# Allpahuayo Mishana Reserved Zone: What it takes to make a protected area function in the Peruvian Amazonia?

# Zona Reservada Allpahuyao-Mishana: ¿Cómo lograr un área protegida funcional en la Amazonía Peruana?

**Sanna-Kaisa Juvonen[1] & José Alvarez Alonso[2]**

[1]Amazon Research Team, University of Turku, Department of Biology, FIN-20014 Turku, Finland, skj@iki.fi, corresponding author
[2]Instituto de Investigaciones de la Amazonía Peruana, P.O. Box 784, Iquitos, Perú
jalvar4@lsu.edu

**Abstract**
Peruvian Amazonia is one of the most diverse regions in the world due to the high heterogeneity of habitats derived from different edaphic and ecological conditions, resulting in a real mosaic of different environmental conditions and being reflected in a very diverse flora and fauna.

The area near the city of Iquitos is characterized by a great variety of different environmental conditions clearly demonstrated in the variability of forest types in the recently created Allpahuayo-Mishana Reserved Zone.

Biodiversity continues to be threatened in the area of the Reserve due to habitat destruction for agriculture, extraction of wood as firewood and as construction material, selective extraction of certain woods for saw mills, uncontrolled hunting and fishing, selective cutting of fruit trees and extraction of other forest products.

Several lines of action can be planned to combat the threats to biodiversity:
1) environmental education;
2) development of alternative uses, e.g. sustainable tourism and recreation;
3) involvement of local people in the conservation;
4) development of management plans for resources used;
5) resolving the land ownership and use and resource use rights issues and conflicts.

**Resumen**
La Amazonía peruana es una de las regiones más diversas en el mundo. Uno de los factores que más contribuye a su excepcional diversidad es la alta heterogeneidad de hábitats, derivada de condiciones edáficas y ecológicas diferentes y que resulta en un verdadero mosaico de condiciones ambientales, lo que a su vez se refleja en una flora y fauna muy diversas.

El área cercana a la ciudad de Iquitos está caracterizada por una gran variedad de condiciones ambientales diferentes dentro de un área relativamente pequeña. Esta heterogeneidad de hábitats está claramente demostrada en la variabilidad de tipos de bosque en la recientemente creada Zona Reservada Allpahuayo-Mishana.

La Reserva es única por: 1) la diversidad excepcional de ecosistemas, incluyendo la concentración más extensa conocida en la Amazonía peruana de bosques sobre arena blanca, y 2) la gran diversidad a nivel de cada ecosistema, la que está reflejada en la riqueza de especies

dentro de los hábitats y en la presencia de muchas especies únicas, raras y de distribución restringida.

La biodiversidad continúa siendo amenazada en el área de la Reserva por actividades humanas: destrucción de hábitat para agricultura, extracción de leña y madera para construcción, extracción selectiva de madera para aserrío, caza y pesca no controlada, tala selectiva de arboles frutales y extracción de otros productos del bosque distintos a la madera.

Algunas líneas de acción pueden ser planteadas para combatir la pérdida de la diversidad biológica:
1) educación ambiental;
2) desarrollo de usos alternativos, ej. actividades de turismo sostenible y recreación;
3) involucramiento de gente local en la conservación;
4) desarrollo de planes de manejo para los recursos utilizados;
5) resolución de los conflictos de propiedad, uso de la tierra y derechos de uso de los recursos.

La investigación hoy en la Zona Reservada trata de producir modelos de desarrollo sostenible en que el uso racional de recursos va mano a mano con la protección de los ecosistemas.

