Impacts of disturbance on genetic resources of tropical forests

In recent years it has become increasingly apparent that conservation of tropical forests cannot rely solely on protected area networks. After a couple of decades of rapid expansion in numbers of protected areas in many tropical countries, there is probably limited capacity for further expansion. This view is reflected in the Global Biodiversity Strategy[1], the Global Biodiversity Assessment[2] and the work of various other authors (e.g. refs 3, 4). A comprehensive approach to forest conservation must therefore incorporate the sustainable management of land outside protected areas, and this requires an understanding of how human activities impact on forest resources.

For the past three years, researchers from three countries – India, Thailand, and Malaysia – have been working collaboratively, under the auspices of the Center for International Forestry Research (CIFOR) and International Plant Genetic Resources Institute (IPGRI), to investigate how human activities affect the genetic resources of forest plant species. This has been a multidisciplinary research project, involving not only research on genetic resources, but also on the reproductive ecology of the studied species, and socio-economic investigations of the communities living in and around the forest.

Recently, members of the research team met in Bangalore to review the results of their studies, to draw conclusions about the impact of human activities on forest genetic resources, and to begin a process of communicating the results to forest managers and policy makers. The selection of sites within countries was made so as to cover as many different types of human activities as possible, while also allowing comparisons to be made across countries. Thus, in Malaysia, the main type of human activity was logging; in Thailand, as well as timber harvesting, the forests were also used for grazing and non-timber forest products (NTFP) collection, and in India the major activities were NTFP collection and grazing.

Although some of the data are still being analysed, the preliminary results provide some insights concerning the interaction between people and forest genetic resources. For example, the socio-economic research in India (conducted at the Biligirirangan Hills, Karnataka, and at Mudumalai, Tamil Nadu) indicated that in general it is the poorer households which maintain a greater reliance on collection of NTFPs. Members of the wealthier households often had access to salaried income which provides not only potential for greater income, but also greater reliability. With the incorporation of many NTFPs into a market economy, there is a marked tendency for unsustainable harvesting, even when the harvesting is undertaken by tribal groups who have traditionally relied on these products for their livelihoods. Consequently, regeneration of species such as *Phyllanthus emblica* and *Terminalia chebula* is almost completely absent in areas of highly intensive harvesting, and genetic diversity in these species is consequently eroded[5].

In contrast to NTFP collection, most other activities appear to have a much less obvious impact. Although the impacts of logging, based on the research done in Malaysia, were evident on all species sampled – not only those which were harvested – the loss of genetic diversity, measured as expected heterozygosity, did not exceed 24%. Similarly, the impact of harvesting wood for construction and fuel in Thailand was only significant at very high intensities of harvesting.

The Thai research also clearly demonstrated that the intensity of impact is dependent on the reproductive ecology of the species. Those species which are pollinated by weakly flying insects show increased levels of inbreeding as density of reproductive individuals decreases, while species pollinated by more strongly flying insects are less affected. Depending on the behaviour of pollinators, and the degree of host–pollinator specificity, there may also be clear thresholds in disturbance that affect the mating system and, consequently, genetic diversity[6].

Further comparative analyses across the three countries will indicate the degree to which these findings are generalizable. Similarly, the integration of research across all three disciplines involved will illustrate the processes which determine the consequences of people–forest interactions much more clearly than would be possible from examination of just one discipline.

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Honorary members of the International Liquid Crystal Society

Prof. S. Chandrasekhar, Centre for Liquid Crystal Research, Bangalore and three other distinguished scientists, Profs P. G. de Gennes, G. W. Gray and A. Saupe, have been elected as the first honorary members of the International Liquid Crystal Society. This honour has been bestowed on Prof. Chandrasekhar to mark his outstanding contributions to the field of liquid crystals and technology which have had such a profound influence on the field. The formal admission of the honorary members will take place in Strasbourg in the summer of 1998.