



Park Profile - Peru Amarakaeri Communal Reserve

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Location: District of Madre de Dios, province of Manu, department of Madre de Dios and district of Pilcopata, province of Paucartambo, department of Cuzco.

Year created: 2002

Area: 402,335.62 ha

Eco-region: Southwestern Amazonian moist forests, Peruvian yungas.

Habitats: Subtropical humid forests, subtropical rainforest, semi-flooded subtropical rainforest



Summary

Description

Amarakaeri Communal Reserve is located in the department of Madre de Dios between Manu National Park, Tambopata National Reserve and Bahuaja-Sonene National Park. It forms part of an international conservation corridor that includes protected areas in Bolivia and Brazil. It features a typical tropical humid climate, with plains and winding rivers in the lowlands and mountain ranges and deep gorges in the highlands.

Biodiversity

Amarakaeri Communal Reserve has a wide range of life zones and high biological diversity. The forest features varied plant life due to the altitudinal ranges, and a large number of species are found throughout different forest regions. The area is home to species such as the giant river otter, jaguar, black spider monkey, spectacled bear, macaw and helmeted curassow.

Threats

ParksWatch classifies this protected area as **vulnerable**, meaning that there is a high risk that the area will fail to protect and maintain biological diversity in the medium-term future if current trends are not reversed. Amarakaeri Communal Reserve does not have any on-site administration or master plan. This makes the reserve more vulnerable to threats. The most serious threats to the area include gold mining (concentrated in the southeastern corner of the reserve), illegal logging, hunting, excessive extraction of forest resources such as game, fish, fruit and palm fronds, the expansion of the road network around the reserve (both in the area around the Puquiri River and the Itahuanía region), and increased migration to the area.



Chilive River, Photo: Diego Shoobridge

Description

Physical description

Supreme Decree No.031-2002-AG created the Amarakaeri Communal Reserve in 2002. It was originally entirely within the department of Madre de Dios, in the district of Madre de Dios, province of Manu. However, in the maps and technical documents, it appears that part of the reserve is located in the districts of Pilcopata and Quincemil (Department of Cuzco). This discrepancy between the legal technical documents needs to be clarified and corrected to prevent possible conflicts in the future.

There are three major land formations in the reserve: terraces, which cover 50% of the communal reserve; hills, ranging from 700-1,000 meters above sea level (masl) where soil is subject to erosion, which cover 15% of the reserve,; and mountains, ranging from 1500-2500 masl, which cover 35% of the reserve.¹

The reserve contains rivers, ox-bow lakes, lagoons and marshland. The reserve is defined by the sub-watersheds of the following tributary streams along the left bank of the Upper Madre de Dios and Madre de Dios Rivers: Carbón, Salvation, Yunguyo, Adan Rayo, Shintuya, Mochino, Serjali, Mamajapa, Blanco, Chilive; and the Colorado or Karene River and its tributaries Puquiri and Huasoroco.

The area's geology is predominately sedimentary and metamorphic bedrock that formed since the Paleozoic through Quaternary time periods.² The soil in the area has several origins. In the high terraces or areas with low drainage, most of the soil originated from fine alluvial sediment. The soil in intermediate areas originated from fine and deep sediment deposited on medium-altitude hills in ancient times. There are also alluvial soils on the left bank of the Puquiri River, whose sandy and earthen banks are often flooded. Primary soils, or those formed in situ, dominate the hillsides, high hills, and peaks with complex, gully-ridden or steep slopes.³

Climate

The climate varies from semi-hot and humid to hot and humid. Average temperatures range from 23-28°C in the highlands and 25-38°C in the lowlands. Temperatures in the area can plunge to 8-10°C in June and July, during the occasional cold spell known locally as *friaje*, caused by polar winds sweeping over the mountains. Average annual rainfall ranges from 2480 mm in Kosñipata to 3810 mm in Shintuya.⁴

Biodiversity

Amarakaeri Communal Reserve features the following life zones which have created the conditions for its rich biological diversity: subtropical humid forests; very humid subtropical forests; subtropical rainforest; semi-saturated subtropical rainforest, with an abundance of tree ferns and year-round mist.⁵

Flora

Amarakaeri Communal Reserve features: terraced forest, forested foothills, highland forest, and cloud forest on the high peaks on the southern edge of the communal reserve, which forms a protective buffer zone.⁶

The forest is made up of diverse vegetation due to the highly variable altitude. A large number of species are widely distributed through the forest areas. The highland forest is characterized by trees that reach 30 meters, have broad overlapping crowns, and house epiphytes of the araceae family, bromeliads and a diversity of orchids. The understory of the highland forest is noticeably denser than that of the low forest.

The riverbanks are lined with reed species such as cane *Gynerium sagittatum*, *Tessaria* sp., cecropia tree (*Cecropia* sp.), balsa *Ochroma* sp., *Guadua* sp., *Calliandra* sp., *Ochroma* sp.



Botanical species most commonly used by the local native communities include *Jacaranda copaia*, *Ceiba pentandra*, *Hura crepitans*, *Myroxylon* sp., *Dipterix* sp., *Callophyllum brasiliensis*, *Swietenia macrophylla*, *Cedrela odorata*, *Cedrelinga* sp., *Otoba parvifolia*, *Castilloa elastica*, *Ficus insípida*, *Pouteria caimito*, *Pouteria mamosa*, *Euterpes precatoria*, *Jessenia batano*, *Mauritia flexuosa*, *Guilielma speciosa*, *Bactris* sp., *Scheelea cephalotes*, *Iriarteia* sp.⁷

Fauna

The communal reserve features a major diversity of fauna which is typical of the highland and lowland jungle. Mammal species in the area include common woolly monkey (*Lagothrix lagotherica*), red howler monkey (*Alouatta seniculus*), monk saki (*Pithecia monachus*), black-capped capuchin (*Cebus apella*), white-fronted capuchin (*Cebus albifrons*), black spider monkey (*Ateles paniscus*), owl monkey (*Aotus trivirgatus*), squirrel monkey (*Saimiri sciureus*), dusky titi (*Callicebus moloch*), pygmy marmoset (*Cebuella pygmaea*), saddle-back tamarin (*Saguinus fuscicollis*), lowland tapir (*Tapirus terrestris*), collared peccary (*Tayassu tajacu*), white-lipped peccary (*Tayassu pecari*), red brocket (*Mazama Americana*), brown brocket deer (*Mazama gouazoubira*), giant anteater (*Myrmecophaga tridactyla*), giant armadillo (*Priodontes maximus*), Brazilian lesser long-nosed armadillo (*Dasybus septemcinctus*), long-nose armadillo (*Dasybus kappleri*), capybara (*Hydrochaeris hydrochaeris*), and felines: *Pantera onca*, *Felis concolor*, *Felis pardalis*, *Felis wiedi*.⁸ The giant river otter (*Pteronura brasiliensis*), classified as endangered by the IUCN, and the spectacled bear (*Tremarctos ornatus*), classified as vulnerable by IUCN, are also present within the reserve.