## Introduction

Peruvian Amazon is one of the most diverse regions in the world. It is now understood that the environmental heterogeneity is much greater than what it was thought to be before (Tuomisto et al. 1995), resulting in a real mosaic of different environmental conditions, and as a consequence, in a very diverse flora and fauna. Among the factors that contribute to this exceptional diversity is the high heterogeneity of habitats derived from different edaphic and ecological conditions (Terborgh 1985; Gentry 1986; Ruokolainen & Tuomisto 1993, 1998; Tuomisto et al. 1995). This heterogeneity is due to past and present landscape forming processes and is one of the most characteristic features of Peruvian Amazonia, making it a unique area within the Amazon Basin. Here many different types of vegetation can be found in a small area, as vegetation grows on soils that are formed from sediments of different origin, age, nutrient content, texture and state of erosion. This diversity of soils is caused by a series of ecological and historical factors, including processes like river dynamics (changes in courses of the rivers), and geological phenomena related to the tectonics and the subsequent uplifting of the Andes (Linna 1993; Räsänen 1993; Räsänen et al. 1987, 1990, 1998).

The area close to the city of Iquitos (located in the northeastern part of Peru) is characterized by a great variety of different environmental conditions. The variation in soils, geomorphology, different properties of the rivers, fluctuations in the rivers, and other factors make the environmental conditions vary significantly within the area. The fauna and flora reflect this heterogeneity of environmental conditions. When these conditions occur simultaneously within a relatively small area the result is a unique landscape within Peruvian Amazonia and in the world. This heterogeneity of habitats is especially demonstrated in the great variability of forest types in the Allpahuayo-Mishana Reserved Zone, located about 22 km southwest from Iquitos.

However, there is a great demand of the biological resources of the area by the urban population of Iquitos with its 300000 inhabitants, the largest city in Peruvian Amazonia. This demand puts the biological diversity at a great risk, threatening to drive into extinction endemic plant and animal species.

We argue in this article that the Allpahuayo-Mishana Reserved Zone is a high priority for conservation. We also take a look at the current threats to the biological diversity in the area and

make some suggestions in order to make this unique protected area function in Peruvian Amazonia.

## Charcteristics of Allpahuayo-Mishana Reserved Zone

The area in the vicinity of Iquitos is one of the most heterogeneous regions in Amazonia, where numerous different forest types are found within a relatively small area. In March, 1999, the Allpahuayo-Mishana Reserved Zone was established, consisting 57000 ha, to protect the great biodiversity and variability of ecosystems within the Reserve. Two characteristics make the area unique: 1) the exceptional diversity of ecosystems, including the largest concentration of white-sand forests known in Peruvian Amazonia, and 2) the great diversity at the level of each ecosystem which is reflected in the richness of species within habitats and in the presence of many unique and rare species, and species of restricted distribution. The area exhibits forest types that harbor species that do not occur anywhere else.

Many of the occurring species only inhabit certain white sand forest types and are thus depended on the continued survival of these habitats (Anderson 1981; Oren 1982; Jordan 1985; Richards 1996). For the conservation of biodiversity in the area it is of utmost importance that all types of forest mosaic are preserved. There are numerous species which have only recently been found, e.g. 15 species of birds are found in the area that are specialists of white sand forests or are in this area restricted to them, including one species that is restricted to the forests inundated by black water rivers. Of these 15 species nine are species not previously registered in Peru, and up to five or six species of them are new to science (Whitney & Alvarez, 1998; Alvarez & Whitney 2001; Isler et al. in press).

The plant life in Allpahuayo-Mishana is among the richest in Peru, with more than 1900 species known today. Some 40 species are endemic to the area or have a very restricted distribution in Peru; these plant species are generally specialists of white sand forests or forests flooded by black water rivers (Vásquez Martínez 1997; Alvarez et al. 1999).

## Challenges to conservation

The establishment of Allpahuayo-Mishana Reserved Zone helped, to some extent, to stop the destruction of forests in the area. However, the biodiversity continues being threatened as the area is located in the vicinity of the big city of Iquitos, which poses significant challenges to the functioning of the Reserve, as the pressure to use the area is considerable. There are several human activities that have a negative impact on the biological diversity of the area: habitat destruction mostly for agriculture, extraction of wood as firewood and as construction material, selective extraction of certain woods for saw mills, uncontrolled hunting and fishing, selective cutting of fruit trees and extraction of other forest products.

