 5 mm long, folded along the midrib and with the appearance of overlapping scales in two rows, the lower ones reddish brown and the upper ones shiny, dark green with reddish tips, with abundant silky and white trichomes inside. Inflorescences in small heads up to 0.5 cm in diameter. Flowers tubular, pale yellow or cream. Fruit with a crown of trichomes up to 5 mm long, straw-white in color.

Similar species

Loricaria azuayensis, generally smaller, with thin branches less than 5 mm wide and axillary inflorescences. *Loricaria ilinissae*, which grows on ridges and summits above 4000 m a.s.l., is a shrub with very dense branching and ovate-triangular leaves as opposed to the triangular ones of *L. ferruginea*.

Distribution

From Colombia to Bolivia. In Ecuador, it is distributed in the *páramos* of the provinces of Azuay, Chimborazo, Napo, and Pichincha.

Ecology

It grows dispersed or forms small shrubby clumps between Calamagrostis and Festuca grasslands, adapting to wet sites.

ASTERACEAE

Monticalia arbutifolia (Kunth) C. Jeffrey





This genus is also known by the name Pentacalia.

Shrub 1 to 3 m tall, laxly and alternately branched. Leaves thick, glossy, alternate, lamina ovate, 6 to 8 mm long by 4 to 6 mm wide, the margins with small teeth. Inflorescences in subtending, small heads, each up to 1.5 cm in diameter. Flowers of two types: marginal flowers (about 10), ligulate, narrow ligule up to 8 mm, pale yellow or cream. The disk flowers, internal (about 20), are tubular and have 5 teeth, pale yellow or greenish yellow. Pappus of silky trichomes 8 mm long, white.

Distribution

In Ecuador, it is distributed in the Andean region, from 2500 m a.s.l. to 4000 m a.s.l., from the province of Pichincha to Loja.

Ecology

In the CNP, it lives in grasslands and Polylepis forests. In the *páramos*, it forms small bushes in sheltered places, while in the forests, it reaches heights of up to 3 m and is often found along the edges.

ASTERACEAE

Monticalia empetroides (Cuatrec.) C. Jeffrey; N.v.: "Contrahierba".




Shrubs up to 0.5 m tall, many-branched, branches densely woolly white. Leaves alternate, minute, up to 5 mm long, ovate-lanceolate, thick, stiff, the apex acute, the margins entire and revolving, upper surface woolly when young, glabrous when old, glossy green, the underside completely covered with dense white woolly tomentum, sessile, the internodes very short, woolly. Inflorescences of solitary, terminal, short-stalked, densely wooly-white heads, each up to 1.5 cm long. Flowers of two types, ray-florets 11-13, up to 12 mm, the ligule narrow, yellow, the disk florets about 25, tubular, about 7 mm, with 5 teeth, yellow. Pappus of silky trichomes up to 8 mm, white.

Similar species

Monticalia myrsinites has larger leaves, 6 mm long by 3 mm wide, with ovate-elliptic lamina, while *M. empetrioides* has small leaves with ovate-lanceolate lamina 4 mm long by 1.3 mm wide. The twigs of *M. empetroides* are covered with a whitish woolly pubescence.

Distribution

Endemic to Ecuador, it has been collected only in the province of Azuay.

Ecology

In the CNP, it grows scattered in grasslands, especially on protected slopes, and also in rocky outcrops.

ASTERACEAE

Monticalia peruviana (Pers.) C. Jeffrey.





Shrubs up to 1.5 m tall, densely branched. Leaves alternate, up to 0.5 cm long, ovate-elliptic, leathery; upper surface bright green, the underside completely covered with dense, grayish-white, woolly indumentum; apex apiculate, the margins slightly toothed, with small, spaced teeth; internodes very short and leaves appear crowded; petiole clasping. Inflorescences of small, solitary, terminal heads, each up to 1.5 cm long. Flowers of two types: ray-florets (about 10), ligulate, ligule narrow, spatulate, up to 8 mm, bright yellow; disk florets (about 20), tubular, about 5 mm, 5-toothed, bright yellow. Pappus of silky trichomes, 8 mm long, grayish white.

Distribution

Andes of Colombia, Ecuador, and Peru. In Ecuador, it grows in high Andean forests and moorlands between 2500 and 4500 meters a.s.l.

Ecology

It inhabits Andean forests and humid *páramos*. In the CNP, it grows in grasslands and thickets dominated by *Gynoxys cuicochensi* in protected areas.

ASTERACEAE

Monticalia vacciniodes (Kunth) C. Jeffrey; N.v.: "Cubilán".





Low shrub, 1 to 2 m tall, very many-branched. Leaves alternate, up to 4 cm long, thick, bluish-green, with a pointed, pinkish tip, entire margins, the base sessile, leaving scars on stems. Inflorescences with up to 8 heads, at the tips of the branches, each 1.5 cm long. Flowers about 30, tubular and 5-toothed, up to 8 mm long, lemon yellow. The silky trichomes are up to 5 mm long and white. The leaves give off a lemony aroma when crushed.

Distribution

The Andes of Colombia and Ecuador, where it is distributed in the *páramos* from Carchi to Azuay.

Ecology

In the CNP, it inhabits open grasslands and exposed slopes, and it adapts well to rocky soils.

ASTERACEAE

Oritrophium crocifolium (Lam.) Cuatrec.; N.v.: "Clavelina de cerro".





Herb up to 0.3 m tall, long, white, silky trichomes. Leaves in a basal rosette, linear blade 4 to 16 cm long by 0.2 to 0.3 cm wide, with thickened and toothed margins, the upper surface glossy green, the underside completely covered with a dense layer of woolly, white tomentum. Inflorescences of erect, solitary heads up to 2 cm in diameter. Flowers of two types: ray-florets about 80, ligulate, narrow ligule up to 10 mm long, white; disk florets (about 50) short, tubular and 5-toothed, pale yellow. Pappus from rough trichomes, 8 mm, yellowish-cream.

Similar species

Oritrophium peruvianum has linear leaves 3 to 7 cm long with woolly pubescence on the underside and an acuminate apex, in contrast to *O. crocifolium*, which has linear leaves 4 to 16 cm long with tomentose pubescence on the underside and an acute apex.

Distribution

It is distributed in the *páramos* of central and southern Ecuador and northern Peru.

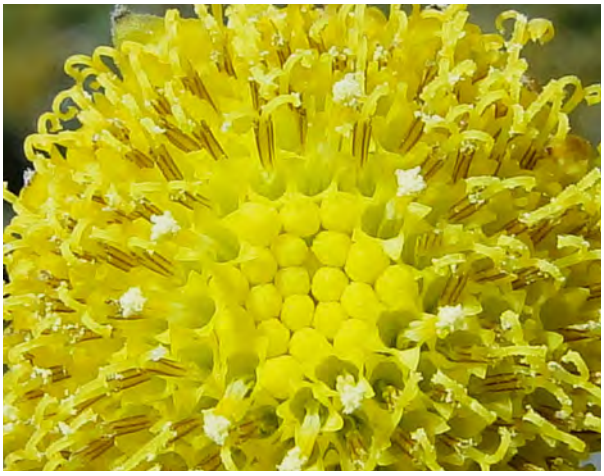
Ecology

In the CNP, it commonly grows in moist, open grasslands and at the edges of lagoons, and it can tolerate very wet soils.



ASTERACEAE

Senecio chionogeton Wedd.





Herbs up to 0.5 m tall. Leaves form a basal rosette, with smaller ones along the stem, ranging from oblong to spatulate, up to 15 cm long; margins crenate and revolute, the base shortly auriculate. Inflorescences of showy, nodding flower heads at the tip of the stem, up to 15 per plant; each head up to 2.5 cm in diameter, with large, lemon-yellow bracts and pinkish-reddish peduncles. Flowers up to 15 mm long, lemon-yellow, tubular, with 5 short teeth. Pappus of silky trichomes, up to 12 mm long, white.

Distribution

Colombia, Ecuador, and Bolivia.

Ecology

It grows dispersedly in grasslands of Calamagrostis and thickets dominated by *Gynoxys* and *Chuquiraga*.

ASTERACEAE

Werneria nubigena Kunth; N.v.: "Chicoria", "achicoria".




Low herbs up to 15 cm in diameter. Leaves forming a basal rosette, fan-shaped, up to 10 cm long, elongated and narrow, tongue-shaped, leathery, glaucous, with a white woolly base. Inflorescences are solitary flower heads at ground level, up to 7 cm in diameter. Flowers are of two types: about 25 ray-florets, irregular and ligulate, the ligule up to 25 mm long, white; and more than 100 disk florets, about 10 mm long, tubular with five teeth at the tip, yellow or sometimes reddish. Pappus of silky trichomes, about 10 mm long, white.

Similar species

Werneria pygmaea has spirally arranged leaves and small flower heads with 15 to 30 central flowers, while *W. nubigena* has leaves arranged in two opposite rows (distichous) and larger flower heads with 100 to 200 central flowers.

Distribution

From Mexico to Bolivia. In Ecuador, it grows in the high Andes, from Carchi to Loja.

Ecology

It grows scattered, forming small clumps in low grasslands and open areas, and can also be found at the edges of wetlands and in rocky sites at the base of small hills.

ASTERACEAE

Xenophyllum humile (Kunth). V.A. Funk





Plants forming very compact cushions, up to 1 meter in diameter. Leaves arranged spirally and densely packed, terete, up to 2 cm long, very narrow and thick, green with yellowish tips. Inflorescences of solitary flower heads at ground level, up to 1 cm in diameter. Flowers are of two types: about 12 ray florets, irregular and ligulate, with white ligules; and about 25 disk florets, short, tubular, yellow, with 5 teeth. Pappus a crown of white bristles.

Distribution

It is distributed throughout the *páramos* and *superpáramos* of Ecuador and northern Peru, as well as in the Bolivian Highlands.

Ecology

In the CNP, it grows, forming scattered cushions among the grasses, particularly on slopes and well-drained areas.



BROMELIACEAE

Puya cajasensis Manzan. & W. Till.





Herbs without stems; leaves spirally arranged, forming a basal rosette. Leaves long and narrowly triangular, up to 22 × 2.5 cm, with widened base, broad and clasping up to 3 cm wide, the apex gradually tapering; leathery, rigid, the underside glaucous, the margins coarsely spiny-serrate, the teeth narrow, up to 5 mm long, brown, curved upward, spaced along the margin. Inflorescence simple, robust, globose, terminal, on an erect scape up to 30 cm tall, covered with strongly overlapping bracts; bracts broadly ovate, up to 15 × 4 cm, the apex tapering to long-tapered, the margins finely spiny; inflorescence bracts ovate, reflexed; sepals 3, up to 15 mm long, hidden by bracts; petals 3, 25 mm long, more or less overlapping, whitish-green to green. Fruit a capsule, ovoid, about 15 mm.

Similar species

It is similar to *Puya pygmaea*, from which it differs by its translucent bracts of papery texture and orbicular shape, versus the non-translucent, membranous, ovate bracts of *P. cajasensis*; *P. pygmaea* also has clearly shorter pedicels (5 mm long versus 10 mm long).

Distribution

Humid *páramos* of southern Ecuador and northern Peru. In Ecuador, it has been recorded in the provinces of Azuay and Loja.

Ecology

Grows in clusters on damp slopes and is also scattered among tussock grasses. In the CNP, it is abundant around the Osohuayco Lagoon and can be found up to 4000 m.



BROMELIACEAE

Puya clava-herculis Mez & Sodiro; N.v.: "Achupalla", "aguarongo".





Large plants, up to 1.5 m tall, form a rosette up to 1 m in diameter. Numerous leaves in a basal rosette, narrowly triangular, elliptic, up to 50 cm long, thick and rigid, with reddish to purplish hues; underside densely white and scurfy, the margins serrate with large, black, recurved spines up to 1 cm. Inflorescences solitary in the center of the rosette, ellipsoid-globose, up to 20 cm. Subtending bracts ovate, up to 10 cm long, pointed, brown, densely covered with white woolly trichomes, borne high on a peduncle over 1 m tall, densely white-wooly. Flowers up to 2.5 cm long, bluish-green, with yellow-orange stamens. Capsules are globular and dry, eventually opening. Puyas are monocarpic, dying after seed production.

Similar species

During vegetative growth, it resembles *P. hamata*, although it is smaller and bears smaller spines without a brownish base, with a white woolly indumentum at the base. It also resembles *P. compacta*, which differs in that the latter has bracts with a grayish woolly indumentum and smaller spines.

Distribution

Páramos of Colombia and Ecuador.

Ecology

Grows in wet grasslands, sometimes covering extensive areas. It is a monocarpic species that dies after seed production. Hummingbirds visit the flowers, and the spectacled bear feeds on the buds. In the CNP, the voracious appetite of llamas is decimating populations of this species.



CAMPANULACEAE

Lysipomia sphagnophila subsp. variabilis McVaugh.



Small herbs with deep underground rhizomes, short stems, up to 2 cm. Leaves in a basal rosette, elliptic to oblanceolate, up to 15 mm long, ovate, slightly callose-crenulate, thick, with purplish tinges, ciliate. Numerous flowers in the center of the rosette, up to 5 mm long, calyx purple, ciliate; corolla white or pale yellow, with 2 tiny dorsal lobes and 3 ventral, triangular ones; stamens fused into a central column.

Similar species

Lysipomia oellgaardii has rigid leaves with a scarious margin and a calyx with unequal sepals, compared to the ciliate margin and calyx with equal sepals in *L. sphagnophila*.

Distribution

Lysipomia sphagnophila is distributed in the *páramos* from southern Colombia to northern Peru; however, the subspecies variabilis is endemic to southern Ecuador and has been recorded in the *páramos* of Azuay and Loja.

Ecology

This is a species of variable size, depending on habitat; it is common in low, open grasslands, although it has also been found in rocky areas and near wetlands.

CAMPANULACEAE

Lysipomia vitreola McVaugh




Small herb, sometimes forming small clusters. Leaves in a basal rosette, up to 2 cm long, lanceolate, thick, rigid, shiny, pointed, with a yellowish tip. Solitary flowers, up to 10 mm long, the corolla white with purple spots towards the center, with 2 dorsal lobes and 3 ventral lobes, 3-4 mm long, triangular; the stamens dark purple, fused to form a central column.

Similar species

See *Lysipomia oellgaardii* in the chapter Wetlands and Cushions or Pads.

Distribution

Endemic with a restricted distribution to the *páramos* of Cajas National Park.

Ecology

It grows in open grasslands and the cushion *páramo*. It is often observed on the margins of trails and streams.

CAPRIFOLIACEAE

Valeriana microphylla Kunth; N.v.: "Valeriana".



Low shrubs, erect or slightly reclining, up to 60 cm tall, with a fetid odor. Opposite, decussate leaves, ovate or elliptical, thick, up to 10 mm long, with short internodes. Terminal inflorescences, up to 5 cm long, with numerous small, tubular flowers, about 3 mm long, with 5 short lobes, white or pink with lilac tints; 3 stamens. Fruity achenes, about 1.5 mm, crescent-shaped, crowned by a plumose pappus, about 3 mm long.

Similar species

Valeriana hirtella is a shrub 1.5 to 5 m tall, with linear to elliptical leaves 1 to 6 cm long, while *V. microphylla* reaches 1.5 m in height and has leaves 0.5 to 2 cm long.

Distribution

In the *páramos* from Colombia to Perú.

Ecology

Ecology It is a variable species that has clusters of leaves and flowers when growing at higher altitudes, while they are laxer in the forest. In CNP, it grows in grassland *páramos*, rocky environments, and shrubby *páramos*.

Use

The root is taken in an infusion as a relaxant.



CAPRIFOLIACEAE

Valeriana rigida Ruiz & Pav.; N.v.: "Espino blanco".





Rosette-forming, fetid-smelling herb, up to 15 cm in diameter, growing at ground level, sometimes forming small cushions. Leaves in a basal rosette, spirally arranged, lanceolate, up to 10 cm long, narrow, rigid, and pointed, with a ciliate base. Partial inflorescences alternate with vegetative rings or are arranged in a disk in the center of the rosette on a short peduncle about 10 mm high; flowers are small, tubular, about 4 mm long, with 3 short lobes, white; 3 stamens. The fruit is an achene, about 2 mm, without a pappus.

Distribution

Andean region from Colombia to Bolivia. In Ecuador, it is a widely distributed species throughout the *páramos*.

Ecology

Grows forming scattered rosettes in grassland *páramos* and in open, rocky sites. It is a grazing-resistant species.

CYPERACEAE

Carex pichinchensis Kunth



Herbs up to 1 m tall, tufted at the base; stems triangular, striated, glabrous, with rough, sharp angles. Grass-like leaves, very long and narrow, up to 8 mm wide, rigid and striated; the main vein very prominent on the underside, and the leaf folded along it; the base sheathing and reddish. Inflorescences pendulous on thin peduncles, in compound spikes, male and female, cylindrical, each up to 5 cm long, blackish-purple, with overlapping, scale-like bracts, lanceolate, up to 5 mm, keeled, blackish-purple with light, membranous margins. Flowers modified and scale-like, with stamens and styles pale yellow.

Similar species

Carex jamesonii Boott has leaves with finely serrated margins, lanceolate-triangular bracts, and erect inflorescences, while *C. pichinchensis* has leaves with entire margins, oblong bracts, and pendulous inflorescences.

Distribution

Andean mountains of Colombia and Bolivia.

Ecology

It grows between tussock grasses (Calamagrostis and Festuca) and along paths and hedges. It is abundant in low grasslands.

CYPERACEAE

Carex tristicha Boeckeler



Small herb, up to 10 cm tall, tufted and fan-shaped at the base. Leaves grass-like, long-lanceolate, up to 4 mm wide, rigid and striped; main vein very prominent on underside, along which leaf is folded; base clasping. Inflorescences in small, compact compound racemes, male and female, up to 2 cm long, with overlapping, scale-like bracts, lanceolate, up to 5 mm, keeled, long-apical, light green, hyaline, and membranous. Flowers are modified into scales.

Distribution

Páramos of Ecuador and Colombia.

Ecology

It grows forming clumps in open grass meadows; it is also present in wetlands of *Stiff Plantago* as small isolated plants.

CYPERACEAE

Oreobolopsis inversa Dhooge & Goetgh.



Rhizomatous herbs growing in small clumps 10 to 30 cm high. Culms rounded, 10 to 25 cm long and 0.6 to 0.8 mm in diameter; grass-like leaves, shorter than the culms, with triangular-cylindrical blades, rigid, striate, 5 to 11 cm long and 0.5 to 0.7 mm wide, with a clasping base and membranous ligule. Inflorescences in a compact spike 4-6 mm long and 2-3 mm wide, with scale-like bracts about 3 mm long, light brown, hyaline, and membranous. Small bisexual flowers, with 6 short scales, 3 stamens with long filaments and anthers 1 mm long, the ovary with 3 carpels, the style with 3 papillose cream-colored branches. The fruit is a small brown achene.

Similar species

Trichophorum rigidum subsp. *ecuadoriense* has smaller culms, 5 to 25 cm long, and flowers with a scaly perianth. This latter species is common in low, moist grasslands.

Distribution

Páramos of Ecuador and Perú, between 3700 and 4400 m a.s.l.

Ecology

Grows on dry grassland, wetland edges, and rocky areas, generally forming small aggregates scattered among the grasslands.

CYPERACEAE

Rhynchospora vulcani Boeckeler





Herbs up to 0.6 m tall, rhizomatous, fasciculate at the base, with triangular, striated stems, the angles rough and sharp. Grass-like leaves, very long and narrow, up to 5 mm wide, rigid, striated, with a very prominent midrib on the underside and some leaves folded along it, with a clasping base. Large, paniculate, dense inflorescences, in compound racemes, up to 6 cm long, cylindrical, reddish-brown, both male and female, with imbricate, scale-like bracts, lanceolate, up to 6 mm, keeled, long-lobed, membranous. Flowers modified, scaly, with very long styles; stamens pale yellow.

Similar species

Vegetatively similar to Rynchospora ruziana Boeckeler, but the latter has larger spikelets (0.6 to 0.8 cm) long, versus 0.4 to 0.5 cm long in R. vulcani.

Distribution

From the Andes in Bolivia to Colombia and in Central America to Mexico.

Ecology

Grows in tall, wind-protected grasslands, very common at the base of small hills.

ERICACEAE

Pernettya prostrata (Cav.) DC.; N.v.: "Borrachera".





Low shrub, up to 30 cm tall, very many-branched. Leaves alternate, lanceolate, up to 1.5 cm long, leathery, with toothed margins; stalks very short, up to 4 mm. Flowers solitary, on stalks up to 10 mm, calyx short, with 5 triangular lobes, about 4 mm, becoming fleshy in fruit; corolla urn-shaped, 5-7 mm long, with 5 short, recurved teeth, white, sometimes pinkish; stamens 10. Fruit a berry, rounded and fleshy, 6-10 mm, dark black-blue.

Distribution

From Mexico to the northeast of Argentina.

Ecology

Prefers grasslands and rocky sites, but can be found in almost any bog environment.

Use

The fruits are poisonous and are accidentally eaten because they are mistaken for the edible ones of the Andean blueberry (*mortiño*) (see *Vaccinium floribundum*).

ERIOCAULACEAE

Paepalanthus pilosus (Kunth) Kunth




Herbs up to 8 cm tall, with leaves grouped in basal rosettes forming small cushions. Stems 2-5 cm long. Leaves up to 20 × 1-2 mm, lanceolate-linear, glabrous, with pointed tips. Stalks up to 8 cm long, stiff, straw-colored. Flower heads up to 5 mm in diameter, ash-white, solitary at the end of the peduncle. Staminate florets with ovate sepals; tube white, glabrous, anthers white. Pistillate florets with ovate, dark sepals; petals spatulate to ovate, white.

Distribution

Colombia, Costa Rica, Ecuador, Panam, Perú, Venezuela.

Ecology

In the CNP, it is a rare species; it is found in open areas, on clay and moist soils in the Osohuayco area.

FABACEAE

Lupinus microphyllus Desr. ; N.v.: "Sacha chocho", "tauri".





Sinewy shrubs, covered with long silvery trichomes. Alternate leaves, composed of 8 palmate leaflets, linear, up to 0.8 cm long. Inflorescences are in clusters of up to 8 flowers. Flowers irregular, papilionaceous, up to 10 mm long; petals of various irregular shapes, deep purple with white. Fruit is a compressed legume, up to 15 mm long, opening through the sutures.

Similar species

Lupinus tauris is an erect shrub, usually over 50 cm long, whereas *L. microphyllus* is usually creeping and smaller.

Distribution

From Colombia to Bolivia. In Ecuador, it is found in the Andes region between 2500 and 4500 m asl.

Ecology

This species grows in low, open grasslands; in the CNP, it is also common in rocky areas.

FABACEAE

Lupinus tauris Benth.; N.v: "Tauri", "sacha chocho".





Up to 2 m tall, erect shrub. Leaves alternate, digitate, at the base of the stem; two stipulate bracts, consisting of 5 to 7 leaflets, lanceolate, about 1 cm long, slightly hairy. Inflorescence is a terminal raceme, flowers up to 10 mm long, papilionaceous, blue-violet with magenta, violet, and white shadings. Fruit, a pod up to 3 cm long, with white hairs and up to 5 seeds.

Distribution

Colombia and Ecuador between 3000 and 3500 m. It has been recorded in the provinces of Azuay, Cañar, Carchi, Imbabura, Loja, and Pichincha.

Ecology

It prefers to grow in dense grasslands dominated by *Festuca subulifolia* and *Calamagrostis intermedia*.



GENTIANACEAE

Gentianella hirculus (Griseb.) Fabris; N.v.: "Globito", "sarashima".





Low herb, up to 10 cm tall, solitary or in clumps. Leaves are opposite, up to 1.5 cm long, linear to spatulate, internodes are very short, and leaves are densely packed. Inflorescences in cymes, 1-3-flowered, the peduncles slender, up to 15 mm, the flowers up to 20 mm, the calyx tubular, 5-lobed, light green with purple tinges, the corolla globose to ovoid, the petals overlapping and seldom open, bright yellow-orange with reddish to salmon-pink free edge; stamens 5; ovary large, fusiform, green; style short, forked.

Similar species

It differs from *Gentianella hyssopifolia* in that it has a lower growth habit and larger but fewer, more brightly colored flowers.

