Protected Area Profile – Peru

Pui Pui

Protected Forest

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Location: Department of Junín, provinces of Chanchamayo, Satipo, La Concepción and Jauja
Year created: 1985
Area: 60,000 hectares
Ecoregion: Peruvian Yungas
Habitats: Tropical montane forest, tropical subalpine paramo

Summary

Description

Pui Pui Protected Forest consists of forests with entangled vegetation on very steep slopes and páramo in its highest altitude where vegetation is scarce and the landscape is less steep. It is extremely humid, with cloud forests covered by epiphytes and mosses. It is the source of many important watersheds in the region.

Biodiversity

Studies on the area's biodiversity do not exist. Nonetheless, because it is part of the Andean tropical humid forest, it probably has rich biodiversity and high endemism. The floristic composition is heterogeneous because of high ecological variety. Vulnerable or endangered species probably inhabit the protected area, including cock-of-the-rock (*Rupicola peruviana*) and the spectacled bear (*Tremarctos ornatus*).

Threats

Because the protected area is extremely difficult to access, Pui Pui Protected Forest is not directly threatened. Presumably, cattle ranchers place a certain amount of pressure on the southern part of the protected area, although that does not necessarily amount to a significant threat. Pui Pui has no administration, no director or park guards or budget; as a result there is no vigilance or control. Areas surrounding the protected area continue to be colonized, deforested, and invaded. There is also a certain amount of timber extraction, mostly for fabricating fruit shipping boxes. Mining activities exist in the protected area's zone of influence, as does a growing population. If these activities and tendencies are not controlled, within a few years, they could directly threaten the protected area.

Slopes of the Pui Pui Range, photo © Diego Shoobridge, ParksWatch – Peru

Description

According to Supreme Resolution Number 0042-85-AG/DGFF of January 31, 1985 that declared Pui Pui Protected Forest, it is located in the districts of Vitoc, Chanchamayo and Pichanaki in the province of Chanchamayo; in the district of Pampa Hermosa in the province of Satipo; in the district of Comas in the province of La Concepción and in the district of Monobamba in the province of Jauja, all of which are in the department of Junín. However, recent INRENA maps show that the protected area covers parts of the districts of San Ramón and Perené, but not Comas.

Pui Pui Protected Forest, a true wilderness zone, is located in the Pui Pui mountain range, and is known by nearby townspeople and field hands. The protected area covers 60,000 hectares; its perimeter is 104,600 m.

Physical description

The protected area is mountainous with jungle valleys and ravines that are crisscrossed by streams and torrents. According to Peru's ecological map elaborated by the National Office of Natural Resource Evaluation (ONERN), the protected area is found within the following life zones:

Very humid, Lowland Montane Tropical forest (bmh-MBT)
This life zone is located in the northwestern part of the protected area. Here, average annual temperature varies between 12° and 17° C and the total average precipitation varies between 2,000 and 4,000 mm per year. The actual and potential land use is unfavorable for agricultural or ranching activities, or timber extraction. This entire life zone is considered protected forest.

Very humid, Montane Tropical forest (bmh-MT)
This life zone is located in the western to central part of the protected area. Its maximum annual temperature is 10.9°C and the average minimum annual temperature is 6.5° C. Maximum average precipitation is 1,720 mm and minimum is 840 mm per year. Because this life zone's

topography is uneven and due to its climatic conditions, farming is not an appropriate land use. Instead, its lands should be protected.

Pluvial Lowland Montane Tropical forest (bp-MBT)
This life zone is found in the southern part of the protected area along the left bank of the Antuyo River. Its average annual precipitation is 3,500 mm and its annual average temperature varies between 12°C and 17°C. There are no human populations in this life zone. The topographical and climatic conditions are inappropriate for agricultural, livestock, or forestry activities. This life zone should remain under a protective forest covering.

Pluvial Montane Tropical forest (bp-MT)
This life zone is located in two strips that cross the protected area from northeast to northwest and southeast to southwest. Average annual temperature varies between 6°C and 12°C and average annual precipitation varies between 2,000 and 3,700 mm. This area has no agricultural, livestock, or forestry potential because of its climatic and topographic limitations and it should be protected.

