

LETTERS TO THE EDITOR

Sir,

I refer to your note in Volume 74(1), page ii announcing your intention, from time to time, to devote whole issues of the Review to particular subjects. In the last three decades the role of forests and their contribution to society has changed greatly. In the 1960s, the emphasis was on the exploitation of forest resources to promote economic growth. Later, in the 70s, this model of development began to be challenged and social aspects of forestry development came to be emphasised. In the 80s the environmental movement emerged and in the 90s has become more prominent still. The pressure it exerts has become a matter of concern to governments and official international agencies throughout the world. Although environmental aspects are important, it has to be remembered that forest resources continue to provide a valuable raw material for industry as well as to play a vital role in maintaining the lives of poor people around the world.

One of the greatest challenges for foresters will be to find ways of reconciling the claims of development and environment. I would like to suggest that you consider devoting one special issue to forestry education. It is time to debate the role of the forester of the XXIst century and what sort of training he or she should have.

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Sir,

How can ecology contribute to the silviculture of natural tropical high forest and its regeneration? A reply to Lowe

R.G.Lowe (1995, this journal, *Comment*) asks 'How can ecology contribute to the silviculture of natural tropical high forest and its regeneration?' The question is worthy of debate, and enables us to consider some important issues.

We disagree strongly with Lowe's statement that 'ecology has contributed little of practical use to tropical silviculture'. In fact it is no coincidence that most of the notable figures in the history of tropical 'forestry' have also been notable in ecology. Today's ecologists may be more specialised but their contribution continues.

Almost any silvicultural treatment will be uneconomic while the world timber markets are dominated by the products of resource mining and timber revenues do not reflect the costs of sustainable production. Lowe's main example is the Nigerian tropical shelterwood system. This system suffered from a low density of desirable species, labour intensive refining methods (including killing of species that

would later become marketable) and excessive canopy opening leading to climber infestation (Lowe 1978, 1995). It is unreasonable to believe that an easy remedy is available or would be sufficient to make such a system viable. Other systems however have been much more successful and are gaining viability as the number of marketable species increases and efforts to promote sustainable production gain economic credibility (e.g. Buschbacher 1990).

We agree with Lowe that there is a continual need for baseline and monitoring data. Ecologists have been at the forefront of those pressing for permanent plots and adequate multi-species inventories - and should not be blamed if such activities are neglected by poorly funded forest departments. Lowe, however also argues against these activities suggesting that these studies are expensive and 'moreover the deductions are still only inferred' which he considers 'bad science'. Such reasoning would appear to undermine most scientific progress since the Dark Ages.

Lowe criticises phytosociology and modelling, and suggests that these be discarded in favour of autecological studies of the exploited species. The different approaches serve different needs. Hall and Swaine's (1981) ordination based classification of Ghanaian forests is used by Ghana's forest managers as a basis for stratification of both inventory and management. Through monitoring changes these techniques also provide an objective assessment of what may constitute 'bad' or 'unsustainable' management. Powerful ordination based methods are developing rapidly (e.g. see ter Braak and Prentice 1988) and are increasingly useful in practical research (e.g. Brandani *et al.* 1988). Computer modelling has already increased our understanding of forest dynamics in both practical (e.g. Vanclay 1994) and theoretical terms (e.g. Urban and Shugart 1992). The autecology that Lowe advocates is not new and already comprises a considerable portion of the shelf space in plant science libraries.

Lowe says that the 'banal hypotheses' generated by ecologists' ordinations 'ought already to be known to a silviculturalist worth his salt'. However such ecological relationships are often poorly characterised. Even where broad patterns (e.g. catenary variation) are known to 'ready-salted' silviculturalists, the format of this knowledge is not appropriate for optimising quantifiable management criteria. Many 'self-evident' hypotheses are in any case flawed or deficient. Contrary to long held belief and policy (c.f. Lowe's 1995 own opinions of early anthropogenic deforestation in West Africa) recent research in Guinea has shown that savannah peoples are the principal agents of afforestation with mixed 'natural' forest (see Fairhead and Leach 1995/in press).

Lowe comments elsewhere (this journal 74 (2), 1995 book review, p.167) on some ecological recommendations for promoting natural regeneration in Ghana: the activities that he chooses to criticise are judged 'obvious' and have, he

tells us, been tried in Nigeria 'long ago' and abandoned. It is critical to this argument to consider the context of these past failures - were they really due to a lack of ecological understanding? Accumulated experience and research, and the modern context, suggests that many common-sense improvements are realistic.

Lowe correctly states that ecologists have not provided a method for generating guaranteed economic natural regeneration in heavily harvested natural forest. Failures in natural forest management are more often caused by political or economic shortcomings than by deficiencies of ecological knowledge. There is an implication in Lowe's criticisms that a simple management recipe would be available if only ecologists would 'do their science right'. In reality foresters need to become ecologists, and understand ecology. Lowe for example suggests that shade-tolerance is more worthy of research than what he calls 'light-demandingness'. We do not understand this point, as we have yet to meet an ecologist who studies the second but not the first. Contrary to Lowe's implications much study has focused on the role of light levels suppression and competition in forest regeneration.

Lowe's criticisms demonstrate a narrow expectation of what ecologists should contribute to forest management. Effective management of tropical high forests requires much more than the post-harvest regeneration of timber species, and will commonly include issues of biodiversity conservation, non-timber forest products, utilisation by local communities, and environmental protection. Foresters need ecological guidance to make progress under the continually changing demands to which they are exposed.

Insistence that regeneration studies should focus narrowly on seedling ecology could be argued to be part of the problem. Holistic ecosystem level evaluations remain essential. There are many examples where ecologists have identified dependencies that are not recognised by the forester. For example Frankie *et al.* (1990) show that the key pollinators in some forests of Costa Rica required non-forest patches, generally outside the reserved areas, which were increasingly being destroyed by smallholders.

We agree with Lowe's sentiment that ecologists could do more to help foresters. We disagree with how this might be achieved. Ecology, when pursued as a pure-science, is impartial to local economic restraints or management goals. By contrast, applied ecologists can help to optimise local management activities but require the scientific framework of academic developments and its more rigorous theory both to suggest profitable lines of research and to allow generalisation and evaluation.

Lowe says we need a 'different sort of ecology' which may be correct, but we also need a different type of forestry. What is lacking is the ability to develop silvicultural strategies that can use the abundance of ecological information. This may be because ecologists are now rarely part of a forest department. There are many factors that keep ecologists away from purely management oriented research which include few employment opportunities and poor funding. Academics find that applied research is less easily published

and we would not be the first to suggest that academic 'trial by citation' should be modified so that uptake of practical research results can also earn academic brownie-points. In considering the tropical silviculture hall of fame it is notable that the successful 'silvicultural-ecologist' is likely to be claimed as a 'silviculturalist' by silviculturalists and as an 'ecologist' by ecologists. Such hybrid vigour is now rare. Forest departments would be better served if they invested in staff ecologists. If practical problems of economic significance require ecological answers then there is a need to invest in applied ecology. As the quest for extensive 'sustainable' timber gains speed we hope that developments will be well supported by ecological science.

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