Distribution

Endemic to the CNP, common in the highlands.

Ecology

It grows preferably in low and open grasslands, in places above 3700 m. It is also common in rocky places and on the edge of wetlands.



GENTIANACEAE

Gentianella hyssopifolia (Kunth) Fabris




Herbs up to 60 cm tall, with several stems. Leaves are opposite, up to 3 cm long, linear. Inflorescences in cymose clusters, up to 10 flowers, pedicels slender, up to 30 mm. Flowers up to 15 mm long, calyx tubular, 5-lobed, light green with purplish tinge; corolla globose to ovoid, petals 5, overlapping and narrowly open, yellow to pale orange with red or salmon pink tinges; stamens 5.

Distribution

Endemic to southern Ecuador, found in the provinces of Azuay and Cañar, between 2800 and 3900 m asl.

Ecology

Grows scattered among *Calamagrostis* and *Festuca* clumps, in dense, well-preserved grasslands.

GENTIANACEAE

Halenia minima C. K. Allen; N.v.: "Cacho de venado".



Small herbs, up to 15 cm tall when flowering, with numerous stems, decumbent to erect. Leaves of vegetative stems in a basal rosette, those of flowering stems opposite along the short stem, narrowly elliptic, up to 1 cm long; petioles up to 2 cm long. Flowers solitary or 2 to 7, hanging or horizontal, clustered in a corymb, about 20 mm long, pale yellow-green; pedicels slender to 20 mm, the calyx about 5 mm, the lobes very short, corolla up to 7 mm, the spurs divergent, about 4 mm long; stamens 5.

Similar species

Halenia taruga-gasso is larger, usually between 15 and 25 cm, while *H. minima* reaches between 10 and 15 cm, and its flowers have tiny spurs, usually less than 4 mm, while H. *taruga-gasso* has spurs between 4 and 8 mm long.

For differences with *H. serpyllifolia*, see the chapter on Wetlands and cushion plants.

Distribution

Endemic to Ecuador, recorded in the *páramos* of the provinces of Azuay, Loja, and Morona Santiago at altitudes between 3000 and 4500 m asl.

Ecology

It grows in open and low grasslands; it is also common in places where there is grazing, on roadsides, and on rocky areas.

GENTIANACEAE

Halenia taruga-gasso Gilg; N.v.: "Cacho de venado".





Small herbs, 10-25 cm tall, with numerous stems, decumbent to erect. Leaves of vegetative stems in a basal rosette, those of flowering stems opposite along the short stem, narrowly elliptic to linear, up to 15 mm long; petiole 2-20 mm long. Flowers solitary or in 2-8 umbellate cymes, hanging or horizontal, up to 5 cm long, pale yellow-green, the calyx about 7 mm, the corolla up to 12 mm, spurs divergent, up to 8 mm long..

Distribution

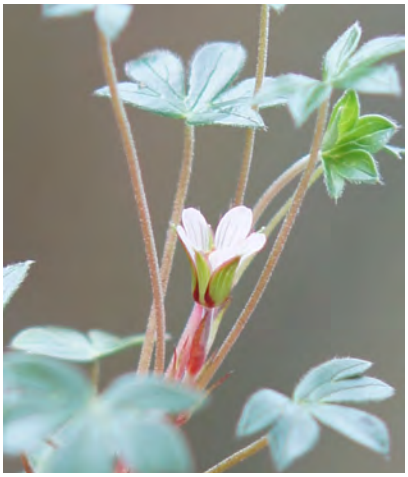
Endemic to southern Ecuador, found in the provinces of Azuay, Cañar, Loja, Morona Santiago, El Oro, and Zamora, between 2500 and 4000 m asl.

Ecology

Preferably grows in dense, well-preserved grasslands; unlike *H. minima*, it does not resist trampling by cattle.

GENTIANACEAE

Geranium sibbaldioides Benth. subsp. sibbaldoides




Perennial, up to 4 cm tall, forming small mats, with a short vegetative stem. Leaves in a basal rosette, polygonal in outline, up to 17 mm wide, deeply palmate, divided into 5 segments, white-pilose on both surfaces, the largest lobe being the central one, each segment lanceolate to elliptic, up to 7 mm long, the apex reddish, membranous; petiole up to 18 mm, slender, white-pilose. Flowers solitary in the centre of the rosette, on a peduncle about 10 mm long, hairy; sepals about 6 mm long, lanceolate, green, with apical bristles; petals 5, about 5 mm long, oblong, erect, entire, glabrous, white or pale pink with yellowish-green centre, the 5 stamens darker, purple; stamens 10, anthers yellowish. Fruits about 5 mm long, erect, reddish-brown, with protruding seeds.

Similar species

Geranium maniculatum, from which it differs in that the leaflets of *G. sibbaldioides* open laterally and have glabrous margins, whereas those of *G. maniculatum* open laterally and have small trichomes on their margins.

Distribution

The species occurs from Venezuela to Bolivia. The subspecies is distributed in the Andean region from southern Colombia to northern Peru, between 2700 and 5000 m asl.

Ecology

It is common in all types of grassland, but also in *Gynoxys* thickets and on the edges of *Polylepis* forests.

HYPERICACEAE

Hypericum decandrum Turcz.



Shrubs up to 60 cm tall; stems reddish-brown or yellowish-brown, the bark peeling off in irregular scales, sparsely branched, 4-6 in a row. Leaves sessile, oblanceolate, 4-15 × 0.7-3 mm, slightly leathery, appressed and overlapping. Inflorescence terminal, flowers solitary, up to 20 mm across, with bright yellow petals; stamens yellow. Capsule up to 5 mm long; seeds are tiny.

Distribution

The Andes of Ecuador and north of Perú, between 2500 and 4500 m. asl.

Ecology

It grows in the grasslands and thickets of Loricaria. In grasslands, it is common but inconspicuous, being small and slender and hidden between clumps of *Calamagrostis intermedia* or *Festuca subulifolia*.

LAMIACEAE

Clinopodium nubigenum (Kunth) Kuntze; N.v.: "Tipo".





Creeping, spreading, carpet-forming shrubs; very aromatic, reddish-brown stems. Leaves opposite and decussate, ovate, up to 4 mm long, crowded on the stems, densely hairy. Flowers solitary, axillary, very light lilac with purple tints, irregular, tubular, bilabiate, up to 7 mm long, the lower lip 3-lobed and the upper lip emarginate; stamens 4. Fruit in a nutlet, about 2 mm.

Distribution

From Colombia to Peru. In Ecuador, it has been recorded in the Andes, between 2500 and 4000 m asl.

Ecology

It inhabits dry and open grasslands, growing in small clusters between clumps of tussocks and along roadsides; it is also recorded in Loricaria and Gynoxys thickets.

Uses

Used in aromatic infusions. Helps prevent and cure "soroche" or altitude sickness.

LENTIBULARIACEAE

Pinguicula calyptrata Kunth




Carnivorous plant, up to 10 cm tall. Leaves arranged in a basal rosette, ovate-elliptic, to 3.5 × 2 cm, with upturned margins, light green with reddish-brown margins, the upper surface covered with sticky glands adapted for catching and digesting small insects. Inflorescence: a solitary, terminal flower in a long, upright scape, up to 10 cm long; flowers up to 15 mm long; calyx 5-lobed, brownish-purple; corolla bilabiate, the upper lip 2-lobed, the lower lip 3-lobed, blue-violet or violet with white.

Distribution

The Andes from Colombia to Bolivia. In Ecuador, it grows throughout the Andean region between 2000 and 4500 m asl.

Ecology

It grows in wet grasslands and along the banks of rivers and streams. In the CNP, it is common in transitional areas between grasslands, wetlands, and humid rocky áreas.

LYCOPODIACEAE

Austrolycopodium magellanicum (P. Beauv.) Holub.




Herbaceous, creeping, spreading, or hanging in ditches; stem rooting at intervals, branches up to 15 cm long, unevenly branched. Leaves whorled, lax, linear-acicular, scale-like, up to 5 mm long, pale green, apiculate. Terminal strobili up to 50 mm long, sometimes forked, yellowish green; sporophylls in alternate whorls of 4, peltate, the margins erose.

Formerly known as *Lycopodium magellanicum*.

Similar species

Lycopodium clavatum has long whitish membranous hairs on the apex of the leaves, whereas *Austrolycopodium magellanicum* lacks these hairs.

Distribution

The Caribbean, Costa Rica, and the Andes, from Venezuela to Chile and Argentina. In Ecuador, between 2500 and 4500 m. asl.

Ecology

It grows in dry grasslands and shrubby páramos. The CNP lives in low and open grasslands, surviving grazing and burning thanks to its underground rhizomes. It is also common on rocky sites and shrub edges.

LYCOPODIACEAE

Lycopodium clavatum L.



Herbaceous, creeping, spreading, or hanging in ditches; stem rooting at intervals, branches up to 50 cm long, unevenly branched. Leaves whorled, arranged in 10 rows, linear-acicular, scale-like, up to 8 mm long, light green, ending in a long translucent hair. Stems up to 30 cm long, simple or branched, with up to 6 stalks, stalks up to 60 mm long, sometimes forked, silvery-green or yellowish-green; sporophylls arranged in alternate whorls of 5-6, subpeltate, the margins erose.

Distribution

Subcosmopolitan, absent from Australia. In Ecuador, it is found in the Andean region, between 1000 and 4500 m asl.

Ecology

In the CNP, it grows preferably in humid grasslands, between Calamagrostis or Festuca tussocks, or in open soils; it is also found under the canopy of *Gynoxys* and *Loricaria* shrubs.

LYCOPODIACEAE

Phlegmariurus crassus (Humb. & Bonpl. ex Willd.) B. Øllg.



Herbaceous plants up to 40 cm tall, solitary or in small groups; stems cylindrical, up to 3 times forked, about 7 mm in diameter. Leaves whorled, arranged in 10 rows, scale-like, triangular-lanceolate, up to 5 mm long, loosely lobed, smaller and appressed towards the tip, erect, with toothed margins, green with reddish-pink tips. Upper leaves bear reproductive structures (sporangia) at the base; sporangia about 2 mm, kidney-shaped, green to yellow.

Formerly included in the genus *Huperzia*.

Distribution

Native to Ecuador, recorded in the provinces of Azuay, Bolivar, Carchi, Chimborazo, Cotopaxi, Imbabura, Napo, Pichincha, Tungurahua, between 2500 and 4500 m altitude.

Ecology

It grows scattered in humid and open grasslands, also on the edges of wetlands and in damp rocky places. In the CNP, it is common in the Toreadora and Taitachugo Lakes sectors.

MELASTOMATACEAE

Brachyotum jamesonii Triana; N.v. "Zarza", "zarcillo sacha".





Shrubs up to 1.5 m tall, with thick white trichomes covering the entire plant; branches with knobby scars from fallen leaves. Leaves lanceolate, opposite, up to 1.6 cm long, with three main veins emerging from the base. Flowers pendulous, solitary or in groups of 3, up to 20 mm long, with showy bracts and reddish-pink sepals; 4 overlapping petals forming a tube, dark purple in color; style dark pink.

Similar species

Brachyotum alpinum grows to a tree size and has ovate to elliptical leaves with smaller petals. *Brachyotum confertum* has ovate to oblong leaves and flowers with five sepals and five petals. *Brachyotum jamesonii* has lanceolate leaves and flowers with furled sepals and four petals.

Distribution

It is endemic to central and southern Ecuador, recorded in the provinces of Azuay, Cañar, Chimborazo, and Morona Santiago, between 3000 and 4200 meters above sea level.

Ecology

It grows scattered in grasslands, in *Arcytophyllum vernicosum* thickets, and on the edges of Polylepis reticulata forests. Several species of hummingbirds visit its flowers.

Uses

It is used for cleansing rituals and for dyeing various items.



ORCHIDACEAE

Pterichis parvifolia (Lindl.) Schltr.

Terrestrial herbs up to 45 cm tall. White fasciculated roots. When present, the leaves are basal with a linear-lanceolate, glabrous blade measuring 10–15 cm in length and 1–1.5 cm in width. The blade has a canaliculate base and an acute apex, and the petiole is 12–15 cm long. The inflorescence is erect and is supported by a 40 cm long pubescent scape. The flowers have glabrous, ovate green bracts; pubescent, ovate lemon-yellow sepals; papillose, linear-oblong petals with three yellow veins and brown lines; and a triangular, cordate, papillose yellow lip.

Distributon

Colombia, Ecuador, and Perú; it grows in the Andes from 2500 to 4000 m.

Ecology

It grows in open, moist grasslands, usually associated with Puya rosettes. Its leaves normally dry out before flowering.



OROBANCHACEAE

Bartsia laticrenata Benth.

Herbs up to 50 cm tall, with a woody base, covered with glandular, sticky trichomes. Opposite, lanceolate leaves, up to 2 cm long, with crenate margins curled downward, often reddish purple, especially on the upper surface. The flowers are located at the top of the stems, measuring up to 10 mm in length, and feature a purple calyx and a yellow-green, tubular corolla.

Similar species

This species is easily distinguished from other Bartsia species in the Cajas by its yellow corolla.

Distribution

Páramos of Colombia and Ecuador, where it has been recorded between 2,500 and 4,500 m above sea level.

Ecology

It grows in humid grasslands and rocky areas. In the CNP, it is common on slopes and grassland edges.



POACEAE

Agrostis perennans (Walter) Tuck





Soft herbs 20 to 40 cm tall, with mostly basal leaves forming small clumps. Basal leaves linear, grooved, 8–15 cm × 1–1.2 mm; cauline leaves linear, 3–5 cm × 1.3 mm. Loose panicles, 4–12 cm long, purple in color, spikelets 2 mm long; glumes with a central vein, slightly rough, lemma 5-veined with a 1.5 mm long geniculate dorsal awn.

Similar species

Agrostis tolucensis has contracted, dense panicles, and its leaves are slightly wider and rougher than *A. perennans*.

Distribution

Widely distributed species in the Americas. In Ecuador, it has been recorded between 2000 and 4500 m above sea level.

Ecology

It adapts to various environments and is very abundant in disturbed grasslands and open scrublands; it is dispersed by livestock.

POACEAE

Bromus lanatus Kunth



Grassy herbs, growing in loose clumps; culms 15–30 cm long, cylindrical internodes, hairy; leaves basal primarily, sheath cylindrical, 3–4 cm long, ligule membranous, blade linear, smooth, flattened, hairy, 10–16 cm × 1.2–1.5 mm. Open panicles with few large spikelets, 1.8–2.2 cm long, glumes hairy, oblong-lanceolate, 9–10 × 1.1 mm, lemmas hairy, elliptic-oblong, 13 × 3 mm, with a 4 mm long dorsal awn.

Similar species

Bromus lanatus is very similar to B. pitensis, from which it differs in that its spikelets and peduncles are covered with woolly-looking pubescence.

Distribution

Native to the Andes, distributed from the *páramos* of Colombia and Venezuela to the mountains of northern Chile and Argentina. In Ecuador, between 3000 and 4500 m a.s.l.

Ecology

In the CNP, it grows in the transition zone between grasslands and wetlands dominated by *Plantago rigida*.

POACEAE

Calamagrostis intermedia (J. Presl) Steud.; N.v. "Paja", "ugsha".



Robust herbs form dense clumps, reaching heights of up to 110 cm. Erect culms 50 to 100 cm long and 1.5 to 3 mm in diameter, slightly rough. Leaves mostly basal, with a glabrous sheath partially surrounding the stem; membranous ligule 1 to 3 mm long; linear blade 40 to 80 cm long, the margins folded, giving a cylindrical appearance, inner surface slightly rough. Inflorescences are conspicuous, in contracted panicles 10-40 cm long. Purple spikelets, 6 to 8 mm long. Persistent membranous glumes, lanceolate, 1 to 1.2 mm long; membranous lemma, lanceolate, 6 mm long, with a toothed apex and an awn inserted on the back; palea 4 mm long.

Similar species

Vegetatively, it is very similar to *Festuca subulifolia*, but it can be distinguished because the latter has tiny teeth on the surface of the leaf, which makes it rough to the touch; also, the base of the lamina is open in *F. subulifolia* and almost completely closed in *C. intermedia*.

Distribution

Mesoamerica and South America, where it is distributed from Colombia to Argentina. In Ecuador, it grows in the Andean region between 2,500 and 4,500 m above sea level.

Ecology

It is one of the dominant species in the southern Ecuadorian grasslands. In the CNP, it grows in association with *Festuca subulifolia*, forming dense grasslands with it. It is a plant that is resistant to grazing and survives burning.



POACEAE

Festuca subulifolia Benth.; N.v. "Paja", "paja macho".



Robust herbs, growing in dense clumps, up to 120 cm tall. Erect, scabrous culms, 30–80 cm long. Basal leaves involute, 20–60 cm long, sheaths finely grooved, slightly scabrous, membranous ligule 1 mm long. Panicles contracted or open at maturity, 10-30 cm long. Spikelets purple, 7-8 cm long; rachis covered with tiny teeth; glumes membranous, acute, first glume lanceolate, 3.2-3.5 mm long, second glume oblong, 5-5.5 mm long; lemma oblong-lanceolate, purple, scabrous, 6.5-7 mm long with a 1 mm long terminal awn; palea membranous, lanceolate, 6 mm long; stamens 3, with 2 mm long anthers; caryopsis oblong-lanceolate..

Similar species See *Calamagrostis intermedia*

Distribution From Colombia to Peru. In Ecuador, it has been recorded between 3000 and 4500 m a.s.l.

Ecology In the CNP, together with Calamagrostis intermedia, these are the dominant species in grasslands. It is particularly abundant and dominant at the base of small hills and protected slopes. It shows great morphological variability, which is why it is smaller in size in exposed areas.

Uses Locally, it is used for thaching and in traditional medicine to prepare baths and drinks that help women during childbirth.



POACEAE

Paspalum bonplandianum Flugge; N.v.: "Grama".



Herbs with superficial rhizomes 3–20 cm long, basal leaves forming small clumps 5–20 cm tall and covered with whitish pubescence; culms erect, 10–30 cm tall; sheaths narrow, tubular. Leaves lanceolate, 3-10 cm × 3-6 mm. Panicles narrow, 3-7 cm long, arranged on thin reddish stems; clusters 1.5-3 cm long, light green with purple spots; upper glume and lower palea membranous; upper palea hardened, yellowish green.

Distribution

Andes from Colombia to Peru. In Ecuador, it is distributed between 1500 and 4000 m above sea level.

Ecology

It grows in wet and dry grasslands and is abundant in areas affected by grazing.

Uses

The inhabitants of the communities surrounding the park use it to treat infections.



POACEAE

Stipa rosea Hitchc.



Fasciculate herbs, up to 65 cm tall. Leaves 15–25 cm long, involute, rigid, upper leaves reduced, lower sheaths short, clustered, glabrous, those on the culm longer than the internodes. Narrow panicles, up to 18 cm long; lanceolate glumes 6 to 7 mm long, violet in color, completely covering the florets, cylindrical lemma with an apical awn and abundant white hairs.

Similar Species

Calamagrostis intermedia, from which it differs in its smaller size and purple panicles with longer awns. A closely related species of *Nassella* is present in the Cajas, but it differs in that it has smaller (5 mm) purple glumes and shorter hairs on the lemma.

Distribution

Moors in central and southern Ecuador and northern Peru. In Ecuador, it has been recorded in Azuay, Chimborazo, and Loja, between 3000 and 4150 m above sea level.

Ecology

It grows in humid grasslands among clumps of *Calamagrostis* and *Festuca*, as well as in wetland-grassland ecotones. It disappears in areas that have been burned or subjected to excessive grazing.



POACEAE

Poa pauciflora Roem. & Schult.





Perennial herbs, 20–60 cm tall, forming loose clumps; simple, hollow, cylindrical culms, green with purple spots; basal leaves, purple tubular sheath, membranous ligule, folded, rounded blade, with a rough, bristly surface, 4 mm long. Open panicles 10 to 25 cm long. Spikelets laterally compressed, purple, 3.3 mm long; glumes trinerved, 3 mm long; lemmas purple, keeled, 2.6 mm long with a callus and arachnoid trichomes at the base; ovary glabrous with two white feathery styles.

Distribution

Andes from Venezuela to Peru. In Ecuador, it is recorded between 3000 and 4500 m above sea level.

Ecology

In the CNP, it is a very common species in open grasslands, growing among clumps of *Calamagrostis intermedia* and *Festuca subulifolia*, although they never become dominant.

RUBIACEAE

Arcytophyllum filiforme (Ruiz & Pav.) Standl.





Moss-like herbs that form carpets; creeping stems, somewhat woody. Opposite leaves, lanceolate, up to 4 mm long. Solitary flowers, up to 5 mm long, white or tinged with lilac or pink, with a short tube with four triangular lobes; four stamens, purple anthers.

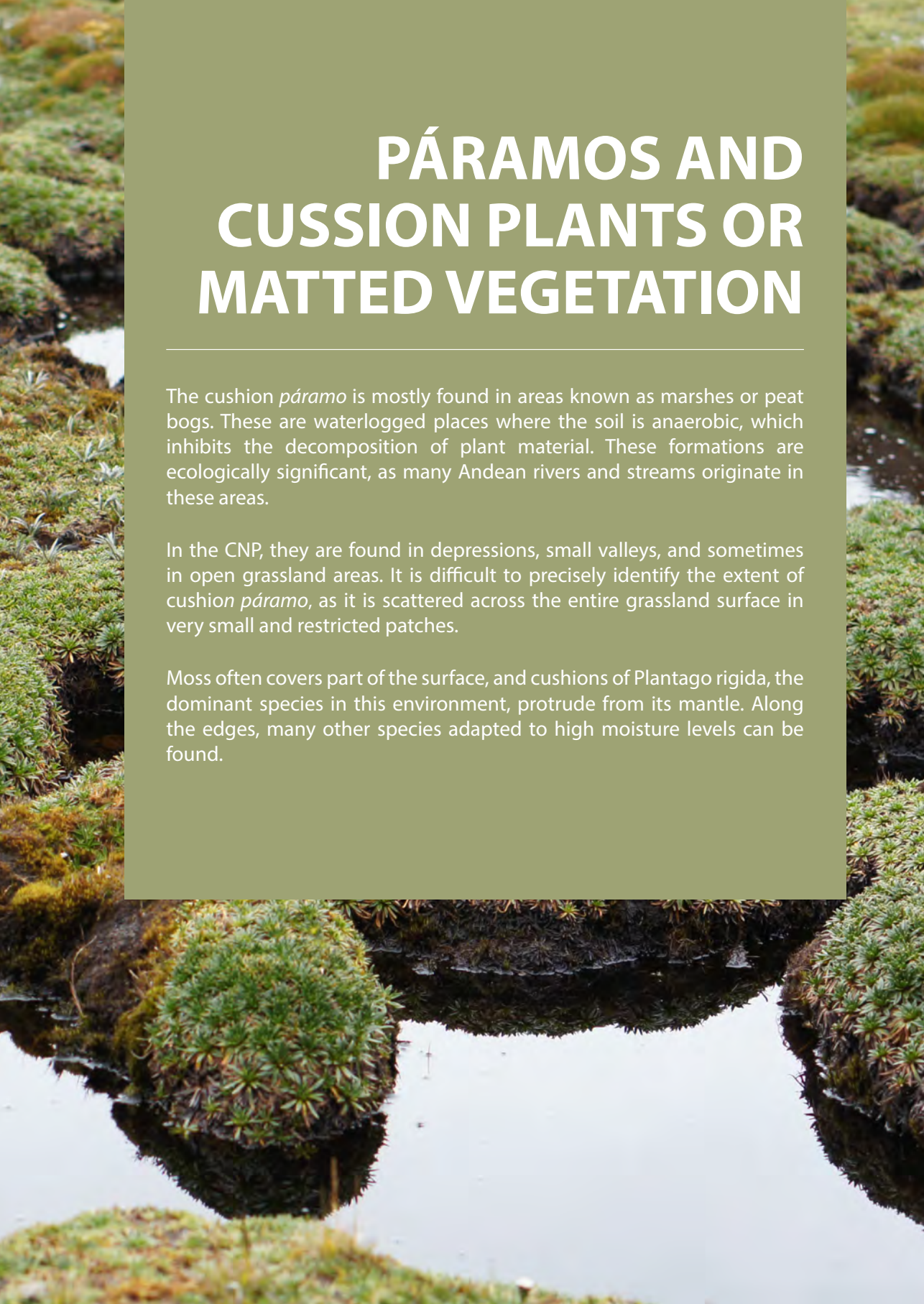
Distribution

From Ecuador to Bolivia. In Ecuador, it has been recorded in the Andean mountain range, between 2,800 and 4,500 m above sea level.