Very humid, Sub-alpine Tropical Páramo (pmh-SaT)
This zone is located in the southwestern part of the area in a thin belt. Its maximum average annual temperature is 6°C and its minimum average annual temperature is 3.8°C. Average precipitation is 1,255 mm per year. The land includes characteristics appropriate for extensive grazing since it contains natural pastures, but because of the topographic and climatic conditions, it has been declared as an intangible zone.

Pluvial, Sub-alpine Tropical Páramo (pp-SaT)
This is found in the central part of the protected area. Annual precipitation fluctuates between 1,754 and 1,820 mm. Average annual temperatures vary between 3°C and 6°C. As with many of the previously mentioned life zones, because of climatic and topographical limitations, these lands should be protected, as they are not appropriate for other uses.

> The páramo is a sort of humid puna. It is very cold and rainy, and generally covered by a cloak of fog that makes this landscape a mysterious place. Located at altitudes of more than 3,000 m, where the air is usually cold and large expanses of grasslands grow along with strange forests of miniature trees: dwarf forests. Their trunks are twisted and always covered by a thick moss layer and they are home to strange creatures…The precipitation and topography help create beautiful lagoons…Páramo vegetation is an enormous sponge that absorbs a large amount of moisture from the zone's characteristic rains and fog. This in turn provides water year-round, which benefits countless people in the populated centers and agricultural zones found at lower elevations.[1]

Climate

In general, the climate is warm and very humid, although there are marked variations as the altitude changes; warm in the lower elevations, temperate to cool in mid- and upper-elevations. Altitude varies between 2,000 and 4,000 meters above sea level. In the southwestern part, there are natural pastures and snow-capped peaks. Exact data on precipitation is unavailable since rain gauges are not found in the protected area. Based on data from nearby stations at San Ramón and Satipo, it is estimated that precipitation varies between 1,300 and 3,500 mm per year. Average annual temperature vary between 6°C and 15°C. These estimates are also based on meteorological readings in San Ramón and Satipo.

Geology

Tectonic processes felt in the area during primary geological times to relatively recent eras have created a geologically complicated structure. Primary lithologic formations present in the area are derived from the tertiary continental, the mid superior cretaceous, the inferior cretaceous, the Paleozoic and the Quaternary time periods.

The area is made up of sedimentary and igneous rocks. Sedimentary rocks cover most of the area and outcrops are frequent in Pui Pui's highest altitudes and peaks. The igneous rocks, mostly granite, are found in the northeastern part of the protected area, in the upper areas of the Ipoki and Pichanaki rivers.

Physiography

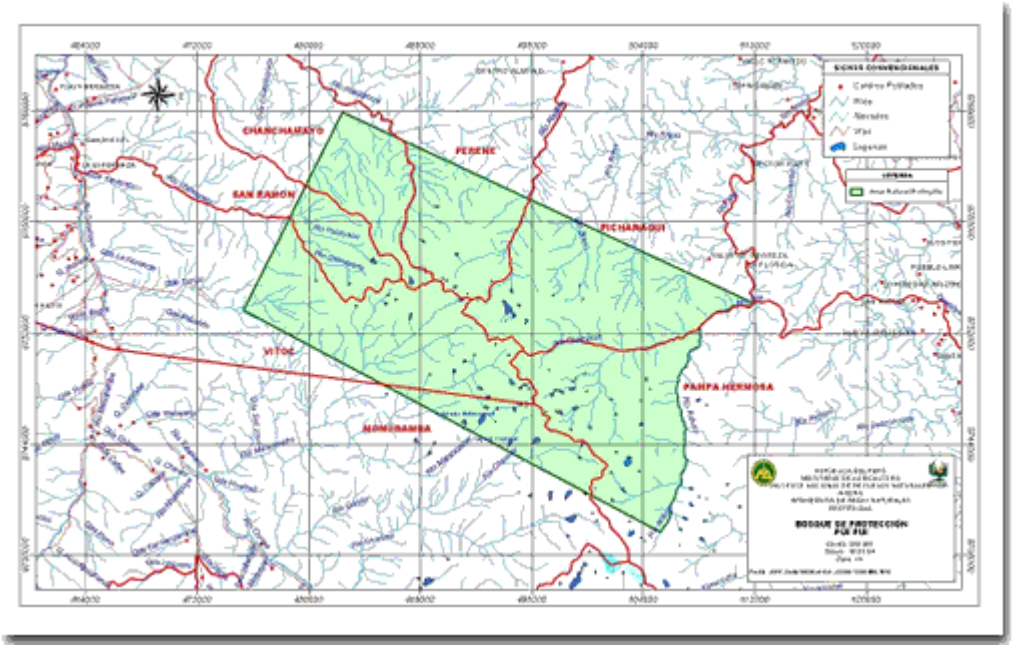
The forest covers a mountainous landscape, of very uneven relief, with severe slopes throughout. The range's divortium aquarum (literally meaning separating of water, more commonly known as the watershed) is located here.

