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PROCEEDINGS OF THE WORKSHOP

FORESTS FOR POVERTY REDUCTION:

Changing Role for Research, Development and Training Institutions

17–18 June 2003
Dehradun, India

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Editors
H.C. Sim, S. Appanah and N. Hooda

Jointly organized by

Indian Council of Forestry Research and Education (ICFRE)
Asia Pacific Association of Forestry Research Institutions (APAFRI)
Forestry Research Support Programme for Asia and the Pacific (FORSPA)

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FOREWORD

An enormous challenge awaits developing countries in the Asia-Pacific region. The region as a whole has seen a dramatic economic transformation in the last 30 years. However, these benefits have eluded significant portions of its population. The existence of such extreme poverty makes its removal the region's most critical development challenge. Quite a significant number of the poor are forest dwellers or from the communities living close by. By virtue of that association alone, it can be said that forest-dependency has led to their impoverishment, yet these forests can also be the solution to their indigent condition.

This would come as a surprise to most though. In former times, most forests belonged to local rulers, and villagers had complete access to most of the non-timber forest products. The people lost their access to such wealth following consolidation of the forest lands into forest reserves to be managed by the government authorities. Most of the governments focused management towards production forestry to support the timber industries and increase their foreign exchange earnings. Poor people's dependence on forests was usually relegated to themes such as minor forest products.

Readjusting our focus back to the socio-economic role of forests would require considerable adjustments to the system. For a start, forest policies would have to be revised so as to prioritize the role of forests in meeting the needs of forest-dependent communities. Agencies that are involved in forest management would have to rethink considerably their strategies, and restructure their departments to take on roles that previously were given minor attention. This would also require engaging personnel with completely new skills in subjects such as participatory processes, community approaches, gender issues and other poverty reduction strategies. The work does not end here. The role of research institutes is pivotal to the success of new programmes in poverty alleviation. This would require a considerable revision of the research agenda, and likewise the hiring of people with new skills. Additional attention would have to be given to transfer of technology, extension, and effective implementation of these new programmes.

A number of participatory research methodologies have emerged recently. Innovative approaches for development and diffusion of poverty alleviation technologies are being pioneered in many parts of the developing world. There is also growing recognition that local community organizations can assist in natural resources management, utilization and development planning; and can play a critical role in facilitating community level application of basic and strategic research results and in translating them into highly adoptable and profitable technologies. However, disparities in scientific capacity and capability, coupled with the often archaic and bureaucratic administrations, in the developing and underdeveloped countries, have hindered the effective adaptation and application of these technologies.

All in all, we see considerable work ahead for many forestry institutions in the region. But most of all, there is a need for considerable transformation in their objectives, agenda, and the products they will have to deliver. This workshop, the first in the series of three workshops held in 2003 on the theme of *Forests for Poverty Reduction – Exploring the Potential*, was organized to share the experiences hitherto gained from poverty alleviation initiatives by forestry research and development agencies in the Asia-Pacific region. These proceedings, a collection of papers presented during the workshop, could serve to increase the recognition of the role of forestry in poverty reduction, as well as the awareness of policy-makers and specialists on the need for a more pro-poor focus in their undertakings.

Forests have great influence on the welfare and economy of human society. In developing countries the linkage between forests and the people is more intense due to higher dependence of the people for their livelihoods. Considerable work lies ahead to bring about the desired results of using forests for alleviating poverty. The renovation of the forestry institutions represents the beginning.

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Key papers were invited from several eminent speakers from all over India for various themes related to poverty reudction. Representatives from national forestry agencies in a number of countries in the region also presented their countries' status reports. The workshop participants represented a mix of foresters, scientists, NGOs, bureaucrats, academicians and scholars, from countries in the Asia-Pacific region. We wish to thank all of them for their contributions during the workshop and also for the preparation of this proceedings.

We are also indebted to all our colleagues in ICFRE for their help, and thanks are due to all the support staff and our office team for their painstaking efforts. The unstinting support from Dr Y.P. Singh, Dr Mohit Gera, Dr Anita Srivastava and Smt. Neelu Gera specially acknowledged.

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1 Welcome address

R.P.S. Katwal*

Dr Oudara Souvannavong, FAO Representative, Rome; Dr Baskaran Krishnapillay, Executive Secretary, APAFRI; Dr Simmathiri Appanah, Senior Programme Officer, FORSPA, Bangkok; Dr Sim Heok-Choh, Executive Director, APAFRI; Padam Shri Chandi Prasad Bhatt; distinguished delegates, members of media, print as well as electronic, ladies and gentlemen, I am extremely delighted to welcome you all today to this Asia-Pacific Regional Workshop on "Forests for poverty reduction: the changing role for research, development and training institutions". We were looking forward to this opportunity for long, the idea was floated in Sri Lanka during December 2002. The meeting was originally slated to be at Delhi in April, but could not be held due to the outbreak of the SARS epidemic.

Forests have great influence on the welfare and economy of human society. In developing countries the linkage between forests and the people is more intense due to higher dependence of the population for the fulfillment of their daily needs. But today the forest ecosystems have become fragile and are much less productive and under an acute form of degradation.

In India, of the 576 000 villages approximately, 175 000 villages are located in and around forests and the predominantly tribal population consisting of about 350 million people has a symbiotic relationship with the forests. They are substantially dependant on the nearby forests for their livelihood requirements. Though 19.27 percent of the landmass in India is under forests, only 11 percent is under good forest cover. With 1.8 percent of the world's forests, we have to meet the needs of 17 percent of the world's human and 18 percent of the livestock population.

One-third of the country's area is stipulated to be brought under tree cover and to achieve this an area of 29.70 million ha has to be brought under plantation. For this an investment of Rs. 50 billion is needed as against the present availability of Rs. 16 billion.

The problem of forest management is linked to the rural poor and overuse of the resource. An increase in the population in the previous century has put severe pressure on scarce natural resources in India. The long gestation period of the forests has led to a situation where a big gap exists between the demand and supply for timber, fuelwood, fodder and non-wood forest products.

Though poverty is in both urban and rural areas, rural poverty is of greater concern as approximately 67 percent of the population resides in rural areas and is predominantly dependant on forests to fulfill their basic needs. The process of development has been such that the benefits of the green revolution and other developmental activities could not be passed on in a uniform manner and consequently a separate class of rural poor consisting of marginalized groups (mainly scheduled castes and landless) has emerged. This has resulted in disparities in incomes. The people living in and on the forest fringes have particularly been affected adversely.

The process of degradation of natural resources and inequity in the society can be reversed if focus is maintained on the following aspects:

- increase in income from the forests to the target groups;
- empower landless and marginalized groups;
- establish processes and mechanisms which can provide cushion in times of environmental imbalances like floods, droughts, cyclones, etc.

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Efforts need to be undertaken at all levels to ensure that the development process is pro-poor. It requires informed and pro-poor policy-making, strategy planning and programme formulation. The forestry research during the past century has been focusing on the basic disciplines of silviculture, forest product utilization, wood technology, entomology, pathology, mensuration and soil science, etc. Though all these are of immense relevance for furthering the development of forestry science, today the focus has to shift to research which can bring quick changes and improve the economy of the poor, leading to poverty reduction.

The purpose of carrying out forestry research today should be to generate benefits for poor people by the application of new knowledge to natural resource management. This shall include livelihood strategies based on the sustainable use of the forests including wildlife habitat and planning strategies to sustain the livelihoods of poor people dependent on forests adjacent to croplands. The three basic things which are essential to the rural poor are fuelwood, fodder and small timber for agricultural implements and house construction.

The fuelwood requirement was estimated to be 390 million m^3, while recorded production from the forests is estimated to be 56 million m^3, which leaves a gap of 334 million m^3.

Against a total requirement of 1 712 million tonnes of cattle feed, the availability from non-forestry sources is only 664 million tonnes. The gap is met from forest areas leading to heavy pressure on the fragile forests. There is demand for 55 million m^3 of wood but the availability is only 29 million m^3, thus there is a gap of 26 million m^3.

Field-based research has to focus on these major issues with standardization of permutations and combinations where silvi-pasture can be encouraged with improved soil and moisture conservation techniques. Slope management has to be such that maximum water is conserved for enhancement of soil productivity and moisture retention. Promotion of user-managed research is an essential step in the right direction.

There are several specific development projects which are being carried out. Their conventional mandate of reducing poverty within a geographical area could be met more effectively if they could:

- identify sub-groups of poor people more clearly and target them specifically;
- improve prioritization and sequencing to reduce the risk of elite capture;
- mainstream crosscutting themes such as gender and environment more strongly. The role of women, though acknowledged, has to be researched from the point of view of mitigating their hardships;
- interpret principles of learning, ownership and sustainability in a more pragmatic manner.

The success of any research activity will depend upon its organization in the states and utilization of extension services to carry research from the laboratory to the field. Under this scenario, investment in research, the need for strengthening of human resources for forestry research, training requirements and strengthening of forestry extension, will have to be attended to.

There is a need for a user-friendly and problem-solving thrust in research planning and extension. An example can be cited regarding exploitation of age and growth projections for community managed forest areas and the prevailing calculations have to be modified for coppice and non-coppice areas. The rate of growth in different management systems and compatibility with NWFP at the forest floor and in understory have to be studied.

In a world where there is still so much extreme poverty, inequality and environmental degradation, the concept of technology leapfrogging acquires a new and special meaning.

The best technologies are those that create sustainable livelihoods. They must facilitate the fulfillment of basic human needs and promote basic attitudes of self-reliance. Promoting local water harvesting structures, energy-efficient stoves, biomass-fuelled power stations are such technologies, which strive to fulfill the basic needs of the society. While promoting such technologies, care should be taken that women who face the brunt of poverty are at the centre of development.