Ecology

Creeping plant, growing under tussock grasses or on the floor of scrubland and *Polylepis* forests. It is also common on moist slopes and roadsides.





PÁRAMOS AND CUSSION PLANTS OR MATTED VEGETATION

The cushion *páramo* is mostly found in areas known as marshes or peat bogs. These are waterlogged places where the soil is anaerobic, which inhibits the decomposition of plant material. These formations are ecologically significant, as many Andean rivers and streams originate in these areas.

In the CNP, they are found in depressions, small valleys, and sometimes in open grassland areas. It is difficult to precisely identify the extent of cushio*n páramo*, as it is scattered across the entire grassland surface in very small and restricted patches.

Moss often covers part of the surface, and cushions of Plantago rigida, the dominant species in this environment, protrude from its mantle. Along the edges, many other species adapted to high moisture levels can be found.

APIACEAE

Niphogeton azorelloides Mathias & Constance



Low, tufted herbs forming mats, 2–4 cm tall, glabrous, yellowish-green, with a woody base. Leaves alternate, clustered, oblong-ovate, 4–9 mm long, deeply 3-lobed, lobes linear-oblong, 2–6 mm, narrow, entire; petioles up to 15 mm, winged-sheathing. Inflorescences in small umbels, peduncle short, about 15 mm; involucre with two bracts, about 5 mm; rays 1-3, ascending, petals 5, ovate, white. Fruit of mericarps about 2 mm, markedly 5-ribbed, with oil-secreting vesicles, carpophore bifid.

Similar species

Oreomyrrhis andicola is larger, with bipinnatifid and herbaceous leaves, compared to the ternate leaves of *N. azoreloides*, which are subcoriaceous. *Niphogeton dissecta* has 2-pinnate leaves 2-8 cm long, compared to 0.5-1 cm long in *N. azorelloides*; the latter is also recognizable by its orange exudate when the stems are broken.

Distribution

Highlands of central and southern Ecuador and northern Peru. In Ecuador, it has been recorded in the provinces of Azuay, Cañar, Chimborazo, Cotopaxi, Napo, and Pichincha, at elevations between 3000 and 4500 m above sea level.

Ecology

It grows in humid *páramos*. In the CNP, it is common in wetlands dominated by *Plantago rigida* grows in rocky, humid sites.

APIACEAE

Oreomyrrhis andicola (Kunth) Endl. ex Hook. f.



Low, tufted herbs, 3–5 cm tall, with a white-tomentose appearance. Leaves alternate, pinnatisect, oblong to ovate in outline, 1-8 cm; leaflets 9-17, 1.5-15 mm long, 1-10 mm wide, divisions entire or pinnatifid, terminal divisions dense, ovate to linear; petioles 0.5-10 cm, sheathing at base. Inflorescences in umbels on peduncles 1-40 cm, hirsute; involucral bracts 6-10, lanceolate to obovate, entire to pinnatisect, pubescent, connate; petals 5, inconspicuous, white or tinged with pink. Fruit of mericarps, 3-5 mm long, ribbed, glabrous or pubescent, with oil-secreting vesicles; the carpophore is bifid.

Similar species

Niphogeton azorelloides (for differences, see N. azorelloides).

Distribution

From Costa Rica and Colombia to Bolivia and Argentina. In Ecuador, it is distributed in the Andean region, between 2,500 and 4,500 m above sea level.

Ecology

It inhabits wetlands and humid grasslands. In the CNP, it is common in wetlands and grows between or on cushions of *Plantago rigida*.

ASTERACEAE

Cotula mexicana (DC.) Cabrera



Low, tufted herbs, acaulescent or with short aerial stems, stoloniferous; stolons long, up to 15 cm long, glabrous to hairy, with reddish-purple tinges. Leaves 1-3-pinnatifid, 1-3.5 cm, oblanceolate in outline, fleshy, yellow-green; the central vein marked, the segments opposite, 3-6 pairs, entire or lobed, the apex spiny, the last segment oblanceolate, about 3 mm long, the petiole dilated at the base. Inflorescences in axillary heads, the peduncles about 1 cm, hairy, capitula around 5 mm in diameter, involucre with 10 bracts with lilac apices, marginal flowers 7-10, without corolla, disc flowers around 60, around 2 mm, tubular, 3-lobed, white, those in the center with lilac hues.

Similar species

It is very similar to *Cotula australis* (Sieber ex Spreng.) Hook. f., from which it differs in that the leaves of the latter are generally 12-pinnatifid and the capitula are smaller (0.3–0.5 cm in diameter compared to 0.5–0.8 cm in diameter in *C. mexicana*).

Distribution

Native to Central and South America, it is distributed from Mexico to Bolivia, Chile, and Argentina. In Ecuador, it grows in the Andes mountain range, between 3000 and 4500 m above sea level.

Ecology

It is a common species in various environments, preferring humid and open sites. In the CNP, it grows on the edges of lagoons and wetlands, as well as on humid slopes and humid rocky sites.

ASTERACEAE

Oritrophium limnophilum (Sch. Bip.) Cuatrec.



Herbs up to 7 cm tall, erect stems with internodes of 2-3 mm, with abundant long white trichomes between the nodes. Opposite leaves, some petioles longer than the blade and with a widened base; blade oblong-lanceolate, 1.8-2 cm long, 6-7 mm wide, the upper surface villous, the margins entire, the lower surface slightly tomentose. Inflorescence with a single terminal capitulum, purple peduncle, up to 6 cm tall; receptacle with three series of green-purple bracts. Marginal flowers with ligulate corolla, shortly lobed, with white-lily-colored upper surface, tubular disc flowers yellow-lily-colored. Achenes with transparent pappus.

Distribution

In the Andes from Venezuela to Bolivia. In Ecuador, it is found in the highlands at elevations between 3000 and 4500 m above sea level.

Ecology

It prefers very humid or flooded environments, where it is associated with species such as Plantago rigida and *Distichia acicularis*. It is also common on the edges of lagoons.

ASTERACEAE

Oritrophium peruvianum (Lam.) Cuatrec.



Rhizomatous herbs 10 to 30 cm tall, with brownish woolly pubescence at the base. Leaves arranged in a basal rosette 10 to 20 cm in diameter, petiole widened and covered with woolly pubescence, oblong blade 4 to 8 cm long and 0.8 to 1.2 cm wide, entire margin and acuminate apex, glabrous, grooved on the upper and lower surfaces with tomentose pubescence. Inflorescences in solitary capitula, supported by scapes, purple, 12 to 25 cm long; capitula 1.5 to 2 cm in diameter. Two types of flowers: the marginal flowers are irregular, prolonged, ligulate, white; the inner flowers are short, tubular, creamy yellow. Pappus with scabrous bristles.

Distribution

Páramos from Venezuela to Peru and northeastern Bolivia. In Ecuador, it is distributed along the Andes mountain range between 2500 and 4500 m above sea level.

Ecology

In the CNP, this species is found in marshes, peat bogs, riparian habitats, and lake shores.

ASTERACEAE

Werneria pygmaea Gillies ex Hook. & Arn.




Creeping herbs with horizontal or oblique rhizomes of variable size. Leaves arranged spirally, forming rosettes up to 5 cm tall; leaf blades linear, 1 to 3 cm long, with a papery texture. Inflorescences are solitary flower heads at ground level, measuring 2.5 cm in diameter. Two types of flowers are present: the marginal ones (approximately 14) are irregular and have a ligule up to 15 mm long, which is white; the inner flowers (approximately 25) are short, tubular, with five teeth, and yellow. The fruit bears a crown of trichomes measuring 10 mm in length, which are white.

Similar species

Werneria nubigena, from which it differs by its generally smaller stature and fewer central flowers. It also differs in leaf arrangement: spiral in *W. pygmae*a and distichous in *W. nubigena*.

Distribution

South America, ranging from Venezuela to Patagonia in Argentina. In Ecuador, it is found along the Andean mountain range between 2,500 and 4,500 meters above sea level.

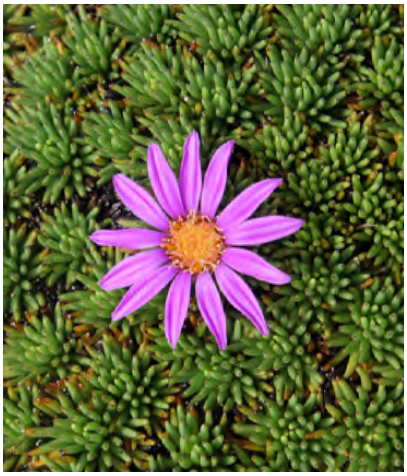
Ecology

It adapts to a wide variety of habitats. In the CNP, it grows in permanently humid areas and is abundant in waterlogged sites such as marshes and lake edges.

ASTERACEAE

Xenophyllum roseum (Hieron.) V. A. Funk





Low-growing herbs, forming small groups or cushions. Leaves in rosettes, very narrow, terete, up to 10 mm long. Inflorescences are flower heads at ground level, 2 cm in diameter. Two types of flowers are present: the marginal ones (approximately 13) are irregular and display a conspicuous ligule, 10 mm long, deep pink in color; the inner flowers (approximately 35) are tubular with five teeth, dark yellow in color. The fruit bears a crown of silky trichomes, 8 mm long, white.

Distribution

Endemic plant of the páramos in southern Ecuador, likely restricted to the area of the Cajas Massif.

Ecology

Prefers humid and waterlogged sites, forming small cushion-like patches. In the CNP, it is found in high-altitude zones above 3,900 meters above sea level.

CAMPANULACEAE

Lysipomia oellgaardii Jeppesen



Small rhizomatous herbs. Leaves in acaulescent rosettes, arranged at the apex of the rhizomes; leaves glossy, rigid, with a widened whitish base, 2 mm wide; blade lanceolate, 5 to 8 mm long and 2 to 2.5 mm wide, with a narrow hyaline band along the margin resembling a callosity; apex ending in a hyaline point. Flowers solitary, almost hidden by the upper leaves; sepals equal, 1.5 mm long; corolla zygomorphic, white, about 4 mm long, located at the center of the rosette, weakly bilabiate; filaments fused into a tube approximately equal in length to the corolla tube; anthers black. Capsule papery, bell-shaped, 2.5 × 1.3 mm.

Similar species

Lysipomia vitreola is a closely related species, differing in leaf size, which in *L. vitreola* ranges from 15 to 20 mm, compared to 10 to 12 mm in *L. oellgaardii.* Additionally, *L. vitreola* has a corolla with purple spots, whereas *L. oellgaardii* has an entirely white corolla.

Distribution

Endemic to the *páramos* of southern Ecuador, found in the provinces of Azuay and Loja, between 2,850 and 4,060 meters above sea level.

Ecology

Inhabits wetlands, preferably along the edges of lakes and streams. In the CNP, it is a rare species and has only been recorded in around Lake Osohuayco.

CAPRIFOLIACEAE

Valeriana bracteata Benth.





Small herbs, up to 10 cm tall, fetid. Leaves in a basal rosette, lanceolate-spatulate, up to 5 cm long, thick and fleshy, with a base expanded into a petiole. Inflorescence on a peduncle about 25 mm long, capitate, up to 8 mm in length, with three flowers surrounded by bracts; flowers approximately 2 mm, with four short lobes, white with purplish tinges; 3 stamens. Fruit is an achene, approximately 2 mm long, ellipsoid, and lacks a pappus.

Distribution

In the Andes from Colombia to Ecuador. In Ecuador, it is found in the páramos between 3000 and 4500 meters above sea level.

Ecology

Prefers humid, open environments. In the CNP, it is common in wetlands dominated by Plantago rigida, although it is also found in rocky areas and humid, open grasslands.

CYPERACEAE

Carex pygmaea Boeckeler



Herbs up to 20 cm tall, rhizomatous. Leaves clustered at the base, linear, with a canaliculate blade up to 3 mm wide; sheath glabrous with a translucent margin. Terminal inflorescence, with several pedunculate spikelets, brownish in color. Culm shorter than the leaves. Each flower is enclosed by a persistent scale. Flowers are abundantly arranged in the spike; staminate flowers are reduced to three yellow-cream stamens, while pistillate flowers have a single ovary, the style bearing two short stigmas that emerge through an opening at the apex of the flattened perigynium.

Distribution

In the Andes from Costa Rica to Ecuador.

Ecology

Grows in wetlands dominated by *Plantago rigida*.

CYPERACEAE

Eleocharis acicularis (L.) Roem. & Schult.



Perennial, tufted herbs, 20 cm tall. Leaves small, 8 mm long, glabrous, clasping the base of the culm. Terminal inflorescence, reddish-brown. Culms slightly arched, (1)4–11(22) cm long; spikelet (1.5)3.5(6) mm, ovoid; scales helically arranged, green in the center and reddish-brown on the sides. Staminate flowers have three stamens, with yellowish anthers; the style has 3 stigmas. Fruit is an obovoid achene, greenish in color.

Similar species

A species closely related to *Isolepis cernua* (Vahl) Roem. & Schult., from which it differs by lacking leaves, whereas *Isolepis* has small, fine leaves at the base of the stems. Generally, *Eleocharis* has longer stems, and its spikelets are always terminal, while in Isolepis, they may be terminal or pseudolateral.

Distribution

Distributed throughout the Americas, including the Arctic. In Ecuador, it is found at elevations of up to 4,300 meters above sea level.

Ecology

Inhabits shallowly flooded areas and lake edges, sometimes forming monospecific aggregations or associated with species such as *Isolepis cernua*, *Distichia acicularis*, and *Oreobolus ecuadorensis*. It is common in disturbed areas.

CYPERACEAE

Uncinia tenuis Poepp. ex Kunth



Perennial, tufted herbs, up to 25 cm tall. Leaves linear, up to 25 cm long and 2 mm wide, glabrous, with sharp-cutting margins, grouped near the base, flattened; the sheath is ligulate. Terminal inflorescence in a spike, 4–5 cm long, greenish-reddish in color. Unisexual flowers, each enclosed by a persistent scale; staminate flowers located in the upper part; pistillate flowers in the lower part, more numerous than the staminate ones. Perigynium 4 × 2 mm, from whose apex emerge three wine-colored stigmas and the rachilla, distally hooked, 5–6 mm long, shaped like a true hook, facilitating seed dispersal. Achenes trigonous, ovoid, 2.5 mm long.

Similar species

Differs from *Uncinia hamata* (Sw.) Urb. by having generally narrower leaves with smooth margins, whereas U. hamata has broader leaves with toothed margins, which can cut one's hand. Also, the perigynium is glabrous in *U. tenuis* and pubescent in *U. hamata*.

Distribution

Found in Central and South America, from Mexico to Chile and Argentina. In Ecuador, it is distributed in the Andean region, between 3000 and 4000 meters above sea level.

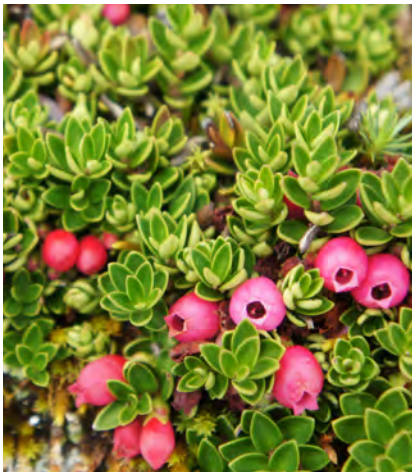
Ecology

Prefers moist environments, especially in the wetland-grassland ecotone. It can also be found in humid sites under the canopy of *Calamagrostis* and *Festuca*.

ERICACEAE

Disterigma empetrifolium (Kunth) Drude; N.v.: "Nigua".





Dwarf shrubs or creeping plants, profusely branched, forming small cushions; stems reddish. Leaves alternate, oblong-lanceolate, up to 10 mm long, rigid, with serrated margins; internodes very short and leaves overlapping; petioles absent. Flowers solitary, pedicels about 3 mm long; calyx short, about 4 mm; corolla ellipsoid-urceolate, 6–10 mm, fleshy, with four small teeth, bright pink or pale pink to pinkish red; 8 stamens. Fruit is a globose berry, 8–12 mm, fleshy, translucent, whitish-green.

Distribution

In the Andes from Venezuela to Bolivia. In Ecuador, it grows along the Andean mountain range between 2500 and 4500 m a.s.l.

Ecology

This species is adaptable to various *páramo* environments, commonly found on rocky slopes and in moist areas, where it grows in small, cushion-like mats. In the CNP, it is abundant in wetlands dominated by *Plantago rigida*; it is also present in shrublands of *Loricaria* and *Gynoxys*.

GENTIANACEAE

Gentiana sedifolia Kunth




Small herbs, up to 4 cm tall. Leaves are opposite, up to 1 cm long, narrowly lanceolate. The flowers are solitary, erect, about 10 mm long, the calyx about 6 mm long, shortly tubular with five short, light green lobes; the corolla is funnel-shaped with five expanded lobes with folds between them, pale blue or violet, with purple dots toward the center and a yellow throat, rarely white or pale yellow; stamens are 5. The flower closes at night or when the sun sets.

Distribution

In the Andes from Venezuela to Bolivia, Argentina, and the Costa Rican mountain ranges. In our country, it has been recorded in the Andean region between 2000 and 4500 m above sea level.

Ecology

A common species in various *páramo* environments, it grows in both grasslands and wetlands, as well as under the canopy of shrubs.



GENTIANACEAE

Gentianella cerastioides (Kunth) Fabris



Small herbs, up to 5 cm tall, solitary or forming small cushions. Leaves are opposite and crowded at the base, lanceolate, up to 15 mm long. Flowers are generally solitary, flush with the ground, erect, up to 25 mm long; the calyx is up to 10 mm long, with a short tube and 5 long triangular lobes; the corolla is up to 20 mm long, with 5 petals that open gradually; the color is lilac or rarely pink, with darker veins; 5 stamens.

Similar species

It can be confused with *Gentianella rapunculoides*, from which it differs because the latter has flowers in clusters, while *G. cerastioides* has solitary flowers.

Distribution

In the Andes of southern Colombia and Ecuador, between 2000 and 4500 m above sea level.

Ecology

It prefers moist sites, where it is commonly found associated with cushions of *Plantago rigida*.

GENTIANACEAE

Gentianella limoselloides (Kunth) Fabris





Small herbs, up to 5 cm tall, solitary or in small groups. Leaves are opposite and crowded at the base, spatulate, and up to 25 mm long. Flowers are solitary, raised on a floral peduncle, up to 50 mm long, the calyx up to 8 mm, with a short tube and 5 long, triangular lobes; the corolla up to 15 mm, the 5 erect petals, white with lilac tints and violet veins; 5 stamens.

Distribution

Endemic to Ecuador, where it is widely distributed in the paramos between 2,500 and 4,500 m above sea level.

Ecology

It inhabits humid, sometimes waterlogged areas. It is common in disturbed wetlands, associated with species such as *Lachemilla orbiculata*, *Agrostis breviculmis*, and *Plantago rigida*.

GENTIANACEAE

Halenia serpyllifolia J. S. Pringle; N.v.: "Cacho de venado".





Small, rhizomatous herbs with prostrate vegetative stems and erect flowering stems 2 to 6 cm long. The leaves are formed in a rosette at the base, with others opposite along the short stem. The lamina is elliptical to ovate, measuring 5 to 8 mm in length by 1.5 to 2.5 cm in width, and is supported by a petiole that ranges from 0.5 to 2.2 cm in length. Flowers are solitary or sometimes grouped in cymes of 2 to 4; flowers are 10 to 12 mm long; the calyx is 6 to 7 mm long with 5 spatulate lobes; the corolla is light green-yellow, 7 to 9 mm long, with 5 elliptical lobes 3 to 4 mm long and spur-like extensions 6 to 8 mm long.

Similar species *Halenia minima* is larger (ranging from 10 to 15 cm, compared to 4 to 8 cm for *H. serpyllifolia*). Its leaves are lanceolate to elliptical and measure between 0.8 and 2 cm, while *H. Serpyllifolia* has elliptical to ovate leaves that measure between 0.5 and 0.8 cm in length. The flowers of *H. minima* measure between 1 and 1.2 cm, compared to 0.7 to 0.9 cm for *H. serpyllifolia*.

Distribution Endemic species, restricted to the *páramos* of the Cajas massif, between 3000 and 4500 m above sea level.

Ecology It inhabits humid areas and frequently grows in association with cushions of *Plantago rigida*; it can also be seen in swampy areas and on the edges of lagoons.

Uses Its flowers and leaves are used in infusion to cure diarrhea in children.

GENTIANACEAE

Geranium maniculatum H. E. Moore




Perennial herbs, 2–4 cm long, with a short vegetative stem. Leaves in a basal rosette, obovate in outline, up to 1.2 × 1.6 cm, deeply palmately divided into five segments, the largest being the central one; each segment lanceolate, with 1–3 apical bristles, the main vein raised on the underside, membranous, glabrous, shiny on the upper surface. Flowers solitary in the center of the rosette, on a short pedicel about 10 mm long, tomentose; sepals about 6 mm long, lanceolate, green; petals 5, about 8 mm long, oblong, erect-spreading, entire, glabrous, color ranging from white to pale pink with a greenish-yellow center, with five darker veins; stamens 10, anthers yellowish. Fruits about 8 mm long, erect, reddish-brown, with projecting seeds.

Similar species

Geranium sibbaldioides (for differences, see the *G. sibbaldioides* file in the Grassland chapter).

Distribution

In the Andes from Colombia to Peru. In Ecuador, it is found in the high-altitude zone, ranging from 3000 to 4500 m above sea level.

Ecology

It inhabits swamps and wetlands, where it grows preferably among and on pads of *Plantago rigida*. It prefers black soils with a high organic matter content. It flowers year-round.

JUNCACEAE

Distichia acicularis Balslev & Laegaard




Herbs forming loose cushions, up to 50 cm in diameter. Individual plants up to 15 cm long, branched, the proximal part covered with withered leaves, the distal part with 6-8 green leaves. Leaves divergent, up to 2 cm long, embracing each other by prominent sheaths, these bent in a U-shape, the margins scarious, continuing into two pointed auricles up to 3 mm long. Flowers solitary, axillary, dioecious; male flowers with stamens around 4 mm, female flowers with filiform style, around 5 mm, exserted.

Similar species

Distichia muscoides forms larger and more compact cushions than *D. acicularis*. The leaves of *D. muscoides* are thicker and wider, ending in a whitish point.

Distribution

Highlands of the western mountain ranges of central and southern Ecuador, between 3000 and 4500 m above sea level.

Ecology

It inhabits swamps, small watercourses, and the edges of lagoons; it grows in small cushions generally associated with mosses of the genus *Sphagnum*.

JUNCACEAE

Distichia muscoides Nees & Meyen





Very dense herbs that form cushions several meters in diameter. Individual plants can reach up to 15 cm in length and are branched. Leaves are distichous, straw-colored, and gradually wither along the stem, with only 2 or 3 green leaves emerging from the cushion. These leaves are folded and V-shaped, approximately 2 cm long, hard and shiny, with scaly margins, pointed apices, very short internodes, and overlapping leaves. Flowers solitary, axillary, dioecious, tepals about 5 mm, male flowers with stamens, about 3 mm, female flowers with filiform style. Fruit in capsule, approximately 6 mm in diameter, with a yellowish-brown color.

Distribution

In the Andes from Colombia to northern Argentina. In Ecuador, it grows in the highlands at elevations between 3,500 and 4,500 m above sea level.

Ecology

It inhabits flooded areas, forming dense cushions, frequently associated with *Oreobolus ecuadorensis*.

LYCOPODIACEAE

Phlegmariurus crassus var. ***manus-diaboli*** (B. Øllg.) B. Øllg.



Herbaceous plants up to 25 cm tall, solitary or in small groups; cylindrical stems, entire or digitately bifurcated, rooting at the basal nodes. Leaves spirally arranged, scale-like, elongated, up to 8 mm long, overlapping, rigid, orange-red, pink-red, or violet with green tones. The upper leaves bear the reproductive structures (sporangia) at the base; the sporangia are 2 mm long, kidney-shaped, and green to yellow in color.