Crystal clear water flowing from the protected forest, photo © Diego Shoobridge, ParksWatch – Peru

The study justifying Pui Pui Protected Forest's establishment classified the area's land use capacity as "protection lands" after taking into account Peru's land classification regulation approved in Supreme Decree Number 0062-75-AG, on January 22, 1975.

Hydrology

The protected area's great hydrological potential was one of the fundamental reasons why it was declared a protected forest. The protected forest's hydrographic basins are made up of the Tulumayo, Huatziroki, Pichanaki and Ipoki rivers, all of which flow into the Perené River. The headwaters of these rivers are in the *divortium aquarum* of the Pui Pui mountain range, making up various sub-basins including the following: Tulumayo River's sub-basins: Shimayacu River, Tunquimayo River, Puyuhuán River, Marancocha River, Colorado River, and Encanta River; the Huatziroki River's sub-basin: Chunchuyacu River; the Pichanaki River's sub-basins: Aladino River; the Ipoki River's sub-basin: Kitihuarero River, Bravo River, Antuyo River, and Chamiriari River.



Map INRENA

Access

The protected area cannot be accessed directly. The western region of the area is reached first by a road uniting San Ramón with Tingo, then by continuing on a smaller road that reaches Chacaybamba. The towns of Vitoc and Chacaybamba are located along this road, from which the protected area is accessed by using existing foot trails or cutting new ones. Currently, the only way to enter the protected forest is on foot, not even mules can access its uneven topography.

In the northern sector, one must first travel via the Huatziroki River and then walk a long way to reach the protected area. This route is very difficult because of the extremely steep slopes. Vehicles can reach the eastern portion of the protected area by crossing the Pichanaki and Ipoki rivers, but then access is by walking only. The eastern side is the easiest way to access the protected area since there is less of a slope and the lands are not as steep.

We were unable to learn of any access routes to the southern portion of the protected area, although we assume that there are cattle/horse paths to the range's puna that are used by herders and cattle ranchers from La Concepción and Jauja.

Biodiversity

"Covered by an eternal fog cover, a mysterious and unknown world is located on the mountain's abrupt slopes. Moisture is the key part of the intricate natural gear within this evergreen territory. Here, the rivers gain strength and descend eastward carrying mountain sediments with them. This land is one of crystal clear waterfalls and creatures as beautiful as orchids."[2]

Flora

The vegetation is made up of a mix of herbs, bushes, and trees of poor quality. There are many thick-growing vegetative species, among them are ferns, rushes, and other ground covers. There are also many bushes, many of which protect the soil. They are small and thick, forming dense masses covered by epiphytes.

Large tree species are scarce because of the altitude. The trunks grow to approximately 25 to 40 cms in diameter and they can reach 5 or 10 m in height. Most individuals have skinny trunks, they are short and deformed, and have small crowns that are sometimes partially dead. Epiphytes abound, almost the entire plant is covered. Mountainous forests prevail.

