



Natural forest management with strip clear-cutting

J. Ocaña-Vidal

Julio Ocaña-Vidal is director of the governing committee of Asociación Amazonia, based in Lima, Penal

This article briefly describes an experimental silvicultural system, called strip clear-cutting, which is being tested in the Palcazu Valley of eastern Peru. The experience described in this article is of importance both for the promising results obtained and because the technique - developed by a multidisciplinary team with the coordination and active participation of institutions, local communities and scientific experts is being implemented by an indigenous Amazon people, the Yanasha.

[Natural regeneration in a clear-cut strip two years after harvesting](#)

Central forest/Palcazu valley project

The 469500 ha of the Palcazu River basin, known as the Palcazu Valley, are located in the Central Forest area of Peru in the province of Oxapampa, in the department of Pasco. This area lies in the foothills of the Andes, upstream from the great Amazon basin (Selva Alta). For millenia, the Palcazu Valley was inhabited exclusively by the Yanasha. In more recent times, the Yanasha have been joined by settlers primarily ranchers of European descent and, to a much lesser extent, commercial loggers.

In 1980, studies were initiated for the Central Forest/Palcazu Valley Resource Management Project, aimed at developing the area's resources with methods that guarantee long-term, sustainable productivity, and with appropriate technology which may be applied in other similar forest areas. The studies, supported by the United States Agency for International Development (USAID), revealed that, rather than being appropriate for sustained agriculture or ranching, the soils were mainly suited to forestry (JRB Associates, 1981; ONERN, 1970 and 1982; Brack Egg, 1981; Tosi, 1981) and that production activities should therefore be concentrated in this area.

The overall project was aimed at integrated and sustainable resource use; the management of natural forest, agroforestry and silvipastoral systems; and the management of water and hydrobiological resources, including the creation of protected areas for the conservation of watersheds and biodiversity (ecosystems, species and germplasm). It envisaged the local people, particularly the Yanasha, as protagonists, offering their customs, traditional technology and active participation in development planning and implementation.

Strip clear-cutting

In the area of natural forest management, the government decided to experiment with a new

silvicultural system developed by the Tropical Science Centre of Costa Rica: strip clear-cutting. This system is based on ecological observations of the gap-phase dynamics of natural tropical forests. The forest is harvested in long, narrow clear-cuts designed to mimic the natural forest disturbance caused by the fall of a single large tree, followed by the subsequent natural regeneration over a period of 40 to 50 years. The economic basis of the system is complete utilization of all logs of more than 5 cm in diameter taken from the strips. Logs of more than 30 cm in diameter are cut for sawn wood while smaller logs are used for telephone poles, construction posts, etc. Critical aspects of the strip clear-cutting system include proper site selection; size and orientation of the strips; careful design of access roads to minimize erosion; use of animal power to remove logs from the strip; and no felling of trees adjacent to the strips for at least 15 years after harvest.

Within the overall management plan, the area in which strip clear-cutting is to be undertaken must be designated as permanent forest land. The specific areas to be cut are determined on the basis of a ground-level forest inventory. The dimension of the strips to be clear-felled must allow enough light to reach the ground level and stimulate the growth of natural regeneration, yet be narrow enough to ensure that seed from neighbouring trees reaches the clear-cut area, either through the action of water and wind or with the assistance of animal vectors.

In the Palcazu Project, the width of the strips is determined by the height of the tallest natural trees (30 to 50 m), while the length is determined by the predominant ecological conditions of the surrounding terrain; for example, strips on flat ground where, the risk of erosion is low, can be longer than strips on steeply sloping land. However, the total area of a strip rarely exceeds 0.5 ha.

In theory, the strips are best oriented on a 45° angle to the north-south axis, i.e. northeast-southwest, or northwest-southeast. This angle permits the uniform distribution of light entering the strip, thereby fostering an even regeneration. In practice, topographical conditions, particularly the slope of the land and its contours - which need to be followed in order to minimize erosion - often require flexibility in the positioning of the strips.

Design and construction of access roads

A full discussion of the implications of the strip clear-cutting system in terms of access roads is beyond the scope of this article. However, it is important to recognize that, since this forest management system is based on the harvesting of a series of noncontiguous areas, the access road system tends to be a complex network of small feeder roads. Particular attention must therefore be dedicated to ensuring that these roads are constructed and maintained in a manner that minimizes erosion.

