GUEST COMMENT

Despite Grave Losses of Forest, Some Good Things are Happening in Amazonia

From the avalanche of media articles, television documentaries, and films on Amazonia, an impression emerges that much of the region's extensive forests are being torched by an onrush of settlers, ranchers, and mining companies. Publications in the scientific literature also tend to highlight ecological and social problems associated with development schemes. While a thorough discussion and analysis of social and environmental stresses in Amazonia is certainly warranted, some promising developments are under way in the region that are often obscured by the perception that a massive conflagration is consuming one of the last great bastions of global biodiversity.

Yield Improvement Important

Much of the concern about the future of Amazonia focuses on deforestation and concomitant species-loss. Erosion of biodiversity reduces options for future development, such as novel pharmaceuticals, genes for upgrading existing crops, and the potential for domesticating more plants (Smith *et al.*, 1992). While forest loss is pronounced in some areas of Amazonia, particularly in Rondônia and southeastern Pará, most of the region is still cloaked by trees. One of the surest ways to relieve pressure on remaining wilderness is to improve and sustain yields on farms, ranches, and plantations.

Fortunately, both small- and large-scale operators in various parts of the Amazon basin are improving the productivity of their rural holdings, while minimizing environmental impacts. Small farmers in such widely-scattered locations as the Bragantina zone east of Belém, Tomé-Açu, the Manaus–Itacoatiara highway, the Altamira–Itaituba stretch of the Transamazon, the Santarém–Curuá Una road, and the Ariquemes area of Rondônia, are switching to perennial-based cropping systems that help to conserve the soil and suppress weeds (Smith *et al.*, in prep.).

Farmers are striving for diversity in space and time with such market-oriented crops as Sweet Orange (*Citrus sinensis*), Brazil Nut (*Bertholletia excelsa*), Mahogany (*Swietenia macrophylla*), Mangosteen (*Garcinia mangostana*), Passionfruit (*Passiflora edulis*), 'Keitt' Mangoes (*Mangifera indica*), and Cupuaçu (*Theobroma grandiflorum*, a relative of Cacao, *T. cacao*). A mix of native and exotic species helps farmers to overcome disease and pest problems, as well as price-swings that are typical of commodity markets. Many of the crop combinations and varieties are being selected and propagated by the farmers themselves, or by private companies.

Upgrading of Existing Pastures

On the controversial cattle 'front', many ranches are also being upgraded by improved technologies and management practices. The question here is not whether cattle 'belong' in Amazonia or not; roots in Iberian culture nourish a cultural taste for red meat in much of the regional population, distasteful though this may be for consumers in industrial countries who are worried about levels of low-density lipoproteins in their blood. The removal of fiscal incentives for cattle-raising in the Brazilian Amazon in the late 1980s has not slowed the trend towards pasture as a major feature of cultural landscapes in Amazonia.

Rather, the issue is: how can existing pastures and rangeland be made more productive in an affordable manner without undercutting the natural resources-base? Cattle are an important part of the rural economy, and they benefit both small and large landowners. Small-scale farmers often recycle cattle droppings onto crops — particularly perennials and vegetables; manure is also used to fuel biogas digesters. For large farmers and smallholders alike, cattle always provide ready cash to cover emergencies. A major challenge here is to improve dual-purpose cattle breeds, so that milk production is increased with low-input techniques.

A range of technologies are now being employed throughout Amazonia to upgrade pastures: deployment of more productive grasses, such as Bryzantão (*Brachiaria brizantha* cv. Marandu); application of phosphorus fertilizers; mechanical clearing of weeds and disking of the soil to break up compacted layers; and fencing. The cost of such measures can range up to US $800 per hectare, but is usually in the $300-range. Even farmers with as little as 50 hectares are recuperating weed-choked pastures that were originally planted to Guinea-grass (*Panicum maximum*) or *Brachiaria decumbens* by burning them and planting vigorous Bryzantão. Only about a quarter of the 15 million hectares of artificial pasture in the Brazilian Amazon has been improved, but the trend is quickening, particularly in areas where ranchers can sell timber.

Fish-farming

Many medium-scale ranchers are also experimenting with raising of native fish, such as Pirarucu (*Arapaima gigas*) and Tambaqui (*Colossoma macropomum*). A rancher near Rio Branco, Acre, is already marketing pond-raised Tambaqui, and hundreds of ranches in the vicinity of Belém and Manaus will soon have farmed Pirarucu ready for sale to urban customers. Much of the experimentation on stocking densities,

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food rations, and improved conditions for breeding, has been worked out by the ranchers — sometimes in collaboration with scientists from regional research institutes.

Jari Pulp Operation

At Jari a huge pulp operation, which originally engendered controversy, has demonstrated that investments in research can pay off. After a consortium of Brazilian companies purchased Jari from Daniel Ludwig in the early 1980s, management practices were altered to improve productivity of plantations and preserve the environment. Superior selections of eucalyptus (*Eucalyptus* spp.), Caribbean Pine (*Pinus caribaea* var. *hondurensis*), and Gmelina (*Gmelina arborea*), were deployed and clearing on steep slopes was halted. Gmelina has been confined to the better soils. Such measures have helped to boost substantially the yields of the checkerboard plantations. Forest corridors are left, so that animals and some plants can disperse and maintain gene-flow. By raising yields, Jari anticipates clearing only 10% of its 1.6 million hectares' concession.

Further Improvements

Other promising developments in the region include the trend to more democratic governments which will allow for a fuller examination than hitherto of development policies and their impact, following improved scientific guidance. Many more scientists who have been trained at the graduate level now reside in the region than a decade ago. The Brazilian Agricultural Research Service (EMBRAPA = Empresa Brasileira de Pesquisa Agropecuária)) alone has 33 PhD scientists in the Amazon — up from only a handful in the 1970s.

Research and extension organizations in the region increasingly recognize the need to coordinate their efforts — an important asset in these times of scarce resources for research. EMBRAPA has created mechanisms for coordinating research on agro-forestry in the region. Also, EMBRAPA is consciously gearing its R&D efforts towards participatory research with farmers and ranchers and at the same time to helping to conserve natural resources. Some nongovernmental organizations (NGOs) have begun working constructively with research and development institutions in Amazonia.

More open political systems in the region have fostered a large crop of new NGOs. Although the region may be approaching an NGO-overload, such organizations help to place environmental and social concerns at the top of government agendas (Livernash, 1992). Also, some NGOs have good links to rural communities, and can thus provide valuable feedback for R&D efforts. A major challenge ahead is to forge better working relationships between NGOs and governmental organizations, as exemplified by the efforts of Rainforest Alliance and Museu Goeldi in Belim, Pará, and IMAZON (Instituto do Homem e Meio Ambiente da Amazônia) and EMBRAPA-CPATU in Pará.

Research Funding Low

In spite of the global preoccupation with the fate of Amazonia, funding for research is deplorably deficient. In the case of Brazil, only 0.6% of the gross national product is invested in scientific research and development (EMBRAPA, 1992), and only a small fraction of that reaches the Amazon. Ironically, the greater part of the scientific manpower in the region is not fully utilized, because laboratories are ill-equipped, many vehicles are beyond repair, and supplies for supporting office- and field-work have essentially dried up.

Most politicians are inherently suspicious of the value of research, yet little of the development in the region will be sustainable without the underpinnings of a vital scientific community and the participation of the proposed beneficiaries of research. If international donors and national governments fail to nurture the scientific institutions in the region, and to encourage more collaborative research with a wide range of 'stakeholders', then many of the current gains in productivity and livelihood in the region will erode.

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