The Nanay River Basin, where the Reserve is located, has been for decades the warehouse of natural resources destined to the Iquitos market. In many cases, these resources are being exploited by users from the city in an uncontrollable and at times illegal manner, and to the detriment of the local communities, that are forced to see their forests and oxbow lakes being destroyed and used to the benefit of others having no legal instruments to stop that. There is no organized management of any of the resources used, save attempts by the local communities to protect the resources closest to their villages. Lack of real knowledge of basic ecology of most of the species used as resources hinders management efforts.

## Conservation strategies

One of the main tasks for this protected area is to protect its unique characteristics, notwithstanding the importance to guarantee the local communities possibilities of survival in their traditional places. Sustainability of the Reserve in the long run will only be achieved through involvement of the local population in the management of the area and them becoming guardians of their own territories and resources. It is important to find alternative uses, that are sustainable and in tune with capacity of the ecosystems. Subsequently, these uses must be promoted both for subsistence and commercialization, as it is increasingly possible to enter the certified products to the international "green" market. Based on these alternatives it is possible to design management plans for the resources in which the local communities are key players.

However, the management plans are only viable if there is enough knowledge on the functioning of the ecosystems, on the conservation status of the resources and the sustainability of their use. As this knowledge is still very much lacking it is important to invest in research in order to have a sound basis for management plans.

One of the most promising indirect uses is sustainable tourism in the Reserve as long as carrying capacity of the ecosystems is taken into account in planning the tourism activities. As the Reserve harbors such an array of unique species and ecosystems, and is so close to Iquitos and its international airport, it has a potential of becoming a major tourist attraction. It is important to guarantee that the local communities can be shareholders in the tourism activities thus generating direct benefits for them from the conservation of the local biodiversity.

As the Reserve is readily accessible from Iquitos either by road or by river, many extractors enter into the area to use the resources. This generates the problem of rights of use as the local communities are affected by the outsiders using resources in their territory. In the short term, one of the most urgent problems is to resolve the land ownership conflicts and use questions along with the rights of use of the resources in order to make the local communities partners in the conservation of biological diversity.

## Conclusions

Allpahuayo-Mishana Reserved Zone is a unique area within Peruvian Amazonia due to the mosaic of different environmental conditions in a close proximity, resulting in a great diversity of habitats and species. The area deserves to be protected for its exceptional characteristics. The current studies in the Reserved Zone are aimed to produce possible solutions to some of the conflicts between the resource use and conservation and to understand the biological basis of the functioning of the ecosystems in the Reserved Zone in order to achieve better management of the protected area.

## References

Alvarez Alonso, J. & B.M. Whitney. 2001. A New *Zimmerius* Tyrannulet (Aves: Tyrannidae) from White Sand Forests of Northern Amazonian Peru. *Wilson Bull*. **113(1)**: 1-9.

Anderson, A.B. 1981. White-sand vegetation of Brazilian Amazonia. *Biotropica,* **13(3)**: 199-210.

Alvarez, J., P. Soini, C. Delgado, K. Mejia, C. Reyes, C. Rivera. J.C. Ruiz, J. Sanchez & L. Bendayan. 1999. Evaluación de la diversidad biológica en la Zona Reservada Allpahuayo-Mishana, su estado de conservación, y propuesta de categorización defintiva. IIAP. Iquitos, Peru.

Gentry, A.H. 1986. Endemism in tropical versus temperate plant communities. Pp 153-181 in: M.E. Soule (ed.). *Conservation Biology: the science of scarcity and diversity*. Sinauer, Sunderland, Massachusetts.

Isler, M.L., J. Alvarez Alonso, P.R. Isler & B.M. Whitney. In press. A Review of the *Percnostola rufifrons* complex (Passeriformes; Thamnophilidae) with a Description of a New Species from Amazonian Peru.