Because of ecological variety, floristic composition is heterogeneous. Notable species from the Lauraceae family include oaks, walnuts and others, whose extraction is not profitable due to the area's topography and the low volume of harvestable trees.

Epiphytes on the trunk of a tree.

Fauna

Fauna registries for the protected area do not exist; however it is estimated that the principal species of the Peruvian Yungas Ecoregion are present in Pui Pui Protected Forest. The following lists probable animal families:

Birds: Hummingbirds (Trochilidae), tucans (Ramphastidae), parrots (Psittacidae), falcons (Falconidae), finches (Fringillidae), vultures (Cathartidae), curassows (Cracidae), owls (Strigidae), doves (Columbidae), tinamous (Tinamidae), sunbitterns (Eurypygidae), eagles (Accipitridae), new world flycatchers (Tyrannidae), motmots (Momotidae), swallows (Hirundinidae), and cotingas (Cotingidae).

Mammals: Rats (Muridae), armadillos (Dasypodidae), opossums (Didelphidae), bats (Vespertilionidae, Molossidae), pumas (Felidae), ocelots (Felidae), deer (Cervidae), squirrels (Sciuridae), spectacled bear (Ursidae). Reptiles: lizards (Gymnophthalmidae, Iguanidae, Tropiduridae), vipers (Viperidae), snakes (Colubridae, Boidae). Amphibians: Toads (Bufonidae), frogs (Leptodactylidae). Fish: salmon (Salmonidae), (Anostomidae), and (Characidae).

Management

Pui Pui Protected Forest's principal objective is to conserve soil and water resources. Existing forested vegetation in the upper part of the Tulumayo, Huatziroki, Pichanaki and Ipoki river basins are fundamental for soil and water conservation. Vegetative coverage provided by tree crowns nullifies and buffers rainwater's direct impact on the soil thereby impeding or reducing erosion.

The intricate subterranean network of tree and bush roots retains and establishes the soil, increasing the amount of organic material as roots decompose, which facilitates and increases the soil's ability to absorb water. The leaf litter, including leaves, branches, trunks, and fruits in different stages of decomposition and the plants themselves help to reduce the velocity of surface water runoff and lessens the possibility of slides or avalanches.

Another one of the protected forest's objectives is to guarantee a water supply for human consumption and for agricultural or industrial purposes. The protected area helps guarantee water in the Chanchamayo and Perené valleys, where important agricultural lands and populated centers exist. The forest's foliage, root systems, and the leaf litter covering the soil facilitate infiltration, percolation, and water storage. This in turn increases the amount of water available in the rivers originating in this upper part of the watershed.

Administration

The Natural Protected Areas Agency of the National Natural Resources Institute (INRENA) within the Ministry of Agriculture is responsible for Peru's natural protected areas. Law Number 26834, Natural Protected Areas Law passed June 30, 1997, and its corresponding Supreme Decree Number 038-2001-AG of June 26, 2001 regulate their administration. Supreme Resolution Number 0042-85-AG/DGFF on January 31, 1985 created Pui Pui Protected Forest.

The protected area currently lacks administration. It does not have a park director, park guards, any infrastructure or a liaison office. It does not even have a budget. Administratively speaking it has been abandoned. Furthermore, no one really has information regarding the protected area's actual situation. The Natural Protected Areas Agency of INRENA in Lima has an area coordinator who is in charge of coordinating the few issues relating to Pui Pui.[3]

Peru's central jungle region has very few Natural Protected Areas Agency offices. The city of Oxapampa has one office responsible for managing Yanachaga Chemillén National Park, San Matías San Carlos Protected Forest, and Yanesha Communal Reserve. There are also offices in Puerto Bermúdez and the city of Satipo to manage El Sira Communal Reserve. None of the regional offices are responsible for Pui Pui Protected Forest.

Pui Pui Protected Forest's buffer zone has not been determined, which makes managing potential threats in its surrounding areas difficult.