There is the possibility of developing eco-farming models under adverse agro-climatic conditions with integrated approaches to land and water management. The ultimate goal of development initiatives is not only to meet the immediate needs of the rural poor, but also to reverse the trend of natural resource depletion.

From the above scenario it is evident that a poverty reduction strategy focusing only on rapid economic growth is unlikely to significantly improve the situation of the poor. Both equity and sustainable growth are required. Poverty reduction would work best when the poor are made more productive so they can contribute to economic growth themselves. A two-way exchange of goods and services in the form of agriculture from non-tribal villages and value-added forest products from tribal villages seems to make ecological as well as economic sense.

A number of participatory research methodologies have emerged recently. Innovative approaches to development and diffusion of pro-poor technology are being pioneered in many parts of the developing world. However, disparities in scientific capacity in a globalizing inter-regional system of research network and the paucity of suitable institutional mechanisms to build on the combined strengths of all research partners and institutions remains a challenge.

There is a growing recognition that local community organizations are often better equipped than their upstream research partners in providing insights into traditional research practices and innovations. They are better placed to help in organizing the communities in natural resource management, utilization, and development. This is because they have access to location-specific, agro-ecological and socio-economic information and can play a critical role in facilitating community-level application of basic and strategic research results, and in translating them into highly adoptable and profitable technologies.

This Workshop is being organized to assess the experiences hitherto gained and to identify measures to strengthen these efforts in the Asia-Pacific region as these countries share many things in common.

Your valuable inputs during the course of this Workshop will help in laying the foundation for the bright future of forest dwellers and millions of stakeholders by ensuring livelihood initiatives through forest enrichment. The recommendations resulting from this Workshop are also expected to lay down a road map for research institutions to plan their strategies for reduction of poverty. I am sure that with your wholehearted participation this Workshop shall be a grand success.

I once again heartily welcome you and wish you a pleasant stay in the sylvan surroundings of Doon Valley.

Thank you very much.

2 Introduction: towards forestry institutions for the twenty-first century

S. Appanah *

Do we still need forestry institutions? And with that, do we still need forestry research? I had the enormous mishap of entering into discussion on the subject of forests with a chief minister of a small state in Asia. His argument was that if countries in the Middle East can do without trees, why are we overly concerned with keeping forests? It was of course disingenuous of him – some of his likes are mainly interested in approving logging concessions to a favoured few. I carefully pointed out that the Middle East, fortunately for them, is awash with black gold, and we with green gold. With some small effort, ours is renewable and theirs not. Unlike this isolated case, in all my other meetings of this nature, there was a clear consensus that mankind will need its forests, and likewise the need for forestry institutions.

If that is indeed the case, are our forestry institutions meeting their demands adequately? The stakes are high indeed. If our political masters conclude that our work is ineffective, we are in for the chopping block. Against this reality, the onus is on us to ensure that our work is meaningful, has impact, and the benefits reach the people in need, and the future for forestry is vouchsafed.

If we take a look at forestry across the region, the trend unfortunately seems to go along a predictably poor route. Only three decades ago, many countries in the region were exporters of timber and wood products. Since then, some of them had to take drastic actions, including logging bans to conserve the remaining forests. This was out of concern for environmental degradation. Forestry's contribution to GDP (as measured using current methods) has clearly declined, and likewise, the country's annual budget allocations for the sector have seen a downward spiral. Many are now timber importers both for domestic needs as well as for further processing and re-exporting. More of the domestic timber needs are met from plantations, farm- and agro-forests. Next, the countries that are currently on the producer side too are beginning to show declines in their resources and annual harvests. I may be painting a bleak scenario, but it is becoming reasonable to assume that in the not-so-distant future the natural forests are unlikely to be major source of timber.

Against this backdrop of declining forest resources is an increase in poverty in the region. Although the region has had a burst in economic growth in the last decade, today more poor are living in the region than anywhere else on earth. Another conundrum is the association of gross poverty with forests; most of the poorest are living in forests or in the margins. FAO has pointed out that 1.2 billion people in developing countries depend on trees on farms to generate food and cash, 350 million people live in or next to dense forests and rely on them for subsistence or income, and millions more depend entirely on tropical forests for their survival. This clearly emphasizes how intensely human beings, especially the poorest are dependent on trees and forests for survival. This is not to conclude that forests have impoverished them, rather the governments are largely to be blamed for their indigent state.

For almost a century, forestry institutions in the region were mostly devoted to managing the vast timber resources, and gave scant attention to forest-dependent people's needs. The forests were extensive and the populations small to make a severe dent on them. The main beneficiaries were the government coffers and a small group of people heavily involved in commercial logging activities. The poor and forest-dependent people remained by and large marginalized and unprotected. With the unprecedented growth in human populations in the last half a century, the demand on forest land and other products had grown steeply. This

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led to overexploitation and degradation of forest resources to such a degree that the consequent environmental problems are beginning to overwhelm us. The natural reaction in many countries has been to swing towards greater conservation, locking away remaining forests. This has greatly affected the poor who are dependent on forest resources from public lands. The result is heavy encroachment and continued degradation of the forests.

It has finally dawned on us that conservation is near impossible unless we meet the needs of the poor communities, and better still involve them in the work. So the big question is whether forests can be used to alleviate poverty? While it is germane to our discussions, for the present we have to assume it is possible, and examine how forestry institutions can bring about the results? This endeavor of course, fits in quite well with the United Nations' Millennium Development Goal. Poverty reduction strategies are thus becoming the framework for development planning and implementation, and are guiding the operations of many donors and international development agencies. So, are our institutions, the planning, management, research, extension, and training agencies, capable of delivering the results? This is the main focus of this workshop.

This enquiry is relevant and timely. One simple clue would be to take a quick glance of the annual reports of forest departments in the Asia-Pacific region, and scan our local and regional forestry journals. They are revealing: for example, the contents of one issue of the Journal of Tropical Forest Science (2003) had articles on vegetative propagation, tree wealth of tribal people, microbial biomass, macronutrients, remote sensing, fruit size, mycorrhizae, genetic variation, growth periodicity, growth performance, and forest type classification. Only one-eleventh of the articles relate directly to poverty issues. This trend is even repeated in a national journal such as the Indian Forester – Volume 130 (nos. 4–6) contains only one article that relates to poverty issue, four indirectly, and the rest (36) deal with traditional forestry subjects such as plantation genetics, silviculture, canopy management, wood utilization, insect pests, seed germination, and thereof. What it means is that many institutions are still trying to solve problems that bear little relation to current needs.

This may be too simplistically arrived at, but it does convey an important message. Perhaps our institutions need to review their work, and revamp their strategies and priorities to deliver that expected of them. This workshop, the first in a series on the theme, "Forests for Poverty Reduction," looks at the institutional needs in order to be able to meet these new challenges.

In the welcome address, R.P.S. Katwal stated that the benefits from the green revolution and other developmental activities could not be passed on in a uniform manner, and this has resulted in a separate class of rural poor, those living in and near forest fringes. Their over-dependence on public forest lands has resulted in further loss and degradation of the forests and environment. Such inequities need to be reversed by increasing their income, empowering them, and establish processes and mechanisms to cushion them against hardships. C.P. Bhatt, a leading social worker in the region, opened the discussion (Chapter 3) by emphasizing that forestry research in India is poorly done, and has not identified people's needs, problems and their expectations. There is a clear mismatch between the needs of development programmes and the priorities of research institutions. Exacerbating the situation, some of the useful research does not get transferred from the laboratory to the field. But such expressions may not be revealing the primary cause. However, in a well-thought out presentation on how forestry evolved in the Indian subcontinent, S. Shanmughasundram (Chapter 13) clearly places the blame on the government and forestry institutions for the current predicament. He outlined forestry development in the country into four phases or generations, when radical shifts in forestry objectives and concepts took place. The first was the 'Forestry for Conservation' that led to consolidation and appropriation of communal forest land by the states. This began the alienation of rural people from access to their forests. The second 'Forestry for Economic Development' resulted in the states trying to generate income from forests. High attention to timber management was given but it only resulted in loss of forest capital and biodiversity. The wealth though did not trickle to the poor communities. The third was 'Forestry with People' which recognized the need to include rural people in the restoration of degraded forests. Many innovative ideas such as participatory forestry and joint forest management were born as a result. But overall, these schemes still used the poor merely as cheap labour. Troublesome issues of equity and ownership remained unresolved, and the poor remained unenthusiastic to such schemes. The fourth, and current one, is referred to as 'Forestry for People.' This calls for integration of forestry in the rural life, with focus on using the resources to alleviate rural poverty.

But before we embark on a major endeavour, it would be better to find out where the poor are, what conditions lead to their impoverishment, and what developmental options can be mustered to reverse the condition. K.D. Singh, in a survey of "Forest and Poverty" (Chapter 14) attempts to grapple the issue. By geo-referencing forest cover, forest area and village data, the spatial correlation in distribution of poor, their occupational patterns, and their distance from the forests can be derived. This would be essential information to base any development strategy. One can argue about why we need to devote so much energy to study the character of poverty. Instead, why not transfer our energy directly to poverty eradication efforts? That would be fine when dealing with tiny pockets of poverty. But when the scale and depth of poverty is expressed in the millions, information about distribution and character would be essential for formulating major

development work. Along the same lines, A. Shariff *et al.* (Chapter 15) presented their findings on the socio-economic and human development profiles of scheduled tribes and scheduled castes in India.