Previously known under the genus *Huperzia*.

Similar species

This variety is easily distinguished from others by the red-violet or blue-violet color of its leaves and stems.

Distribution

The species *Phlegmariurus crassus* is widely distributed in Central and South America, from Mexico to Panama and from Venezuela to Bolivia across the Andes mountain range. The variety *Phlegmariurus crassus var. manus-diaboli* is restricted to the *páramos* of Ecuador between 3,500 and 4,450 m above sea level.

Ecology

It inhabits swamps and wetlands dominated by *Distichia acicularis* or *Plantago rigida*, growing scattered among the cushions or forming small clusters.

OROBANCHACEAE

Bartsia pedicularoides Benth.





Herbs up to 20 cm tall, with two types of stems: some grow erect, and others are decumbent at the base, slightly hairy; trichomes are sometimes more prominent at the leaf apex. Numerous basal stems are sterile, prostrate, with many small glabrous leaves, often erect, oblanceolate, narrowly petiolate, crenate-bullate in the upper half. Leaves on the flowering stem are 10–15 mm long, narrowly lanceolate with a rounded apex. Inflorescence with non-glandular hairs, the bracts leaf-like; pedicels 2.5–5.5 mm long; calyx 6–9 mm long, with pale green hispid hairs, lobes 2.3–4.2 mm long, ovate, rounded or obtuse, entire or sub-crenate, ciliate; corolla 6–8 mm long, cream, pink, or violet in color, densely puberulent on the lip. Dehiscent capsule 7.5–9 mm long; seeds 1 mm long.

Similar species *Bartsia stricta*, which differs in being a larger plant completely covered with hairy pubescence, while in *B. pedicularoides* the sterile stems and basal leaves are glabrous; the corolla of B. stricta is rarely white, whereas in *B. pedicularoides* it varies in color from cream to pink-violet or magenta.

Distribution In the Andes from Venezuela to Bolivia. In Ecuador, it occurs in the *páramos* between 3000 and 4500 m a.s.l.

Ecology It inhabits wetlands, associated with cushions of *Plantago rigida*, on which it is hemiparasitic.

OROBANCHACEAE

Castilleja nubigena Kunth



Perennial herbs up to 8 cm tall; stems erect-ascending. Leaves alternate, 1-2.5 cm, lanceolate to ovate, pinnately divided into narrow lobes, sessile, the margins entire. Inflorescences in short to elongated spikes or clusters; bracts often leafy underneath, often conspicuously colored and more showy than the flowers. Flowers markedly bilabiate; calyx tubular; corolla pale greenish, upper lip entire and narrowly galeate, enveloping the anthers; lower lip shorter and external to upper lip in bud; stamens 4, didynamous, attached almost or above the middle of the corolla tube. Fruit in a more or less asymmetrical, ovate or globose capsule; numerous seeds.

Similar species *Castilleja fisifolia* is a larger plant (10 to 30 cm tall), with several stems and racemose inflorescences, while *C. Nubigena* ranges from 5 to 12 cm in height; its inflorescence is arranged in spikes or very short, congested clusters. *Castilleja ecuadorensis* is about 20 cm tall; it has delicate stems and loose racemose inflorescences.

Distribution In the Andes from Venezuela to Peru. In Ecuador, it is widely distributed in the *páramos*, between 3000 and 4500 m above sea level.

Ecology It inhabits wetlands, associated with cushions of *Plantago rigida* and *Oreobolus ecuadorensis*; also in humid sites dominated by *Lachemilla orbiculata* and *Agrostis breviculmis*.

PLANTAGINACEAE

Plantago rigida Kunth





Very dense herbs that form large mounds, 1 m or more in diameter, with highly branched growth. Leaves in a rosette at the end of the branches, linear, up to 20 mm long, hard and shiny. Flowers solitary, greenish, tubular, with four sepals, ovate, about 7 mm long, the tubular corolla about 8 mm long, with four lobes about 3 mm long. Fruit ina capsule, the lower part of which during ripening transforms into a tubular carpophore up to 20 mm long.

Similar species

Plantago tubulosa is a related species, but its leaves are soft and toothed, while in P. rigida the leaves are very hard, with entire margins and spiny at the apex.

Distribution

In the Andes from Colombia to Bolivia. In Ecuador, it is distributed in the *páramos* between 3000 and 5000 m above sea level.

Ecology

It is a characteristic species that forms robust cushions in humid *páramos*. In the CNP, it grows mainly in valleys, marshes, and lagoon edges, where it is the dominant species. In some places, it shares its habitat with other cushion species such as *Distichia muscoides*, *Distichia acicularis*, and *Oreobolus ecuadorensis*.

PLANTAGINACEAE

Plantago tubulosa Decne.



Rosette herbs with thick rhizomes. Linear, narrow leaves up to 5 cm long, with sparsely toothed margins, expanded base, and dense hairiness. Flowers solitary, greenish, tubular, pedicels hairy, with four sepals, ovate, about 8 mm, corolla tubular, 8-12 mm, with four lobes about 1.5 mm long. Fruit in a capsule, the lower part of which during ripening transforms into a tubular carpophore up to 50 mm long.

Similar species

See *Plantago rigida*.

Distribution

From Mexico to northwestern Argentina. In Ecuador, it is distributed in the Andes between 2500 and 5000 m above sea level.

Ecology

It is a semi-aquatic plant that grows preferentially in flooded areas or on the edges of lagoons, as well as in wetlands dominated by *Plantago rigida*.

POACEAE

Agrostis breviculmis Hitchc.

Dense tufts, erect culms, 3–8 cm long; basal leaves folded along the midrib, 1.5–3.5 × 0.5 cm; membranous ligule. Spike-like panicles, 1-3 cm long, the spikelets purple, 2 mm long, with one floret, glumes equal, completely covering the floret, with rough trichomes on the dorsal side, the lemma membranous, elliptical, 1.4 mm long, palea absent.

Similar species

It is easily recognized by its thin, dense spikes of creamy green with purple hues.

Distribution

From Venezuela to Chile and Argentina. In Ecuador, it is distributed in the Andean region between 3000 and 4500 m above sea level.

Ecology

It is a species that adapts to various environments. It is common in wetlands dominated by Plantago rigida and in disturbed grasslands, where it grows in pastures alongside species such as *Lachemilla orbiculata* and *Poa annua*; it has also been recorded on rocky sites.



POACEAE

Calamagrostis fibrovaginata Lægaard





Soft tillers, 20–30 cm long; short rhizomes; fibrous sheaths enveloping the base of the tiller, membranous ligule. Basal leaves, folded along the main vein, 6-12 cm long, glabrous. Compact, dense panicles, 4-6 cm long; straw-colored, fusiform spikelets, 5 mm long; elliptical-lanceolate glumes, sub-equal, completely covering the floret, the first glume 5 mm long, the second glume 4.6 mm long, the membranous lemma 2.3 mm long with three apical teeth and a geniculate dorsal awn 3.5 mm long, the floret callus bearded with short and long white trichomes.

Similar species

Agrostis tolucensis is a very similar species, but it can be differentiated in the field because the base of the clumps of *Calamagrostis fibrovaginata* has remains of black fibrous pods, while *A. Tolucensis* has whole whitish pods. The leaves of *A. tolucensis* are also smooth and flattened, and the panicles are whitish-purple, while *C. Fibrovaginata* has leaves folded in half and straw-white inflorescences.

Distribution

In the Andes from Venezuela to Peru. In Ecuador, it is distributed in the *páramos* between 3000 and 4500 m above sea level.

Ecology

It inhabits open, humid sites, sometimes among cushions of *Plantago rigida* or *Distichia acicularis*; it is also common on the banks of small watercourses and on the edges of lagoons.



POACEAE

Cortaderia sericantha (Steud.) Hitchc.





Robust clumps 30–50 cm tall; basal leaves with fibrous sheaths enveloping the base of the stems and covered at the apex by a dense mass of long, white trichomes, which also cover the base of the lamina; culms simple, erect, with a row of bearded trichomes below the nodes. Leaves involute, 5-20 cm × 2-3 mm, the margins scabrous. Panicles contracted, elliptical, 4-10 × 2-3 cm, with short branches and covered by long and short white trichomes. Spikelets laterally compressed with 2 to 3 florets; glumes 3-veined, lanceolate, cream-colored, 2.4 cm long, completely covering the florets; lemma narrowly lanceolate, 6 mm long, with a bifid apex and a 5 mm apical awn, originating in the middle of the lobes; paleus lanceolate, 5 mm long, with two ciliate lateral keels; callus covered with white trichomes, 4-5 mm long.

Similar species *Cortaderia bífida Pilg.* is a larger species and generally has remnants of twisted sheaths at the base of the clumps.

Distribution In the Andes from Colombia to Peru. In Ecuador, it is distributed in the páramos between 3,300 and 4,300 m a.s.l.

Ecology It inhabits wetlands, lake shores, and, less frequently, wet grasslands. It grows in small clusters or in scattered clumps on the shores of lakes and streams.

POACEAE

Festuca parciflora Swallen subsp. parcifora





Thin tillers, 25–40 cm tall, with short rhizomes; culms slightly scabrous, 0.4–0.5 mm in diameter. Basal leaves, sheaths membranous; ligule membranous, 0.8 mm long; blade conduplicate, 6–15 × 0.4 cm, mostly glabrous. Panicles contracted, 3–8 cm × 3–4 mm, rachis rough; spikelets lanceolate, purple, 0.6–0.7 mm long, with 2–3 florets; glumes persistent, membranous, purple or white when mature, lower glume lanceolate, 2.4–2.6 mm long, the upper glume ovate, about 3 mm long; lemma membranous, 6 mm long with a 1 mm long apical awn; palea 0.5 mm long, lanceolate with winged margin, densely hairy.

Similar species *Calamagrostis fibrovaginata*, has dense, white panicles, while *Festuca parciflora* has very thin, spaced-out panicles that are bright purple in color.

Distribution *Festucaparciflora* is endemic to the southern Andes of Ecuador, specifically in the *páramos* of the provinces of Azuay and Loja, between 3,600 and 4,200 m above sea level. The subspecies *Festuca parciflora* subsp. *parciflora* is restricted to the *páramos* of the Cajas massif between 3500 and 4000 m above sea level.

Ecology It prefers to live in wetlands dominated by Plantago rigida, but also on the edges of wet grasslands, sharing its habitat with *Calamagrostis fibrovaginata* and *Agrostis toluc*.

POACEAE

Chusquea villosa (L. G. Clark) L. G. Clark





Dwarf bamboos 0.3 to 1.5 m tall, growing in dense clumps; hollow cylindrical stems, purple in color, 30 to 120 cm tall, with internodes 1.5 to 3 cm long. Leaves elongated, up to 20 cm long, hard and covered with long, silky white trichomes; margins are extremely sharp. Terminal inflorescences, arranged between the leaves or taller than them, are light brown in color; the axis is hairy and has numerous spikelets, each with several flowers (floscules). Flowers inconspicuous and hard, up to 4 mm long; persistent ovate glumes 1 to 2 mm long.

Distribution

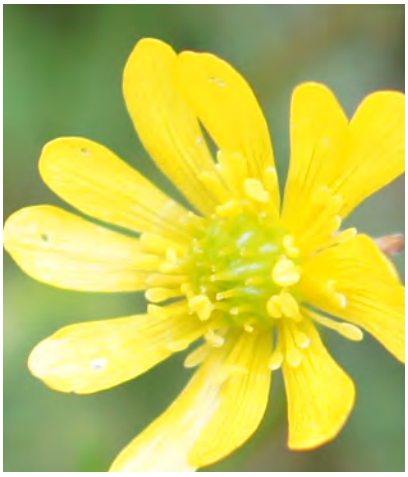
Endemic to the *páramos* of southern Ecuador between 3,200 and 4,500 m above sea level.

Ecology

It inhabits humid *páramos*, generally growing in clusters in small valleys and waterlogged areas, associated with species such as *Puya clava-herculis* and *Loricaria azuayensis*. It is also found, although less frequently, on the edges of *Polylepis* forests.

RANUNCULACEAE

Ranunculus peruvianus Pers.





Terrestrial herbs, sometimes semi-aquatic, up to 10 cm tall. Two types of leaves: those at the base are up to 1 cm long, with long, thin petioles up to 5 cm long and kidney-shaped blades with crenate margins; the others are alternate on the stem and deeply divided. Flowers are solitary and terminal, measuring up to 15 mm in diameter, with five spatulate petals that are lemon yellow in color and shiny; numerous yellow pistils are present. The fruit is a cluster of small, dry fruits, each measuring approximately 1 mm in length.

Distribution

In the Andes from southern Colombia to Peru. In Ecuador, it is distributed in the *páramos* between 2,700 and 4,500 m above sea level.

Ecology

It inhabits humid environments. In the CNP, it is common in wetlands dominated by *Plantago rigida*, as well as on the edges of lagoons and in sites flooded with surface water.

RUBIACEAE

Nertera granadensis (Mutis ex L. f.) Druce





Prostrate herbs, sometimes forming scattered mats, rooting at the nodes; herbaceous stems; stipules sheathing at the base, interpetiolar, broadly triangular, entire or bidentate. Leaves opposite, spatulate to broadly ovate, up to 8 mm long, somewhat fleshy. Inflorescences of solitary flowers are terminal. Flowers 4-merous; calyx extremely reduced; corolla campanulate, cream-white to greenish-white, lobes patent, narrowly ovate; anthers elongated, exserted; style 2-lobed, exserted; fruit a drupe, fleshy, globose, up to 8 mm in diameter, orange or red.

Distribution

It has a transcontinental distribution, including New Zealand, western Australia, Indonesia, Malaysia, Papua New Guinea, the Philippines, and Taiwan. In America, it is distributed from Costa Rica to Argentina and Chile. In Ecuador, it is distributed in the Andes mountain range between 2000 and 4500 m above sea level.

Ecology

It is a creeping species that inhabits swamps, peat bogs, and cushions. It needs permanent water or submerged roots to grow, although it can withstand short periods of drought.

VIOLACEAE

Viola pygmaea Juss. ex Poir.




Herbs up to 2 cm tall, in small or solitary cushions. Leaves in a rosette at the base, linear to lanceolate, up to 1.5 cm long, thick, entire, with a sharp apex. Small flowers, 10 mm in diameter, solitary among the leaves, white with a purple spot in the center; the ventral petal is larger, with a spur, white with purple stripes and a yellow center. Fruit in capsule, about 8 mm long, ovoid, dark purple.

Similar species

Viola bangii is a very similar species, but can be distinguished by its oblong-lanceolate leaves with densely ciliate margins and generally smaller flowers (8 mm diameter) compared to the linear-lanceolate leaves with sparsely ciliate margins and 10 mm diameter flowers of *V. pygmaea*.

Distribution

In the Andes from Ecuador to Bolivia. In Ecuador, it is distributed in the southern *páramos,* between 3000 and 4500 m above sea level.

Ecology

It inhabits wetlands and humid grasslands. In wetlands, it grows in small, low cushions associated with *Plantago rigida*.



POLYLEPIS FORESTS

Polylepis forests (also known as *quinuales* or paper forests) play a crucial role in regulating water in the *páramo*, thanks to the large amount of moss that forms "carpets" on the ground and trees, capable of storing significant amounts of water.

Their high specificity and biological diversity characterize the forest fragments. They are concentrated in very small areas, above 3000 meters above sea level.

It is a key habitat for many animals. Some birds depend entirely on this ecosystem.

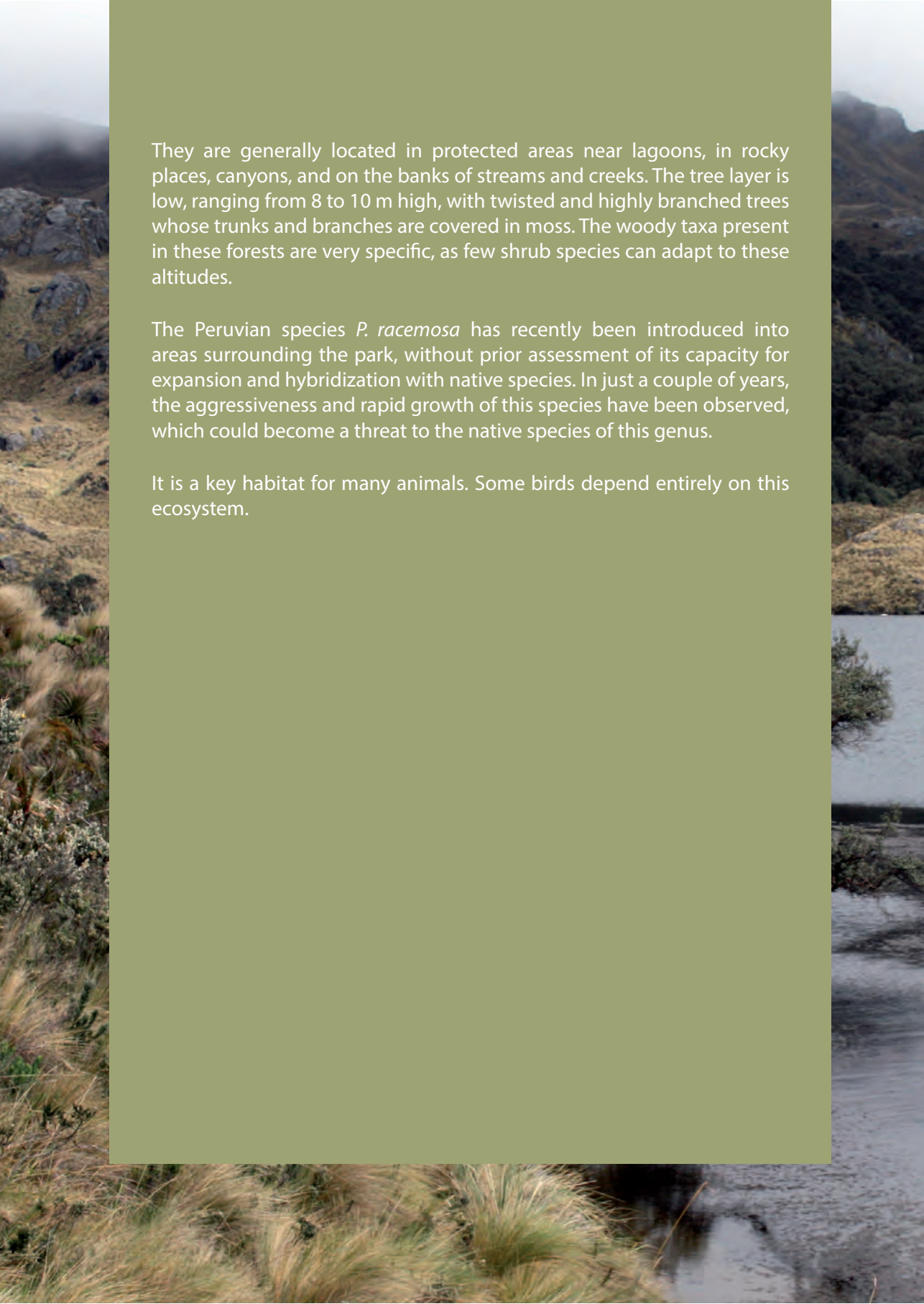
One of the most important areas for diversifying the *Polylepis* genus is Cajas National Park, where four of the seven species recorded in Ecuador are found. The species present are:

- *P. reticulata*, the most common in the park, is distributed mainly in the sub-basins of the Tomebamba and Taitachugo rivers, at elevations ranging from 3,300 to 3,800 meters above sea level.

- *P. lanuginosa*, found only on the western slope of the park, both inside and outside its boundaries, in the areas of Angas, Yacutubiana, and Río Blanco. It is an endemic species.

- *P. incana*, whose groves are found in the northern part of the CNP, near watercourses.

- *P. simpsoniae*, present only in the southeastern part of the CNP, is a species with a limited distribution in this area.



They are generally located in protected areas near lagoons, in rocky places, canyons, and on the banks of streams and creeks. The tree layer is low, ranging from 8 to 10 m high, with twisted and highly branched trees whose trunks and branches are covered in moss. The woody taxa present in these forests are very specific, as few shrub species can adapt to these altitudes.

The Peruvian species *P. racemosa* has recently been introduced into areas surrounding the park, without prior assessment of its capacity for expansion and hybridization with native species. In just a couple of years, the aggressiveness and rapid growth of this species have been observed, which could become a threat to the native species of this genus.

It is a key habitat for many animals. Some birds depend entirely on this ecosystem.

ASTERACEAE

Diplostephium hartwegii Hieron.; N.v.: "Contrahierba".




Shrubs or trees up to 8 m tall and 12 cm in DBH, abundantly branched, with elongated infertile branches and short branches with solitary terminal capitula, covered with woolly pubescence on the twigs and underside of the leaves. Leaves subsessile, arranged in a spiral, elliptical to linear blade 3 to 8 mm long by 1 to 3 mm wide, glossy upper surface, woolly tomentose underside, margin folded downwards. Inflorescences in terminal capitula 1.2 cm long by 1 cm in diameter; campanulate involucre with five series of phyllaries, outer phyllaries ovate, 3 mm long by 1.5 mm wide, inner phyllaries linear, 5 mm long by 1 mm wide. Irregular marginal flowers (about 12 per capitulum) with a light lilac ligule 12 mm long. Central flowers tubular, light yellow, with 5 lobes. Fruit, a hairy achene with a crown of reddish bristles.

Similar species

See *Diplostephium oblanceolatum* in the chapter on grasslands.

Distribution

Southern Andes of Colombia and Ecuador, between 2,500 and 4,500 m above sea level.

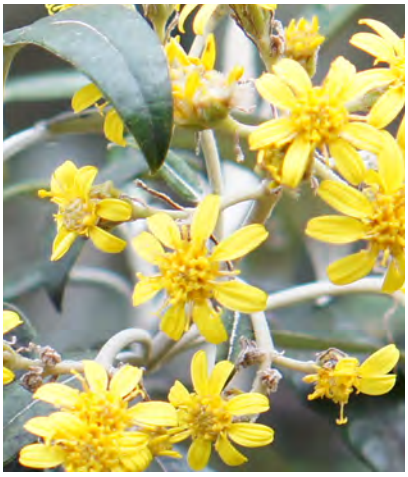
Ecology

It inhabits high Andean forests and *páramos*. In the CNP, it is found in *Polylepis* forests and *Gynoxys scrub*, generally on shallow soils.

ASTERACEAE

Gynoxys multibracteifera H.Rob. & Cuatrec.





Shrubs or small trees up to 5 m tall, covered with a dense layer of whitish-gray trichomes. Leaves are opposite, lanceolate, and up to 10 cm long. Inflorescences consist of several flower heads, each up to 1.5 cm in diameter. There are two types of flowers: the outer ones (approximately 8) are irregular, with a showy ligule up to 13 mm long and bright yellow; the inner ones (approximately 18) are tubular with five teeth, also yellow. Fruit bears a crown of rough trichomes, up to 15 mm long, straw-white colored.

Similar species

Gynoxys multibracteifera H.Rob. & Cuatrec. has oblong-ovate leaves and linear subinvolucral bracts 5 to 7 mm long.

Distribution

Southern Andes of Ecuador, Azuay province, between 3000 and 4500 m a.s.l.

Ecology

It inhabits shrub and grass páramos. In the Cajas National Park, it is found at the edges of *Polylepis forests*, where it forms shrublands and becomes the dominant species; it occasionally grows in open grassy highlands.

Uses

Used in rustic construction and as forage for guinea pigs.



ASTERACEAE

Gynoxys buxifolia (Kunth) Cass.; N.v.: "Tucshi".





Shrubs up to 5 m tall. Irregular crown, opposite branching; whitish foliage with bright yellow inflorescences. Leaves are simple, opposite, with stipules, borne on a short petiole up to 1.6 mm long, puberulent and silvery-whitish in color; the upper surface is glossy dark green, the underside whitish and puberulent. Inflorescences are paniculate-corymbose, 5-7.5 cm long. Flowers are grouped in heterogamous heads ranging from radiate to discoid; each head contains about 18 flowers: 8 marginal ligulate flowers with a three-toothed bright yellow ligule, and 10 disk flowers with a tubular corolla divided into five lobes at the apex. Fruit is a small, dark brown achene with a straw-white colored pappus.

Similar species

Gynoxys miniphylla usually has smaller, ovate leaves, while *G. buxifolia* has oblong-elliptic leaves.