Human influence

There are no land claims within the protected area. This is probably due to the rigorous topographical and climatic conditions and difficult access to the isolated area. This situation could easily change under the right social conditions, such as higher unemployment, or search and hoarding of land, etc., that could force people to enter the protected area. The only existing human presence is temporary in nature; some cattle ranchers enter the southern sector's upper hills during part of the year. There are no plans to grant land to associated businesses or individuals and there are no precarious landholders or invaders.

Town of Vitoc, photo © Diego Shoobridge, ParksWatch – Peru

There are several towns surrounding the protected area that, even though they are far from the protected area's borders, have a certain level of influence in the region. The largest towns with significant economic activities are La Merced and San Ramón to the north of the protected forest. Pichanaki is south of the protected area as are towns like San Juan de Ipoki. The mining towns of Vitoc, Aynamayo, and San Vicente are west of the protected area. There are other towns like Esperanza, La Florencia, Tinco and Chacaybamba found at the farthest reaches of the main access route.

Conservation and research

No studies or research have been carried out in the protected area. The only publication on the protected forest is INRENA's *Justification Study for Establishing Pui Pui Protected Forest,*[*] which we referred to for this profile. No other publications exist, making this uncharted territory when it comes to research.

Threats

Threats to the Pui Pui Protected Forest include:

- Immigration and colonization
- Timber extraction
- Other threats: archeological looting, mining, lack of management, general ignorance of the protected area

Immigration and colonization

There is intense immigration from the Andes to the region. People are searching for new lands to colonize and farm. The coffee crop attracts them and many arrive thinking that they will get rich off of growing coffee. They often start their coffee crop on inappropriate lands. Usually, they cut and burn the forest on steep slopes, generating erosion, sedimentation, and more poverty. Since the soil is relatively unfertile, the migrants have to deforest new areas each year in order to survive off of subsistence farming. Because of soil limitations and improper methods used to plant the coffee crops, colonists usually end up planting corn to feed their chickens and sell whatever excess they grow.

Deforestation on the slopes in areas surrounding the Protected Forest, photo © Diego Shoobridge, ParksWatch – Peru

[*] In Spanish: *El Estudio Justificatorio para el Establecimiento del Bosque de Protección Pui Pui.*

After a certain amount of time, when the land no longer produces, many farmers sell their lands to new immigrants. They do not hold legal title to the lands, but they charge the new migrants for the "improvements" they made to the lands, which usually includes a hut and 2 to 4 hectares of cleared land (i.e. deforested jungle) with some crops planted or in production. They plant mostly corn, plantains, coffee, yucca, and annatto. In the lower valleys, they plant oranges and mandarins. In the mandarin farms, there is a large quantity of mandarins rotting on the ground because the market is far away and prices are low.

In the western part next to the protected area, in the community known as Esperanza close to the district capital of Vitoc, there is intense immigration of Andean inhabitants from Ayacucho and Huancavelica, which are two of the poorest areas of Peru. These people settle in the community to farm. When they cannot purchase "improved" land, they search in the higher altitudes for unoccupied, virgin forested lands that they then deforest and claim. There is a vehicle-accessible road from Esperanza to the lower part of the Shimayacu River. From there, one must continue on foot to the various small agricultural plots and farms. It takes approximately two hours to walk along this trail to reach the last small farm. We observed several new clearings of virgin forest for farming, which shows that there is a strong tendency to clear land closer to the protected area.

According to local inhabitants, this is happening all around the protected area. The area adjacent west of the protected forest is hardest to access, yet the situation here is similar to the area near Shimayacu Creek, La Florida, and Marancocha River. North of the protected area, the same is occurring along Huatzirodi River, mostly because of the La Merced – Perené Highway. Even though the deforestation seen from the highway is still far from the protected area, the degradation process seems to be unstoppable. East of the protected area, again the same thing is happening along the Ipoki and Pichanaki Rivers, where there are more people and secondary access roads. We assume that the people here are the closest to the protected area and their cattle graze on protected area lands.