It is one thing to know the character and demography of poverty, but even more critical would be investigations on how such poverty can be alleviated. Not unsurprisingly, an overwhelming number of researchers linked non-wood forest products (NWFP) intimately with the poor, whether they are forest dwellers or those living in the margins. In keeping with that tradition, we have several presentations in this workshop. For a start, P.P. Bhojvad (Chapter 9) looks at research issues in the value chain of NWFP for poverty alleviation of forest dwellers. He highlights the research needs for sustainable management of NWFPs. In light of the findings, he goes beyond to identify the changing roles of research institutes, forest managers and trainings institutes. A.V. Sagar (Chapter 16) next looks at tribal development and the marketing of non-timber forest products. He gives special attention to how cooperatives formed for marketing such products can bring better returns to the people. The theme is further pursued by P.L. Soni and V.K. Varshney (Chapter 11) who attempt to link poverty alleviation through value addition of NWFPs. They point out correctly that research efforts are inadequate, too thinly spread out, and there is a lack of linkage between different institutions involved in NWFPs development.

Other researchers looked beyond NWFPs as a means to alleviate poverty. These include: (i) report from Zhang *et al.* (Chapter 24) on the role and application of community forestry in mountain development in China; (ii) P. Kant and R.P.S. Katwal's proposal (Chapter 6) to incorporate environmental goods and services from forests for poverty alleviation; (iii) M.K. Singh's study (Chapter 7) on Joint Forest Management scheme in India; (iv) S.S. Negi's study (Chapter 19) on the experiences gained from participatory forestry; and (v) the work of M. George *et al.* (Chapter 12) on agroforestry for poverty alleviation and environmental restoration.

But if this workshop had dealt with issues relating to community forestry, NWFPs, ecological services and what not, we would have missed the point. Our main purpose is to look at how forestry institutions should re-engineer themselves to meet the new challenges of meeting the needs of the poor. Most forestry institutions have been caught somewhat unprepared for the change in demands. Whereas, traditionally the work was focused on timber management from forests mostly owned by the state, today foresters have to look far beyond this narrow dimension. People's issues are paramount, and a typical forester has to contend more with issues ranging from conflict resolution, ownership sharing, participatory processes, NWFPs, and so on. The research institutions have had to shift away from typical subjects as silviculture, mensuration and management, and more into policy related issues such as governance, tenure, taxation, multi-sector planning, certification and thereof. Similar demands are made with the ministries, NGOs, extension and training bodies. The curriculum for forestry education has to be completely revised if the training is to meet the rapidly changing needs.

In keeping with this need, several valuable discussions followed on issues of research, development and training. Let us start with the research issue. At the very start, R.P.S. Katwal in his welcome address calls for efforts to be undertaken at all levels to ensure that development process is pro-poor. He points out that research should shift away from basic disciplines such as silviculture, entomology, wood technology, etc., to income-generation activities geared for poor people, which would include fuelwood, fodder and small timber. In another presentation, P. Kant and R.P.S. Katwal (Chapter 6) go further to identify R&D requirements. They point out that the Joint Forest Management in India has achieved only modest success as it remained confined to NTFPs such as small timber and fuelwood that have remained in the non-monetized economy. They propose research to include environmental goods and services like carbon sequestration, soil and water conservation, ecotourism, etc., to enhance income generation for the poor people. In view of the changing demands on forests, forestry research institutes have been set up for the single purpose of developing technology to meet the needs of the poor. P.K. Shukla and S.S. Bisen (Chapter 5) describe the work of Tropical Forest Research Institute, Jabalpur, India, as a case in point. This institute has developed appropriate agroforestry models, popularized cultivation of medicinal plants among farmers, and introduced multi-use of forest flora. The institute pays additional attention to user uptake of the results to ensure the findings reach tree growers and farmers. Along the same vein, A.K. Rana and N. Gera (Chapter 4) express concern that in the prevailing forestry research systems, the intended beneficiaries have not adopted the technologies to the desired extent. The reasons include inadequate linkages between research institutions and user groups, mainly due to lack of extension efforts, and failure to integrate technologies with the development process. The way to overcome some of these constraints is to ensure that the target groups are not only beneficiaries but are also active partners in the R&D process. The role of research institutions have to be broadened to integrate livelihood support systems, health and nutrition, education and capacity building, revival and strengthening of traditional knowledge systems and development of marketing channels. Further fine-tuning the ideas, K.S. Rao (Chapter 8) calls for forestry research institutes to minimize curiosity-driven research, pursue research that meets society's needs, and give greater consideration to socio-economic issues. F.A. Polisco (Chapter 22) also calls for a major change in the way forestry research institutions work. He proposes greater facilitation or direct transfer of technology to the users, building capacities of communities in sustainable management, and influence policy

development that is pro-poor. Indonesia (Chapter 30) has likewise, undertaken a series of improvements to its forestry research institutions, such as capacity development, and formulating new strategies that take into account local community participation in forest management. Recognizing that most of the forest management problems such as encroachment and illegal logging stem from poor social and economic conditions, a new research centre for social and economic research for forestry has been set up. In keeping with the changing demands, even academic institutes have begun to move, for example the College of Forestry and Natural Resources (University of the Philippines) has revised its curriculum and shifted its research focus into socio-economic issues and forestry (E.O Peralta, Chapter 21).

Perhaps the thrust of the meeting has dealt with reformation of research institutions and the research agenda to meet the challenges of using forests for poverty alleviation. However, other presentations, while not with the same intensity, do recognize the need for training institutes, policy makers and development organizations to have clear and paramount roles in this initiative. Several country reports (e.g. D. Tshering, Chapter 23) made general recommendations along these lines. There are also calls for policy revisions, legislation, decentralization, greater participation, and increasing the social forestry programmes. Proposals are made for introducing national forest programmes which incorporate poverty alleviation strategies into forestry plans and policies. In some cases the concepts have moved beyond theory to practice, as in the case of the Peoples Protected Areas (PPAs) in Chhattisgarh, India. R.C. Sharma (Chapter 17) describes the creation of 32 PPAs, each covering around 15 000 ha of forest land, in the newly created State of Chhattisgarh in India. Considering more than 50 percent of the people living in and around the forests depend for their subsistence on them, the Forest Department is looking into management models with appropriate entitlements to enhance the welfare of the people. In the same realm would be the Community-Based Forest Resources Management (CBFRM) strategy adopted in the Philippines (F.A. Polisco, Chapter 22).

The concept of using forests for poverty alleviation is beginning to gain recognition in the Asia-Pacific region. This is clearly indicated in the country reports. Viet Nam (Chapters 25 & 26), for example, has prioritized forest protection and forestry development which are linked to poverty reduction. Supporting policies and legislation have been approved, and departments are beginning to make the adaptations to implement forestry programmes that include land allocations for households, 5 million ha reforestation programme and improvement of agricultural practices so less pressure is exerted on forest land. Community forestry projects have become the mainstay in Bangladesh (Chapter 29), and are getting more attention in Myanmar (Chapter 31): these are geared towards better landuse efficiency, employment generation, environmental stability, and greater social equity.

Perhaps the country that can best exemplify the shift from traditional timber-production focus to a pro-poor forest management is Nepal. K.C. Paudel (Chapter 20) gives a brief on the developments. Nepal took the initiative to involve local people in the management and utilization of forests for improving livelihoods of local communities in the 1970s. It began with the creation of the Community Forestry Programme. This was followed by the Leasehold Forestry Programme. Some 1 million ha of forest area are now under such management. In keeping with this, the policies are being formulated to transfer government-owned land to the communities. In the 1980s, the Forest Department began involving local people into managing protected areas. To support these developments, the government initiated several measures to increase capacity of local forest users in forest management, participatory methods, revenue sharing mechanisms, and greater women participation. Meanwhile, research was stepped up in propagation and establishment of multi-purpose tree species, forest management in the mountains, agroforestry, and biomass estimations. Appropriate harvesting and processing techniques for key NTFPs have been developed and disseminated. The government recently created a high level coordination committee for promoting high value NTFPs. Yet, Nepal still recognizes problems exist in several areas, such as limitations in planning and management, poor transfer of technology, inadequate links between researchers and users, benefit-sharing mechanisms still in infancy, and low investment into forestry research.

In conclusion, it would be incorrect to claim that a workshop like this has successfully identified all the key institutional issues and provided the strategies and directions to take. However, the workshop has been able to articulate the problem effectively, and push for change across the board. Nevertheless, overall it can be claimed that a definite shift in the thinking is taking place. Countries in the region are taking cognizance of the decline and degradation of their forest resources, the impoverishment of the landless people, and the need to link forest conservation and management to that of poverty alleviation. These will require almost a complete re-engineering of our forestry institutions. Institutional changes, albeit hesitant and uncoordinated, have begun. The experiences gained by countries such as Nepal would provide models for adaptation. The huge innovations in social forestry in India will provide additional direction. While more thought should be given to a number of issues, particularly in the structure and organization of the institutes, new skills are also needed. Gone are the days when a diameter tape and notebook were the forester's equipment. People are going to be his biggest challenge – dialogue, engagement, and meetings would fill his portfolio. But nothing will happen unless we are prepared to change. As Gandhi said, "We must be the change we wish to see in the world." As we transform ourselves, so will our world.

3 In forestry lies the prospect of economic progress

Padam Shri Chandi Prasad Bhatt*

INTRODUCTION

In spite of industrialization and the various alternative employment options available in the twenty-first century, natural resources provide the biggest livelihood opportunities to a large population in the world and in India. In underdeveloped and developing countries, two-thirds to three-quarters of the human population is dependent on the forest and land for their livelihood. The weak point of this situation is that natural resources are not being utilized in a development-oriented manner for providing livelihood strategies. Natural resource removal is not able to foster the socio-economic progress in an effective manner.