Distribution Colombia, Ecuador, and Peru. It is widely distributed in the Ecuadorian Andes.

Ecology In Cajas National Park, it is associated with Polylepis forests, ravines, and *Chuquiraga* shrublands.

Uses Its leaves are used as forage for sheep and guinea pigs.



BERBERIDACEAE

Berberis lutea Ruiz & Pav.; N.v.: "Shuspilla", "espuela casha", "quillo caspi".





Shrubs up to 3 m tall, with yellow wood. Leaves are alternate, clustered, and up to 2 cm long. They are glossy on the upper surface and lighter underneath, with a spiny tip and entire, reddish margins. Flowers are solitary or arranged in umbels of 3, pendulous, about 10 mm in diameter, bright yellow, tinged with pink or reddish on the outside. Fruits are subglobose, fleshy, up to 8 mm long, green at first, then reddish, and finally dark purple-black.

Similar species

The two described species are similar, sharing habitats and locally having the same common name. They are mainly distinguished by their leaves and inflorescences: *B. lutea* has smaller leaves with entire margins and generally solitary flowers; *B. rigida* has larger leaves with spiny margins and flowers arranged in clusters.

Distribution

From Colombia to Bolivia.

Ecology

Found at the edges of *Polylepis* forests and also in grass páramos.

Uses

Its fruits are edible; the wood is used for making tool handles. In the past, the yellow wood was used for dyeing fibers.

BERBERIDACEAE

Berberis rigida Hieron.; N.v.: "Shuspilla", "espuela casha", "quillo caspi".




Spiny shrubs, up to 3 m tall, with yellow wood. Leaves are alternate, clustered, and up to 3 cm long. They are glossy on the upper surface and greenish-white underneath, with yellowish veins on the upper surface, a spiny tip, and spiny margins. Inflorescences are hanging racemes, 5–8 cm long, with a dark pink rachis and pedicels. Flowers are bright yellow, tinged with pink or reddish on the outside, about 10 mm in diameter, with petaloid tepals. Fruits are subglobose, fleshy, up to 8 mm long, green at first, then reddish, and finally dark purple-black.

Distribution

Colombia and Ecuador; many herbarium collections come from the Azuay region.

Ecology

Like *B. lutea*, it is found along the edges of *Polylepis* forests and in grasslands.

Uses

Its fruits are edible. The wood is used to make tool handles. In the past, the yellow wood was used for dyeing fibers.

BRASSICACEAE

Cardamine jamesonii Hook.



Delicate herbs, up to 45 cm tall. Alternate leaves, those at the base are divided into three more or less rounded segments, up to 1.5 cm long. Those on the stem are divided into up to 9 elongated segments, up to 1 cm long, with a purple underside. Inflorescence at the end of the stem, arranged in clusters of a few flowers. Flowers up to 10 mm long; 4 petals, somewhat overlapping, pink to purple in color; purple-brown calyx. Linear fruits, which curl into a spiral when the valves open.

Distribution

The Andes of northern South America and Bolivia. In Ecuador, it is found in the Andean region between 2,500 and 4,500 m above sea level.

Ecology

It inhabits humid sites and under the shrub or forest canopy. In the CNP, it grows mainly in *Polylepis* reticulata forest, associated with mosses and ferns.

CAPRIFOLIACEAE

Valeriana hirtella Kunth; N.v.: "Romero sacha".



Shrubs up to 5 m tall. Stems and branches are quadrangular, up to 10 cm in diameter. Simple cauline leaves, clustered towards the apical parts of the branches, linear to elliptical, 1-6 × 0.2-0.8 cm, subcoriaceous; petioles 2-5 mm long. Panicle inflorescence, 2–23 × 1.5–17 cm. Flowers dioecious; corolla funnel-shaped, 1.5–2 mm long, usually white, occasionally tinged with purple. Fruit is a glabrous, elliptical achene, 1–1.5 mm long, with a white pappus 2–4 mm long.

Similar species

V. microphylla is shorter and has leaves 0.5 to 2 cm long.

Distribution

The Andes of Ecuador and Perú.

Ecology

It is a common species that grows on the margins of *Polylepis* remnants, although it is more abundant in the transition zone between montane forest and *páramo*.

Uses

An infusion made from the bark of the root and stem is used to calm nervous agitation and anxiety.

CAPRIFOLIACEAE

Valeriana plantaginea Kunth; N.v.: "Valeriana".




Large herbs, up to 1.5 m tall, fetid. Leaves in a basal rosette, lanceolate-spatulate, up to 45 cm long, thick and shiny on the upper surface, dull on the underside, with warty margins and a dilated base at the petiole. Inflorescence tall, up to 80 cm, with erect branches, with numerous flowers, the flowers bell-shaped, about 5 mm long, with five short lobes, white with purple tinges; stamens 3. Fruit in achene about 2 mm, lunate in cross-section, crowned by a feathery pappus, about 4 mm.

Similar species

Valeriana pilosa Ruiz & Pav., is a species that grows in areas surrounding Cajas on the margins of ditches and ravines. It is larger and has narrower leaves.

Distribution

From Venezuela to Peru. In Ecuador, it is distributed throughout the Andean region between 2,500 and 4,500 m above sea level.

Ecology

It inhabits forests and open *páramos*, preferably in well-drained soils. In the CNP, it primarily grows in association with Polylepis forests, in clearings, and along edges.



CARYOPHYLLACEAE

Stellaria recurvata Willd. ex D.F.K. Schltdl.; N.v. "Hierba del rocío".



Perennial, ascending herbs, up to 1 m long, with pubescent stems. Leaves are opposite, short-petiolate, triangular, and cordate at the base. Flowers very conspicuous, up to 15 mm in diameter, long-pedicellate; calyx green; petals five deeply bipartite, longer than the sepals, white; stamens yellowish-brown.

Distribution

Endemic to the Ecuadorian Andes. It is distributed from 2500 to 4500 m above sea level.

Ecology

In the CNP, it grows on the edge of the *Polylepis* forest, entangled with shrubs; it is also found in the grasslands.

DRYOPTERIDACEAE

Elaphoglossum lingua (C. Presl) Brack.




Terrestrial ferns, sometimes epiphytes growing on Polylepis trunks, with long rhizomes and growing up to 40 cm tall. Oblong-elliptical leaves, rigid, with conspicuous midrib, densely tomentose upper surface, parallel veins; thin, glossy petiole. Acrosticoid sori ferruginous brown in color. Brown spores.

Elaphoglossum lingua is recognized by its long, creeping rhizomes covered with small black scales.

Distribution

From Costa Rica to Bolivia. Widely distributed in Ecuador, between 500 and 4000 m above sea level.

Ecology

In the CNP, it is associated with *Polylepis* forests, growing abundantly in the understory.

Uses

The root is boiled and used to treat stomach pain.

ESCALLONIACEAE

Escallonia myrtilloides L. f.; N.v.: "Chachaco".





Shrubs or small trees up to 5 m tall. Leaves alternate, obovate-spatulate, up to 2.5 cm long, leathery; margins serrate, with tiny glands. Flowers solitary, pendulous, 10-15 mm long; calyx with five deep lobes, about 5 mm, light green; corolla urceolate, petals 5, long spatulate, revolute, deciduous, yellowish green or greenish cream; stigma large, clavate. Fruit in dry capsule, about 10 mm, eventually dehiscent.

Distribution

From Costa Rica to Argentina. In Ecuador, it is distributed in the Andean region between 2400 and 4100 m above sea level.

Ecology

It inhabits humid forests and *páramos*. Two varieties have been recorded in Ecuador

E. myrtilloides var. myrtilloides and *E. myrtilloides var. patens* (Romoleroux & Freire Fierro, 2004). In the CNP, the *myrtilloides* variety is found growing in Polylepis forests and rocky sites associated with *Gynoxys* and *Chuquiraga* shrubs.

Uses

Its flowers are used in infusions for body aches.

GROSSULARIACEAE

Ribes lehmannii Jancz.




Shrubs up to 1 m tall, covered with trichomes. Leaves alternate, up to 2.5 cm long; margins are crenate-lobed. The inflorescence is in the form of hanging clusters. Flowers up to 10 mm long, with a cup-shaped base, tubular and with five triangular lobes, salmon-pink in color with a yellow interior. Fleshy fruits, orange-yellow in color.

Similar species

In its vegetative state, it can be confused with *Ribes erectum* Freire-Fierro, but the latter has elliptical leaves, whereas *R. lehmannii* has obovate leaves.

Distribution

It is endemic to Ecuador, from 2,800 to 4,200 m above sea level.

Ecology

In the CNP, it is found among grasslands, in *Polylepis* forests, and less frequently in rocky areas. It is considered an endangered species.

MELASTOMATACEAE

Brachyotum alpinum Cogn.





Shrubs or small trees up to 8 m tall and 18 cm in DBH; exfoliating grayish-white stem, rounded crown with sparse foliage, reddish-pink branches with whitish trichomes. Opposite leaves, ovate to lanceolate, up to 1.5 cm long, trinerved, with coarse whitish pubescence, short reddish petiole. Ternate inflorescences with three hanging flowers. Flowers 4-merous, pedicellate; calyx pinkish-green, 4-lobed; corolla purple, with four overlapping petals forming a false tube, style pink. Fruit, a dry capsule with the remains of the calyx lobes, containing numerous seeds.

Similar species

Brachyotum jamesonii Triana is a smaller shrub. The leaves of *B. alpinum* are ovate-lanceolate, while those of *B. jamesonii* are lanceolate-elliptical.

Distribution

Highlands of Ecuador, between 2,900 and 4,500 m above sea level.

Ecology

It inhabits *sub-páramos* and humid *páramos*. In the CNP, it is a rare species that grows in association with *Polylepis* reticulata forests in rocky areas. It is abundant in an area near *Guabidula* at 3,700 m.

MELASTOMATACEAE

Miconia chionophila Naudin




Small shrubs with prostrate, creeping stems, with glandular hairs on the twigs and leaves. Opposite leaves, ovate to oblong-elliptic, up to 1.5 × 1.5 cm, ciliate margins, veined, glossy green upper surface, petiole up to 10 mm, reddish. Flowers solitary or in groups of 3, usually found below the branches, up to 15 mm in diameter, cup-shaped (hypanthium); 4 petals, four stamens, creamy white in color; large, disc-shaped stigma. Fruit is a fleshy berry, about 10 mm in diameter, green turning dark purple when ripe.

Distribution

The Andes from Venezuela to Bolivia. In Ecuador, it is distributed in the Andean region between 3,500 and 4,500 m above sea level.

Ecology

It inhabits humid *páramos* and *sub-páramos*. In the CNP, it grows under the shrub or tree canopy, in *Gynoxys* and *Loricaria* thickets, and in *Polylepis* forests. It also grows in well-preserved grasslands.

MELASTOMATACEAE

Miconia salicifolia Naudin





Shrubs up to 4 m tall, columnar in shape, with densely branched stems and tightly packed branches; twigs, underside of leaves, and flowers covered with yellowish to reddish-brown trichomes. Opposite leaves up to 3 cm long, lanceolate to elliptical-oblong, narrow, with margins rolled downward. Inflorescence 1 to 2 cm long, with few flowers. Flowers up to 5 mm long, urceolate, light pink to greenish with creamy white petals; pink stamens; large, clavate stigma. Fruits are rounded and fleshy, up to 6 mm in diameter, bluish green, and finally purple.

Ecology

It inhabits high Andean forests and *páramos*. In the CNP, it grows in *Polylepis* forests and *Gynoxys* thickets; it is uncommon in open grasslands.

PLANTAGINACEAE

Sibthorpia repens (L.) Kuntze





Tiny prostrate herbs. Leaves alternate, 0.5–2 × 0.5–2.5 cm, entire, orbicular-reniform, deeply cordate, the margins with rounded lobes, the underside lilac-colored, with ascending white trichomes, long-petiolate. Axillary inflorescences of solitary flowers, long pedicellate. Slightly bilabiate reddish-lilac flowers, up to 3 mm long; 4 equal stamens emerging from the base of the corolla, anthers with parallel and contiguous thecae at the apex.

Distribution

Mountainous regions of Mexico, Central America, and the South American Andes between 3000 and 4550 m.

Ecology

It grows in stolon form under *Polylepis* tree trunks; it is also found in grasslands. Shade-tolerant species.

ROSACEAE

Polylepis incana Kunth; N.v.: "Quinua"**.**





Shrubs or trees up to 12 m tall, with twisted trunks and orange-colored bark that peels off in thin, paper-like sheets. Compound leaves, up to 2 cm long, are lanceolate or oblong in shape and grow in clusters at the tips of the branches. They are covered with short, sparse trichomes and have a smooth upper surface. Inflorescences in simple clusters up to 8 cm with 4 to 7 flowers. Flowers are about 6 mm long and greenish. Fruit in dehiscent achene 3-5 × 1.5-3 mm. Seeds 2-3 mm long.

Similar species

Polylepis racemosa Ruiz & Pav., an introduced species native to Peru, differs in that the leaflets of *P. racemosa* are larger (2.5 to 4 cm long in *P. racemosa* vs. 1 to 2 cm in *P. incan*a) and the underside of the leaves of *P. racemosa* is hairy, while in *P. incana* it is yellowish and papery.

Distribution

The Andes from northern Ecuador to southern Peru and Bolivia.

Ecology

In the CNP, it is mainly found in deep valleys and constitutes ecosystems associated with the banks and slopes of high basins, and is restricted to the northern and western sectors of the Cajas massif, above an altitude of 3000 m.



ROSACEAE

Polylepis lanuginosa Kunth; N.v.: "Quinua colorada".





Trees or shrubs up to 8 m tall; trunks are twisted and have orange-colored bark that peels off in thin, paper-like sheets. Petiole 0.5–1 cm long. Leaves 3-6.5 × 3-5.5 cm with 2-4 pairs of leaflets; elliptical leaflets 1.6-3.3 × 0.7-1.8 cm, glabrous on the upper surface and covered with whitish-yellowish trichomes on the underside, rachis with sericeous internodes. Inflorescences in hanging clusters, branched at the base, 5–15 cm long with 10–20 flowers; floral bracts 5–12 mm long, villous. Flowers 5–8 mm long, greenish; sepals ovate or elliptical; stamens 9–24, anthers woolly, mainly at the apex; style hairy at the base. Fruit fusiform, 3–6 × 4–8 mm; seeds 2–3 mm long.

Polylepis lanuginosa is easily recognized by its abundant ferruginous woolly pubescence, concentrated on the underside of its leaves and the base of its twigs.

Distribution

Central and southern Andes of Ecuador. In the provinces of Azuay, Bolívar, Cañar, and Chimborazo, between 2,700 and 3,800 m above sea level.

Ecology

In the CNP, it prefers to inhabit the forest-*páramo* ecotone, where it forms a strip of forest in which it is the dominant species, associated with species such as *Gynoxys baccharoides*, *Oreocallis grandiflora*, *Myrsine dependens*, and *Maytenus verticillata*. It flowers between March and July. It is a pioneer and colonizing species of the *páramo*, resistant to drought and very intense winds.



ROSACEAE

Polylepis reticulata Hieron.; N.v.: "Quinua".





Shrubs or trees up to 12 m tall; twisted trunks. They have orange-colored bark that peels off in thin, paper-like sheets. Leaves and flowers are often covered with trichomes. Leaves are alternate, growing in clusters at the tips of the branches, consisting of 3 leaflets that are up to 2.5 cm long. They have dense hairs on the underside and a smooth upper surface. Inflorescences in inconspicuous hanging clusters, up to 8 cm long. Flowers about 5 mm, greenish.

Similar species

Polylepis simpsoniae is a species related to *P. reticulata*, and can even form hybrids. In the field, it can be distinguished by the olive-green color of *P. simpsoniae*, resulting from the sericeous pubescence covering its young leaves, as opposed to the dark green color of *P. reticulata*.

Distribution

The Andes of Ecuador and northern Peru. In Ecuador, it is distributed in *páramos* between 3,200 and 4,500 m above sea level.

Ecology

It is common on the eastern slope of the CNP and forms remnant forest patches in the *páramo*. These forests may have covered larger areas in the past, but due to the impact of burning and grazing, they are now reduced. However, in the CNP, it is the most abundant and common of the four species of Polylepis recorded in the area.

ROSACEAE

Polylepis simpsoniae T.Boza & M.Kessler




Trees or shrubs up to 6 m tall; stipular sheath mainly at the apex. Leaves clustered at the tips of the branches, 1.5–5 × 0.6–2.5 cm, with 2–4 pairs of leaflets; petiole 0.2–0.6 cm long; rachis with phelloid internodes or densely woolly. Folioles ovate, 0.7–1.5 cm long, the base cordate, the margins entire, revolute, the underside densely pappose, the upper surface hairy. Inflorescence in simple racemes 2–8 cm long with 4–10 flowers. Floral bracts 3–4 mm long. Flowers 4–6 mm long; stamens 8–16, anthers bearded; style hairy. Fruit turbinate, 3–5 × 3–4 mm; seeds 2–3 mm long.

Similar species

See *P. reticulata.*

Distribution

Restricted to the southern Andes of Ecuador, in the provinces of Azuay and Cañar, where it grows in moorlands between 2800 and 3800 m a.s.l.

Ecology

In CNP, it grows mainly on hillsides and stream banks, sometimes forming small groves with P. reticulata; it is very common in the Soldados community.

ROSACEAE

Rubus coriaceus Poir.; N.v.: "Pampa mora".





Very thorny, creeping subshrubs; reddish stems and veins on the underside. Alternate leaves, up to 7 cm long, ovate, thick, with serrated margins. Solitary flowers, up to 30 mm in diameter, bright pink in color; numerous stamens and pistils. Globular fruits, up to 15 mm in diameter, are formed by a cluster of many small fruits (drupes) measuring 3 mm each, which are fleshy and red in color.

Distribution

The Andes from Colombia to Peru. In Ecuador, it is distributed throughout the Andes, between 3000 and 4300 m above sea level.

Ecology

It inhabits subtropical and humid highlands. In the CNP, it is primarily found in Polylepis forests and in thickets of *Loricaria* and *Gynoxys*.

Uses

Its fruits are edible, and its leaves and flowers are used in poultices to treat fever and headaches.



SYMPLOCACEAE

Symplocos nana Brand



Shrubs up to 3 m tall, with tender shoots and glabrous twigs, smooth brown bark with prominent leaf scars. Leaves alternate, ovate or oblanceolate, 0.8–1.2 × 0.3-0.6 cm, leathery, glabrous, the margins crenate; petiole 1-2 mm long. Flowers solitary with short pedicel; corolla pink, glabrous, 5-7 mm long; stamens 35-40 in 3 whorls. Fruits cylindrical, 10.5-16 × 5.5-11 mm, glabrous, black when ripe.

Distribution

From Ecuador to Bolivia. In Ecuador, it has been recorded in Azuay, Loja, and Morona Santiago.

Ecology

A rare species in the CNP, it has been found in the Yantahuaico ravine, in the Río Blanco sector.

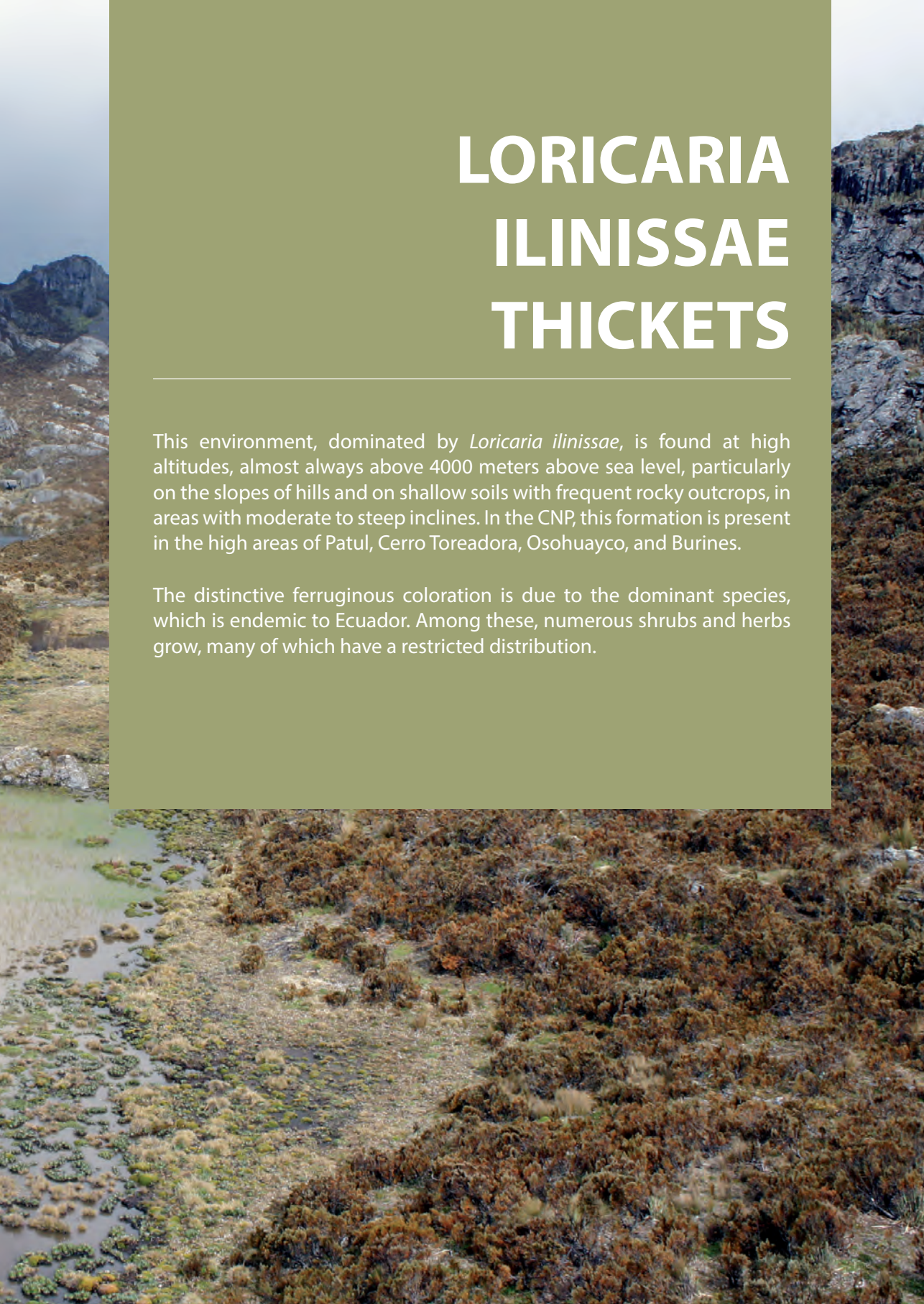




LORICARIA ILINISSAE THICKETS

This environment, dominated by *Loricaria ilinissae*, is found at high altitudes, almost always above 4000 meters above sea level, particularly on the slopes of hills and on shallow soils with frequent rocky outcrops, in areas with moderate to steep inclines. In the CNP, this formation is present in the high areas of Patul, Cerro Toreadora, Osohuayco, and Burines.

The distinctive ferruginous coloration is due to the dominant species, which is endemic to Ecuador. Among these, numerous shrubs and herbs grow, many of which have a restricted distribution.



APIACEAE

Niphogeton dissecta (Benth.) J. F. Macbr.; N.v.: "Zanahoria del monte"



Thin or dense herbs, caulescent, branched, up to 35 cm tall. Leaves alternate, 1–2 times pinnate, oblong to ovate, 1.5–8 cm long, leaflets up to 12 mm long, deeply lobed or pinnatifid, the last divisions linear, up to 6 mm; petioles 2–15 cm, sheathing at the base. Inflorescences in corymbose umbels, pedicel up to 6 cm; involucre with two bracts up to 35 mm long, lobed; rays 5–12, up to 30 mm long, flowers numerous, very small; petals 5, ovate, white. Fruits, mericarps about 4 mm, markedly 5-ribbed, with oil-secreting vesicles, the carpophore bifid.

Similar species

Niphogeton ternata is taller (up to 1 m); in *N. ternata*, the base of the stems is woody, while in *N. dissecta* it is herbaceous; the leaflets in *N. ternata* are obovate, entire to dentate, the last divisions dentate, while in *N. dissecta* they are deeply lobed or pinnatifid, with the previous divisions linear.