The area is home to reptile species such as the yellow-headed river turtle (*Podocnemis unifilis*), yellow-foot tortoise (*Geochelone denticulata*), the spectacled caiman (*Caiman crocodylus*), black caiman (*Melanosuchus niger*), dwarf caimans (*Paleosuchus* sp.), anoles (*Anolis* sp.), snakes such as the bushmaster (*Lachesis muta*), fer-de-lance (*Bothrops atrox*), Amazonian tree-viper (*Bothrops bilineatus*), emerald tree boa (*Corallus caninus*), tropical rat snake (*Spilotes pullatus*), rainbow boa (*Epicrates cenchria*), and Merten's coral snake (*Micrurus mertensi*).⁹ Bird species include macaws and parrots such as *Ara ararauna*, *Ara militaris militaris*, *Ara macao*, *Ara chloroptera*, *Ara severa castaneifrons*, *Ara couloni*.



Blue-headed parrots (*Pinous menstruus*) Photo: C.Kjaerby-Ibis Dinamarca

There is also a large diversity of fish species, including: *Brycon erythroptera*, *Chichlasoma* sp., *Leporinus* sp., *Mylossoma brachypomus*, *Piciratus brachypomus*, *Hidrolicus* sp., *Electrophorus* sp., *Pterygophychthys* sp., *Pseudopimelodus zungaro*, *Pseudoplastystoma* sp., *Rhamdia* sp., *Serrasalmus* sp., *Prochilodus caudifasciatus*, *Plagioscion auratus*.¹⁰

Many species in the area are under some form of human-induced pressure. The ungulates such as Tapirs are pressured by hunting and habitat fragmentation. Giant river otters are affected by habitat disturbance caused by mining, logging, tourism and overfishing. Jaguars are pressured by hunting and habitat fragmentation. The harpy eagle is affected by disturbed habitat, deforestation and a diminished prey base. Cracids, like the helmeted curassow, are also affected by hunting and therefore have low reproductive rates which makes overhunting especially worrisome. Monkeys are also overhunted.¹¹

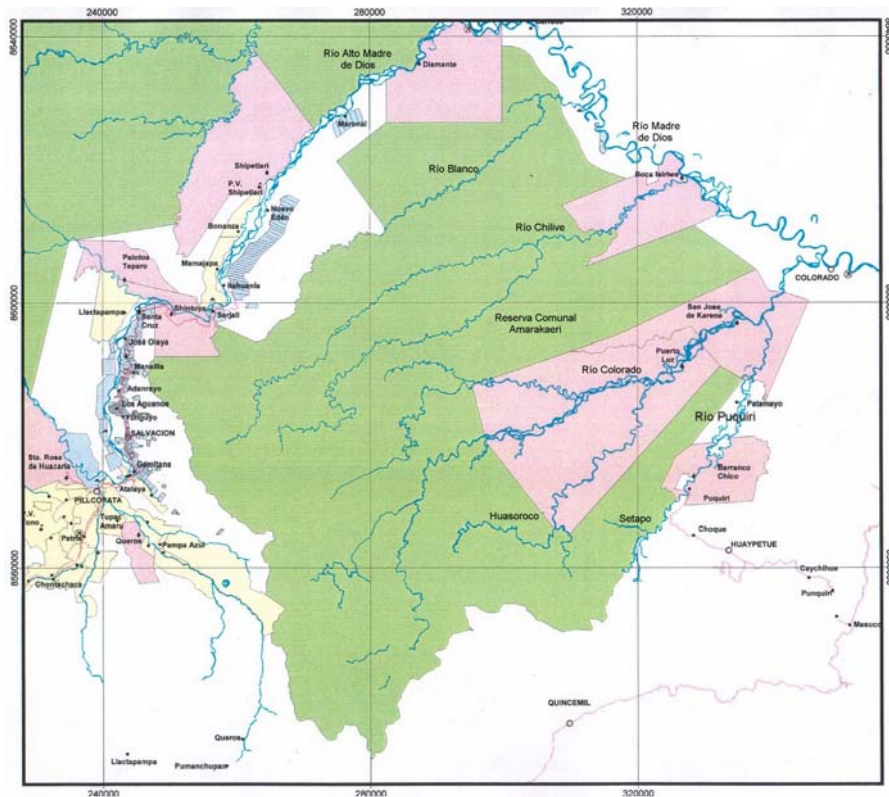
Management

Background

The idea of the Amarakaeri Reserve was conceived in the Harakmbut territory as a defense strategy in the face of growing gold mining activity in the 1980s. It was also conceived as a way to protect the region's biological diversity. The park was created in Year 2000 as a "reserved zone" (Supreme Decree No.028-2000-AG), and then in 2002 it was reclassified to its current form: Amarakaeri Communal Reserve (Supreme Decree No.031-2002-AG of May 11, 2002). The driving forces behind the creation of the protected area were the Amarakaeri Communal Reserve Pro-Recognition and Management Committee together with The Native Federation of Madre de Dios and Tributaries (FENAMAD).

The reserve design excluded areas that were occupied by farmers and/or loggers (with or without formal concession rights), as well as areas that were under State control for possible future expansion of farming and/or logging activities.

The declaration of the protected area as a communal reserve was the result a lengthy process involving local consultations and participatory workshops with native communities and migrants living around the protected area. As a result of the process, 16,803.38 ha were excluded from the protected area, trimming the original 419,139 ha to the size of 402,335.62 ha, because of the presence of 14 existing concessions. After the cutback, only two mining operations entirely contained in the reserve, and two mines partially contained, remain in the reserve. The reduction occurred in the eastern section of the reserve, on the Puquiri River.



Map of Amarakaeri Communal Reserve before modification made near Puquiri River. (The next map shows actual boundaries). Pink shaded areas are native communities' territories. Map: WWF-Peru

The Director's Ruling No. 297-2001-INRENA established the original buffer zone of the first Amarakaeri Reserved Zone. As a result of its categorization as a communal reserve, new borders were established, making it necessary to modify the buffer zone via Director's Ruling No. 282-2002-INRENA.