The land available for natural resources is limited. This valuable resource has given way to scientific research and development of new techniques to enhance productivity per unit area of land. Agriculture has always been a major source of livelihood but it has reached a stage of saturation with no further scope for expansion. Forest resources therefore become the second largest source that together with agriculture and annual husbandry can provide major livelihood opportunities to the rural communities.

It is a well known fact that forests not only protect our valuable soil, provide clear air but also provide a strong basis for agriculture and industrial progress. Forest dwellers and people living near forest areas depend on natural forests for their nutritional requirements, agricultural implements, raw material for cottage industries and fodder for livestock. Forests therefore become an important life support system for employing large number of people.

It is essential to have a certain proportion of land under forests to maintain the microclimate of the area and to promote socio-economic development of the local people. National Forest Policies of India (1952, 1988) have emphasized on bringing more and more land under forest cover and increasing the canopy cover and productivity of the existing forest areas. However, the strategies required for implementing the guidelines are not available within the legal framework.

DEGRADATION OF FORESTS HAS INCREASED POVERTY, UNEMPLOYMENT AND MIGRATION TO URBAN AREAS

Analysis of poverty has highlighted the fact that forest degradation has resulted in unemployment of a large number of households, their livelihood primarily based on agriculture, animal husbandry, forest-based art, crafts and industry (including bamboo and cane products) and collection and processing of forest fruits, gums and medicinal plants.

As a result they are compelled to depend on untraditional livelihood alternatives. This has happened because unlike agriculture, forestry has not been developed like an industry with a practical work plan and not enough investment has been made in developing and disseminating technical forestry work.

It is a fact that the forest area of India is much less than desired and the existing forest land is low in canopy cover and productivity. This has adversely affected the livelihood of village communities, dependent on forests. On the other hand forest based industries are looking for substitutes to the traditional raw material. They have even started importing these raw materials from other countries.

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India is rich in forest areas as well as human resources. Yet forestry has not emerged as a major industry because of lack of appropriate vision and planning. A people friendly forestry programme with sufficient technical and financial assistance can provide a basis for self-dependent and sustainable development of natural resources just like agriculture. A few ideal examples of sustainable development in the field of forestry already exist in different parts of the country. These can provide as role models and can be replicated in other parts of the country.

ABUNDANCE OF FORESTS AND ECONOMIC PROGRESS

Uttaranchal is rich in forests. With a geographical area of 53 483 km^2, the forest area is 34 662 km^2 (64.8 percent). Even after excluding the forest area above the tree line, rocky patches and river, we still have sufficient forest area, which can be potentially developed into high-density cover.

Uttaranchal has two-thirds of the area under forests (64.8 percent) and yet dense forest cover is only one-third (35.56 percent). It is a major task to increase forest density in the remaining forest areas. This task has not been achieved because it still continues to be a government programme and not a people's programme. A major reason for this is that 68.7 percent of the forest area (23 827 km^2) is under reserve forests, 30.8 percent of the forest area (10 673 km^2) is under protected forests and under the custody of the Forest and Revenue Department. About 20 percent of the protected forests are with Panchayat forests (2 368 km^2). So by and large 92.5 percent of the forest area is under the control of government and only 7.5 percent of forest area is under the direct control of the village community.

Uttaranchal government started the Joint Forest Management Programme with World Bank financial assistance over a very small area of forest land under the control of Panchayats (7.5 percent of forest area). However, the need of the hour was to develop 92.5 percent of the remaining forest area in village forest with the help of local village community to further strengthen the resource base of agriculture, animal husbandry, and small scale cottage industry that would eventually provide local employment and boost the local economy.

CHIPKO MOVEMENT FOR SOUND AGRICULTURE AND FORESTRY PRACTICES

The Chipko *Andolan* (Movement) from the very beginning suggested that forest development and village economy are closely interlinked. It envisaged the strengthening of the village workforce, their training in forestry and to decentralize all the forestry protection and development activities. It also emphasized on including environmental awareness programmes in all levels of education and to stop the removal of forest products with the help of contractors. However lessons learnt from this success story have not been incorporated in forest management plans of India. The lessons learned from the good work done by the villages covered under the Chipko *Andolan* need to be extended to the other parts of Uttaranchal. *Dasholi Gram Swaraj Mandal* developed an ideal model of forest protection and development under the Chipko *Andolan* two decades ago. This can be a role model for forest development in the hilly state of Uttaranchal. *Dasholi Gram Swaraj Mandal* strongly feels that a plan based on local needs and future possibilities will motivate and strengthen the local workforce to strike a balance between ecological and economic development. It has done extensive participatory study on the major problems in the villages of Uttaranchal.

In some villages animals did a lot of crop damage. The villagers were not able to reap the benefits of their hard work. They also have a lot of problems regarding fodder and fuelwood. They could barely make enough to provide for one square meal. An agroforestry model was developed to find solutions.

Some villagers were motivated to construct a high stonewall along their agriculture field. The wages for making the stonewall were paid by the *Dasholi Gram Swaraj Mandal.* The wall was constructed in such a manner that land between agriculture field and forest could be used for planting of fodder producing and fruit bearing trees. This work in the Bemru village of Dasholi Vikas Khand has shown encouraging results.

Construction of wall has resulted in crop protection from wild and domestic animals and increased crop production by $1^1/_2$ times. The fodder production has doubled and resulted in two distinct benefits. Firstly, availability of fodder near the village has reduced the time of fodder collection by village women. Earlier they were able to collect only 1 head-load of grass in the whole day. Now they are able to finish all their household chores and get 2 head-loads of fodder and use the remaining free time looking after their children and other productive activities. Secondly availability of sufficient fodder in the area has promoted development of animal husbandry. The milk production has increased one-and-a-half to two times. People have started selling the surplus milk to a milk diary. Fruit production has also contributed to economic change. Sale of fruits in the open market now gives them the purchasing power to buy essential goods and services.

Production of forest produce traditionally used by local artisans can promote the local craftsmanship. For example *Ringal* (bamboo) is used for the production of local products. A large number of households traditionally dependent on *Ringal* for livelihood have lost their traditional way of living because of depletion of the raw material from the forest area. No efforts have been made to increase the production of *Ringal* in the natural forest and to introduce it in agriculture.

Collection of fruits, vegetables and medicinal plants has been a major source of livelihood for a large number of households. Scientific management of forest resources by using sustainable harvesting methods can increase the quantity and quality of forest products. We need to develop a workable strategy to promote this.

RESEARCH REACHING THE COMMON MAN?

Lack of research and technical inputs in the field of forestry has been a major draw back. There is no dearth of forestry research institutes in the country. Very useful research done by these institutes has not been transferred from laboratory to land. We have new scientific achievements, advanced people friendly technologies, development programmes and sufficient resources. In spite of all these we are not able to promote productivity of forests and bring more and more area under forest cover as per the targets laid down by the planners. There could be a shortfall, which must be identified and put right to achieve the ideal situation.

This workshop must deliberate on the priorities of the forestry sector and explore ways and means to execute them. I feel that there is a lack of coordination between the identification of people's needs, problems, their expectations and the planning process. There is a gap between the thinking process of planners and the work culture of the implementing agencies. In a similar manner there is a gap between the need of the development programmes and research priorities of research institutions.

There is a need to plug this with a coordinated effort of various agencies (local people, research institutes, forest planners and executers) involved in forest development. We need to formulate a policy that is based on the grassroots level needs and is implementable.

4 Forestry for poverty alleviation – role of research institutions

A.K. Rana* and Neelu Gera*

ABSTRACT

Although India has made substantial progress since independence, a considerable proportion of population still lives in conditions of extreme poverty, characterised by lack of access to productive assets, information and knowledge of natural resources besides basic rights and services, resulting in exclusion and marginalisation of these people from the development process. Due to the large population and widespread poverty, natural resources are subjected to enormous pressures. Research institutes have a major role to play in view of the widening gap in demand and supply of important forest products, unabated degradation and inadequacy of existing resources and importance of conserving complex ecosystems. FRI Dehradun has developed a number of technologies relevant to the programmes for poverty alleviation, empowerment of masses and integrated development of villages. Some of these, such as the development of substitutes for forest products, extraction of natural dyes, rehabilitation of mined areas, pencil making with hand tools, agroforestry models and cultivation techniques of medicinal plants are highlighted in this paper. However, an important constraint to the operation of the forestry research system has been that the intended beneficiaries have not adopted technologies to the desired extent. Probable reasons being inadequate linkages between research institutions and user groups due to inadequate extension efforts and failure to integrate technologies with the development process.

INTRODUCTION

India is one of the oldest civilizations with a rich cultural heritage, but inhabited by many poor people. The country supports approximately 16 percent of the world's population with only 2.5 percent of the world's geographic area. With the turn of the new millennium, we have already crossed the one billion mark with an average density of 324 persons per km^2 (Forestry Statistics India 2001). With a decadal growth rate of 21 percent, the population is projected to reach 1.25 billion by the year 2010. It is estimated that about 70 percent of the population and 80 percent of those below the poverty line live in rural areas. This includes people who live in resource-poor regions, lack productive assets, skills or capacities and those who are inadequately organised.

Since independence, India has made substantial progress in terms of improvement in basic social indicators such as health, nutrition and education. While the life expectancy has doubled, infant mortality has been halved and literacy rate has risen, a considerable proportion of population still lives in conditions of abject poverty.

Poverty, in general, is characterized by the lack of access to productive assets, basic rights and services such as health and education, besides access to information and knowledge of natural resources. Poverty thus results in exclusion and marginalisation of the people from the development process. Due to the large human and cattle population and widespread rural poverty, the natural resources of the country are subjected to enormous pressures. A major proportion of these people are directly dependent upon these resources for their survival needs. The burden of poverty is more obvious on the rural women, already subordinated by the social structure.