This situation will get worse because of the lack of migratory control policies and insufficient and inefficient participation of state institutions involved in natural resource management and protection. A large immigrant population threatens the natural protected area's integrity and future. People search for new land and settle in virgin forest. In this way, rural farmers exert constant pressure on the lands, which translates into unregulated use and severe environmental alterations in the region. Migrants almost exclusively dedicate themselves to rudimentary farming and ranching, without any planning or technical management. They plant crops and pasture grasses on steep slopes generating deforestation, severe erosion, and topsoil loss.

Intense immigration to the region and increased human settlements around Pui Pui Protected Forest have also seriously impacted fauna inhabiting areas frequented by people. The immigrants learn how to hunt animals to complement their diets. Their mere presence has scared animals away, but also people are destroying wildlife habitat. Targeted species are no longer found around the human populated centers or along the roads. Nonetheless, because Pui Pui Protected Forest is relatively isolated, it is presumed that within the interior of the protected area populations of highland forest species remain healthy.

Elmer Mapelli showing armadillo meat in a rural home.

If present immigration and deforestation rates continue as they are now, destruction will reach dangerously close to Pui Pui's borders, threatening it. Up until now, no preventative measures have been taken to change the situation. Immigration, subsequent deforestation and habitat destruction will most likely continue over the next few years.

New roads and trails connecting new farms will increase access to the area and at the same time these provide incentive for additional migrants to settle and extract or destroy resources even closer to the protected area.

Soil erosion caused by deforestation and forest destruction on the slopes for agricultural purposes, photos © ParksWatch – Peru

Timber extraction

Forestry resources in the region were exploited during the fifties and sixties when new access roads were built, especially when the region's main highway was built during Manuel Odría's presidency. Today, valuable species are only found in inaccessible areas like Pui Pui Protected Forest and its immediate surroundings. However, advancing population and possible future interest in exploiting the forestry resources, either by timber companies or individual loggers, represent a potential threat to the remaining forest and the protected area.

A truck transporting wood to construct fruit packing boxes, photo © Diego Shoobridge, ParksWatch – Peru

One current threat is increased timber extraction to construct wood fruit packing boxes. All types of trees can be used, even skinny trees. Trunks are cut in a specific way where they are felled and then they are taken to the mills and cut into boards to build the fruit boxes. This is occurring in accessible areas, still distant from the protected area. Chainsaws are used to cut the trees and prepare the wood onsite for easy transport; however, this technique results in significant resource waste and is a poor use of the region's forestry resources.

Forestry resources are not used sustainably. In the lower parts, in the valley surrounding the protected area, the forest has been severely affected and its destruction continues. Forestry activity in mountainous areas causes irreversible changes in the soil and vegetation's ability to retain water. As we could see in the zone, this creates serious soil management problems. Specifically, destruction and disturbance of vegetation on mountain slopes creates water flow problems and soil erosion thereby infringing on the protected area's objectives. This forest cover loss prevents future sustainable use of the productive areas found in the basin's lower zones.

The Technical Administration of Forestry and Wildlife Control (ATCFF) within INRENA's Forestry Agency is responsible for controlling and managing the region's forestry resources. In the central jungle region, the administration has offices in Satipo, Oxapampa, San Ramón, Villa Rica, Puerto Bermúdez, Iscozacín, Ciudad Constitución and Chanchamayo.

According to authorities interviewed for this park profile, recently there have not been any denouncements of illegal timber extraction in Pui Pui. The Technical Administration of Forestry Control conducts patrols to detect and stop illegal timber. In the central jungle area, they have promoted formation of seven forestry management committees as endorsed in the forestry law. Via these committees, the communities participate in timber patrols and controls. They work with lieutenant

Area shaded in pink is deforested.

governments, which are the local political authorities responsible for maintaining order in small towns, who can intervene and immobilize undocumented timber then coordinate with INRENA to determine the fate of the wood. Civil society participation to control and monitor forestry resources is an important mechanism to help INRENA, which lacks funds to do it on their own.