Administration

Today, Amarakaeri Communal Reserve has no administrative system in place whatsoever. No one is in charge of carrying out an administrative contract. The area lacks a director, park wardens, offices/control posts, a master plan and infrastructure. In addition, no budget has been dedicated for the reserve's administration. The central office of the Intendancy of Protected Natural Areas in Lima has an area coordinator who is in charge of organizing, documenting and planning affairs at the communal reserve. The coordinator is in contact with conservation groups interested in the area, works with indigenous organizations involved, and coordinates the implementation of future mechanisms for the area's management.¹²

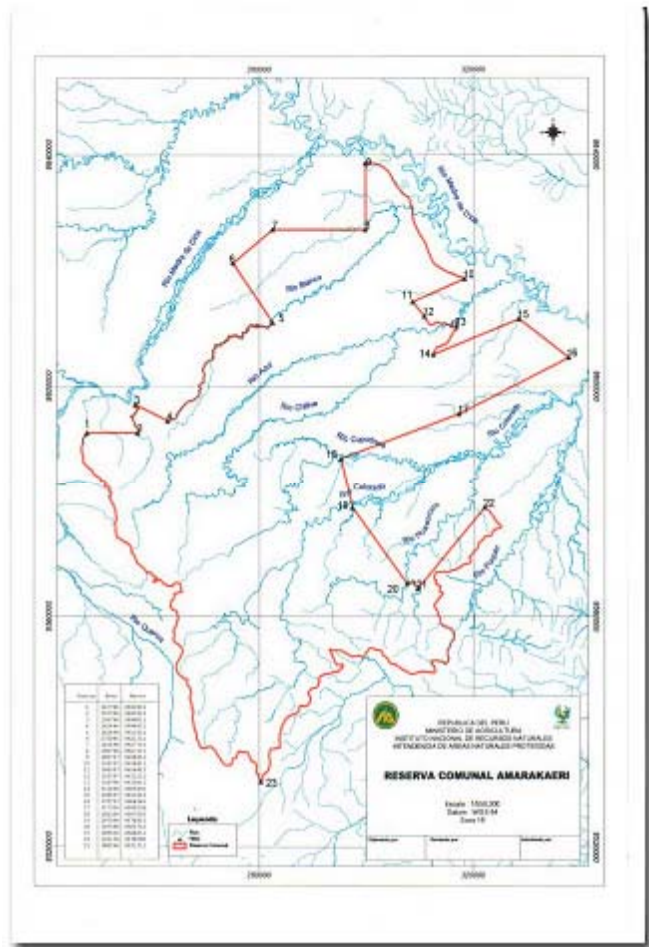
Article 17 of the Law of Protected Natural Areas establishes that the State recognizes and promotes private participation in the management of Peru's protected natural areas. To that end, the State may sign or award contracts to administer the area. These contracts or administration agreements are inter-sectorial management mechanisms which enable non-profit entities to manage and administer an area. Administration contracts with third parties do not remove or lessen the responsibilities of INRENA, or its powers to monitor and audit.

Under the terms of current legislation, management of a communal reserve is run directly by its beneficiaries according to their chosen organizational form. Amarakaeri Communal Reserve needs a person in charge of carrying out the administrative contract who represents all the beneficiaries in the area. The process is still at the early stages and it has a long way to go before it can be consolidated.

Article 125 of the Law of Protected Natural (DS No. 038-2001-AG) further addresses communal reserves, albeit inadequately. This article mentions creating a special administration/management regime for communal reserves, but fails to detail or approve such a regime, leaving it open for interpretation. This complicates the progression of program implementation because it is unknown whether or not this future administration regime will actually come into existence.¹³

Borders

The borders of the communal reserve run from the edges of the native community of Shintuya, through the headwaters of the Blanco Rive. Then it follows the river to the place where the river turns at a right angle towards the edge of Diamante native community, and then follows along the community's limits and then in parallel with the Madre de Dios River at an average distance of 3 km from its right bank. The boundary runs in this direction downstream along the territories of the native community of Boca Isirihue until it reaches the edge of the communities of San José del Karene and Puerto Luz which it borders until it reaches the edge of the community of Barranco Chico, from where the boundary runs south as far as the headwaters of the Puquiri River. From there, the park borders run southeast along the division between the Huasoroco and Puquiri Rivers. The boundary then runs southwest along this watershed divider as far as the mouth of the Huaypetue gully and then follows the division between the Nusiniscato and Colorado Rivers. From here, the border runs along the watershed divider that separates the Queros and Upper Madre de Dios Rivers from the Colorado, Dahuene, Chilive and Azul Rivers, as far as the mouth of the Shintuya gully. The accompanying map shows the limits.



Borders of the reserve are indicated in red. Map: INRENA

The accompanying map shows the limits.

Human influence

The main access road to the western section of the protected area is via the 260 km road that passes Cuzco, Paucartambo, Pilcopata and the native community of Shintuya. Vehicles find it difficult to travel this road in the rainy season. Another key access road enters the area from the east, through the Mazuko, Huaypetue, Choque and Puquiri circuit, which is covered by four-wheel drive vehicles providing a constant service as far as the Puquiri River. There is plenty of river access. The towns of Puerto Maldonado, Laberinto and Colorado are connected by the Madre de Dios River, and Shintuya is connected by the Upper Madre de Dios. From these areas one can reach any part of the communal reserve by river. Access is restricted during the dry season. The town of Diamante has an airstrip where small planes can land. This is mainly used by tourists visiting Manu National Park.

An estimated 3,250 people are settled within the buffer zone of Amaraeri Communal Reserve, between Salvation and Shintuya. This includes those living in neighboring native communities and migrants settlements in Puquiri.¹⁴

There are six bordering communities who actually have titles to land located within the reserve's limits. These communities are: Shintuya, Diamante, Boca Isirihue, San José del Karene, Puerto Luz and Barranco Chico. There is another community found at the mouth of Blanco River which has yet to be officially titled as "community territory" called Puerto Azul or Barraca. The ethnic groups making up the communities are mostly Harakmbut natives. There are also some people from the ethnic groups Yine Yami (or Piro) living in Diamante and a few Machiguenga in Isiriwe. Native communities currently use large tracts of the reserve for seasonal hunting and fishing.

Migrant settlements also influence the reserve. These settlements are found along the access road to Shintuya west of the protected area, from Atalaya, passing through Salvation, Yunguyo, Los Aguanos, Adanrayo and Mansilla as far as Santa Cruz or Kilometer 250, with secondary roads to Pilcopata and Paucartambo. Gold miners live in the area of the Puquiri, Choque and Huaypetue Rivers east of the protected area, with links to Mazuko.

Organization

The "Madre de Dios and Tributaries Native Federation" (FENAMAD) is an organization representing the indigenous population of Madre de Dios. It formulates working policies and elects leaders for congresses among community chiefs. The Harakmbut Council (COHAR) was formed in 1993 as the basis of FENAMAD in the area in a bid to provide better organization for the Harakmbut communities. Later, the COHAR changed its name to Harakmbut, Yine and Machiguenga Council (COHARYIMA) after incorporating these communities into the council.

Migrants living along the Salvation-Shintuya road are organized in a series of associations with varying levels of membership. For example there is the Manu and Kosñipata Forest Extracters Association, the Association of Small- and Medium-scale Agrarian Producers of the Manu, the Manu Livestock Herders Association, the Association of Banana and Pineapple Producers, and the Traders Association (in coordination with the Pro-Manu Project).