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These women carry the burden of meeting the basic subsistence needs of food, fuel, fodder and water in the face of widening demand and supply gap, increasing environmental degradation and diminishing access to natural resources.

With the increasing recognition of the importance of forests for environmental health, energy and employment, the National Forest Policy of 1988 lays emphasis on scientific forestry research and adequate strengthening of the research base for rural and tribal development. The broad priority areas identified in the policy include improvement of productivity, effective conservation and management of existing resources and development of substitutes to replace wood and wood products. The policy also gives due consideration to the symbiotic relationship between forests and people, by emphasizing special attention to integrated development programmes. The Science and Technology Policy 2003 also identifies the need to provide food and health security for all on a sustainable basis as an important objective to be achieved through technological developments.

The research institutes therefore have a major role to play in view of the diverse research requirements for the development of "Science and Technology" in the country. While there is a strong need for conservation of our natural resources, there is an equally important need to harness their potential on sustainable basis for the benefit of the society.

The gradual realization about the widening gap in demand and supply of important forest products, inadequacy of the existing resources, their unabated degradation and the importance of conserving the complex ecosystems guided the forestry research in the country as well as at the Forest Research Institute, Dehradun. With better understanding of the changes in the state of the environment and forestry resources, coupled with the enhanced knowledge levels, the institute took up the challenges of research with much broader objectives during the last three decades. Accordingly, a number of technologies have been developed which have direct relevance to the programmes for poverty alleviation, empowerment of the masses and integrated development of villages. Some of these technologies (Anonymous 1999, 2000) are highlighted in this paper.

IMPROVED PLANTING STOCK FOR HIGHER PRODUCTIVITY

Forest Plantations are a powerful tool in the continuing efforts of foresters to increase productivity. Increasing demand for forest products and services on one hand and decreasing land area available for forestry on the other, has necessitated raising of plantations under various combinations on farm lands and other non-forest lands. The availability of quality planting material for such plantations through research is required. A combination of intensive site preparation with the use of uniform, well-grown genetically-improved nursery stock, planted at uniform spacing, increases growth and yield, reduces rotation length, facilitates tending and harvesting operations and improves the wood quality. This will not only assure better economic returns to the farmers, but also reduce pressure on the remaining natural forests.

Seed technology

The suitability and quality of the seeds have a major effect on the success of plantations raised from them. It costs almost the same to establish a plantation from poor seed, as it does from seed of high genetic potential. However, differences in the quality of plants produced and economic returns can be vast. The seed technology developed at the institute aims at production of quality seeds though various improved technological practices like seed collection, processing storage and pre-sowing treatments for effective germination. Of the various low cost and user-friendly technologies developed, a few are listed below:

- Seed processing including extraction and drying for *Azadirachta indica*
- Seed storage techniques for prolonged viability for *Azadirachta indica*, *Casuarina equisetifolia*, *Albizzia lebbek* and *Acacia nilotica*.
- Processing for improved germination in *Acacia nilotica*, *Albizzia lebbek*, *Bambusa arundinacea*, *Strychnos nux-vomica*, *Tamarindus indica* and *Tectona grandis*.

These technologies aim to realize the economic benefits by not only reducing the cost of nursery operations significantly by limiting the area of nursery to raise a calculated and desired number of seedlings, but also by production of uniform stock, thus increasing the efficiency of transplanting operations and reducing the cost. The expenditure on seed collection, extraction and processing is also reduced with optimum storage conditions.

Tissue culture of bamboo

Tissue culture protocols have been developed for large-scale rapid multiplication of *Dendrocalamus strictus, D. membranaceus, D. asper, Bambusa vulgaris* and *B. arundinacea*. The technology is very useful, where conventional methods of multiplication are either not available or are inadequate to fulfill the demand. This involves the use of plant tissue culture where a small plant part is cultured on artificial medium with the combination of growth regulators. A complete plant with root and shoot system is developed on synthetic medium by providing suitable light and temperature conditions.

Agroforestry models

Agroforestry, the land use system that incorporates woody perennials with agricultural crops, help the farmers to cope with loss of crops due to drought, reduce soil and water loss, utilize off-season precipitation and meet the requirements of fodder, fuelwood, fiber, timber and other forest products, besides improved food production. Accordingly, a number of agroforestry models have been developed with different species of trees, agricultural crops and herb species, for example:

- Poplar–Sugarcane–Turmeric Block Plantation Model with benefit-cost (B/C) ratio of 3.06.
- Poplar–Sugarcane–Wheat–Chari–Potato–Maize–Bajra Block Plantation Model (B/C ratio 2.58)
- Poplar–Sugarcane–Wheat–Chari Block Plantation Model (B/C ratio 3.47)
- Poplar–Sugarcane–Potato–Barseem–Chari Block Plantation Model (B/C ratio 3.01)

SUBSTITUTES FOR WOOD AND OTHER PRODUCTS

Katha from *Uncaria gambier*

The production of katha from the heartwood of khair (*Acacia catechu*) tree has been known for a very long time. However, shortage of khair wood prompted the institute to screen other suitable sources for making katha. One such source is *Uncaria*, a small genus of woody, climbing shrubs found mostly in tropical Southeast Asia. *U. gambier* produces the well-known gambier or pale catechu, but it has not been cultivated in India so far. The cost of production of gambier katha is much less than that from *A. catechu*. The technology would save khair trees and thus help in environmental conservation.

Jigat substitute

Machilus macrantha (Lauraceae) and *Litsea chinensis* (Lauraceae) trees are important to the survival of the agarbathi (incense stick) industry in India, which is dependent on the bark of these trees. Powder of the bark, known as 'Jigat', functions as an adhesive or binder in agarbathi. Over the years, the expansion of agarbathi industry has inflated the demand for Jigat, leading to indiscriminate felling of these trees, which is a valuable component of the evergreen and semi-evergreen forests of the Western Ghats and the north eastern states. Substitute for Jigat has been developed from agro-based biopolymers. The technology not only avoids the use of forest-based raw material but is also economically very competitive.

Natural dyes from forest waste

Processes have been developed for the extraction of natural dyes from some abundantly occurring plant materials of forest origin. Methods have also been developed to use these dyes on silk, wool and cotton. These dyes can be used by handloom as well garment designing industries, which export their products to developed countries like Germany and Denmark, where the use of azo dyes have been banned. Due to environmental awareness, the natural dyes obtained from plants and animals are the dyes of 21st century. The forest biomass can be used for the production of dyes on cottage scale, generating employment for the people through value addition to the non-wood forest product and creating an additional source of revenue.

CONSERVATION AND REHABILITATION OF NATURAL RESOURCES

Rehabilitation of mined areas and overburden spoils

Surface mining operations drastically affect the productivity of the land as an appreciable thickness of overburden is required to be removed to reach the ore resource. Starting from removal of vegetation and topsoil, the ecology, socio-economic conditions and hydrology of the areas are also adversely altered. Conventional afforestation practices to revegetate mine derelict lands do not effectively rejuvenate the disrupted ecological functions, emphasizing the need for site-specific eco-restoration technologies. FRI has developed the ecorestoration technologies for surface mined phosphate mines, which have already been transferred to many companies. The salient features of the technology include an ecosystem approach towards restoration and use of ecologically and socio-economically viable species.

Cultivation techniques of NWFP species

The institute endeavours to undertake *in-situ* and *ex-situ* conservation of medicinal plants. Cultivation techniques of a number of economically important and endangered medicinal and aromatic plant species have been developed and transferred to various institutions, NGOs and pharmaceutical industries. The species include *Abelmoschus moschatus, C. citrates, Cymbopogon martini, Catharanthus roseus, Mentha arvensis, M. spicata, Ocimum kilimandscharicum, Rauwolfia serpentina,* and *Withania somnifera.* The technology will help to reduce pressure on forests besides being an excellent income generating activity.

OTHER LOW COST TECHNOLOGIES

Pencil making with hand tools

Pencil manufacture is a complex process undertaken in modern factories, with almost all operations being carried out by mechanical appliances. FRI has developed a set of hand tools for making pencils on a cottage industry scale, with the main objective of providing additional source of income to the rural people. The industry can be organised in community development blocks on a cooperative basis. The technology has an added advantage that it can be easily and effectively integrated with literacy programmes at the village level.

Portable essential oil distillation unit

Essential oil bearing plants are very valuable as they are the sources of perfumes, cosmetics, flavouring agents and aromatic chemicals, which are also used as antiseptics, deodorants, repellents and medicines. A simple portable distillation unit of 50 kg capacity has been developed for distilling oil from essential oil bearing grasses like *Cympopogon martini* and *C. citratus* besides other leaves, roots etc. The cost of the unit is about Rs. 14 000 and is more efficient as the yield of oil is 30 percent more than the traditional ones. The distillation unit can be easily transported to the felling site/field.

Colouring and ammonia fumigation of wood

There is often consumer resistance in the use of plain looking secondary plantation grown woods like poplar for furniture, in comparison to traditionally used darker decorative grained woods like teak, sissoo, rosewood and walnut. The present methods of staining and artificial grain development, based on Aniline base dyes, are not only costly, but also hazardous for health, inconsistent and develop unnatural looking grains. The process of ammonia fumigation developed by FRI gives permanent shisham, teak and walnut appearance in otherwise dull and plain looking timbers. The process is simple, inexpensive, and effective and can be adopted by small entrepreneurs, as it works out to be nearly 50 percent cheaper over conventional methods of staining.

Wood plasticisation and bending

Wood bending is an ancient craft and is of key importance in many industries, especially in manufacture of furniture and sports goods. The traditional steam bending technique has several limitations in quality and number of species of wood that can be bent. Recent work carried out at FRI has helped to overcome these limitations by using vapour phase ammonia plasticisation technique, enabling a wider choice of species for production of bentwood components for a variety of commercial products. The technique would economize

the use of wood without affecting the functional requirements of the products, as the current practice to obtain bent wood components is from wider sections, where there is lot of wastage of timber.

