Silviculture for non-timber forest product management: challenges and opportunities for sustainable forest management¹

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Recent concerns regarding non-timber forest product (NTFP) management are focused on raw material production. But NTFP ought to be viewed from the perspective of ecological processes, cultural heritage, livelihood of local people, economic values and incentives for forest management. This broader role for NTFP cannot be realised by simply domesticating a few species. Integration of NTFP in forest management is necessary in order to achieve sustainable forestry. Because forestry technologies are developed with timber values uppermost, it is vital to develop forest management technologies that take into account both timber and non-timber values. Global examples show that traditional knowledge could play a vital role while developing silvicultural regimes, and in situ experimentation will strengthen the regimes. Guidelines for ethnobotanical studies are briefly presented.

Key words: cultural heritage, ecological processes, ethnosilviculture, livelihoods, non-timber forest product, sustainable forestry

Les produits forestiers non ligneux (PFNL) ont attiré récemment l'attention en foresterie. Malgré que l'intérêt principal des PFNL ait porté dernièrement sur les ressources brutes, l'importance des PFNL doit être visualisée selon la perspective des processus écologiques, de l'héritage culturel, des habitudes de vie, des valeurs économiques et des mesures incitatives d'aménagement forestier. Une telle importance ne peut se refléter par la simple domestication de quelques espèces. L'intégration des PFNL en aménagement forestier est nécessaire pour atteindre la foresterie durable. Même si les technologies forestières sont généralement développées pour tenir compte seulement des ressources ligneuses, il est nécessaire d'élaborer des techniques d'aménagement forestier qui considèrent autant les ressources ligneuses que non ligneuses. Les instances mondiales indiquent que les connaissances traditionnelles pourraient jouer un rôle vital dans l'élaboration de ces technologies, par ex. en fournissant une assise à la recherche scientifique. Des méthodologies sont suggérées en se basant sur de récentes études ethnobotaniques.

Mots-clés : héritage culturel, processus écologiques, ethnosylviculture, modes de vie, produit forestier non ligneux, foresterie durable

Introduction

The evolution of industrial forestry over the past few centuries focused on timber production and overshadowed non-timber forest products (NTFP) that were important to human development for generations. Recently, this deterioration of NTFP has become a matter of great concern for foresters, scientists, environmentalists, industrialists and commercial entrepreneurs (Salick *et al.* 1995, Ruiz-Perez and Arnold 1996, Lund *et al.* 1998, Davidson-Hunt *et al.* 2001, Emery and McLain 2001). Marketable NTFP—as opposed to those used at the subsistence level in rural areas—have mainly fuelled recent concerns. Demand for marketable NTFP is expanding and has led to severe depletion of NTFP species in the forests. Accordingly, many such species have been officially upgraded to the status of rare, threatened or endangered. Increasing the supply of these products without compromising the quality of forests is a new challenge for sustainable forestry.

Expanding commercial demand for some NTFP species has inspired scientific communities to study the prospects for large-scale production, and accordingly progress in domesticating/cultivating some NTFP species has been achieved. But mere domestication of a few species may not reduce collection

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from the wild and subsequent depletion of reserves. Rural people's livelihood cannot be sustained without these products yet—out of economic necessity—they continue to increase collection from the wild. The only way to reduce this ravaging of forests is to offer local people genuine alternatives through which they can sustain or improve their livelihoods.

It is important to view NTFP as something more than commercial items needed to sustain industries; they must be seen as part of an ecosystem with a diverse array of uses and values. In this context, forest management needs to explore productive uses of forests and maintain their capacity to produce timber and NTFP. Forest management practices and technologies need to be reoriented not only to increasing timber productivity but also to the management of NTFP in a sustainable manner. This approach takes the forest management

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paradigm beyond trees, and toward consideration of all life forms of forest ecology. This evolution is essentially a shift in focus with the objectives of forest management taking on new dimensions that would compel foresters to look for appropriate silvicultural methods and technologies to manage both timber and NTFP.

Silviculture is a dynamic field where ecological knowledge and social and economic issues converge. The product's role and importance in ecological and sociological perspectives must be understood in order to craft a proper silvicultural regime for the product. But the present reality is that research-based ecological and biological knowledge of NTFP that includes shrubs, herbs, vine, grass and fungi is very limited (Davidson-Hunt *et al.* 2001).

In this paper, we review the importance of NTFP from different perspectives, which are crucial prerequisites for crafting silvicultural regimes for NTFP management.

Importance of NTFP

Besides raw materials for an ever-increasing forest industry, NTFP have the following importance in local, regional and global contexts:

Sustaining ecological processes. Complex combinations of facilitation and competition interactions have been identified in a number of plant communities (Callaway and Walker 1997, Rebel 2000, Tielborger and Kadmon 2000, Pugnaire and Luque 2001, Sans *et al.* 2002, Totland and Esaete 2002). Any disturbance of plant communities may affect ecological processes. Non-timber forest products are linked to the ecological processes of disturbance and succession in the forests (Davidson-Hunt and Berkes 2001). Every species has ecological specifications and grows and survives in natural associations, and disappearance (due to over-harvesting or other reasons) of one or more species from their natural habitats may have far-reaching consequences for the habitat itself. It is not only that a particular product may start to decline but that this may also affect other life forms and species. Thus, harvesting any product from forests may have a significant role in sustaining ecological processes and maintaining biodiversity. The issue is very sensitive and needs to be given serious consideration while making any prescription for NTFP management.