Economic Activity and Use of Natural Resources

Agriculture in the area is disorganized, lacks diversity and is low-yielding. The main crops planted in the area are rice, banana and manioc. Maize, citrus fruits, papaya and pineapple are farmed on a smaller scale. Aid programs have provided incentives for growing rice and it has become the leading crop in the entire Upper Madre de Dios area, although it is sold only on the local market. Native farmers run small plots of land with a high diversity of crops including manioc, banana, maize, sugarcane, sweet potato, pineapple, *pijuayo*, *barbasco*, etc. Agricultural yields are small-scale and for subsistence only.¹⁵ Migrant populations rely in part on agricultural production done in Cuzco and on manufactured products.¹⁶

Farmers constantly complain that the land is no longer as productive as it once was, and that crops are prone to disease. The Pro-Manu project¹⁷ has introduced insecticides and fungicides. The project has also promoted monoculture which is susceptible to disease, creating a further dependency on the pesticides. The lack of wood due to over-extraction has forced local inhabitants out of forestry and pushed them into farming. This has led to further clearing of the forest for agriculture. All these factors could contribute to the reason for the farmers complaints.

In 1960's a road was built with the help of the army. At that time, livestock herders also came into the area. There were several attempts at large-scale cattle ranches, but these projects failed. An example of once such failed project was in Shintuya promoted by the Regional Catholic Mission Leadership of Alto Madre de Dios. Conditions in the area do not favor cattle ranching, yet there are still people who persist in promoting it.

Today, lumber and mining are the most important industries in the area. The construction of the road provided loggers access, who have since been operating in the area for years. This has resulted in the disappearance of valuable hardwoods in the area around the road.

Hunting has also traditionally been done on a small-scale and mostly for subsistence. Greater human presence in some areas has scared away the wildlife, meaning hunters have to travel greater distances to find game. Excessive hunting and perturbation have had an adverse effect on the presence of animals near villages and mining settlements. The use of shotguns and the presence of large numbers of miners and loggers in areas near rivers and gullies have diminished the wildlife population throughout the region. Natives now have to take lengthy hunting trips,¹⁸ while migrants tend just to hunt around their fields.

According to comments made by a Shintuya resident, there does exist a certain demand for animal products. Most of the demand is coming from the Paucartambo community. They go to the area looking for macaw or other parrot feathers. Feathers are used in mask- and costume-making for festivals and dances. There is a lesser demand for jaguar pelts.

Fishing is also small-scale and mainly for local consumption. Fish is vital for the natives' nutritional needs as fish provides nearly 50% of the protein in their diet.¹⁹ There is no information regarding fish populations. In the past, when mining was most intense, there was some commercial fishing done by the Diamante residents.²⁰ Today, many fishermen complain that fishing is poor in the area, claiming the low catches are the result of the past dynamite use and the constant use of the *barbasco* poison by native communities. There are apparently less fish today in the Colorado River as a result of mining, while in the Puquiri River, fish have practically disappeared altogether.²¹

The natives also gather non-timber products from the forest such as fruit, insects, fibers, medicinal plants, and palm fronds for building homes. These traditional activities have been affected by the acquisition substitute products available in the modern market. Migrants do not have a tradition of gathering produce from the forest, but have learned to gather *aguaje* fruit, *chonta* palm hearts, palm fronds, and the edible grub "*suri*."

Tourism

Amarakaeri Communal reserve has major potential for eco-tourism. Tourists who come to visit Manu National Park arrive by way of the Pilcopata road, which skirts the edge of Amarakaeri Communal Reserve. Jungle lodges have been built in the area of the Upper Madre de Dios and serve as rest stops after the overland trip before tourists continue downriver to Manu. Tourism in Manu National Park is expensive due to logistical difficulties. In recent years, new lodges have been built in the area which offer their own attractions and circuits, seeking to attract less exclusive tourists and to provide alternatives in Manu.

Between the towns of Atalaya and Blanquillo on the Madre de Dios River, two hours downstream from Boca Manu, there are 15 tourist lodges. Some are owned by established companies and tour operators and others by the local population, who at their own initiative and with an eye on the potential earnings, built their own lodges. Tourism is having an increasing influence in the area, as more people are becoming involved in the activity, learning the trade and risking their own investment in tourist operations.



Tourist area in Diamante community.

The area is also home to the community tourist venture Wanamei, set up under the initiative and management of the local indigenous population with backing from the NGO Racimos de Ungurahui,²² which provides consulting for the operation. The venture has established tourist circuits within the reserve eight neighboring native communities are involved in its operation. The initiative started up in 1998 as part of a bid to provide a sustainable and participatory alternative in the use of the protected area, to create development funds, and provide a source of income for the native communities involved.



*Wanamei near the headwaters of Blanco River.
Photo: C.Kjaerby – Ibis Dinamarca.*

Wanamei's business is autonomous and does not depend on agencies or other tourist facilities. At this point, they are the only tourist company bringing visitors into the communal reserve. They currently operate without INRENA's official authorization.

To spur the tourist trade, the communities have organized an inter-communal committee with a central coordination office in the city of Cuzco. The committee has its own internal regulations, implementation strategies, training programs and monitoring indicators.²³ The program recognizes Amarakaeri Communal Reserve as the heritage of all native communities. It is difficult to implement programs of this kind, because of lack of financing, social conflicts between indigenous communities, and ignorance of the specific legal norms.

The inhabitants of the town of Salvation have a keen interest in tourism. The local technological institute, a higher education entity, teaches tourism as a trade, and two classes have already graduated. The graduates are working to form their own organizations and are making contact with tour operators and agencies in Cuzco.

The local attitude regarding the communal reserve

The local population, in general, recognizes the existence of Amarakaeri Communal Reserve, but is unaware of the details of its goals and objectives or how to deal with activities being carried out within and around the reserve.

Amarakaeri Communal Reserve has not directly affected individual plots of private land. Yet, migrants and miners are wary and distrustful of the communal reserve. Migrants nearby, who are looking to either expand their plantations, enter into forestry extraction or mining activities within the reserve, feel that the reserve is an obstacle to developing their activities. In general, all the migrants who live in the area around the communal reserve are against it. They see the reserve as an exclusion mechanism, which bans access by these people to resources within the reserve.

Mining and logging associations in Huaypetue, Puquiri and Colorado complain that FENAMAD does not coordinate sufficiently with their entities. These associations do not accept the communal reserve and are entirely against it. The population of the district of Huaypetue feels

that the only place they can expand their activities is within the communal reserve, as Huaypetue is surrounded by forestry concessions which curb their expansion elsewhere.

The regional government of Madre de Dios is led by president Rafael Ríos, who has interests in the logging industry. The regional government has with an extraction-based policy and is campaigning against protected areas in general and specifically against Amarakaeri Communal Reserve. Conflicts regarding the reserve could arise in the near future. It is possible that local opposition to the reserve by migrant populations could be pressed into service for political ends.

Conservation and Research

There is a scarcity of research in the area.

Fernandez, M. & C.A. Kirkby (2002). Evaluación del estado poblacional de la fauna silvestre y el potencial turístico en los bosques de Salvación y Yunguyo, Reserva de Biosfera del Manu, Madre de Dios, Perú. Pro-Manu, Cuzco.

