The old and new of reduced impact logging

More training and less waste are critical to the wise use of tropical forests

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What's wrong with this photo? People living downstream drink the mud caused by poor logging and land use management upstream. *Photo: A. Sarre*

THE TERM 'reduced impact logging' (RIL) started to appear in forestry publications in the early 1990s; before long it was being used widely in both technical articles and news releases. The concept of forest management technologies that reduce logging impacts appeared to resonate not only with foresters but also with the general public and, perhaps more importantly, with influential environmental organisations such as the Worldwide Fund for Nature and IUCN—the World Conservation Union. As a consequence, RIL gained a legitimacy that foresters alone could never have provided.

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What then is RIL? The term has become associated with logging technologies that have been introduced into tropical forests explicitly for the purpose of reducing the environmental and social impacts associated with industrial timber harvesting. Although it varies somewhat with the local situation, RIL in tropical forests generally requires the following (in approximately chronological order):

- pre-harvest inventory and mapping of individual crop trees;
- pre-harvest planning of roads, skid trails and landings to provide access to the harvest area and to the individual trees scheduled for harvest, while minimising soil disturbance and protecting streams and waterways with appropriate crossings;
- pre-harvest vine-cutting in areas where heavy vines connect tree crowns;
- construction of roads, landings and skid trails so that they adhere to engineering and environmental design guidelines;
- the use of appropriate felling and bucking techniques including directional felling, cutting stumps low to the ground to avoid waste, and optimal crosscutting of tree stems into logs in a way that maximises the recovery of useful wood;
- the winching of logs to planned skid trails and ensuring that skidding machines remain on the trails at all times;
- where feasible, using yarding systems that protect soils and residual vegetation by suspending logs above the ground or by otherwise minimising soil disturbance; and
- conducting a post-harvest assessment in order to provide feedback to the concession holder and logging crews and to evaluate the degree to which RIL guidelines were successfully applied.

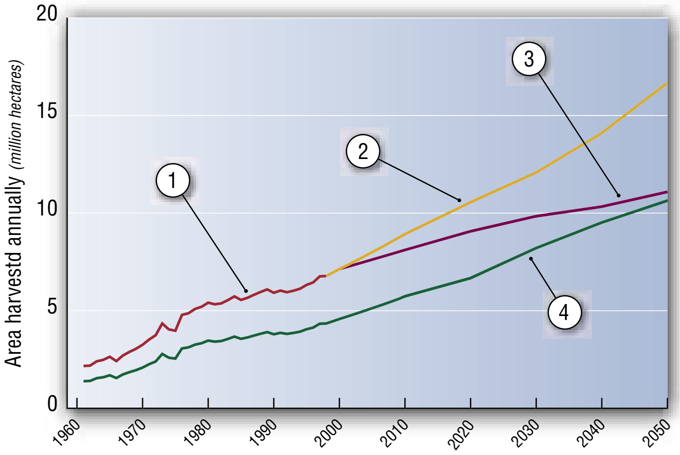
Many of these practices were developed in temperate countries, where they are widely applied (the mapping of individual crop trees and pre-harvest cutting of vines are two exceptions that are generally applicable only in tropical forests). In this sense, RIL is not new—it is simply the transfer of well-established technologies from temperate forests to the tropics. As the following discussion indicates, however, significant impediments remain to the widespread application of RIL technologies in the tropics.

Issues in reduced impact logging

Philosophical acceptance by foresters: although most foresters recognise that harvesting is necessary if income

Less waste, more forest?

Figure 1: Historical area of tropical forest harvested annually 1961–98, with projections through to 2050 *(millions of hectares; see main text for an explanation of lines 1–4)*



is to be generated from forestry investments, there is a tendency to treat the logging operation in the way farmers treat the slaughterhouse—hide it away in the hope that it won't disturb the customers. As a result, harvesting operations are often left entirely to loggers, with little or no oversight by foresters and no one insisting on the application of best practice.

The cost: conventional wisdom holds that environmental protection always costs more. It is generally assumed, therefore, that RIL *must* be more costly than conventional logging. The truth is just the opposite. A long series of studies, culminating in a recent study by Holmes et al. (2000), have demonstrated convincingly that properly planned and supervised harvesting operations not only meet conditions for sustainability but also reduce harvesting costs by a substantial margin compared to conventional logging. The difficulty is that these cost-savings are due to better planning, better supervisory control and more efficient use of felled timber. To obtain these savings, therefore, it is necessary to have technically competent planners, loggers and supervisors.