Other threats

Archeological looting

Many people think that there are gold and other riches hidden within Pui Pui's ruins, caves, and lakes. This encourages nearby residents, mostly those from Pichanaki, to adventure into the protected area in search of riches. We learned of several expeditions in which locals take equipment and metal detectors. We were able to interview one resident who had made such a trip and who was planning another expedition soon. Treasure hunters not only destroy existing archeological ruins, they learn more about the territory and could use that knowledge in the future to exploit the area in some way other than for protection.

During our evaluation, we heard that the mayor of Vitoc Municipality was planning a joint expedition with the National Institute of Culture to assess the condition of the Huacrash archeological ruins.[4]

Mining

A large-scale mining operation, the San Vicente Mine belonging to the San Ignacio de Morococha Mining Company, is located next to the protected area's western border. It has mined lead and zinc for more than 30 years. Locals claim that the mine used to dump its tailings directly into the Tulumayo River, negatively affecting and contaminating it. Seven years ago, the company implemented a mining pit to manage the waste, but it is close to the Tutumayo River and the community of Vitoc. This pit takes up a lot of space, and according to locals, it still contaminates the river.

Mining tailings from the San Ignacio de Morococha Mine in Vitoc, photo © Diego Shoobridge, ParksWatch – Peru

Mining activity could increase in the region. Explorations in search of minerals are common throughout protected area's surrounding regions. This represents a threat to the protected area

because it does not have a legally established buffer zone, which makes controlling existing and potential mining activities next to the protected forest difficult.

Lack of management

The fact that the protected area does not have a director, park guards, or anyone in the local INRENA offices is in itself a threat to Pui Pui. Because of this, there is no control whatsoever in the protected forest. If there were illegal timber extraction, deforestation, or territorial invasion, no one would be there to denounce it to the authorities.

In addition, border markers have yet to be installed to clearly identify the protected area's boundaries. This further complicates any future control or vigilance planning or monitoring of immigration into the area, as does the lack of a legally established buffer zone.

General lack of knowledge of the protected area

Immigrants and local governmental authorities have very little environmental awareness and sensitivity. This inhibits their ability to effectively coordinate and make decisions that would help manage the protected area. This is especially true in the case of the Public Ministry, which grants land titles in unauthorized areas, and in the judiciary branch, which does not authorize evictions or sanction land speculators or illegal extractors.

Deforestation contributes to accelerated loss of biodiversity because of habitat reduction and destruction. Immigrants are acutely unaware and lack environmental consciousness. Yet, deforestation's negative impacts directly harm them by reducing their land's productive capability and creating economic impoverishment and social unrest.

People are generally unaware of Pui Pui Protected Forest. Most inhabitants of La Merced and San Ramón and the other districts have no idea that it even exists.

Recommended Solutions

A detailed diagnostic of Pui Pui is urgently needed. The number of inhabitants within the surrounding communities, their legal status, as well as the types of municipal services they enjoy, must be determined. The exact entrance place used by local residents to access the protected area should be identified and the type of use, either extraction, grazing, occupation, should be determined. In addition, inventories and studies on the protected area's flora and fauna are needed. We recommend visiting the eastern side of the protected area in order to understand its situation. Because of difficult access, we recommend a fly over in order to have a better idea of the protected area's general panorama.

Because increased immigration to the region is likely, we recommend forming an immigration prevention and control program. Authorities from towns and communities around the protected area should restrict immigration. Immigrant colonists looking for land should be rejected without considering whether they are strangers or not, or relatives of existing inhabitants. Mechanisms and allies for implementing this type of program should be sought and coordinated. Support

should also be sought from the regional administration or the Public Ministry so that these institutions will adopt the initiative and promote it on a regional level.

Local governmental authorities and institutions should implement land use planning and zoning in the protected area's surrounding region. They should start by establishing a buffer zone to promote sustainable development in the region directly surrounding the protected area in order to diminish future direct pressures. If agriculture, cattle ranching, resource extraction, and human settlements are regulated in the protected forest's surrounding areas, it will be possible to better monitor and control the protected area so that it will not suffer from impacts related to unregulated or unsustainable activities.