Threats

Threats to Amarakaeri Communal Reserve include:

- Gold mining
- Logging
- Use of forest resources
- Expansion of existing road network
- Migrant land grabs

Gold mining

Today, gold mining is concentrated in the eastern corner of the communal reserve, on the Puquiri River and within the buffer zone and on the Colorado River and tributary streams, where there are clandestine gold panning operations within the reserve. The areas of Huaypetue and Choque, some 20-30 km from the eastern edge of the reserve, feature the most intense gold dredging activity in the country, although it is now in decline. There are mechanized mining operations in the area in which miners use front loaders, dump trucks and large platforms for drainage and separation. Mining has had a major environmental impact on the region, as the landscape is littered with large piles of sediment, sterile gravel and stones.

On the Puquiri River, on the eastern edge of the buffer zone of the reserve, semi-mechanized mining operations abound. They use water pumps and medium-sized platforms where gold panning is done by hand. Mining has had an enormous impact on the river, as Huaypetue mechanized operations dump sediment into the Puquiri River along a stretch of several kilometers. The riverbanks are dug up by miners who have settled there. The water is cloudy and the riverbed is covered with fine sediment and sandbanks, making navigation difficult and causing flooding in the rainy season. Flooding, which is becoming increasingly common, carries sediment into other parts of the forest, covering the ground, whereupon the vegetation withers and dies. This represents a major environmental impact.



Ruquiri River, note the sedimentation.



Mining at Huaypetue

The native communities of San José del Karene, Puerto Luz and Barranco Chico suffer the impact of gold mining within their community territories. Mining affects their land as well as hunting and fishing. Migrants have settled in native territory to look for gold, forming small gold panning associations in each site. These land invasions have forced native communities to get involved in the gold-based economy.²⁴ Natives now pan for gold along the riverbanks before anyone can else do so, and travel to areas far from their own territories to prevent others from entering the area.²⁵

The native community of Barranco Chico is a community mixed with Andean migrants who work entirely in gold mining along the Puquiri River, with titled land bordering large-scale mining operations. As in the case of the communities along the Colorado River, Barranco Chico has not only been forced into mining, but has also suffered a major impact from large-scale mining. Large numbers of workers has changed the structure of their community and the pollution of the Puquiri River by mining residuals produced by Huaypetue negatively impact fishing. In the words of the president of the community of Barranco Chico, “miners invade, cut wood, hunt, fish and do whatever they want.”



Semi-mechanized mining in Puquiri River



Gold panning in Puquiri River

Within the communal reserve, in the upper reaches of the Huasoroco River, lies the mining settlement of Huasoroquito. They mainly work in gold panning, which enables them to stay there all year-round. The settlement has an elementary school with an appointed teacher, and 15 families live near the school on a permanent basis.

According to local reports, people in the area of Salvation extract gold from the Upper Azul River, which is within the reserve. There are few people working within the reserve, a family based in the area with 6-8 hired workers are there on a temporary basis, working in small-scale extraction.

The village of Boca Colorado wields a major influence over the area. It is a supply center for miners who operate along the Madre de Dios and Colorado Rivers. The village can only be reached by river, has a population of 250 established families and is a way-station for many involved in mining in the region. To the south, meanwhile, lies the town of Huaypetue, the largest mining settlement in the area with a population of some 3,800 inhabitants. The town can be reached by road and is a trading and distribution center for mining operations in the area.



Colorado Settlement



Dead forest, affected by mining

Logging

Forestry is one of the main business activities in the area and is done in a very rudimentary fashion. It is selective and is aimed at the most commercially valuable species such as mahogany and cedar. It is unknown to what extent logging takes place around the reserve.²⁶ Evidence of logging in the protected area and wood extraction from unauthorized areas shows that the forestry industry does not adhere to the zoning regulations. The department of Madre de Dios is in the process of reordering forestry concessions to organized sectors as established by the Forestry Law.²⁷ This has led to logging concessions being awarded inside the communal reserve as well. These concessions will have a major impact on the protected area. It is possible that wood will be taken from inside the reserve and then “legally” sold through the neighboring concession claiming it came from within the concession. It is also possible that there will be

increased pressure for wood from within the reserve, since in the surrounding areas, forestry concessions will be made to some, but will exclude others.

Selective extraction of fine hardwood, specifically in the area along the road to Shintuya and in the area of Huaypetue, has stripped the forest of valuable wood and made it easier for migrants to enter the area. The current process of wood extraction is not regulated by forestry management plans and has sparked a depletion of wood resources, fragmentation of habitats and impoverishment of the soil. Selective extraction of valuable tropical hardwood in the communal reserve has spurred an informal lumber trade, largely along the road or downriver to Puerto Maldonado.

The wood taken from this area is sold mainly via Shintuya or is sold directly to truck drivers along the road to Cuzco.²⁸ The area is home to many clandestine and informal loggers who work without any kind of permit. They make contact with transport companies, who pay the woodcutters a lower price as they have no logging permits. The trucking firms then contact loggers with permits, concessions or anything that can guarantee them a bill of lading to be able to transport the wood without any problems. Trucks arriving from Cuzco bringing merchandise and various products to the area try not to return to Cuzco empty. The trucks are loaded entirely with wood, because other products such as fruits and vegetables are not as profitable for the trucking firms.



Wood hidden under brush on the side of the road, waiting to be picked up.

Migrants living along the Salvation-Shintuya road see logging as the only profitable business in the short term, and neither look for or know of any other alternative way to make a living. In this area one can no longer find tropical hardwood, forcing loggers to cut down tornillo (*Cedrelinga catenaeformis*) and other common trees. In this area, woodcutters do not take wood from the communal reserve due to the watershed divide, a steep hill which makes it difficult to transport the wood. However, there are reports that Mansilla villagers are taking wood from the mouth of the Shintuya gully. The location of the village of Mansilla near the communal reserve provides greater access to the protected area.

Logging in the native community of Diamante is becoming increasingly frequent due to the fact local inhabitants are cutting mahogany *Swietenia macrophylla*, which can still be found on community land. This community features the largest stockpiles of cut wood, ready to be taken to market. Under the internal rules of each community, each family is authorized to cut a maximum of 7,000 timber feet a year. In Diamante there are several migrants who are married to natives, giving them access to forestry resources in community lands. These people, together with their local native relatives, extract the largest amount of wood. They often ask other

families who do not cut wood to allow them to cut the 7,000 feet to which the former are entitled, in exchange for a fee.

In the community of Puerto Azul Berowe, villagers claim that the lumber trade was more vigorous in previous years. Today, the natives continue to extract wood from the forest on a small scale, mainly to build boats which provides them with a major source of income. The natives claim they cut 6,000 feet a year, but according to Salvation's forestry director, the figure is closer to 20,000 feet a year—a quantity which in the end is not that high. He said problems arise when natives cut wood on behalf of traders, who then launder the origin of the wood.