Preservative treatment of secondary species

Eucalypts have been planted in many states of the country to meet the growing demand for wood and has emerged as an important species for manufacture of doors/windows and joinery. It is, however, prone to termite attack, requires protection for giving long service life and is also refractory to treatment. ACA treatment technology has been developed for the treatment of such refractory wood species to make it suitable for joinery purpose. The method has been used on a commercial scale for the treatment of eucalyptus wood for door/window panels for which no other method was available. By this technology the eucalyptus could be economically used with the treatment cost of about Rs. 900 per m^3.

Conversion technique for eucalypts and poplar

Plantation grown woods like eucalypts and poplar, though extensively available, pose problems in producing standard quality sawn and seasoned material. Major problem in its utilization is the warping in sawn timber that occurs on the saw itself and further warping and splitting in portions near the pith that occurs in subsequent air or kiln seasoning. Processing technology has been developed for their economic utilization for doors, windows, furniture and many other value added products. Recent improvements in sawing and seasoning of eucalypts and poplar have enabled them to be commercially adopted for furniture, door and windows in states like Punjab, Haryana and Uttar Pradesh with cost advantage of about 35–45 percent relative to traditional products from species like sisoo and teak, etc.

Besides these, a number of other technologies have been developed, which include utilization of juvenile wood of eucalypts and poplar for furniture, utilization of poplar for doors/windows, afforestation techniques for stress sites and agroforestry models for different agro climate regions.

ROLE OF RESEARCH INSTITUTIONS

An important constraint to the operation of the forestry research has been the lack of a method, based on the systematic application of the tested technologies for the benefit of the target group (NFRP 2000). The intended beneficiaries have not adopted technologies to the desired extent. One of the obvious reasons being inadequate linkages between research institutions and user groups, probably due to insufficient outreach efforts. Inadequate linkages, on one hand lead to lack of information on constraints in adopting technologies and the modifications needed, while on the other hand lead to insufficient impetus to augment suitable research efforts.

Impact of forestry research

Direct Impact		**Indirect Impact**
Human Welfare Conservation and Productivity	**Institutional**	**Scientific**
• Adoption of new technologies. • Sustainable production. • Sustainable management of natural resources. • Resource conservation. • Improve environment • Extension of developed technologies.	• Capacity building • Training and education. • Networking and collaborative research. • Improved research processes. • Improved institutional effectiveness. • Improved capacity of work force. • Improved quality of knowledge adopted.	• Advances in science and technology. • Increased knowledge and understanding of the problems. • New and improved research tools and approaches. • Adaptive and applied research. • Contribution to better environment. • Contribution to better life.

Modified from Guevara (1999).

Policy interventions

The experiences over the last few decades indicate that economic growth, and targeted interventions alone are not sufficient to eradicate poverty. The essential precondition to growth should, therefore be participatory planning. The role of the target group should not only be as a beneficiary but also to act as partner in guiding

the process of research and development. This requires institutional strengthening at grassroots level and bottom-up micro-planning in identifying village priorities through participatory approach. This can turn the poor communities from mere beneficiaries to active partners in the research and development process.

The National Science and Technology Policy 2003 directly addresses the problem of poverty, identifying one of its objectives as "To mount a direct and sustained effort on the alleviation of poverty, enhancing livelihood security, removal of hunger and malnutrition, reduction of drudgery and regional imbalances, both rural and urban, and generation of employment by using scientific and technological capabilities along with our traditional knowledge pool". However, there is lack of direct attention of this issue in National Forest Policy of 1988, that addresses the issue through increased productivity, sustainable utilization of resources, and effective conservation and management of resources besides adequate strengthening of research support.

This, therefore, calls for adequate policy revision. Generation of new and adoptable technologies and screening of available technologies for their direct impact on poverty is needed. This has to be followed by widespread dissemination through networking and support for the vast unorganized sectors of our economy. The forestry research institutions thus have their role cut out for them "to ensure food, agricultural, nutritional, environmental, water, health and energy security of the people on a sustainable basis".

Stakeholder driven approach and empowerment

Traditionally, the organization of research has always been highly compartmentalized. There is a strong need to rejuvenate the linkages between the researchers and the stakeholders. The lack of adequate linkages between researchers and stakeholders result in insufficient interaction and understanding of the needs. The absence of networking and sharing also results in lack of development of proper extension methods for successful transfer of technologies. The stakeholders are thus unable to benefit from the research programmes. The research institutes, therefore, need to develop adequately strong linkages with the stakeholders to understand their needs, and develop technologies. A paradigm shift in the attitude of forestry researchers towards stakeholders is needed. An integrated and holistic approach is needed with the concerted effort of all the stakeholders (Sharma 2003).

Empowerment through participation involves recognition that local people, through their knowledge and experiences, decide what is best for their development. True participation occurs when decisions by the government, services provided by the state, control of external productive resources and priority setting are carried out in conjunction with beneficiaries of these actions (Guevara 1999). James Gustave Speth in his address to UNDP in 1993 stated, "Sustainable human development is participatory. It can only be achieved when people have an opportunity to participate in the events and processes that shape their lives; where entrepreneurs, women, non-governmental organizations, and others in civil society are empowered to take initiative and participate in both open markets and effective governments, and where pluralism prevails and human rights and access of information to all parties are guaranteed". Thus the new paradigm of forestry for sustainable development must include participation, equity and environmental conservation.

Livelihood support, health and nutrition

There is a strong need for collective and individual endeavours at the level of target groups as well as research institutions and development agencies to undertake activities for income generation, development and operation of community support infrastructures and creation of assets.

Forests are still called the foster mother of agriculture. In most parts of the country, forests provide an essential supplement to the nutritional status of the family. In times of food scarcity, the tubers and rhizomes provide sustenance to fight hunger. In other times, the food from forest provides essential nutritional supplements in the form of vitamins and minerals. It is, therefore, important that nutritional aspects should constitute an essential component of the package of activities at the village level.

While a number of technologies have been developed to be implemented at the grassroots level, there is need to build the capacities of hitherto marginalized groups, especially women, to become actors in development productive employment and education need to become the entry points. Research institutions can actively associate themselves with NGOs as well as government organizations to initiate projects for integrated social development, for example, community based initiatives by women's groups to start collective farming, processing of forest produce and pisciculture. The education and health interventions will converge with regeneration of livelihoods and productive employment to ensure positive impacts on the society especially the marginalized sectors.

Increased availability of even a single resource, say, for example water or fuel would lessen the women's burden and provide them with time and opportunity to take up income generation activities such as gum collection, crafts and fodder production. Capacity building of women and youths can also be done through developing cadres of para-professionals, not only for primary health care but also for activities like rainwater harvesting, developing and maintaining biogas units, etc. Research institutions have a very important role to play in this field by organizing training workshops to train these para-professionals.

Reviving and strengthening traditional knowledge systems

While issues of sustainable agriculture, health, nutrition and education can be addressed through strengthening of community based organizations, there is a strong need to focus on improving, adapting and reviving local technologies not only for health and nutrition but also for water harvesting in traditional ponds, use of traditional methods of agriculture etc. For example, while the modern high yielding varieties require high inputs in-terms of fertilizers, pesticides and water requirements, the traditional pest and drought resistant varieties can provide equally good harvest with low inorganic inputs (www.undp.org.in). R&D institutions need to actively associate themselves with programmes for revival of such practices, besides developing strong linkages with community and NGOs. Research institution can also pay a lead role in setting up seed banks of important species and in adapting traditional technologies of rain-fed agriculture to rehabilitate degraded lands.

The importance of traditional knowledge in the field of health care needs no explanation. The importance of documentation of this knowledge is being talked about, the world over. Building on traditional knowledge in the field of medicinal plants, will not only help to preserve it for posterity, but also aim at optimal use of forest resources besides helping the community to take control of the health of its members. Research Institutions can help to take up research on traditional systems of healthcare so as to contribute to fundamental advances in health care, help to develop effective commercial products as well as appropriate norms for their standardization and validation. They also can have a key role to play in development of technologies for value addition to indigenous resources for their optimal utilization. This will have a direct impact on the health care as well as sustenance at the grassroots level.

The process of globalization is leading to a situation where the collective knowledge of the societies, normally used for common good is converted to proprietary knowledge for commercial profit of a few. Research organizations need to actively associate themselves with development of IPR systems to protect scientific discoveries and technological innovations arising out of tradition and indigenous knowledge.

Education, empowerment and capacity building

Education not only refers to formal education or literacy status, but also enhancement of the knowledge level of the society as well as the individuals to become partners in development. The research institutions can build upon the emerging concept of para-professionals to enhance capacity of the community to access facilities and serve the poor. Para professionals are people from with in the community or group who can be trained through capacity building to deliver the services to the society as well as provide feed back to the institutions. For example in accessing technology, to serve poor peoples needs, and exposure to and understanding of that technology, its appropriateness, implications and sustainability is important. The R&D institutions thus have a role to play not only in development of appropriate user-friendly technologies but creating enabling environment and building leadership within community.

Genuine forestry development manifests itself in the alleviation of poverty and the basic problems could be addressed by a four-pronged strategy, which could be outlined as:

- To ensure education, training and capacity building of stakeholders.
- To augment research and its validation.
- To develop extension and technical cooperation programmes for the validated research results.
- To ensure appropriate participation and empowerment through suitable methodologies and policies.