[Use of animal traction for the extraction of logs is a fundamental element of the strip clear-cutting system](#)

Animal power for removing logs from the strips

A fundamental element of the strip clear-cutting management system being tested in the Palcazu Valley is the use of animal traction (primarily oxen) for the extraction of logs from the harvested area. The use of animal traction has multiple advantages, including minimal disturbance of the natural environment; high flexibility and adaptability; low investment costs; and intensive labour requirements, thereby permitting the involvement of a large number of local people. These positive factors outweigh negative considerations such as the need to care for the oxen even during the period when they are not being utilized; the loss of efficiency when harvesting particularly large logs (more than 70 cm DBH); and the relatively slow pace of the oxen compared with mechanized equipment.

Harvesting procedures

The first stage in the harvesting process is the removal of understorey growth of less than 3 cm in diameter. Particularly important is the removal of climbing vines that might interfere with felling operations. Once clearing has been completed, harvesting begins with the smaller trees, i.e. those with a diameter of less than 30 cm. This timber, destined for use as telephone poles and construction posts after pressure treatment, must be removed from the strip as quickly as possible in order to avoid loss of moisture (moisture required for the pressure treatment).

[Sorting of harvested wood in a clear-cut strip](#)

The larger trees, those more than 30 cm in diameter, are felled last, and require special care to ensure that they are felled in a manner that does not cause damage to the surrounding area. This is particularly important because the sustainability of the strip clear-cutting system is dependent on the natural regeneration of undisturbed trees in the surrounding area.

Social considerations

A recurring pattern in the failure of many natural forest management systems is the inability of external forest managers to control land use over the long term. Involving local communities in the design and implementation of forest management systems can promote land-use stability by providing the residents of a region with a strong economic incentive to conserve the forest.

Socially, the Palcazu Valley project is based on the collective management of lands owned communally by the indigenous people. The project is based in an area designated by the Peruvian Government as a Yanasha Communal Reserve, covering an area of some 35000 ha. Within the overall administrative structure of the Communal Reserve, ten communities joined together in 1987 to form the Yanasha Forest Cooperative Ltd. The main objectives of the cooperative, as determined by the members, are: to provide work for its members under an overall forest management plan; to direct and implement the integrated exploitation of its forests; to promote the wood industry and market; and to support the community's development while maintaining its indigenous identity.

Results

The initial results of the Palcazu Valley experiment with strip clear-cutting are encouraging. Studies of two strips cut in 1985 indicate that harvesting and extraction of wood can be accomplished under local conditions without serious environmental damage, and that initial forest regeneration is rapid, abundant and diverse. Hartschorn (1988) focused on an initial grouping of ten species (90 percent of which were pioneer species), with *Bismia basifera* being the most important in Strip I and *Cecropia sciadophylla* in Strip II. Similar results were obtained by Pariona and Bazan (1990).

A subsequent study by Pariona compared regenerating species from two strips cut in the forest of the Shiringamazu community with those within a 15 ha radius in the surrounding primary forest. The study found that 48 of the 50 most common species were present in one strip and 40 in the other.

Regarding the potential profitability of the strip clear-cutting system, inventories carried out on the production strips revealed an average output of 125 different species and an average of 971 trees per hectare. In terms of output by type of product, on a per hectare basis the strips yielded 1112 fence end vineyard poles (5 to 15 cm); 138 electricity poles (16 to 30 cm); 168.8 m³ of sawlogs of more than 30 cm in diameter; 90.7 m³ of branches, stumps and twigs for charcoal; and an additional 16.86 m³ of chips and cuttings. The system also leaves options open for the production of non-wood products such as resins, latex, ornamental plants,

medicines, bark and wildlife from the surrounding forest.

[A member of the Yanesha Forestry Cooperative evaluates forest resources](#)

On the social level, as part of an integrated approach to land-use planning, the strip clear-cutting system has helped to stabilize land tenure and safeguard the protected areas. It has also led to a greater understanding between the local population, the settlers and the loggers, and land disputes have virtually ceased. Similarly, there are no longer invasions of migrants and squatters.