One villager from Puerto Azul Berowe said the community once denounced loggers illegally entering the Blanco River area, but when community representatives, police and INRENA officials went to the area, they were unable to find the loggers. “Everyone knows that they go into hiding, they have short-wave radio and are aware of every attempt to control them.”

Wood waiting to be picked up along the river when it will be transported to Cuzco.

Villagers in the community of Boca Isiriwe mainly extract tornillo and cedar. They claim that they cut wood within their boundaries, and mostly on the sector of the Madre de Dios River. They sell the wood in the village of Colorado. There is little infrastructure there, and loggers claim that business is not profitable due to low prices. If they make the effort to get the wood to market, they would fetch better prices. The villager said loggers are trying to take the mahogany that still exists in the upper reaches.

The community, San José del Karene, says that they are not engaging in logging activities. The local authorities maintain control and do not allow outside loggers in. In the community of Puerto Luz, there is some logging and a system of financing, but it is on a small-scale and there are only a few residents involved in this economic activity.²⁹ In Setapo (located in upper Puquiri River), some residents extract tornillo to sell in Huaypetue. This wood is used mostly in the construction of mining equipment.

In the available areas surrounding the reserve, forestry concessions have been awarded to companies, several of them formed by local business groups. These forestry concessions surround the villages of Huaypetue, Choque and Colorado. In these villages, one can see that the capacity for expansion to other suitable areas for economic activities is becoming increasingly restricted. Forestry concessionaires will impose a certain degree of control. Faced with this limitation, the communal reserve has turned into a possible area of expansion for Huaypetue and

Choque to be able to continue mining, herding livestock and farming. The communal reserve is seen as the main obstacle to expansion.

In the area of Itahuanía, along the Upper Madre de Dios River, the government is planning to award a forestry concession to people from outside the area, which has local residents worried, as it will cut off their access to these resources. In Itahuanía, villagers claim they are cutting the common tornillo tree, but it is believed that the land to be parceled out as concessions could contain more valuable wood. There is a great interest in this land: to use it for agricultural purposes for people who will migrate here following construction of a road into the area. One group *Edmasse* made up of locals from Itahuanía wants to promote conservation for ecotourism in the area and should lobby for a use change for the solicited concession. WWF Peru has promoted the idea of acquiring a concession with local groups to be used for conservation and eco-tourism. The idea is still far from becoming a reality.

Use of forest resources

In recent years, some species have come under increasing pressure from native and migrant hunters. Species with slow reproductive rates are being hunted to excess. What is more, the area has seen an increase in subsistence hunting as well as for commercial trade.

Studies on hunting in the community of Shintuya show that hunted species traditionally found in the area can no longer be found. Species such as *Tayassu pecari*, *Mazama americana*, *Hidrochoerus hidrochaeris*, *Dasyprocta* sp., *Cebus apella*, *Alouatta* sp., *Aotus trivigartus*, *lagotrix lagotricha*, *Ara* sp. are locally rare. In the community of Shipetiari, downstream from Shintuya on the left bank of the Upper Madre de Dios River, these species are hunted all year-round, as they are more numerous here than in Shintuya.³⁰ In an interview, one villager said he hunted for wild boar, peccary, *sachavaca*, deer, monkeys, partridge, *guam* and helmeted curassow. Every time he sets out to hunt, he said usually brings back a couple of animals. Using the community trail, villagers tend to hunt within the community's lands, a three-hour walk away. The villager admitted that species such as parrots, macaws, *sachavaca* and helmeted curassow are less common today.

The increasing pressure in the use of natural resources by migrant mining, logging, and trader settlements has changed hunting and fishing from a traditional subsistence activity to an intense one, and has introduced high-impact techniques such as widespread use of shotguns for hunting and dynamite and nets for fishing.

Local inhabitants gather a wide variety of products on a small scale and at sustainable rates for traditional use, such as wild fruit, medicinal plants, fibers, etc. They also gather other products on a larger, more intense scale, such as palm fronds, vines, trunks, *aguaje* fruit and *chonta* palm hearts, which involve chopping down palm trees, preventing future harvests and reproduction.

Expansion of existing road network

The road to Shintuya is being extended to the village of Itahuanía, 25 km downstream along the Upper Madre de Dios River with backing by the Madre de Dios Transitory Council for Regional Administration. This road expansion will grant more migrants access to the area, making it easier

to extract and transport wood from the region. This will increase the rate of deforestation and spur greater pressure on wild game hunting, encourages land grabs and the use of currently forested areas for farming purposes.



New trail heading into the forest

From the village of Yunguyo, a trail heads into the reserve. The trail, made by the villagers searching for access to new lands and natural resources, reaches the reserve crossing the hilltops via the Paujil gully. Along the first half of the trail one comes across crop fields and plots of land planted by the local residents. The trail is used by those headed for the headwaters of the Azul and Chilive Rivers, mainly in search of gold. There are few miners, and their activities are done on a small scale.

Until the late 1990s, in the eastern sector of the communal reserve, the road that linked the port on the Inambari River to the village of Huaypetue followed the route carved out by mining operations. Recently a dirt road was built which runs from the Inambari River to Huaypetue, skirting the mining areas and crossing through the surrounding jungle. This recently-built road has already had a major impact in terms of opening up jungle areas to cattle herding. It is not hard to imagine what will happen if the road network were to be extended as far as the communal reserve.

Migrant land grabs

Mining draws the largest number of migrants to the region. Migrants who leave mining operations often do not return to their homelands and stay in the area where they live off farming or logging, often settling on unclaimed lands along the riverbanks or alongside access roads. In many cases, Andean migrants enter indigenous communities by marrying natives, thereby acquiring local rights and access to natural resources such as wood, land and gold.

The arrival of more people in the area will lead to unplanned occupation of lands. The introduction of customs which have little to do with local usage will result not only in inefficient use of lands and natural resources, but also will spur demand for regional development projects, such as road-building or cattle ranching, which go against conservation of natural resources.

Future threats

Increase in disorganized tourism

An increase in tourism has the potential to increase the flow of river traffic in the area, to bring boats to the river and canoes and catamarans on lakes and in gorges. More sites will be used as campsites and more riverbanks will be used for rest stops. This bustle will possibly disturb sensitive fauna species, which are territorial and are scared away by excessive numbers of

tourists approaching their habitats, resting sites or feeding grounds. There will also be larger numbers of trail networks and greater access to the forest.

The invasion of key habitats by tourists affects feeding and social habits of sensitive species, cutting their rate of reproduction.³¹ The intense search for animals by tourist groups will disturb the wildlife. Another side-effect is the custom of collecting turtle eggs on sandy riverbanks by workers at tourist companies.

New lodge construction and the new tourist operations in the buffer zone will produce more pollution from garbage, domestic waste and liquid run-off. The area lacks any facilities to deal with increased waste incurred as a result of increased tourism. Types of waste problems will include: plastic and glass disposal; proper treatment of organic matter (such as food leftovers); human waste (latrines); waste water treatment (available technology is currently only through oxidation pools); detergent disposal; toxic wastes including fuel, motor oil, batteries, paint, insecticides, etc. A lack of technology has already produced physical and chemical pollution in the soil and water in areas around the existing lodges and will only get worse as tourism grows.