Jordan, C.F. 1985. Soils of the Amazon Rainforest. Pp 83-105 in: G.T. Prance & T.E. Lovejoy (eds.). *Key environments: Amazonia*. Pergamon Press, Oxford.

Linna, A. 1993. Factores que contribuyen a las características del sedimento superficial en la selva baja de la Amazonía peruana. Pp 87-97 in: R. Kalliola, M. Puhakka & W. Danjoy `(eds.). *Amazonía peruana: Vegetación húmeda tropical en el llano subandino*. PAUT & ONERN, Jyväskylä, Finland.

Oren, D.C. 1982. Testing the refuge model for South America: A hypothesis to evaluate discrepancies in refuges number across taxa. Pp 601-607 in: G.T. Prance (ed.). *Biological diversification in the tropics.* Columbia Univ. Press. New York.

Richards, P.W. 1996. *The tropical rainforests: an ecological study*. Cambridge Univ.

Ruokolainen, K. & H. Tuomisto. 1993. La vegetacion de terrenos no indundables (tierra firme) en la selva baja de la Amazonia peruana. Pp 139-153 in: R. Kalliola; M. Puhakka & W. Danjoy (eds.). *Amazonia Peruana: Vegetacion humeda tropical en el llano subandino*. PAUT & ONERN, Jyväskylä, Finland.

Ruokolainen, K. & H. Tuomisto. 1998. La vegetacion natural de la zona de Iquitos. Pp 253-365 in: R. Kalliola & S. Flores P. (eds.). *Geoecologia y desarrollo amazonico. Estudio integrado de la zona de Iquitos, Perú.* Annales Universitatis Turkuensis Ser A II Vol. **114**.

Räsänen, M. 1993. La geohistoria y geología de la Amazonía Peruana. Pp 43-67 in: R. Kalliola, M. Puhakka & W. Danjoy (eds.). *Amazonía Peruana: Vegetación húmeda tropical en el llano subandino*. PAUT & ONERN, Jyväskylä, Finland.

Räsänen, M., J.S. Salo, & R.J. Kalliola. 1987. Long-term fluvial perturbance in the western Amazon Basin: Regulation by sub-andean tectonics. *Science* **238**: 1398-1401.

Räsänen, M, J.S. Salo, H. Jungnert & L. Romero Pittman. 1990. Evolution of the Western Amazon Lowland Relief: impact of Andean foreland dynamics. ***Terra Nova* 2**: 320-332.

Räsänen, M., A. Linna, G. Irion, L. Rebata, R. Vargas, & F. Wessenlingh. 1998. Geología y geoformas de la zona de Iquitos. Pp 59-137 in: R. Kalliola & S. Flores P. (eds.). *Geoecologia y desarrollo amazonico. Estudio integrado de la zona de Iquitos, Perú.* Annales Universitatis Turkuensis Ser A II Vol. **114**.

Terborgh, J. 1985. Habitat selection in Amazonian birds. Pp 311-338 in: M.L. Cody (ed.). *Habitat selection in birds.* Academic Press, Inc., New York.

Tuomisto, H., K. Ruokolainen, R. Kalliola, A. Linna, W. Danjoy & Z. Rodriguez. 1995. Dissecting Amazonian Biodiversity. *Science* **269**: 63.

Vásquez Martínez, R. 1997. Flórula de las reservas biológicas de Iquitos, Perú: Allpahuayo-Mishana, Explornapo Canmp, Explorama Lodge. Monographs in systematic botany from the Missouri Botanical Garden. Vol. 63. The Missouri Botanical Garden Press, St. Louis.1046 pp.

Whitney, B.M. & J. Alvarez. 1998. A new Herpsilochmus antwren (Aves: Thamnophilidae) from northern Amazonian Peru and adjacent Ecuador: The role of edaphic heterogeneity of terra firme forest. *The Auk* **115(3):** 559-576.