Distribution

Páramos from Venezuela to Bolivia. In Ecuador, it is found throughout the mountain range, above 3000 m a.s.l.; only in the province of Loja is it found at lower altitudes.

Ecology

It grows in steep, open sites on rocky soils.



APIACEAE

Niphogeton ternata (Willd. ex Schltr.) Mathias & Constance

Thin herbs, up to 1 m tall, scattered, branched, woody at the base. Leaves alternate, ovate to orbicular, up to 4.5 cm long, ternate-divided, leaflets obovate, about 3 mm, entire to dentate, last divisions dentate; petioles up to 10 cm, sheathing at the base. Inflorescences in umbels, peduncle up to 4 cm; involucre with 5–7 linear bracts, up to 20 mm long, lobed; rays 5–12, up to 30 mm long, patent to ascending; flowers numerous, very small; petals 5, ovate, white. Fruits, mericarps about 4 mm, markedly 5-ribbed, with oil-secreting vesicles, the carpophore bifid, the axes of the infructescences reddish-brown.

Similar species

See *N. dissecta*.

Distribution

From Venezuela to Ecuador, where it is found above 3000 meters above sea level.

Ecology

It prefers open areas with organic, flat, and moist soils. In the CNP, it has been recorded in the Osohuayco lagoon sector.



ASTERACEAE

Diplostephium rupestre (Kunth) Wedd.



Shrubs 1 to 2 m tall, poorly branched; terminal twigs covered with woolly pubescence. Leaves sessile, alternate, oblong-lanceolate, 3.5–4.5 × 0.3–0.5 cm, the margins revolute, the upper surface covered with long white trichomes, lower surface densely pubescent-woolly. Inflorescences in capitula grouped in thyrses, 4–4.5 × 4–4.5 cm. Heterogamous radiate capitula, campanulate involucre, with four series of phyllaries, outer phyllaries ovate-lanceolate, 4–5 × 1.5 to 1.6 mm wide, inner phyllaries oblong-lanceolate, 6–7 × 1.5–1.6 mm. Marginal flowers ligulate in 3 series, ligule white, 4 mm long, with three tiny apical teeth; central flowers staminate; corolla tubular-infundibuliform, yellow, 4.2 mm long. Achenes brown, 2–2.5 mm long, glandular; pappus of scabrous bristles.

Similar species

Diplostephium ericoides has smaller leaves, up to 0.5 cm long, while those of *D. rupestris* measure up to 4.5 cm. The marginal ligules in *D. ericoides* measure up to 8 mm in length, while in *D. rupestre*, they are 4 mm long.

Distribution Highlands of Colombia, Ecuador, and Peru, above 3000 m a.s.l.

Ecology

It grows on hilltops as scattered individuals among *Loricaria ilinissae* thickets. In the CNP, it has been recorded in the following sectors: Burines, Tres Cruces, and Cerro Toreadora.

ASTERACEAE

Loricaria ilinissae (Benth.) Cuatrec.





Shrubs 0.8 to 1.5 m tall. Cylindrical stems with gray outer bark. Alternate, dense branching forming an irregular to globose crown; terminal twigs laterally compressed, 0.3–0.4 cm wide. Leaves distichous, embracing the stems; triangular-concave, about 3 × 2 mm deep, the upper surface glabrous with resinous dots, the lower surface densely woolly pubescent. Terminal capitula discoid, involucre campanulate, with two rows of brown bracts; outer bracts 4 × 1.5 mm wide, inner bracts 5 × 1 mm wide, all bracts with irregular membranous margins. Flower heads 8–12 per capitulum; pistillate flower heads filiform, cream-yellow in color, staminate flower heads yellow, 5 mm long. Achenes ellipsoid, glabrous, 6 mm long including pappus bristles.

Distribution

Endemic to Ecuador, recorded from Carchi to Azuay. In the CNP, it is found in Patul, Cerro Toreadora, Tres Cruces, Osohuayco, and Burines, above 4000 m a.s.l.

Ecology

It grows on the highest ridges of hills, where it forms dense thickets, being the dominant species. Due to its thick foliage, it is an ideal refuge for other plant and animal species.



Loricaria ilinissae (Benth.) Cuatrec.

ASTERACEAE

Monticalia andicola (Turcz.) C. Jeffrey



Shrubs 1 to 2 m tall; cylindrical, knotty stems with open branching. Leaves alternate, oblong to elliptical, 1.8–4.2 × 0.8–1.6 cm wide, the margins serrated, the upper surface glabrous olive green, lower surface tomentose woolly, subsessile. Terminal inflorescences, corymbose. Homogamous disc capitula, 0.8–1 cm in diameter; convex receptacle with a row of 8 free, oblong phyllaries, 4–5 × 2 mm wide. Central florets with yellow tubular corolla, 4–5 mm long. Achenes with five ribs; pappus of scabrous bristles basally connate.

Distribution

From Costa Rica to Peru. In Ecuador it is found throughout the Andes mountain range. In the CNP, it has been recorded on Cerro Toreadora, Burines, and Tres Cruces.

Ecology

It grows in association with other shrub species, generally in thickets of *Loricaria ilinissae*. It is found on rocky soils and steep slopes.

ASTERACEAE

Senecio culcitioides Sch. Bip.



Rhizomatous herbs, 20 to 40 cm tall, growing in basal rosettes. Leaves elliptical to lanceolate, 10–25 × 0.5–0.8 cm wide; upper surface olive green, glabrous, lower surface white and woolly; petioles sheathing, widened, purple. Peduncle 15–40 cm long with whitish woolly pubescence. Calyx-bearing capitula, arranged in dichasial cymes, with a lateral bract 2.5–4.5 cm long. Capitula 1.5 cm in diameter, the involucre convex with a row of oblong-lanceolate phyllaries, 6–8 × 1.2–1.6 mm wide, purple, woolly, with translucent membranous margins. Florets are lemon yellow. Achenes obovoid with a row of silky bristles.

Distribution

From Ecuador to Bolivia.

Ecology

In the CNP, it grows in high, rocky places; it forms clusters in open areas. It is frequently found in Tres Cruces, on Cerro Amarillo, Patul, and Osohuayco.



DRYOPTERIDACEAE

Elaphoglossum lasioglottis Mickel

Rock ferns, creeping rhizome, densely scaly. Leaves with petioles articulated to filopodia are darker than the petioles. Linear lamina, densely scaly; scales different from those on the stem, translucent silver on the upper surface and translucent brown on the underside. Brown sori.

Distribution

From Colombia to Bolivia. In Ecuador, it has been recorded at altitudes above 3700 m a.s.l.

Ecology

In the CNP, it grows in rocky places, on steep slopes exposed to the wind, alongside *Loricaria ilinissae* and *Chuquiraga jussieui* shrubs.



ERICACEAE

Gaultheria amoena A. C. Sm.





Dwarf shrubs, often creeping, rarely up to 30 cm tall. Leaves alternate, elliptical to subrounded, up to 20 mm long, leathery, the margins serrated; petiole about 2 mm. Flowers solitary, pedicels 6–10 mm; calyx about 5 mm; corolla urceolate, about 7 mm long, with five lobes, light pink to dark pink; stamens 10. Fruit in capsule, 5-valved, surrounded by the fleshy tissue of the accrete calyx, giving the appearance of a berry, rounded, about 8 mm in diameter, white with reddish tinges.

Distribution

From Costa Rica to Perú.

Ecology

It grows among mosses, preferring sandy soils formed by rock erosion. It is protected by shrubs or grasses. The flowers are usually hidden among moss or other decomposing material.

Uses

The fruits are edible.

ERICACEAE

Vaccinium floribundum Kunth; N.v. "Mortiño





Shrubs up to 0.5 m tall, densely branched. Leaves alternate, lanceolate, up to 20 mm long, leathery, the margins serrated; petiole about 2 mm. Inflorescences in clusters of 6 to 10 flowers, up to 2 cm long. Flowers with short calyx, around 3 mm; cylindrical-urceolate corolla, 6–8 mm long, with 4 or 5 short teeth, white-pink to reddish; 10 stamens. Fruit is a rounded berry, around 8 mm in diameter, fleshy, black-blue in color, sometimes with a waxy coating.

Distribution

From Costa Rica to Peru. In Ecuador, it is found above 2700 m a.s.l.

Ecology

It grows among rocks. The flowers are visited by insects.

Uses

The fruits are edible, slightly sweet, and are used as an ingredient in colada morada for All Souls' Day (*Día de los Difuntos*).

GENTIANACEAE

Gentianella longibarbata (Gilg) Fabris



Herbs with loose stems, somewhat reclining at the base, somewhat woody, up to 0.5 m tall. Opposite leaves, spaced along the stems, lanceolate, up to 6 cm long, papery. Inflorescences with few flowers on slender pedicels up to 25 mm long, flowers up to 40 mm long; calyx up to 15 mm with five triangular lobes; corolla about 30 mm, bell-shaped or tubular in appearance due to the five somewhat overlapping petals, pendulous, yellowish-green or lemon yellow in color, sometimes with purple spots; 5 stamens.

Distribuion

A plant endemic to Cajas. It has been recorded above 3500 m a.s.l., although it is more abundant above 4000 m.

Ecology

It grows within Polylepis forests or in shrubby highlands. It is abundant in the thickets of *Loricaria ilinissae* and *Chuquiraga jussieu*. Its showy flowers are visited by insects.



GENTIANACEAE

Geranium multipartitum Benth.; N.v.: "Aguja sacha".



Low herbs, up to 10 cm tall, form small carpets. Leaves in a basal rosette, rounded-polygonal in outline, up to 2 × 2 cm wide, divided into nine narrow, hairy segments, each segment in turn divided into 3–9 lobes, the apex reddish and with 1–3 bristles; petioles long, up to 8 cm, reddish, white-hairy. Flowers solitary in the center of the rosette, on a pedicel longer than the leaves, hairy, sepals about 5 mm, lanceolate, green; petals 5, about 8 mm, entire, glabrous, very pale lilac with purple veins, stamens 10, anthers yellowish. Fruit of around 10 mm, reddish-brown, with projecting seeds.

Distribution

From Colombia to Bolivia. In Cajas, it grows at around 3,800 m above sea level.

Ecology

It grows in open areas, among rocks, sometimes exposed to strong winds. It is also found in the grasslands and in *Polylepis* forests. Its flowers are visited by insects.

HYPERICACEAE

Hypericum aciculare Kunth; N.v. "Romerillo".



Shrubs up to 70 cm tall, highly branched. Opposite leaves, up to 15 mm long, needle-shaped, and arranged in clusters. Solitary flowers, located at the tips of the branches, up to 40 mm in diameter, with five bright yellow petals; numerous bright yellow stamens. Fruit is in an ovate, dry, brown capsule.

Distribution

Ecuador and Peru. In Ecuador, it has been recorded in the provinces of Azuay, Cañar, Chimborazo, Loja, and Zamora Chinchipe.

Ecology

It grows preferably associated with *Loricaria* and *Chuquiraga*, and is also found within Polylepis forests or in open areas, forming monospecific aggregations. It prefers flat, humid areas. Its showy flowers are a characteristic and possibly unique feature of the Cajas landscape.

Uses

Its leaves are used in infusions for the flu.

OROBANCHACEAE

Bartsia stricta (Kunth) Benth.

Subshrubs up to 40 cm tall, pubescent. Opposite leaves, up to 2 cm long, narrowly lanceolate, the margins coarsely crenate, purple. Spiked inflorescences, pubescent, with leaf-like bracts with coarsely crenate margins, purple-magenta; calyx 7–9.5 mm, purple-magenta; corolla 6–7.2 mm, white, bilabiate and galeate, hairy. Fruits in capsule, dehiscent, 8 mm long.

Distribution

From Venezuela to Peru. In Ecuador, it has been recorded throughout the mountain range at elevations above 3000 m.

Ecology

It also grows in grasslands. It prefers exposed locations, sometimes among rocks, and withstands strong winds.



OROBANCHACEAE

Castilleja ecuadorensis N. Holmgren; N.v. "Lancetilla".





Herbs up to 30 cm tall, foliage often tinged with purple. Leaves alternate, up to 3 cm long, linear, basal leaves entire, apical leaves divided into narrow lobes. Inflorescences in clusters up to 5 cm long; bracts with a bright red petal-like appearance supporting each flower. Flowers irregular, more or less tubular, somewhat recurved, up to 25 mm long, light green, with tiny trichomes.

Distribution

Endemic to Ecuador. It has been recorded in Azuay, Cotopaxi, Imbabura, and Loja. It is common in the CNP.

Ecology

It grows in various environments, on rocky soils, and is protected by scrub. The most striking red parts of the plant are bracts, not flowers.

OROBANCHACEAE

Pedicularis incurva Benth.; N.v. "Zanahoria del monte", "pimpinella del cerro".





Herbs up to 30 cm tall. Leaves in a rosette at the base and sometimes a few alternate along the stem, up to 9 cm long, deeply divided to the main vein into numerous crenate segments, bluish-purple. Inflorescences in spike-like clusters, up to 20 cm long, with multiple flowers. Flowers tubular, recurved, up to 2 cm long; calyx magenta, up to 8 mm; corolla up to 8 mm, white tinged with magenta to deep pink, upper lip galeate, and petals forming a darker beak.

Distribution

From Colombia to Peru. In Ecuador, it has been recorded in Azuay, Loja, and Morona Santiago. In Cajas, it is found above 3,100 m a.s.l.

Ecology

It is an abundant, widely distributed species and can also be found in highlands and occasionally in cushion bogs. It prefers open, flat, and humid places.

Uses

Its flowers are used in infusions to relieve fever and flu.

PTERIDACEAE

Jamesonia cinnamomea Kunze

Terrestrial ferns, rhizome 2 to 3 mm wide, creeping, pubescent, trichomes thick like bristles. Leaves up to 60 × 1.5 cm, linear, erect, pinnate, pubescent, the apex rolled, indeterminate; containing more than 100 pinnae, 4 mm wide, rounded, almost sessile, imbricate and leathery, the margins typically rolled, veins free. Sori along the veins, without indusia, protected by the reflexed margins of the pinnae; sporangia patent along the pinnae. Spores black.

Similar species

It is similar to *Jamesonia goudotii*, from which it differs in that *J. cinnamomea* is larger, with sparse brown pubescence, whereas *J. goudotii* has abundant and reddish-brown to orange-brown pubescence.

Distribution

From Colombia to Peru. In Ecuador, it is recorded in the provinces of Azuay, Carchi, Chimborazo, Napo, Pichincha, and Tungurahua at altitudes between 3,500 and 4,500 m.

Ecology

It is associated with the open scrublands of *Loricaria ilinissae*, *Chuquiraga jussieui*, and the margins of *Polylepis* forests.



PTERIDACEAE

Jamesonia goudotii (Hieron.) C. Chr.

Terrestrial ferns, up to 35 cm tall, are covered with reddish-brown to orange-brown trichomes. Leaves up to 30 cm long, straight and stiff, the apex is circinate (curled), composed of numerous pairs of pinnae, generally ear-shaped, up to 5 mm long, overlapping, thick; margins curled downward. The reproductive structures (sori) are found on the underside of the leaves; the spores are dark brown.

Similar species

See J. *cinnamomea*.

Distribution

From Venezuela to Bolivia. In Ecuador, it has been recorded throughout the entire Andean mountain range.

Ecology

It grows associated with *Loricaria ilinissae* thickets, in which it is a very common species; it is also found on the margins of Polylepis forests. Species of this genus are almost exclusive to the Andean highlands.



ROSACEAE

Lachemilla hispidula (L.M. Perry) Rothm.



Perennial herbs, generally pubescent, decumbent, highly branched; some stems emerge from the same point and are reddish in color, reaching up to 25 cm in height. Leaves very small, up to 7 mm long, very narrow, joined at their bases in a sheath and arranged in rings along the stem, with 10 lobes, linear to lanceolate, hairy, reddish at the base. Globular inflorescence at the tip of the stems, with several flowers. The flowers are tiny, measuring up to 2.5 mm in length, and are pink with a greenish-white hue.

Similar species

Lachemilla nivalis differs in that it is an erect herb up to 60 cm tall with leaves up to 10 mm long, while *L. hispidula* is decumbent, 25 cm tall, and has leaves up to 7 mm long.

Distribution

Colombia, Bolivia, and Ecuador, where it is widely distributed throughout the Andes.

Ecology

A common plant in undisturbed sites, it grows under the bushes of *Loricaria ilinissae* and *Chuquiraga jussieui* or at the base of rocks. It is also found in the cushion *páramo*.

ROSACEAE

Lachemilla nivalis (Kunth) Rothm





Erect herbs, up to 0.60 m tall, with several stems from the base; the entire plant is very pubescent with long white trichomes. Leaves reduced, up to 10 mm long, joined together to form sheaths around the stem with 10-15 narrowly lanceolate lobes. Terminal or axillary inflorescence with lobed floral bracts. Small flowers 1.8-2.5 mm long, green or reddish-brown in color; 3-4 to 6 carpels; clavate stigma.

Similar species

See *L. hispidula*.

Distribution

From Venezuela to Peru. In Ecuador, it has been recorded at elevations ranging from 3,200 to 4,700 m.

Ecology

It grows in association with *Loricaria ilinissae*. It prefers open, rocky places exposed to strong winds. In the CNP, it is a rare species, recorded in Osohuayco.



ARCYTOPHYLLUM VERNICOSUM THICKETS

This environment is characterized by the presence of *Arcytophyllum vernicosum*, one of 15 species in the genus, which are distributed in the mountains of Costa Rica and Panama, as well as in the Andes, from Venezuela to Bolivia, with greater specific diversity in Ecuador, where 10 species have been recorded. Along with the aforementioned species, there are other characteristic species such as *Senecio josei*, *Melponeme moliniformis*, and *Werneria pumila*. The herbaceous plants are accompanied by numerous woody species, some of which are specific to this area, and others are widely distributed.

The thickets with *Arcytophyllum vernicosum* are characterized by shallow soils and exposed rocks, among which numerous shrubs and herbs with striking and varied colors grow. Abundant lichens grow on the ground, rocks, and among vascular plants, creating a better microclimate and further enriching the diversity of this ecosystem. They are found between 3,750 and 3,900 meters above sea level.

They can be easily observed between the Patoquinuas and Toreadora lagoons.

ASTERACEAE

Bidens andicola Kunth; N.v. :"Ñáchig", "ñáchac".





Annual creeping herbs, up to 50 cm tall. Opposite leaves, odd-pinnate compound. Inflorescences in radiate capitula, terminal on a long peduncle up to 20 cm long; campanulate involucre, rigid phyllaries, brown in color. Marginal flowers yellow, the corolla 10 mm long, ligulate; disc flowers yellow-green, tubular with five small teeth; style bifurcated, branches recurved. Fruit is an achene with two spiny trichomes.

Similar species

Bidens triplinervia Kunth has finely dissected leaves and grows erect, while *B. andicola* is creeping.

Distribution: From Venezuela to Argentina. In Ecuador, it is found between 2000 and 4500 meters above sea level.

Ecology: It inhabits *páramos*, humid montane forests, and even disturbed areas. In the CNP, it is common in rocky areas, slopes, and open grasslands.

Uses: As an infusion, it is used to cure colds, flu, and stomachaches. The petals are used to dye wool, as well as for nerves in combination with lemon balm leaves (*Melissa officinalis*) and vetch flowers (*Vicia andicola*).

ASTERACEAE

Chuquiraga jussieui J. F. Gmelin; "Chuquiragua", "flor de montaña".



Shrubs up to 1.5 m tall. Leaves alternate, ovate to broadly elliptical, up to 1.2 cm long, arranged horizontally, hard and pointed, uninerved, the margins thickened. Inflorescences of showy flower heads up to 5 cm long, very compact, with sharp orange bracts. Flowers 20-45, tubular, deeply 5-lobed, yellow or orange, up to 20 mm long; style very exserted, orange. Pappus feathery, white.

Distribution

In the Andes from southern Colombia to Bolivia. In Ecuador, it is distributed between 2,500 and 5000 m above sea level.

Ecology

It inhabits various Andean highland and sub-highland environments. In the CNP, it grows scattered in grasslands or rocky areas, forming low scrub dominated by *Arcytophyllum vernicusum*. Its flowers are visited by the hummingbird *Oreotrochilus chimborazo*, commonly known as the Ecuadorian hillstar.

Uses

Its leaves and flowers are used in infusions to relieve typhoid fever. An infusion of its bark is used for the prostate, and the flowers are used to treat colds and calm the nerves.



Chuquiraga jussieui J. F. Gmelin



Diplostephium ericoides (Lam.) Cabrera

ASTERACEAE

Diplostephium ericoides (Lam.) Cabrera




Shrubs up to 1 m tall, densely branched, with grayish-white woolly trichomes. Leaves alternate, linear, up to 5 mm long, thick, the margins folded downwards, the underside covered with a dense layer of grayish-white woolly trichomes. Inflorescences in heads up to 1.5 cm in diameter, arranged at the end of the branches. There are two types of flowers: the marginal ones (approximately 15) are irregular and have a ligule up to 8 mm long, which is white in color; the internal ones (approximately 20) are tubular with five teeth, and are yellow to orange in color. The fruit has a crown of white trichomes 10 mm long.

Similar species

Diplostephium oblanceolatum has oblanceolate to spatulate leaves, 15 to 20 mm long, while *D. ericoides* has linear leaves, 10 to 12 mm long; the marginal flowers of *D. oblanceolatum* have a light lilac ligule, while *D. ericoides* has a white ligule.

Distribution

Endemic to Ecuador, it is widely distributed between 2,500 and 4,500 m above sea level.

Ecology

In the CNP, it grows in rocky areas, forming open thickets alongside species such as *Arcytophyllum vernicosum*, *Chuquiraga jussieui*, and *Senecio josei*. To a lesser extent, it grows scattered on slopes covered with grasslands.

ASTERACEAE

Dorobaea pimpinellifolia (Kunth) B. Nord.; "Manzanillón de páramo".





Herbs up to 25 cm tall. Leaves arranged in a rosette at the base, up to 5 cm long, deeply divided to the main vein into serrated rhomboid segments. Inflorescence raised on a peduncle and consisting of showy flower heads up to 7 cm in diameter. Two types of flowers: the marginal ones (around 20) are irregular, with a ligule up to 30 mm long, bright yellow; the internal ones (more than 50) are tubular, dark yellow to orange in color. Fruit with a crown of silky trichomes about 10 mm long, white.

Distribution

From Colombia to Peru. In Ecuador, it is distributed in the highlands between 2000 and 4,500 m above sea level.

Ecology

It grows in humid grasslands and rocky areas, and it is also common on slopes and stream banks, associated with shrub species of the genera *Loricaria*, *Monnina*, and *Gynoxys*.

ASTERACEAE

Perezia pungens (Humb. & Bonpl.) Less.; "Escorzonera".





Herbs up to 25 cm tall, with glandular trichomes on various parts of the plant. Two types of leaves: basal leaves in a rosette, spatulate to elliptical, up to 15 cm long with finely spiny margins, leathery; rough upper surface, stem leaves up to 4 cm long with glandular trichomes. Inflorescences in heads up to 3 cm long, on an elongated peduncle up to 20 cm. Flowers irregular, bilabiate; they have a showy blue-violet or white-violet ligule, up to 25 mm long; style with markedly recurved stigmas.

Similar species

Perezia pungens differs from other species in its ciliate-spiny margin leaves and fragrant flowers.

Distribution

From southern Colombia to northern Argentina. In Ecuador, it grows between 2000 and 4,500 m above sea level.

Ecology

It inhabits mountains and slopes, as well as rocky and sandy areas, dense grasslands, and under the canopy of *Arcytophyllum*, *Gynoxys*, and *Chuquiraga* shrubs.

Uses

The juice from its root is taken to relieve fever.



ASTERACEAE

Senecio josei Sklenář



Herb up to 60 cm tall. Leaves are alternate, clustered towards the tips of the branches, linear, up to 50 × 5 mm, leathery, with revolute margins, and the underside is densely white-tomentose. Inflorescences racemose, with up to 10 capitula, peduncle up to 6 cm, purplish. Capitula discoid, up to 10 mm long, pendulous; involucre calyx-like, purplish. Flowers 30-45, tubular, greenish-yellow; style bifurcated. Pappus with silky, white bristles.