Ultimately the research output can only be judged by its impact on development. The research institutions must therefore reorient themselves to “bridge the knowledge gap, i.e., disparity in the capacity to generate, acquire, disseminate and use scientific and technical knowledge, which is the most vital difference between the rich and the poor” (IDRC 1991).

CONCLUSIONS

The creation and implementation of plans for sustainable management of forests through integrated forest strategies is one of the central mechanisms for poverty alleviation programmes. It is not only important to view forest resources as effective potential tool for poverty alleviation but also to understand the connection between poverty and deforestation. Poverty is often viewed as one among the many causes of degradation of natural resources. With no better alternatives, forest destruction and degradation become short-term solutions to many of the burdens imposed by poverty. It is equally true, however, that for poor people who live in and near forests, and those who live in places where woodlands have been destroyed or degraded, silvicultural interventions can be effective in regenerating and rehabilitating such forests. This could be instrumental in reducing poverty by providing increased and sustained employment in the production and processing of timber

and non-timber forest products. We must now agree that unless poverty is alleviated, the forests will continue to be lost. It is therefore, important that the natural resources especially forests are recognized as primary poverty fighting assets. An integrated and holistic approach is important to amalgamate the ideas from different disciplines and sectors to achieve successful sustainable forest development.

Forestry research institutions can play a leading role in the development of integrated forest strategy (Figure 1). As one of the major stakeholders, the research institutions can take up the challenges to develop ecologically sound practices, provide training for capacity building, ensure validation and extension of technologies, as well as develop information systems to integrate research outputs with cross-sectoral linkages. Creating an integrated strategy requires the interactions of forests with other sectors of the economy. The forest research institutions have the knowledge, experience and expertise to take up this challenge. Such institutions can thus play a pivotal role in utilizing the tool of knowledge to attain economic power by playing a decisive and beneficial role in improving the well being of all sections of our society. They can have a central role in raising the quality of life of the people, particularly the disadvantaged sections of the society, in creating wealth for all by utilizing natural resources in a sustainable manner and by protecting our environment.

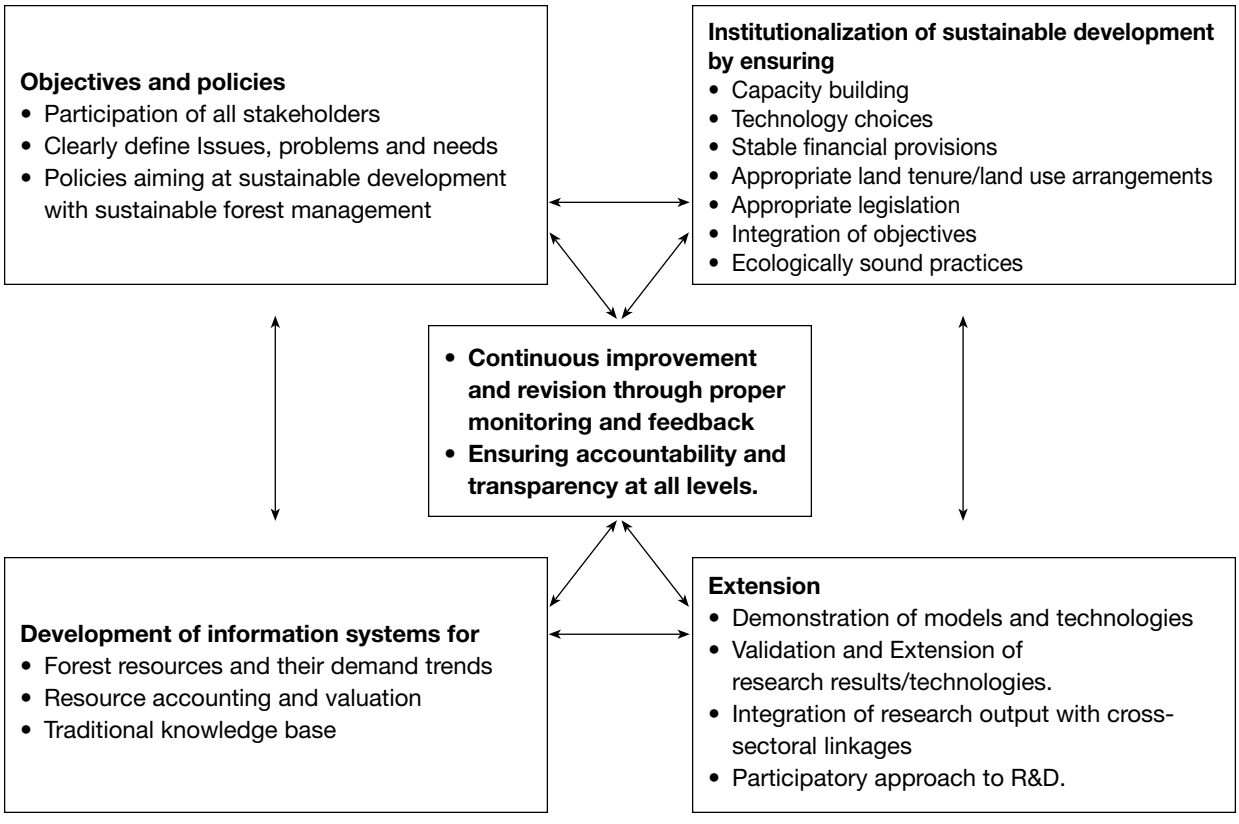

Figure 1. Integrated forest strategy

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5 Forestry research intiatives for poverty reduction

P.K. Shukla* and S.S. Bisen*

ABSTRACT

Tropical Forest Research Institute, Jabalpur, is one of the premier institutions under ICFRE, working for the forestry research needs of four central Indian states, viz. Madhya Pradesh, Chhattisgarh, Maharashtra and Orissa. Developing appropriate models of agroforestry, popularizing cultivation of medicinal plants among the farmers, developing conservation methods of multiple-use forest flora, developing species-specific biofertilizers for enhancement of productivity in natural forest, value addition of NTFPs, including bamboo, are some of the works among the thrust areas addressed by the institute. The institute has also taken care to take the results to the user groups so as to make the forest ventures more attractive and economically viable. Some of the technologies developed by the institute are described in this paper.

INTRODUCTION

Poverty is not an income determined outcome alone and therefore, increasing attention is now placed on the capability factors of poverty. It is a multi-dimensional phenomenon and it is always difficult to disentangle its causes and consequences. The nature and quality of governance largely determine the results of development efforts and success of poverty alleviation strategies, irrespective of the quality of design and amount of investment.

Poverty alleviation has found its place time and again as the goal of national plans and policies of Government of India with very little success on the ground. The strategies to overcome poverty should be diverse, recognizing the differences among people and their opportunities for sustainable living standards. Rural masses in India, particularly tribals, are poor because they have not acquired essential assets since they live in remote areas, where the resources available have not been properly identified and utilized.

Central India is well known for its rich and vast biodiversity, owing to its diverse climatic zones. Non-wood forest products (NWFPs) are distributed in all bio-climatic zones ranging from dry deciduous to tropical coasts. Collection and marketing of NWFPs is a way of life for poor people, especially in predominantly tribal areas, to meet their daily needs.

Central India also has different types of NWFPs, which can be a very good source for social upliftment. However these are not being utilized properly and are being destroyed as people are unaware of their importance. Tropical Forest Research Institute, Jabalpur, has taken initiatives in this direction by way of carrying out research on propagation, multiplication and suitable value addition at local levels. The research carried out so far is on a few selected plant species having good potential in indigenous as well as international market.

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TECHNOLOGIES FOR POVERTY ALLEVIATION STANDARDIZED AT TFRI

Mushroom cultivation

Mushrooms are saprophytic fungi that convert decaying matter into their own food. The major commercial use of mushrooms is for food. However, many species are inedible or poisonous, so the ability to identify these fungi is critical to harvesting and cultivation. Mushrooms are also cultivated for other uses, such as bio-pulping processes, to reduce some of the toxic materials in municipal dumps and as dyes for textiles. There are several species of forest mushrooms, which are used for such commercial purposes. TFRI has developed technology for cultivation of two common edible mushrooms with the objectives of introducing them to the rural masses to enhance their income. The technology includes:

- Preparation of spores (seed) of white button mushroom (*Agaricus bisporus*) and oyster mushroom (*Pleurotus ostreatus* Florida)
- Standardization of substrates (compost) for cultivation of these mushrooms.
- Standardization of crop production techniques in tropical climate of central India.

Two crops of white button mushroom and year-round cultivation of oyster mushroom can be undertaken. Cultivation of *Agaricus bisporus* (25 trays; 1 m x $^1/_2$ m x 0.20 m) can give profit of Rs. 2650 per winter season. Cultivation of oyster mushroom (500 bags; 30 x 35 cm) can give profit of Rs. 5530 per month.

Cultivation of *Ganoderma lucidum,* a medicinal mushroom

Ganoderma lucidum mushroom is also called Ling-zhi in Chinese or Reishi, Saru-no-koshikake and Mannendake in Japanese. Traditional Chinese medicine (TCM) values Reishi as the highest ranked medicine. *Ganoderma lucidum* naturally occurs in the sal forest of India. It is also a parasite on several multipurpose trees like *Albizia procera*, *Leucaena leucocephal* and *Pongamia pinnata*, etc. TFRI has worked on standardization of technology for the commercial cultivation of this mushroom and to promote its cultivation by developing simple methodology, which can be adopted by the rural poor:

- Preparation of spores (seed) of *Ganoderma lucidum* has been standardized.
- Cultivation technique on different substrates *viz*, logs and wood chips have been standardized.
- Cost-benefit ratio is being worked out. Preliminary trials indicated highly beneficial results.