Recommended solutions

Gold mining

It is important to gather better, quantifiable data on the actual mining situation in and around the protected area. Visits need to be made to the upper watersheds of the Colorado, Cupudnoe and Huasoroco Rivers to verify mining operations within the communal reserve and visit the buffer zone along the Puquiri River to be able to calculate how many people work in the area.

All the miners working in the buffer zone along the Puquiri River should be registered, the operating permits and contracts need to be checked, and the scale of each operation gauged. Miners must be forced out of the communal reserve and new mining operators must be prevented from starting up within the protected area.

A mining usage plan needs to be designed and implemented to provide guidelines and mechanisms for running mining operations in the buffer zone so as to ensure they do not affect the protected area or the environment. Any master plan created for the protected area must address mining and specify approved locations for mining activities. Unannounced monitoring visits need to be made, above all during extraction seasons, to verify that the corresponding regulations are being obeyed.

Awareness campaigns targeted at miners need to be conducted. The campaign should address issues regarding the protected area, mining, and environmental legislation that applies to them and with which they must comply. The campaigns should also explain the importance of control and monitoring of mining operations by the respective authorities in order to help set expectations.

The administration of the protected area needs to be in close contact with national and regional mining authorities to establish mechanisms for coordination and information exchange.

Logging

The respective authorities must be strict when it comes to enforcing the Forestry Law and the Law of Protected Natural Areas. Forestry concessions in the communal reserve granted under the terms of the forestry law should have to implement environmental impact studies and implement management strategies as requirements for their operation. Design and execution of a management plan should be promoted to the loggers, making logging regulations and expectations regarding compliance clear. INRENA personnel in charge of the forestry sector need to take special care when investigating the origin of the wood they supervise, to prevent wood from being taken inside the reserve or by illegal loggers looking to legalize their operations by selling it through a concession.

In the context of the communal reserve, local participation plays a fundamental role. Participative forestry control over wood extraction should be promoted so that nearby communities can become efficient guardians of their resources. To be successful, it will be crucial to strengthen local organizations and provide ample training. Guidelines and strategies for local control need to be established so as to be efficient and prevent loggers from continuing to illegally extract wood from unauthorized sectors.

In native communities, internal control needs to be strengthened to prevent independent members acting outside community regulations, extracting wood on their own account or together with migrants or loggers. Particular attention is needed for migrant members or non-native migrants who have gained access to the communities, to ensure they do not surpass corresponding extraction quotas, and that they operate according to established rules and sustainable criteria.

More research is recommended on the current status of the forests and forestry resources in native communities around the protected area.

Use of forest resources

In fishing and hunting, local inhabitants need to have at least a basic knowledge of the biological and ecological characteristics of the species most heavily hunted and fished, including details such as reproductive seasons and habitats, local migration, feeding habits, etc. Based on this information, communities around the protected area can then establish appropriate hunting and fishing regulations such as sustainable quantities, volumes and catch sizes, seasonal bans, restricted activity in critical habitats, territorial zoning and restrictive mechanisms, all set by local consensus.

Necessary incentives need to be established to set up monitoring and control mechanisms among the communities. To do this, professionals and aid institutions will need to provide advice and training. The hunting management plan needs to consider ideas such as seasonal species bans, banning hunting of animals caring for their young, rotating approved hunting grounds, restricting the use of firearms, breeding wild animals, and limiting commercial hunting.

To ease the pressure of hunting in the communal reserve, the communities need to assume responsibility for managing and controlling habitats and key plant species for fauna within their

own community lands. Territorial zoning is needed for areas depending on community management and regulation of hunting through social consensus mechanisms.

In fishing, particularly commercial fishing, local inhabitants must establish and respect catch sizes and weights. With the help of professionals and institutions, the communities need to organize their own control mechanisms, marking out areas and fishing seasons, and preventing outsiders from entering the protected area.

To regulate palm fruit and frond gathering, collectors must be prohibited from chopping down trees for harvest. There are tools and basic mechanisms that can help inhabitants to climb the trees, and these tools should be promoted and made available to the communities. A parallel alternative is to promote palm tree plantations to supply the produce that is in demand. Information needs to be made available on more sustainable techniques for harvesting and gathering palm fronds, trunks, and fruit to supply the local population with food and construction materials without having to destroy the source of these resources.

Expansion of existing road network

There is ample evidence throughout the world of the impacts caused by roads in tropical forests. Construction of access roads around the communal reserve must be stopped. Local authorities, local and regional governments and development entities, must be informed of the impacts and disadvantages of expanding the road network in the area. Regional consensus must be achieved on the idea of halting construction of further access roads into the area.

Work on the expansion of the Shintuya-Itahuanía road must be halted, and the road must not be extended to other areas, such as Nuevo Eden and Diamante, that are exerting pressure to gain road access. River transport, which has been an effective means of transportation for years, should continue and should be promoted to residents and local authorities.

Particular attention needs to be paid to the area east of the communal reserve, in the area of Huaypetue, where the population wants new access routes into the jungle to be able to extract resources and to be able to prepare land for farming and mining operations. The expansion of the road network for transport mining personnel and traders in the area of Puquiri is particularly worrisome. This road network runs through gullies in order to reach mining operations near the communal reserve and titled indigenous lands. It is foreseeable that the road network leading to the area around the Puquiri River could be extended in the near future, crossing land inside the communal reserve. The same could happen in the village of Setapo, in the headwaters of the Puquiri River, where the expansion of the network of dirt roads will become a reality in the short term.

Migrant land grabs

There is a possibility that in the medium-term the area will see an increase in the migrant population who flock to the area to farm the land. Country-wide awareness campaigns should be conducted showing that an increasing population in remote areas goes against the efficient distribution of natural resources. Long-term established communities could be educated about the disadvantages of overpopulation in the area, which may result in fewer migrations of family

members from Andean regions to the Amarakaeri region. Massive information campaigns need to be carried out to underscore the disadvantages of settling in the area so as to discourage potential migrants.

Monitoring needs to be done to track new settlement and current populations in zones around the protected area. More detailed knowledge about the number of settlers, how settlements are created, and how they gain access to local resources is needed. At the same time, more insight into the values, attitudes and practices of migrant communities is needed in order to discover how they make use of their natural resources.

Monitoring needs to be done in the sector between Maronal and Diamante to gauge whether the migrant population has increased due to the expansion of the road to Itahuanía. Similarly, the sector around the Puquiri River needs to be monitored in terms of population growth. Information is also needed regarding how many miners have migrated to areas around the protected area and have stayed in the region. No new settlements should be allowed along the Puquiri River. Local leaders need to coordinate closely with Huaypetue Town to prevent future migration and the construction of new settlements around the communal reserve.