The main achievement regarding the local communities is that they have begun to manage the forest and organize its exploitation themselves. The Yanesha Forestry Cooperative provides services, management support and training; motivates people to seek a better future; and represents an example of the success and pace of the Yanesha "nation".

Areas for additional work

The long-term success of the strip clear-cutting system and the overall forest management plan will depend to a large extent on the capability of the Yanesha forest communities to manage the logging, processing and marketing operations. Extraction activities must be managed carefully to avoid environmental damage during periods of high rainfall. Processing facilities, particularly sawmill and the pressure treatment equipment, must be maintained in good running order notwithstanding the challenging environment and the difficulty of access to spare parts. Considerable management skill will also be necessary to ensure that transport is available at the proper time and, if necessary, to alter the product mix in response to market conditions. Finally, an equitable distribution of the ultimate benefits among community members will be essential. The Yanesha must perceive direct and continuous benefits from the forest resource, or they will burn and farm the areas that have been clear-cut.

Extension and expansion of the system

Efforts are being made to replicate the strip clear-cutting system in various parts of Peru, particularly in the Selva Alta. Both the government and the Yanesha Forestry Cooperative have demonstrated the system to indigenous and settler communities. Outside Peru, the system is being applied by two Ecuadorian indigenous communities who have been trained by Yanesha leaders.

Bibliography

APODESA. 1989. *Experiencias silviculturales y de manejo de bosques en America Latina*. Technical Document No. 20. Lima, Peru, Instituto Nacional de Desarrollo (INADE).

Brack Egg, A. 1981. *Ecological evaluation of the Palcazu River valley and guidelines for an environmental conservation program*. Em. JRB, 2:D1-D39.

Buschbacher, R.J. 1990. Natural forest management in the humid tropics: ecological, social and economic considerations. *Ambio*, 19(5): 253-258.

Chumpitaz, M. 1988. Creación e implementación de la administración técnica del Distrito Forestal de Iscozacín en la cuenca del Río Palcazú (Prov. Oxapampa-Dpto. Pasco) (Ph.D. thesis). Lima, Peru, Universidad Nacional Agrícola La Molina.

FAO/INFOR. 1985. *Curso de extensión para forestales en la Sierra Peruana*. Lima, Peru, Instituto Nacional Forestal y de la Fauna, Ministerio de Agricultura.

Hartschorn, G. 1988. *Natural regeneration of trees on the Palcazu demonstration strips*.

Lima, JRB Associates.

JRB Associates, eds. 1981. *Central Selva resources management*. Lima, Peru, USAID.

More, T. 1987. La Cooperativa Forestal Yanasha: una alternativa autogestionaria de desarrollo indigene. *Amazonia Indígena*, 7(13): 18-27.

Ocaña-Vidal, J., ed. 1990. *Manejo de bosques naturales de la Selva Alta del Peru: estudio de cave del Valle del Palcazú*. Technical Document. Lima, Peru, INADE - APODESA.

ONERN. 1970. *Inventario, evaluación e integración de los recursos naturales de la zona Villa Rica - Puerto Pachitea*. Lima, Oficina nacional de evaluación de recursos naturales.

ONERN. 1982. *Inventario y evaluación semidetallada de los recursos naturales de la zona del Rio Palcazú*. Lima, Oficina nacional de evaluación de recursos naturales.

Pariona, W. & Bazan, F. 1990. *Manejo forestal por el sistema de fajas de aprovechamiento integral y sostenido con especial referencia a la regeneración natural en el Valle del Palcazú*. Ponencia del Taller "B" de la Reunión Internacional sobre Experiencias para el Desarrollo Sostenido de la Amazonia. Lima, Peru, APODESA - RONCO.

Stocks, A. 1985. *Subsistencia en las comunidades nativas del valle del Palcazú*. Lima, Peru, PEPP/USAID.

Tosi, J. 1981. Land-use capability and recommended land use for the Palcazu Valley. In JRB Associates, eds. *Central Selva resources management*. Lima, Peru, USAID.

Walkinshaw, C. 1986. *Extensión y capacitación en servicio en el Proyecto Especial Pichis Palcazú: evaluación y recomendaciones*. Prep. by Ronco Consulting Corporation for USAID/Lima. (unpubl.)