Distribution

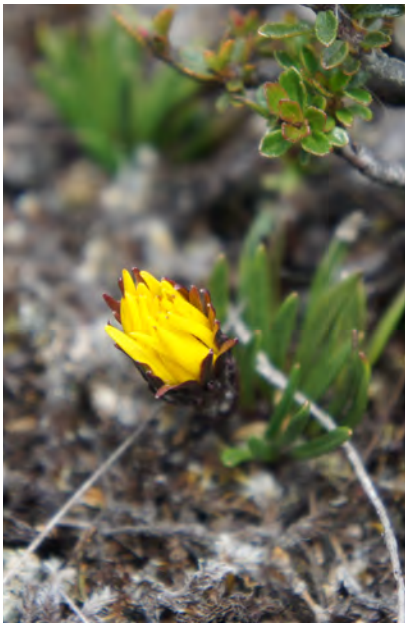
Species described in 2012, and recorded only in the *páramos* of Sabanilla, Loja province, and in the CNP, Azuay.

Ecology

It inhabits rocky sites, forming low, open scrub associated with shrubs of *Arcytophyllum*, *Vaccinium*, *Gynoxys*, and *Hesperomeles*.

ASTERACEAE

Werneria pumila Kunth




Low herbs up to 5 cm tall, growing singly or in small groups. Leaves forming a rosette, growing close to the ground, up to 4 cm long, elongated and narrow. Inflorescence, a flower head about 2.5 cm in diameter, with bracts reddish brown. Two types of flowers: the marginal ones (around 20) are irregular, with a striking ligule up to 15 mm long, yellow; the internal ones (numerous) are tubular with five teeth, yellow. Fruits with a crown of white trichomes.

Similar species

In Ecuador, it is the only species of *Werneria* with yellow flowers.

Distribution

Endemic to Ecuador, common in the northern and central Andes of Ecuador between 3,500 and 4,800 m above sea level.

Ecology

It inhabits high *páramos*, rocky sites, and the edges of grasslands. It grows in scattered rosettes or in small groups.

BROMELIACEAE

Puya compacta L.B. Sm.



Giant herbs, up to 1.2 m tall, with a polycarpic inflorescence, the leaves form a large basal rosette. Linear leaves, 40–60 cm long, leathery, with serrated, spiny margins; spines 5 mm long. Inflorescence elevated on a peduncle 40–70 × 2–3 cm, erect, completely covered by woolly, overlapping bracts; inflorescence cylindrical, 20–40 × 7 cm, compact, with bracts with ashy woolly indumentum. Flowers actinomorphic, light blue in color; petals 3, 4 cm long; anthers yellow. Fruit in capsule; winged seeds.

Similar species

See *Puya clava-herculis* in the Pajonales chapter. *Puya maculata L.B.* Sm. has smaller spines and a black spot at the base of the spines.

Distribution

Endemic to Ecuador, it is restricted to the southern region, particularly the CNP, where it is widely distributed. Due to its narrow range of distribution and the fact that its habitat is affected by burning, it is considered a critically endangered (CR) species.

Ecology

It inhabits humid grasslands and protected slopes near *Polylepis* forests, growing as isolated clumps or forming small, dense groups.



DRYOPTERIDACEAE

Polystichum orbiculatum (Desv.) J. Rémy & Fée

Terrestrial ferns have very narrow leaves. Rhizome 2–4 cm in diameter, unbranched. Lanceolate scales. Leaves up to 35 cm tall, 2-pinnate-crenate; pinnae up to 4×1 cm, oblique, pinnae obtuse, markedly revolute. Rachis without a prolific bud, with orange-yellowish rachis scales that discolor with age. Abaxial sori on brown veins.

Similar species

It is distinguished from other species of the genus *Polystichum* by its very narrow leaves and revolute pinnules.

Distribution

From Mesoamerica to Bolivia. In Ecuador, it is found in the highest peaks, reaching elevations of up to 5000 m above sea level.

Ecology

It inhabits hill ridges and rocky sites, as well as slopes and roadsides. In the CNP, it is common among *Arcytophyllum* and *Loricaria* shrubs.



GENTIANACEAE

Gentianella rapunculoides (Willd. ex Schult.) J. S. Pringle





Herbs up to 20 cm tall, solitary or in small groups. Leaves opposite, lanceolate, up to 1 cm long, with purple tinges. Inflorescences in clusters, up to 10 cm long, with 3 to 10 flowers; the axis is red-purple. Flowers up to 20 mm long, bell-shaped and pendulous, pale to dark violet or bluish, with darker veins; 5 lilac-colored stamens.

Similar species

See *Gentianella cerastioide*s in the chapter Wetlands and Carpets or Cushions.

Distribution

In the Andes of southern Colombia and Ecuador, between 2500 and 4500 m above sea level.

Ecology

It is a variable species in size and adaptable to many páramo habitats. In the CNP, it grows under the canopy of *Gynoxys* and *Arcytophyllum* shrubs, as well as in the grassland-wetland ecotone.

HYPERICACEAE

Hypericum quitense R. Keller; N.v.: "Romerillo".




Highly branched shrubs, up to 1 m tall; woody stems reddish-brown. Opposite leaves, decussate, narrowly ovate, up to 8 mm long, subsessile. Solitary yellow-orange flowers, abundant at the end of small twigs, up to 1 cm in diameter. Capsular fruit 4 mm long, reddish.

Similar species

Hypericum quitense is easily distinguished from other Hypericum species present in the CNP, as it is the only one with olive-green ovate-lanceolate leaves.

Distribution

Endemic to Ecuador, widely distributed in the central and southern Andes, in various habitats between 2000 and 4050 m above sea level.

Ecology

It inhabits humid valleys and slopes, rocky sites, stream banks, and marshes.

ONAGRACEAE

Oenothera epilobiifolia Kunth



Creeping herbs up to 30 cm. Pubescent stems, pinkish-reddish. Alternate leaves, basal leaves oblong, up to 4.5 cm, and cauline leaves up to 2.5 cm, glabrous on the upper surface and slightly tomentose on the underside, serrated margins, purple. Flowers solitary, axillary, pedicel short, densely covered with trichomes; petals up to 10 mm, broadly ovate and overlapping in a false tube, red with yellow hues; calyx dialysepalous with purple hues.

Similar species

Oenothera multicaulis Ruiz & Pav. has leaves with a dentate margin and longer, thinner stems.

Distribution

From Mexico to Peru. In Ecuador, it is distributed in the Andes mountain range, between 2000 and 4000 m above sea level.

Ecology

In the CNP, it is found in steep areas with rocky outcrops, under the shrub canopy of *Chuquiraga jussieui* and *Diplostephium ericoides*, as well as in the grasslands and forests of *Polylepis*.

ONAGRACEAE

Epidendrum tenuicaule F. Lehm. & Kraenzl.




Epiphytic or terrestrial plants, sometimes growing on rocks, up to 30 cm tall; roots are white. Leaves alternate, lanceolate, up to 3 cm long. Inflorescences in hanging clusters, up to 4 cm long, with up to 20 flowers. Flowers up to 10 mm long, pale greenish-yellow in color, the central petal (labellum), which is larger, has three lobes. Fruit in capsule, globose, 2 cm long, with thick ribs, green when fresh, turning brown and dehiscent with age, and with thousands of minute seeds.

Distribution

Endemic to Ecuador, it is found between 3000 and 4000 m above sea level.

Ecology

Epiphytic or terrestrial, it grows on *Polylepis*, *Gynoxys*, or *Chuquiraga* trees or on rocks. In the CNP, it is a very common species in scrublands and Polylepis forests.

Uses

Its flowers are used in infusions to relieve nerves and heart problems.



Epidendrum tenuicaule F. Lehm. & Kraenzl.

POLYGALACEAE

Monnina crassifolia (Bonpl.) Kunth.; N.v.: "Igualán", "igüila".




Shrubs up to 1.5 m tall, densely branched. Leaves alternate, lanceolate, up to 6 cm long, leathery, with purplish hues. Inflorescences up to 6 cm long, with numerous flowers. Flowers about 6 mm long, papilionoid (butterfly-shaped), blue or bluish-purple in color; one of the petals, called the "keel," has a yellow tip. Fruit is a fleshy berry, ellipsoid or bean-shaped, up to 8 mm long, wine-purple and green at the base when immature, dark purple-black when ripe.

Similar species

Monnina ligustrina (Bonpl.) B. Eriksen has elliptic to lanceolate leaves with a papery texture and flat margins, whereas *M. crassifolia* has elliptic to lanceolate leaves with a fleshy texture and revolute margins.

Distribution

Colombia and Ecuador. In Ecuador, it is found between 2,500 and 4,500 m a.s.l.

Ecology

A variable species in terms of stem and leaf size, it grows in various highland environments, sometimes forming shrublands in association with species of the genera *Arcytophyllum*, *Chuquiraga*, and *Gynoxys*, scattered in moist grasslands or along edges and slopes of ravines and trails.

Uses

Its crushed roots are used for hair cleansing, to promote hair growth, and to eliminate dandruff.

ROSACEAE

Hesperomeles obtusifolia var. ***microphylla*** (Wedd.) Romoleroux; N.v.: "Casha jalo", "manzana cashpi".





Shrubs up to 2 m tall, with branch tips that often end in a spine. Leaves are alternate, lanceolate, up to 3 cm long, rigid, with coarsely serrated margins. Inflorescences up to 4 cm long, bearing one or several flowers. Flowers are 10 mm long; petals are white with pink to reddish hues. Fruit is a fleshy, rounded pome, 10 mm long, red in color, turning wine-red when mature.

Similar species

The variety *microphylla* is distinguished from Hesperomeles obtusifolia (Pers.) *Lindl. var. obtusifolia* by its smaller leaves, less than 1 cm long, compared to up to 2 cm in the obtusifolia variety.

Distribution

From Venezuela to Bolivia. In Ecuador, it grows in the Andean region between 2,800 and 4,200 m a.s.l.

Ecology

It inhabits highlands; it grows in open grasslands, in areas with rocky outcrops, and forms dwarf shrublands alongside species of *Arcytophyllum*, *Vaccinium*, and *Pernettya*. Birds consume its fruits.

Uses

Its wood is used for making handles for hand tools. Its small apple-like fruits are edible.

ROSACEAE

Potentilla dombeyi Nestl.




Herbs spreading across the ground, with reddish branches densely covered in silky white or glandular trichomes. Leaves are alternate, compound, with three leaflets up to 2 cm long, and coarsely serrated margins. Flowers are solitary, up to 10 mm in diameter, with five heart-shaped petals that range in color from bright yellow to pale yellow; numerous pistils are present. Fruit is surrounded by the enlarged calyx and consists of a cluster of small dry fruits, each about 1 mm long.

Distribution

Highlands of Ecuador and northern Peru, between 3,500 and 4,500 m a.s.l.

Ecology

It inhabits open grasslands and rocky areas, sheltered by shrubs. In Cajas National Park, it is an uncommon species.

RUBIACEAE

Arcytophyllum vernicosum (Ruiz & Pav.) Standl.; N.v.: "Romerillo de altura".





Shrubs up to 1 m tall, densely branched. Leaves are opposite, lanceolate, and up to 6 mm long, with a shiny upper surface and thickened margins on the underside. Inflorescences with 1 to 3 flowers at the apical parts of the branches. Flowers up to 8 mm long, white with a lilac, purple, or pink tinge, with a short tube and four triangular lobes, covered with tiny white trichomes.

Similar species

Arcytophyllum capitatum (Benth.) K. Schum. has inflorescences in umbellate cymes and elliptical to ovoid leaves, while *A. vernicosum* has solitary flowers or cymes of 2 to 3 flowers and ovate leaves. *A. vernicosum* is easily distinguished by its glossy, varnished foliage, particularly in dried specimens.

Distribution

Southern Ecuador and northern Peru. In Ecuador, it is found in the provinces of Azuay, Cañar, and Loja, between 2500 and 4000 m above sea level.

Ecology

It inhabits hills and rocky slopes, forming low thickets, where it is the dominant species. It also grows scattered in open grasslands and along roadsides. Its flowers are visited by several species of insects and hummingbirds.

Uses

Its branches and flowers are boiled for baths after the fifth day of birth.





ROCKS

The highest parts of the CNP, located above 4000 m above sea level, feature exposed rocks and soils that are almost entirely removed due to erosion. The climatic conditions are extreme: days of intense fog and drizzle are frequent; the winds are constant and intense, and the temperatures are particularly low; on the rare clear days, the light is intense, UV radiation is high, and the air is extremely dry. However, some plants thrive in this inhospitable environment. Among the rocks, the vegetation is very diverse, and unique plants can be found, whose distribution is restricted to this particular habitat. This is the case of rare species such as *Nototriche hartwegii*, *Valeriana henrici*, and *Valeriana secunda*. They are species adapted to low temperatures and sporadic frosts. Still, above all, they can defend themselves against the drying caused by low atmospheric pressure and wind through specific morphological and physiological mechanisms, including small size, the presence of hairs, and slow growth.

The preservation of this environment is essential to ensure their survival.

ASTERACEAE

Hieracium frigidum Wedd.





Herbs up to 60 cm tall, covered in long white trichomes on all parts of the plant. The basal leaves are spatulate, measuring up to 12 cm in length. The inflorescences are heads at the end of the stems, hanging from long, thin peduncles, up to 3 cm in diameter; the bracts are dark green. The flowers are irregular, with a ligule up to 25 mm long, with five small, lemon-yellow teeth.

Distribution

Páramos from Venezuela to Peru. In Ecuador, it has been recorded in all the mountain provinces between 1500 and 4000 m above sea level.

Ecology

It is a common plant in the páramos; in the CNP, it grows among rocks and in the grassland.

BRASSICACEAE

Draba steyermarkii Al-Shehbaz




Herbs up to 45 cm tall, lax, somewhat recumbent, covered with rough white trichomes. Leaves are alternate, lanceolate, and up to 1.5 cm long, arranged in clusters. The raceme inflorescences are located at the terminal part of the stems and bear about 10 flowers. Flowers up to 10 mm long; calyx with four purple sepals; corolla with four spatulate, unguiculate, somewhat overlapping petals, purple with a greenish-yellow base; stamens 6, anthers yellow; pistil yellow. Fruit in a silique, lanceolate to slightly curved, erect form.

Similar species

Draba steyermarkii is easily distinguished from the other *Draba* species found in Cajas by its violet or lilac petals. In the vegetative state, it can be confused with *Draba alyssoides* Humb. & Bonpl. It has scabrous, ovate to narrowly oblong leaves, compared to the hairy, oblong leaves of *D. steyermarkii*. Another related species is *D. stylosa Turcz*, with ovate to oblong, very scabrous leaves.

Distribution

An endemic plant, exclusive to Cajas, where it is found above 3,700 m above sea level.

Ecology

Draba is a *genus* that grows in the mountains of Asia, Africa, America, and Europe. This species grows on shallow, rocky soils, occasionally in *Polylepis* forests and grasslands.

BRASSICACEAE

Eudema nubigena Bonpl.



Acaulescent herbs, up to 3 cm tall, forming small pads. Basal leaves form a rosette, are simple, spatulate, and up to 10 mm long, with entire to ciliate margins and transparent trichomes. Flowers are solitary at the end of branches; petals 4, about 3 mm long, creamy-white, with a yellowish base. Two subspecies have been recorded in the National Park of Ecuador: *E. nubigena subsp. nubigena* and *E. nubigena subsp.* remyana (Wedd.) Al-Shehbaz.

Distribution

Endemic to the Ecuadorian Andes, it is predominantly found between 4000 and 4600 m above sea level.

Ecology

It is a relatively common plant in the high-altitude *páramo*, where it grows among rocks. In CNP, it is found exclusively in rocky areas at the highest elevations.

CAMPANULACEAE

Lysipomia rhizomata McVaugh



Small, rosette-shaped herbs, up to 4 cm in diameter, grow solitary or in small groups. The leaves are long and lanceolate, measuring up to 18 × 3 mm, with a very narrow shape and a blue-purple upper surface, and ciliated margins. The flowers are numerous in the center of the rosette, small, up to 8 mm long; the corolla is white with five lobes; the stamens are united in a 5 mm tube, and the anthers are black. The fruit is in a capsule.

Distribution

Endemic, with a distribution restricted to the province of Azuay, where two populations are known, one in Tinajillas and the other in CNP.

Ecology

This is a rare species that grows in open areas at higher elevations on rocky, shallow soils.



Lysipomia rhizomata McVaugh

CAPRIFOLIACEAE

Valeriana henrici (Graebn.) Eriksen



Acaulescent, cauliflower-like herbs, up to 7 cm in diameter. The leaves are arranged in a kidney-shaped basal rosette, measuring up to 3 × 5 cm, and are leathery with an olive-green upper surface and deep veins, giving it a wrinkled appearance. The underside is purple, featuring curved margins and pinkish tinges. The inflorescence of numerous flowers that are between the leaves in the center of the rosette. The flowers are tubular, about 5 mm long, with five short, white lobes; stamens are 3. The fruit is an achene about 3 mm long, lunular in section, crowned by a feathery pappus about 8 mm long.

Distribution

In the Andes of southern Ecuador and Peru, between 4,100 and 4,900 m above sea level.

Ecology

In CNP, it's a rare plant, found only in the highest areas, such as Cerro Amarillo. It can easily go unnoticed because it blends in with the color of the rocks.

CAPRIFOLIACEAE

Valeriana secunda Eriksen




Herbs up to 30 cm tall, with a fetid odor. The leaves form a basal rosette, are spatulate, up to 10 cm long, thick, subcoriaceous, and green with purple tinges. The margins are ciliate, and the base expands into the petiole. The inflorescences are secundiflorous, up to 15 cm long, composed of pendulous subunits, the peduncle thick, green with purple tinges, densely covered with white trichomes; the bracts are purple; the flowers are tubular, about 4 mm long, with five short, white or purple lobes; stamens are 3. The fruit is an elliptical achene, about 2 mm long, with a feathery pappus about 3 mm long.

Distribution

Endemic plant, very rare, possibly exclusive to Cajas.

Ecology

It is found only in rocky areas at higher elevations, such as the Tres Cruces area. It is an endangered species.

CARYOPHYLLACEAE

Arenaria digyna Willd. ex D.F.K. Schltdl.



Diffuse, procumbent to suberect, much-branched, mat-forming herbs; glabrous, up to 5 cm tall. Leaves are opposite, linear-oblong, up to 6 × 1-1.5 mm, glabrous but ciliate on the surface, the apex acute, the margins entire, sessile or short-petiolate. Inflorescence of solitary, very small flowers, about 3-4 mm long, erect, axillary or terminal, on short pedicels; calyx persistent, glabrous; petals 5, lanceolate, glabrous, white; anthers lilac. Capsule elliptical, 2 mm; tiny grayish-black seeds.

Distribution

Ecuador, Peru, Bolivia, and Chile. In Ecuador, it is recorded from Pichincha, Cotopaxi, and Azuay.

Ecology

It grows on moist, clayey soils in a variety of environments, between 3,700 and 4,300 meters above sea level.

CARYOPHYLLACEAE

Cerastium danguyi J.F. Macbr.



Perennial herbs up to 40 cm tall, finely pubescent; ascending stems. Leaves are opposite, linear-lanceolate, 15-30 × 3-4 mm, connected at the base, densely pubescent, more or less glandular, the margins entire, revolute. Inflorescences are contracted, with few flowers. Flowers on pedicels up to 10 mm; calyx deeply 5-partite, up to 6 mm, light green; petals 5, about 8 mm long, forming a tube, the apex emarginate-bilobate, white with fine lilac lines. Capsule 12 mm, membranous, containing numerous rounded seeds.

Distribution

In the Andes of Colombia, Ecuador, Peru, and Bolivia, between 3,200 and 4,700 m above sea level.

Ecology

In CNP, isolated plants grow among the rocks and grasslands.

EPHEDRACEAE

Ephedra rupestris Benth.





Shrubs up to 50 cm tall, densely branched, olive-green; erect stems with longitudinal grooves. Leaves reduced to scales in rings spaced along the stem, up to 3 mm long, and pinkish-red. The reproductive structures are called strobili and consist of a set of thick, modified leaves (bracts) that are up to 8 mm long, green with pinkish-red, yellow, or orange hues. The male strobili produce pollen, while the female ones carry ovules. The orange-yellow seeds are enveloped by thickened, fleshy, pinkish-red bracts.

Distribution

Widely distributed in the Andes from Ecuador to Argentina.

Ecology

In CNP, it is found almost exclusively in rocky areas; it has only been collected above 3,700 m above sea level.

MALVACEAE

Nototriche hartwegii A. W. Hill.



Herbs form cushion-like mats up to 1 m in diameter, densely covered with white, velvety trichomes that give the plant a grayish appearance. Leaves are clustered at the tips of the stems, measuring up to 2 cm in length, and are deeply palmately lobed into segments, with a broadened petiole. Flowers are solitary, nestled among the leaves of the cushion, erect, very showy, up to 25 mm long; calyx 20 mm long, deeply lobed; corolla with five broadly obovate, overlapping petals, intense violet with a white and yellow-green center at the base inside. Stamens are fused into a white column, slightly shorter than the corolla, with yellow anthers at the tip. Fruit is a schizocarp composed of mericarps with a long beak.

Distribution

It is a very rare species, endemic to Ecuador, and has been recorded in Azuay, Cañar, and Imbabura, at an elevation of around 4,100 m above sea level.

Ecology

In the National Park of Ecuador, it is found only in sandy soils or on rocks, forming soft cushions, sometimes growing under tussock grasses.



PLANTAGINACEAE

Ourisia chamaedrifolia Benth.





Small herbs, reclining, up to 10 cm tall, solitary or in groups, with a basal rosette of leaves. Leaves are opposite, elliptic, up to 1.2 cm long, with coarsely crenate margins and a papery texture. Flowers are solitary, somewhat nodding, borne on a slender, elongated pedicel of wine color, zcovered with white trichomes; calyx is tubular with five lobes, wine-red colored, also with white trichomes; corolla up to 21 mm long, with a long tube and five lobes, dark pink to pinkish-red.

Similar species

Ourisia muscosa Wedd. differs by being smaller, with leaves 1.7–3 mm × 1–1.8 mm and a white-yellow corolla, 3.5–6 mm long; whereas *O. chamadradifolia* has leaves 6–12 mm × 5–9 mm and red flowers with a corolla 14–21 mm long.

Distribution

From Venezuela to Bolivia. In Ecuador, it is present throughout the Andean mountain range.

Ecology

In CNP, it is found in rocky areas, mainly in the highest parts of the highland.

POLYPODIACEAE

Melpomene moniliformis (Lag. ex Sw.) A.R. Sm. & R.C. Moran



Terrestrial, rupicolous, or epiphytic ferns, up to 20 cm tall, with short, creeping rhizomes; scales reddish, turning blackish; petiole up to 6 cm long. Leaves are narrow, erect, divided into multiple, more or less rectangular segments about 5 mm wide, somewhat concave, with a grayish-green upper surface; the rachis is glossy black. Sori are rounded, brown in color, and lack an indusium. Spores are green.

Distribution

Ceter and South América in mountainous regions.

Ecology

In Cajas National Park, it is found in areas with rocky outcrops, and also grows on the trunks of *Polylepis* trees.

POLYPODIACEAE

Campyloneurum angustifolium (Sw.) Fée

Ferns, epiphytic or rupicolous, with cylindrical, elongated rhizomes, 2 to 3 mm in diameter, covered with clathrate scales, ovate-lanceolate in shape. Sterile and fertile leaves are monomorphic; petiole articulated to the stem, 5 to 15 cm long; blade simple, oblong to narrowly elliptical, 10 to 25 cm long and 0.8 to 1.4 cm wide; midrib prominent on both surfaces; secondary venation composed of inconspicuous areolate veins. Sori are rounded, without indusium, arranged in a row between the central vein and the margin; spores are yellow.

Similar species

Campyloneurum amphostenon (Kunze ex Klotzsch) Fée differs by having a generally broader blade and more prominent lateral secondary veins.

Distribution

Native to the American continent, it is recorded in all regions of Ecuador, up to an elevation of 4,500 m above sea level.

Ecology

It grows in rock crevices and as an epiphyte on Polylepis trees.



VIOLACEAE

Viola bangii Rusby



Plants form a solitary rosette or occur in small clusters due to branching. Leaves are oblong-lanceolate to spatulate, up to 20 × 4 mm, glossy green with a membranous purple false petiole. Flowers are solitary among the leaves, white, mottled with blue, with a yellow throat. Fruit is a capsule that emerges slightly from the leaves.