Increase in disorganized tourism

Research must be done to identify indicators to gauge the impact of tourism at various attractions inside the communal reserve visited by tourists. These indicators should include tourist infrastructure, behavior along trails in observation sites, disposal of waste and run-off, storage and management of fuels, river transport, relations with the local community and others.

Animal populations that are sensitive to human presence need to be monitored. Rules and regulations must be established to govern the behavior of tour operator personnel and tourists during their stay in the area. The presence of campsites in sensitive riverbank areas should be limited.

Training programs are urgently needed for tour operators and guides. More inter-institutional coordination is needed between tour operators, development entities, authorities and the local population. Tourism needs to be more vigorously promoted for the communal reserve. With backing from NGOs and INRENEA, the local population can implement appropriate tourism control mechanisms.

Conclusions

Amarakaeri Communal Reserve is home to beautiful landscapes and a wealth of flora and fauna distributed throughout various life zones. Its geographic location makes it part of a conglomerate of protected areas in Peru's southern jungle (Manu National Park, Bahuaja Sonene National Park, Tambopata National Reserve, the Upper Purús Reserved Zone, Otishi National Park and its two neighboring communal reserves), forming an international conservation corridor including protected areas in Bolivia and Brazil.

Within the communal reserve there are two settlements, Huasoroquito and Setapo, and an undetermined number of gold panning settlements. The buffer zone is heavily-populated, above

all in the area around the Puquiri River to the east of the reserve and along the Cuzco-Salvation-Shintuya road. The communal reserve is currently highly vulnerable. The area has no administrative infrastructure or capacity, no director to head the reserve, no master plan and no management committee.

Amarakaeri Communal Reserve has become an experiment of cultural revalidation linked to the traditional management of natural resources by surrounding native communities.

To help improve the management of Amarakaeri Communal Reserve, the indigenous organization COHARYIMA needs to be bolstered. In addition, training needs to be provided for those in charge of the handling the administration contract for the communal reserve.

Bibliography

Technical Report on Amarakaeri Reserved Zone. Agriculture Ministry, National Institute of Natural Resources, General Department of Protected Natural Areas and Wildlife. June 2000.

FENAMAD, 1999. Proposal to Create Amarakaeri Communal Reserve - Technical Report. Madre de Dios.

Peruvian Society for Eco-development and the Peruvian office of the WWF SPDE/WWF, July 2001. Education and Communication Plan for Conservation in the Area of Connectivity Manu-Bahuaja Sector 1/Proposal for validation.

NOTES

¹ Technical Report on Amarakaeri Reserved Zone. Expediente Técnico Zona Reservada Amarakaeri. Ministerio de Agricultura, Instituto Nacional de Recursos Naturales, Dirección General de Áreas Naturales Protegidas y Fauna Silvestre. Junio 2000. Pag. 9.

² Ibid. Pag. 10.

³ Ibid. Pag. 12-13.

⁴ Ibid. Pag 8.

⁵ Ibid. Pag. 16-17.

⁶ Ibid. Pag. 18.

⁷ Tables: Species in Amarakaeri Communal Reserve. Especies de Flora Dicotiledónea Usadas por los Nativos de la Reserva Comunal Amarakaeri y Especies de Flora Monocotiledónea de Uso Común en la Reserva Comunal Amarakaeri. Federación Nativa del río Madre de Dios y Afluentes FENAMAD, 1992.

⁸ Mammal species in Amarakaeri Communal Reserve. Especies de Mamíferos de la Reserva Comunal Amarakaeri. FENAMAD, 1992.

⁹ Table: Reptile species in Amarakaeri Communal Reserve Especies de Reptiles de la Reserva Comunal Amarakaeri. FENAMAD, 1992.

¹⁰ Table: Fish Species of the Amarkaeri Reserve Especies de Peces de la Reserva Comunal Amarakaeri. FENAMAD, 1992.

¹¹ Metas de Conservación para los Elementos de la Biodiversidad Focal Priorizados. SPDE/WWF, 2001.

¹² Coordinadora en Lima de la Reserva Comunal Amarakaeri: Cecilia Cabello Hcabello@inrena.gob.pe Telf. 511 2251055.

¹³ Article No. 31 of the Natural Protected Areas Law establishes that in the respective administration agreements, details of the functions of the administrator need to be outlined. This means that it is not necessary to explicitly and legally describe the competencies or responsibilities of the administrator.

¹⁴ Information gathered during the site visit, March-April 2003.

¹⁵ Expediente técnico. OP.Cit. Pag. 23-24.

¹⁶ Sociedad Peruana de Ecodesarrollo y WWF Oficina de Programa Perú. SPDE/WWF, julio 2001. Pag. 40.

¹⁷ El Proyecto Promanu es un programa de desarrollo financiado por la comunidad europea. En el 2003 está culminando una fase de cinco años de trabajo en la zona, en la que ha implementado actividades de apoyo en infraestructura a la administración del Parque Nacional del Manu y asesoría, semilla y servicios a los agricultores locales. El proyecto ha sido de gran envergadura y actualmente posee importantes activos como motores, botes, camionetas, etc. En el momento de la visita de campo el proyecto entraba a una fase de evaluación para la posible implementación de una siguiente etapa.

¹⁸ Sociedad Peruana de Ecodesarrollo y WWF Oficina de Programa Perú SPDE/WWF, julio 2001. Plan de Educación y Comunicación para la Conservación en la Zona de Conectividad Manu – Bahuaja Sector 1/Propuesta para validación. Pag. 39.

¹⁹ SPDE/WWF, 2001.

²⁰ FENAMAD, 1992.

²¹ Author's personal observation.

²² Contact: Lily La Torre HUngurahui@ungurahui.com

²³ See Claus Kjaerby's Ecotourism Guide to the Amazon: [Guía Ecoturismo en la Amazonía](#) de Claus Kjaerby. Hwanamei@terra.com.pe

²⁴ SPDE/WWF 2001. Pag. 43.

²⁵ Field observation.

²⁶ SPDE/WWF 2001. Pag. 47.

²⁷ Artículo 10 de la Ley No. 27308, Ley Forestal y de Fauna Silvestre, 2000. Artículos 80 al 124 del Reglamento de la Ley Forestal y de Fauna Silvestre DS No. 014-2001-AG.

²⁸ FENAMAD 1992.

²⁹ The financing system is found throughout the Peruvian Amazon. The logging company (or other logger middle-man) provides an advance payment, in the form of consumer products, fuel and tools to the natives so that they can extract timber. When the native people turn in the timber, the financier discounts the advances and pays the indigenous person a price that he decides. In this relationship, the indigenous people are tricked, exploited and receive minimal benefits.

³⁰ Landeo, C. Informe de campo de la presión de caza en la zona de uso múltiple. SPDE/WWF, 2000. Inédito.

³¹ Landeo, C. Análisis de las amenazas a la Reserva de la Biosfera del Manu: Sector amazónico. 2000. Inédito.