There should be control over new agricultural settlements in the region and established farmers should be encouraged to adopt non-traditional development activities like apiculture, ornamental plants, tourism, and agroforestry activities, among others. Actual land use should correspond to its scientifically determined land use capacity, that is, if the land is appropriate for agriculture, or protection, or forestry management, then it should be used accordingly.

An environmental education campaign should be designed and implemented in the local communities as soon as possible. The program should promote general knowledge of the protected area, and include information on benefits for the region and country, its potential and opportunities, its problems, and related development alternatives, among others. The environmental education program should also promote information exchange between different stakeholders and establish local agreements to conserve and develop Pui Pui Protected Forest.

Long-term effective protection of Pui Pui Protected Forest resources depends on two things. First, on the control and management of forestry resources by the Technical Administration of Forestry and Wildlife Control in the protected area's zone of influence and second, on the Natural Protected Areas Agency's implementation of monitoring and control of the protected area.

In relation to the mining activities in the protected area's zone of influence, both INRENA and the Ministry of Energy and Mines should supervise the mining operation's compliance with the environmental laws and environmental management programs (PAMA) to stop contamination and carry out remediation actions to clean up existing contamination.

Management tools must be urgently created for this protected area. First, joint efforts are needed to secure financing for the protected area and a director is needed to conduct initial planning and general management. Pui Pui Protected Forest needs a Master Plan and corresponding programs such as tourism, infrastructure, vigilance and control, etc. The protected area's borders must be finalized and physical demarcation completed to clearly identify Pui Pui Protected Forest's actual borders. Vigilance infrastructure should be built, like watchtowers and control posts.

Before the protected area is implemented fully and while financing is being sought, sporadic vigilance and control actions are needed. Field visits, patrols, and presence within the communities and critical zones are needed. A volunteer park guard force should be formed in several key communities. Because of INRENA operative limitations, coordination with local

municipalities, rural communities, and grassroots organizations is needed so that all help care for and control the protected area and its influence zones.

Field Team (right to left): Omar Carrara López, Antonio Casimiro Aquino, Elmer Mapelli Zucchetti, Miguel Abarca Arias.[5] *Other team members not pictured included Santos Marcañaupa Arohuillca, and Diego Shoobridge.*

Conclusions

Geographic isolation and difficult access have guaranteed Pui Pui Protected Forest's conservation thus far. It is not currently threatened. This could easily change if surrounding agricultural activities and immigration continue. The situation is partially complicated by the fact that it does not have a buffer zone, budget, or administration responsible for its management.

There is intense immigration from the Andes to the region. People are searching for new lands to colonize and farm. They search in high altitudes for unoccupied, virgin forested lands that they then deforest and claim. A large immigrant population threatens the natural protected area's integrity and future. People search for new land and settle in virgin forest. This situation will get worse because of the lack of migratory control policies and insufficient and inefficient participation of state institutions involved in natural resource management and protection.

One current threat is increased timber extraction to construct fruit packing boxes. General lack of knowledge about the protected area inhibits public support favoring its conservation.

A detailed diagnostic addressing Pui Pui's social and environmental situation is needed. Because increased immigration to the region is likely, we recommend forming an immigration prevention and control program. Local governmental authorities and institutions should implement land use planning and zoning in the protected area's surrounding region. An environmental education campaign should be designed and implemented in the local communities. Management tools

must be urgently created for this protected area and joint efforts to secure financing are needed. Before the protected area is implemented fully and while financing is being sought, sporadic patrols and other control actions are needed.

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NOTES

[1] Wust, W. Santuarios Naturales del Perú. Machu Picchu y el esplendor de las selvas de montaña. Peisa/La República 2003. Ecología del páramo. Pág. 38 - 41.
[2] Wust, W. Santuarios Naturales del Perú. Machu Picchu y el esplendor de las selvas de montaña. Peisa/La República 2003. Ecología de los bosques de neblina Pág. 35.
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