Similar species

See *Viola pygmaea* in Wetlands and Cushion Bogs.

Distribution

In the Andes from Ecuador to Bolivia. In Ecuador, it has been recorded at altitudes above 3,900 m above sea level.

Ecology

It lives among rocks, on shallow or absent soils.





LACUSTRINE HABITATS

Lakes are a characteristic and essential component of the Cajas landscape, which comprises approximately 2,309 bodies of water distributed across an altitudinal range between 3,150 and 4,300 m above sea level. There are 178 lagoons larger than 1 ha and 443 lagoons between 0.1 and 1 ha. The remainder are small ponds and wetlands.

In Cajas National Park, the vast majority of lakes are oligotrophic, characterized by deep waters and steep shorelines. Mesotrophic lakes are scarce in the area, and eutrophic lakes — shallow and with high nutrient concentrations — are mostly restricted to the Quinuas River micro-watershed.

(Source: http://www.etapa.net.ec/Parque-Nacional-Cajas/Biofisico-Cultural/Limnologia)

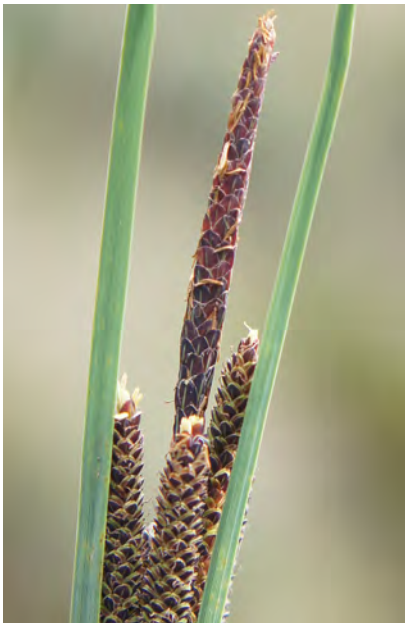
The plant communities found in this environment exhibit high specificity, either covering the lake shorelines or growing submerged in the water. These species can serve as important indicators of lake health, as their density often depends on the quality of the water and sediment. In shallow lakes such as Illincocha, nearly the entire lake surface is covered by dense mats of *Myriophyllum quitense*. *Schoenoplectus californicus* (totora) covers much of Lake Totoras.

The semi-aquatic species *Carex azuayae* and *Carex toreadora*, which were already collected in the 1940s near Lake Toreadora, are endemic species with a distribution restricted even within CNP.

CYPERACEAE

Carex azuayae Steyerm.





Erect, semi-aquatic herbs up to 40 cm tall. Linear, flattened, and tough leaves with a glabrous sheath. Terminal inflorescence with erect, pedunculated, glossy brown spikelets. Flowers are embraced by spirally arranged scales, which are black with a glossy green band in the center. The culm protrudes from the leaves.

Similar species

It frequently shares its habitat with *Carex toreadora*, from which it differs in size (15 to 25 cm in *C. toreadora* vs. 30 to 45 cm in C. azuayae) and the color of the bracts surrounding the spikelets (black in *C. azuayae* vs. brown in *C. toreador*a). *Carex jamesonii* is a rare species in Cajas and sometimes grows at the edge of lagoons. However, it is a robust plant, 60 to 100 cm tall, with shiny black inflorescences.

Distribution

Endemic to Ecuador. Restricted to CNP, where it has been recorded in small lagoons around Toreadora and Las Unidas.

Ecology

It inhabits shallow bodies of water and is even the dominant species in some places.

CYPERACEAE

Carex toreadora Steyerm.





Perennial, submerged, rhizomatous herb, up to 25 cm tall. Leaves are sparsely clustered, covered with a transparent sheath, and channeled, measuring up to 6 cm in width and 25 cm in length. Inflorescence is terminal, brownish, consisting of several sessile spikelets, surrounded by a 6 mm long bract resembling the floral scales. The culm reaches up to 20 cm in height, sometimes equaling the height of the leaves. Flowers are grouped in small, ovoid spikelets. The perigynium is 4 mm long, yellow with a brick-red apex; the stigma is dark brown. The achene is lenticular and pale yellow.

Similar species

Carex azuayae (For differences, see previous entry).

Distribution

Endemic, it has been recorded in the highlands of the provinces of Azuay and Pichincha, between 3700 and 4000 m above sea level.

Ecology

It inhabits wetlands, swamps, and shallow lakes, forming aggregates in association with *Carex azuayae* and *Juncus* sp.

CYPERACEAE

Schoenoplectus californicus (C.A. Mey) Soják.; N.v.:"Totora".





Erect, semi-aquatic herbs, up to 4 m tall; the stems are rigid, spongy inside, and triangular transversely. The leaves are very thin and are found at the base of the stems. The terminal inflorescences on the stems consist of spike-shaped heads up to 5 cm long; the flowers are inconspicuous and brown.

Distribution

This species is widely distributed throughout the Americas. In CNP, it is found mainly in the Totoras Lagoon, due to the partial damming of its water.

Ecology

It inhabits aquatic environments and can grow in lakes up to 1.5 m deep. The substrate's rhizomes form a very tangled network that prevents erosion. The stems live for more than two years and are continuously renewed.

Uses

Locally, its stems are used to make mats and baskets.

HALORAGACEAE

Myriophyllum quitense Kunth



Submerged and floating aquatic plants, typically found in dense groups; stems vary in length and are sometimes semi-woody. Leaves are arranged in whorls, with 4 to 5 at the same level, and measure up to 15 mm in length. Submerged leaves are finely divided into thread-like segments; emergent leaves are entire, yellowish-green with reddish tones, and have serrated margins. Flowers are tiny, about 3 mm long, and greenish.

Distribution

From Venezuela to Tierra del Fuego. In Ecuador, it is mainly found in the Andean region between 3000 and 4500 meters above sea level.

Ecology

A floating or submerged aquatic herb, it grows in cold-water lakes and rivers and can even withstand water bodies with frozen surfaces. In CNP, it is a very common species in several lakes. It is abundant in Toreadora, Totoras, Luspa, and Llaviucu, and serves as habitat for some aquatic bird species.



Myriophyllum quitense Kunth

ISOETACEAE

Isoetes andina Spruce ex Hook.





Aquatic plants that grow forming hard rosettes, 6 to 8 cm in diameter. Stems are short and thick, with leaves arranged helicoidally. Leaves are olive green, rigid, 40–50 mm long; the base is widened, 5–5.5 mm wide; the middle part is somewhat terete in cross-section, 1–1.5 mm wide; the apex is sharp. Sporangium is ovoid, measuring 5.5 × 2.5 mm, light brown, and covered by a hyaline membrane.

Similar species

Isoetes novo-granadensis has rigid leaves that are flattened or triangular in cross-section, whereas *I. andina* has leaves that are rounded in the middle section.

Distribution

In the Andes of Venezuela, Colombia, and Ecuador, between 3000 and 4500 meters above sea level.

Ecology

It inhabits aquatic and semi-aquatic environments, submerged along the shores of lakes and marshes; it can grow up to 1 meter deep underwater. In Cajas, it is frequent in the southwestern zone of the park, particularly in the Angas, Soldados, and Jerez sectors.

ISOETACEAE

Isoetes novo-granadensis H.P. Fuchs





Semi-aquatic or aquatic plants, up to 10 cm in diameter; stems are generally fleshy, short, and buried. Leaves arranged in a semi-buried rosette, linear, up to 50 mm long, somewhat triangular in cross-section, and with thick, pointed air chambers. The reproductive structures (sporangia) are 5 mm long; whether male or female, they are sunken into the base of the leaves and covered with a membrane; the spores are white to gray.

Similar species

See *Isoetes andina*.

Distribution

In the Andes of Colombia and Ecuador, between 3,500 and 4,500 m above sea level.

Ecology

It inhabits wetlands: marshes and lagoon edges, and shallow bodies of water. In the CNP, it is common to find it in wetlands dominated by *Distichia acicularis* or *Plantago rigida*.

JUNCAGINACEAE

Lilaea scilloides (Poir.) Haum




Aquatic plants up to 40 cm tall, shaped like a tuft of leaves arranged on a short stem. The leaves are needle-like, up to 35 cm long and 2 mm wide, with a transparent sheath at the base. The inflorescences are spikes of staminate, bisexual flowers at the tip of a narrow stem and tiny, about 2 mm pistillate flowers in the underwater axils. The pistillate flower consists of an extremely long, filiform style that can be up to 20 cm long, with a stigma at the tip, which floats on the water's surface.

Similar species

When infertile, it can be confused with *Lilaeopsis schaffneriana* (Schltdl.) J.M. Coult. & Rose, but the latter has fistulated and septate leaves.

Distribution

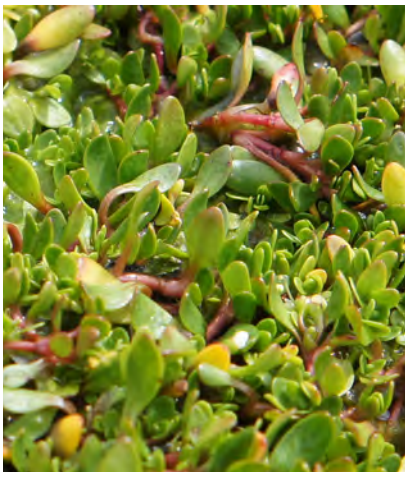
From the United States to Argentina. In Ecuador, it is distributed in the Andean region between 3000 and 4500 meters above sea level.

Ecology

An annual herb that lives on the edges of lagoons and pools, floating or submerged, particularly in surface water bodies. In CNP, it is common in the Toreadora, Osohuayco, and Luspa lagoons.

MONTIACEAE

Montia fontana L.

Semi-aquatic herbs up to 40 cm long. Very slender, reddish stems branch at the nodes and are fleshy. Opposite, oblong-lanceolate or somewhat spatulate leaves, up to 10 × 3 mm long, with a single midrib, sometimes rounded at the apex. Flowers are arranged in terminal or lateral clusters, are very small, around 2 mm; there are five petals, and they are white.

Similar species

Montia fontana L is a complex of variable forms with a cosmopolitan distribution. In northern South America, two species have been associated with this complex: *M. meridiensis* Friedrich and *M. biapiculata* Lourteig.

Ecology

It inhabits wetlands and shallow bodies of water, sometimes submerged. In CNP, it is common in the Totoras Lagoon.

PLANTAGINACEAE

Callitriche deflexa A. Braun ex Hegelm.





Very delicate, aquatic, floating herbaceous plants that form thin, light-green mats. They have adventitious roots. The leaves are simple, membranous, opposite, briefly joined at the base, spatulate, up to 3 mm long, and sessile. The flowers are solitary, unisexual, axillary, and tiny, around 1.5 mm; the petals are lilac-brown. The capsules are tiny, flattened, dehiscent, and dark.

Similar species

Callitriche terrestris Raf. has ovate-oblong to obovate leaves, 4 mm long, while *C. deflexa* has obovate or spatulate leaves, 2 to 3 mm long.

Distribution

Native to Brazil and Argentina, it is currently distributed from the United States to Argentina, Europe, and Asia. In Ecuador, it has been recorded in the Andes, the coast, and the Galapagos, from sea level to 3,500 m above sea level.

Ecology

It inhabits wetlands, lagoon edges, and shallow pools, especially in disturbed areas. In CNP, it is abundant in the Patoquínuas, Toradora, and Llaviucu lagoons.

POTAMOGETONACEAE

Potamogeton paramoanus R.R. Haynes & Holm-Niels.



Submerged and floating aquatic herbs grow in dense clumps; the stems vary in length depending on the water depth. Leaves are of two types: submerged leaves are elongated, up to 26 cm long, and somewhat translucent greenish; emergent leaves are spatula-shaped, up to 7 cm long, and yellowish-green. Inconspicuous inflorescences, submerged or emergent, forming 10 mm long, light green spikes. The flowers are tiny, 1.5 mm long.

Similar species

Potamogeton illinoensis Morong has submerged leaves that are petiolate, distichous, and have an elliptical-lanceolate blade, while *P. paramoanus* has submerged, sessile, spiral leaves with a linear blade. The floating leaves of *P. illinoensis* are generally larger.

Distribution

In the Andes from Venezuela to Bolivia, between 2,200 and 4,100 m above sea level. In Ecuador, it is found in the highlands.

Ecology

It grows submerged in lagoons, ponds, and slow-flowing streams.



RANUNCULACEAE

Ranunculus flagelliformis Sm.





Semi-aquatic herbs with leafy roots up to 40 cm long and stems up to 45 cm long. The leaves float on the water surface, with thin petioles 3–6 cm long. The blade is orbicular, ovate, or kidney-shaped, 0.4–1.1 cm long by 0.5–1.2 cm wide, with crenate margins. Emergent flowers, up to 5 mm in diameter, have five shiny, lemon-yellow petals; numerous, free stamens; the gynoecium is apocarpous, with numerous carpel leaves ending in a simple stigma.

Similar species

Ranunculus limoselloides has elliptical to ovate leaves with entire margins and a generally cuneate base.

Distribution

Neotropical. In South America, it is distributed in the Andes. In Ecuador, it has been recorded between 500 and 4000 m a.s.l.

Ecology

It inhabits ponds and lagoon margins, growing semi-submerged or creeping in swamps and muddy areas. In CNP, it is widely distributed around lakes.

Uses

Forage for llamas and alpacas.



RANUNCULACEAE

Ranunculus limoselloides Turcz.



Aquatic or semi-aquatic herbs, with long creeping stems up to 60 cm. Floating leaves on the water surface, blades elliptic to ovate, 10 to 15 mm long by 5 to 8 mm wide; slender, long petioles up to 15 cm, with a basal sheath that wraps around the stem. Emergent flowers, up to 7 mm in diameter, have five white petals and numerous yellow pistils. Fruit is a small, semi-ovoid achene about 1 mm in diameter.

Similar species

Ranunculus flagelliformis (see previous entry).

Distribution

From Costa Rica and Venezuela to Bolivia. In Ecuador, it is found in the Andes between 3000 and 4500 m a.s.l.

Ecology

Inhabits shallow ponds and lakes; grows submerged or floating. In CNP, it is a common species in the lakes Toreadora, Totoras, and Illincocha.





APPENDICES



GLOSSARY

Achene A dry, indehiscent, one-seeded fruit in which the seed coat is not fused to the fruit wall (pericarp).

Amplexicaul The leaf base that clasps or surrounds the stem.

Awn A long, slender, stiff bristle, such as those found on the glumes of grasses (Poaceae) or in the fruit of composites.

Bract A reduced leaf that subtends a flower or an inflorescence.

Calyx The collective term for the sepals of a flower, usually green, but sometimes brightly colored.

Capsule A dry, usually dehiscent fruit formed from a single or multiple carpels, typically containing many seeds.

Carpophore An extension of the receptacle that bears the ovary and later the fruit.

Carinate Having a keel-like ridge.

Cauline Pertaining to or originating from the stem.

Chartaceous Having a papery texture.

Cinereous Ash-gray in color.

Coriaceous Having a leathery texture.

Corolla The collective term for the petals of a flower.

Crenate Having rounded teeth or scalloped edges on the margin.

Culm he stem or stalk of grasses (Poaceae).

Cushion A dense group of plants growing tightly together, forming mound-like structures resembling a compact cushion.

DBH (Diameter at Breast Height) Abbreviation for "Diameter at Breast Height," a measurement used for trees and shrubs.

Ecotone A transitional zone between two or more distinct ecological communities or ecosystems.

Endemic A species whose distribution is restricted to a particular area, region, or country.

Epiphyte A plant that grows on another plant, using it only for physical support, without extracting nutrients from it (i.e., it is not parasitic).

Exserted Protruding beyond the corolla; usually refers to stamens or the style.

Floret In grasses (Poaceae), the full floral structure consisting of the lemma, palea, lodicules, stamens, and ovary. In composites (Asteraceae), it refers to the tubular flowers in the flower head (capitulum).

Galeate Helmet-shaped.

Geniculate Bent like a knee; applied to stems or parts of flowers and inflorescences.

Glume A sterile bract located at the base of a spikelet in grasses (Poaceae).

Head (Inflorescence) A type of flower cluster, generally small flowers. In composites (Asteraceae), it is a cluster of sessile flowers arranged on a common receptacle and surrounded by bracts; also called a capitulum. The bracts may be green or brightly colored.

Hemiparasite A plant that parasitizes another plant but also performs photosynthesis.

Indumentum The covering of hairs, glands, scales, etc., on a plant organ.

Indusium A membranous outgrowth of the leaf epidermis covering the receptacle and sporangia in ferns.

Inflorescence Inflorescence An arrangement or cluster of flowers on a plant in a specific pattern.

Keel Some modified petals in legume or papilionaceous flowers.

Lanceolate Shaped like a lance; longer than wide, with sides that taper to a point.

Leaflet An individual segment of a compound leaf.

Lemma The lower bract of the floret in grasses.

Ligule In Asteraceae, the strap-shaped extension of the corolla in some flowers. In grasses (Poaceae), a membranous appendage at the junction of the leaf blade and sheath.

Lodicules Two small bracts at the base of the floret in grasses (considered part of the perianth).

Node The point on a stem where leaves or branches originate. The region between two nodes is called the internode.

Nodding Hanging or drooping.

Ovate Egg-shaped, with the broader end at the base.

Palea An inner bract of the grass floret; also refers to a scale at the base of flowers in Asteraceae.

Pappus A modified calyx made up of hairs or scales, typical of composites (Asteraceae).

Peltate Peltate Petiole inserted in the center of the leaf blade.

Perennial Perennial A plant that continues growing after reproduction; generally means it lives for several years.

Perigynium	The part of the flower that contains the female reproductive structures.
Pinnule	A leaflet of a bipinnate or tripinnate leaf.
Pistil	The female part of the flower, including the ovary.
Rachis	In compound leaves, it is the continuation of the petiole beyond the basal leaflets. In inflorescences, it is the axis from which flowers emerge.
Revolute	With margins rolled downward (toward the underside).
Rhizome	An underground stem used for storage and vegetative reproduction. It has nodes, internodes, and adventitious roots.
Rosette	A circular arrangement of closely spaced leaves at the base of the plant or at the tips of branches.
Secundiflorous	An inflorescence with flowers arranged on only one side of the main axis.
Sessile	A leaf without a petiole or a flower without a pedicel.
Sheath	A tubular structure formed by the base of a leaf that wraps around the stem; also a type of fruit.
Scabrous	Rough or coarse to the touch.
Spike	A determinate inflorescence with sessile flowers.
Spikelet	A small spike typical of grasses (Poaceae), with two glumes at the base. It may contain one or more flowers.
Stamen	The male reproductive organ of the flower, consisting of a filament and anthers which produce pollen.
Stipules	Appendages usually found in pairs at the base of leaves.
Sporangium	A cavity where spores are produced.
Sporophyll	A leaf that bears sporangia.
Strigose	Covered with stiff, rough hairs.
Strobilus	A cone; a compact structure of sporophylls arranged around a central axis.
Terete	Cylindrical or round in cross-section; used for stems and leaves.
Tiller	Tiller A group of shoots emerging from the base of a single plant, common in grasses.
Trichome	Trichome Hair or hair-like outgrowth on a plant.
Umbel	Umbel A determinate inflorescence in which flowers arise from a single point, each on a peduncle of similar length.

Urceolate Shaped like a small pitcher or urn (e.g., "urceolate corolla").

Valve Each of the parts into which a fruit naturally splits at maturity.

Vesicle A swollen, often spherical structure filled with liquid or air, providing protection to other organs.

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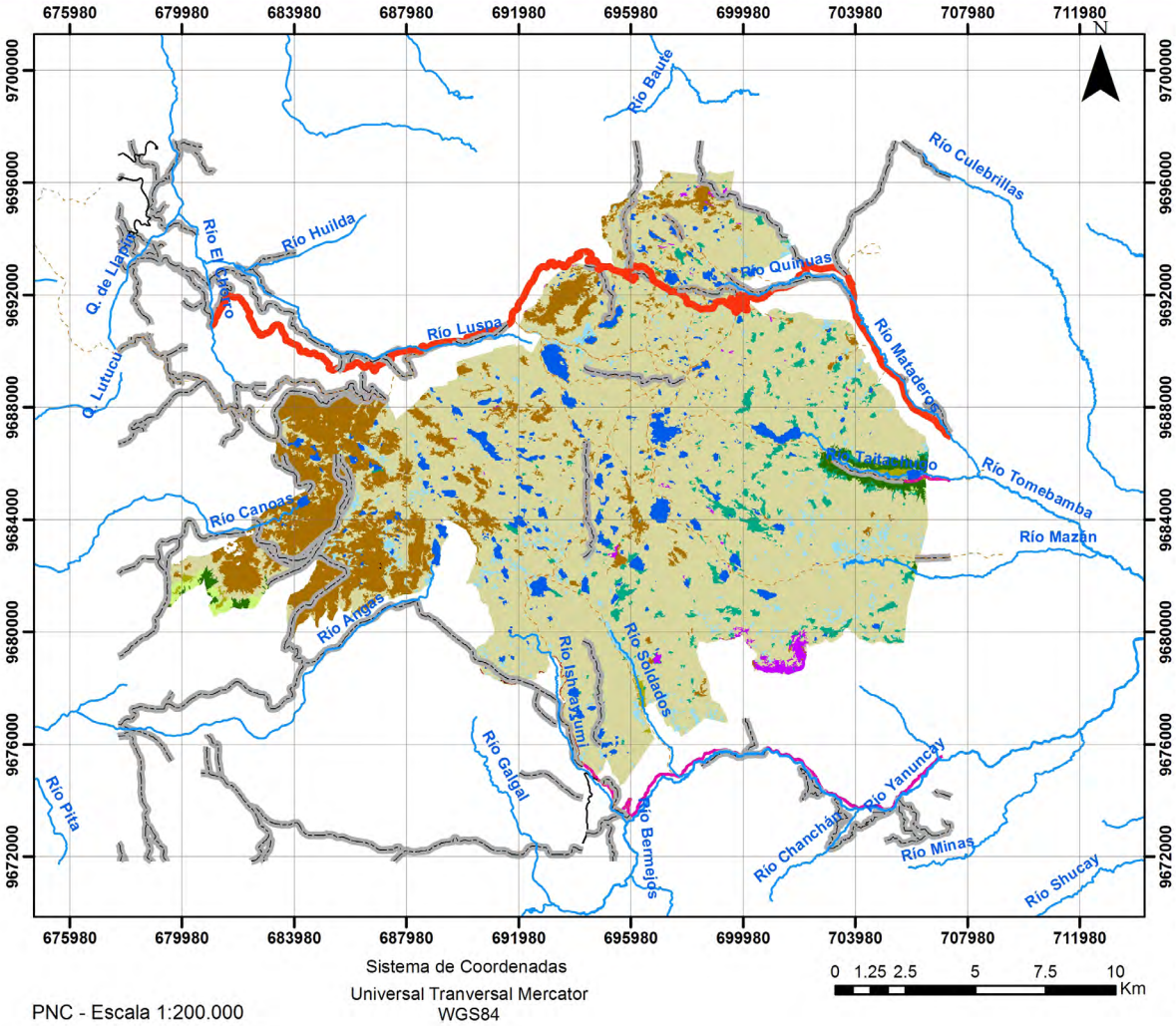




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From left to right: Adolfo Verdugo, Raffaella Ansaloni, Carmen Ulloa Ulloa, Danilo Minga

COBERTURA VEGETAL Y USO DEL SUELO
PARQUE NACIONAL CAJAS



PNC - Escala 1:200.000

Leyenda

- Ríos principales

Vías

Tipo de vía

- Camino de herradura y senderos
- Camino de verano
- Camino lastrado de una vía
- Camino pavimentado de dos o más vías
- Sendero

Uso del suelo - Imagen RapidEye

Agua
- Cuerpo de agua natural

Arbustos
- Arbustos

Bosques
- Bosque natural
- Bosque pluvial subalpino

Pastizal
- Pastizal
- Pastizal cultivado

Páramo
- Humedales
- Páramo de pajonal
- Páramo sobre roca desnuda

Otros
- Área quemada
- Caminos
- Nube
- Sombra
- Suelo degradado

Universidad del Azuay
Mapa base del Parque Nacional Cajas

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