Sustaining cultural heritage. The indigenous peoples of Canada have culturally defined values that reach beyond the economic potential of various species (Turner 2001). In some areas and/or communities, forests are managed for cultural importance (Powell 2000, Byers *et al.* 2001). Different communities may have different cultural importance to different products/species. In such a context, indigenous peoples' culture can be strengthened through NTFP management (Bombay 2001). However, very little attention has been paid to social and cultural aspects of the industrial NTFP (Turner 2001, Taylor n.d.). Commercialisation of culturally important species may bring dissatisfaction among community members, who may protest against such activities while challenging the sustainability of forest management. Thus, appreciation of cultural integrity is a vital element of forest sustainability.

Sustaining livelihood. Most NTFP are collected by poor people residing within and around natural habitats for their liveli-

hood (Gautam 2001, Conroy *et al.* 2002, Shanley and Swingland 2002). Despite the significance of NTFP resources in the livelihoods of diverse ethnic communities, these people increasingly find themselves marginalized on the fringes of modern society and the development process. NTFP development processes are seen as being beyond their capabilities (Conroy *et al.* 2002, Shanley and Swingland 2002). Furthermore, medicinal plants in their natural habitats are crucial for their health, as modern health services are still far from their reach. Any negligence in appreciating such values may challenge the sustainability of forest management.

Enhancing forestry income. NTFP management represents the most immediate and economically competitive method for integrating the use and conservation of forests (Myers 1988, Peters *et al.* 1989), eventually leading to sustainable forest management. NTFP in rural areas represent a large share of regional and national economies (Hyde and Amacher 1996), but their value is little appreciated in forestry management, and the resulting under-valuation has caused policy makers to discount the importance of the forestry sector. If NTFP are accorded a just value, this may attract more resources to forestry.

Providing incentives. NTFP may actually provide a vehicle for forest management. Bamboo, fodder, and fibre grasses act as catalysts between villagers and the forestry authority in joint forest management programmes in India. Ensuring a steady supply of subsistence products from forests has turned the open access forest into common property in Nepal. NTFP could generate many incentives for mobilizing people in sustainable forest management.

Thus, NTFP are important both ecologically and socially. Silviculture, based on up-to-date research on the biology and ecology of species, needs to mesh with the given social, economic and cultural variants in a region in order to attain sustainable forestry. The challenging task for the forester is to craft it with care.

Crafting Silvicultural Regimes for NTFP

Acquiring silvicultural knowledge is the initial stage in developing any new regime. Silvicultural knowledge of NTFP species can be acquired through traditional knowledge, scientific research or a combination of both (Duchesne *et al.* 2001). The biology and ecology of NTFP species are given insufficient study in scientific forestry research. On the other hand, traditional ecological knowledge may play a significant basis in devising a silvicultural system.

An ethnosilvicultural study (Gautam 2001) in Nepal revealed that local people have enormous knowledge of the abundance and distribution of species, associate species (complementary, deleterious, indicator), dispersal mechanism, phenology, propagation characteristics, site quality, and other general features of most of the species in their forests. Indigenous people demonstrate similar knowledge (habitat enhancement and diversification, controlled burning and clearing, selective and strategically timed harvesting, increasing productivity through pruning, coppicing, tilling, and control of weeds and pests) in boreal forests (Lund *et al.* 1998, Marles 2001, Turner 2001). Love and Jones (2001) indicated the existence of indigenous knowledge in temperate forest ecosystems. Studies (Ruiz-Perez and Arnold 1996, Davidson-Hunt and Berkes 2001) revealed the extent of indigenous knowledge of NTFP management in tropical forests. All of this global evidence indicates the enor-

mous knowledge, including silvicultural expertise, among indigenous people. Forest managers and scientists must strive to take advantage of such ethnosilvicultural knowledge while developing silvicultural regimes for NTFP management.

Emery and Zasada (2001) have drafted the process for incorporating NTFP into silvicultural systems through the use of local knowledge. Marles (2001) has developed a practicable method for ethnobotanical research, very relevant for enhancing ethnosilvicultural research. Gautam (2001) has documented a detailed process for acquiring ethnosilvicultural knowledge from community forest users groups.

All socio-economic groups based on ethnicity, age, gender, land-holding, and elite status were involved in an ethnosilvicultural study in Nepal (Gautam 2001). In any of these processes, the participation of all groups in the community is essential, as different groups are the guardians of different types of information. However, community members identify the most resourceful among them in particular forestry issues. Meeting the concerned people individually and/or in groups may refine the information. Further triangulation can be done with other groups and joint group meetings. An exchange of knowledge with local people can provide a good opportunity to improve information.

In situ experiments will provide useful information with which to modify future practices. Thus, a combination of local ecological knowledge and scientific research will produce the silvicultural regime appropriate for a given social context, and eventually contribute significantly to the sustainable forestry.

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