Training: perhaps the single most critical requirement for the successful application of RIL on a wide scale in tropical forests is the availability of skilled logging and supervisory personnel at all levels. Unless tropical countries and the development assistance agencies that work with them recognise this and strive to overcome it, there is little hope that forest concessionaires will be able to implement RIL on a large scale: they simply will be unable to find the personnel who understand both why and how to do RIL.

Aerial logging systems: most logging in tropical forests relies on ground-based skidding machines. Such systems can achieve acceptably low impacts when operators are properly trained and slopes are of low to moderate steepness. Soil impacts associated with ground skidding become unacceptably high when slopes are steeper than about 30–40% (approximately 15–20°). Aerial logging alternatives such as cable systems and helicopters can substantially reduce the direct impacts associated with ground disturbance during logging and, because of their extended yarding capabilities, can also reduce the density of haul roads needed to support logging operations. Since most soil erosion associated with logging can be traced directly to roads and skid trails, reducing the density of this infrastructure will lessen stream sedimentation and all its related offsite impacts. The primary disadvantage of aerial logging systems is that they require highly skilled crews and specialised knowledge that is often in scarce supply. This emphasises the need, again, for effective and widely available training. An additional disadvantage, for helicopter logging at least, is that in many situations the cost is substantially higher per unit volume than for ground-based systems.

Improving harvest recovery: regardless of the logging equipment used, the amount of usable wood recovered from forest harvesting can be improved by reducing wood residues at all stages of production, from felling to skidding, to transportation and final processing. The projections given in *Figure 1* show that improved utilisation, in tropical forests particularly, has tremendous potential for reducing the area of forest disturbed annually through timber harvesting. The projections assume that the demand for industrial roundwood is driven by population growth, and that a 1% increase in population results in a 0.75% increase in demand for industrial roundwood (this is based on an analysis of FAO industrial roundwood data for the period 1960–98). Under these assumptions, the United Nations' projected world population of 8.9 billion in 2050 implies a level of demand for *tropical* industrial roundwood in the order of 453 million m³ per year, compared to about 195 million m³ in 2000.

The historical trend *(line 1)* shows the rather steady increase in area harvested annually in all tropical forests between 1961 and 1998, the most recent year for which data are available. *Line 2* projects this trend through 2050 on the basis of expected population growth as described above; it thus assumes no change in utilisation standards compared to the historical period. Under this level of use, 16.6 million hectares of tropical forest would need to be disturbed in the year 2050 to satisfy the projected demand for industrial roundwood.

Line 3 assumes an improvement in harvesting utilisation rates of 1% annually beginning in 2001. Even such a modest rate of improvement would result in a significant reduction in the area harvested over time. By 2050, the area of tropical forest disturbed annually in order to harvest 453 million m³ of industrial roundwood would be 11.1 million hectares, a reduction of one-third compared to the 'no change' scenario. Even more dramatically, the 1% annual improvement in utilisation would reduce the total area of tropical forest disturbed over the fifty-year period 2001–2050 by almost 150 million hectares! This is an area equivalent to more than one-tenth of the world's protected areas.

As a 'reality check', *line 4* shows the area of tropical forests harvested annually between 1961 and 2050 if the tropical harvesting recovery rate were equal to the harvesting utilisation rate reported for the USA around 1990. Although far better than current practice in tropical forests, this level of use should be achievable over the long run with reasonable improvements in training and forest management. As the figure indicates, a 1% annual improvement in harvesting utilisation beginning in 2001 would result in a utilisation rate around 2050 that is very close to the 1990 USA rate.

A reduction in the annual area of tropical forest harvested in the order of magnitude suggested by this analysis would substantially benefit both timber and non-timber forest resources. In addition, the improved utilisation of felled timber would significantly reduce forest residues, thus decreasing the risk of destructive fires of the type that occurred in 1997 and 1998 in places like Brazil and Indonesia.

Reference

Holmes, T., Blate, G., Zweede, J., Pereira, R., Barreto, P., Boltz, F. and Bauch, R. 2000. *Financial costs and benefits of reduced-impact logging in the eastern Amazon.* Tropical Forest Foundation, Alexandria, Virginia.