Vegetable dyes

A number of plant species (Table 1) growing naturally in central Indian forests, like *Butea monosperma*, *Eclipta alba* and *Lawsonia inermis*, are the important sources of vegetable dyes. Flowers, leaves, roots, fruits of many native plants growing naturally in the forest can be utilized for extracting dyes. With the advent of synthetic dyes, demand of these natural vegetable dyes had come down drastically, but nowadays several synthetic dyes are being banned for human consumption as well as for cosmetic use. Importance of natural vegetable dyes that are safe and eco-friendly is once again being realized. TFRI has initiated a research programme to extract vegetable dyes from available natural sources and develop cheaper technology for dye extraction.

Table 1. Vegetable dye extracted from different plants

Botanical name	Common name	Family	Plant parts employed	Percentage of crude dye	Colour of dye	Use
Bixa orellana	Annatto	Bixaceae	Seeds	15–17 (O+W)	O-Yellow; W-Orange	Colouring cheese, drinks, margarine, cosmetics
Butea monosperma	Palas	Papilionaceae	Flowers	30–35 (W) 9.2 (W) sugar free	Yellow	Drinks, fabrics
Woodfordia fruticosa	Dhawai	Lythraceae	Flowers	19-54 (W)	Reddish brown	Tanning leather, fabrics
Eclipta alba	Bhringaraja	Compositae	Leaves	16 (O+W)	Blackish-brown	Colouring of hair, Hair oil, Hair tonics
Lawsonia inermis	Mehandi	Lythraceae	Leaves	16 (W)	Reddish-brown	Colouring of hair, Cosmetics
Nyctanthes arbor-tristis	Harsingar	Oleaceae	Corolla tubes	30 (W)	Yellow	Beverages, Soft drinks

W – Water soluble dye; O – Oil soluble dye

Forest – a natural source of saponins

Saponins are glycosidic compounds, characterized by their surface active properties. Nowadays these compounds are gaining importance due to a variety of pharmacological and physiological activities. TFRI has taken initiatives to survey and identify plant resources rich in saponin contents and to study their properties for medicinal as well as insecticidal uses. The following have been investigated and show potential. With further value addition, they can be utilized for commercial purposes:

- *Asparagus recemosus* roots contain 3.79 percent saponin.
- *Sapindus mukrossi* seeds contain 14–20 percent saponin.
- *Madhuca indica* seeds contain 7–9 percent saponin. Saponin-free cake can be utilized for cattle feed or as manure.

Food from forest

Natural forests are reservoirs of fruits, rhizomes, roots and leaves, which are very rich in carbohydrates, proteins, starch and minerals. The tribal population living in the forests utilizes these as food supplements. At present these valuable resources are either under utilized or over utilized, whereas they have potential to provide sustained income to the forest dwellers. TFRI has initiated work on standardization of technologies for the extraction of starch and carbohydrates that can be further utilized for making neutraceuticals. Work on standardization of technologies for extraction of starch and carbohydrates from plants like *Curcuma angustifolia* and *Curculigo orchioides* is currently in progress.

New raw material for incense

Over exploitation of the bark of *Litsea* and *Machilus* has brought these two tree species to threatened status. A cheaper substitute for these two species has been found in *Hyptes suaveolens,* a weed growing in the forest of central India. Technology for making incense sticks utilizing mucilage from seeds of this species has been standardized.

Conservation and cultivation of medicinal plants

India is included among the 12 mega-biodiversity nations. Nearly 15 000 plant species are being used as medicine, from this diverse flora. Medicnial plants are living and irreparable resource, which is exhaustible if over used and sustainable if used with care and wisdom. Importance of medicinal plans has been overlooked in the past. However, at present medicinal plants are looked upon not only as a source of affordable health care but also as a source of income. According to WHO report, over 80 percent of the world population relies on traditional medicine largely plant-based for their primary healthcare needs. The position cannot be sustained further because, on the one hand, forest cover is steadily shrinking and on the other, the requirement of medicinal plants and herbs is increasing steeply. In order to conserve the gene pool of medicinal plant reserves and standardize their cultivation techniques, *ex-situ* conservation is very much needed. TFRI has taken the task of conserving medicinal plants, rare, endangered and threatened species, and bamboo of Satpura and Vindhya region by establishing medicinal plant garden at the TFRI campus.

Cultivation and propagation techniques of rare, endangered and comercially important species like *Chlorophytum borivillianum* (safed musli), *Curcuma caesia* (kali haldi), *Acorus calamus* (bach), *Gloriosa superba* (kalihari), *Crataeva magna* (varun), *Strychnos potatorum* (nirmali), *Abelmoschus moschatus* (muskdana), *Asperagus recemosus* (satawar), *Plumbago zeylanica* (chitrak), etc. have been standardised. The institute has also promoted cultivation of these species in the farmers fields by extension activities.

Bio-technology

TFRI has established a well-equipped bio-technology laboratory with trained scientific staff. The institute has started a programme of developing protocols for tissue culture of bamboo and rare, endangered and threatened species of medicinal plants. There are also very good facilities for vegetative multiplication in mist-chamber and green-house-conditions. Tissue culture protocols of five *Bambusa* and three *Dendrocalamus* spp. are available at TFRI.

AGROFORESTRY MODELS

Agroforestry combines agriculture and forestry technologies to create integrated, diverse, productive, profitable, healthy and sustainable land-use systems, with the purpose of sustainable development. Practices are focused on meeting the economic, environmental and social needs of people on their private lands. Agroforestry practices are *intentional* combinations of trees with crops and/or livestock that involve intensive management of the interactions between the components as an integrated agroecosystem. These key characteristics are the essence of agroforestry and are what distinguish it from other farming or forestry practices. To be called agroforestry, a land-use practice must satisfy all of these criteria. Combinations of trees, crops and/or animals are intentionally designed and managed as a whole unit, rather than as individual elements that may occur in close proximity but are controlled separately. Keeping the above fact in mind, integrated cropping models have been developed at TFRI for central Indian condition. These include:

Babul-paddy model

Integration of MPTs like babul with agriculture crop provides a number of products to supplement the income and also enhances yield of the agriculture crops.

Teak-safed musli model

Integration of safed musli with teak utilizes the idle space of teak plantations and provides intermittent income to the growers.

Bach-paddy model

Integration of bach with paddy is a beneficial combination for paddy growers.

Silvi-olericultural model

Vegetables like bhindi, carrot, radish, spinach, cowpea and tomato can be integrated with multipurpose tree species like *Dalbergia sissoo* (sissu), *Albizzia procera* (safed siris) and *Acacia nilotica* (babul) resulting in additional perennial yield of vegetables and thus early income to the growers/farmers.

INTERNATIONAL COLLABORATION

International collaboration for funding and promotion of the aforesaid technologies is sought from the following funding agencies to help in poverty alleviation programme:

Agency	Activities
EC-FAO Partnership Programme (Projct – GCP / INT / 679/EC)	Data collection for sustainable forest management in ACP countries, Asia and the Caribbean
IUCN/SSC Medicinal Plant Specialist Group (MPSG), Ontario, Canada	Medicinal plant conservation and rational, sustainable use.
Overseas Development Institute (ODI), UK	To inspare and inform policies, leading to poverty reduction.
Trade Records Analysis of Flora and Fauna in Commerce (TRAFFIC), Cambridge, UK	Marketing of NWFPs including medicinal plants.
Forest Research Institute Malaysia, Kuala Lumpur, Malaysia.	Processing and utilization of forest resources, bio-technology, forest economics, investment oppurtunities, information technologies and commercialization of forestry R&D.
Forest Products Division, Forestry Department, FAO	To develop practical inventory guidelines for resources providing NWFPs to achieve sustainable forest management.
Training Center for Tropical Resources and Ecosystem Sustainability (TREES), University of Philippines Los Baños, College of Forestry and Natural Resources, Laguna, Philippines.	Participatory approaches in forestry and natural resources development.

6 Environmental goods and services for poverty alleviation: R&D issues

Promode Kant* and R.P.S. Katwal*

ABSTRACT

Forests have a significant potential of alleviating poverty in the rural areas. The joint forest management (JFM), which is a focused approach to exploit this potential, has achieved only modest success in meeting this objective. This is because the JFM has been confined to NTFP, small timber and firewood that are either in the non-monetized sector of the economy or are restricted to raw material collection with little value addition thus restricting their contribution to income enhancement. There is a possibility of expanding the scope of JFM to include in its fold environmental goods and services like carbon sequestration, replacement of fossil fuel, biodiversity conservation, soil and water conservation and ecotourism in addition to the conventional forestry products with the participants sharing the economic values attached to these goods and services that they help produce. This would require a whole range of research and development activities to set up the necessary framework. Research is needed on tree selection and rotation, to place economic values on various grades of these goods and services, modes of transfer of economic values to the communities involved in JFM, and its apportioning between the constituents of the communities and the commitments from the communities in return. Research is also needed for the development of best forestry practices for different bio-geographic zones and evolving appropriate working plan prescriptions to produce suitable combinations of the targeted environmental goods and services for optimizing economic returns in ecologically sustainable manner. The possibilities of linking these services to the international protocols in the field of conservation of natural resources, global warming, intellectual property rights and world trade have to be explored to take advantage of flow of technology and money from North to South as also ways of setting up equitable market systems for these goods and services.

INTRODUCTION

Poverty pervades the entire developing world and India alone has almost 200 million people living below the poverty line. The problem of poverty is a multidimensional web with a myriad of causes some of which are illiteracy, lack of resources, degradation of lands, poor infrastructure, dissipation of resources in non-productive activities, failure to channelize the human energies in appropriate directions, extreme corruption, wrongful appropriation of knowledge of the poor without adequate compensation and illegitimate profiting by traders and trading nations at the expense of the poor, to name just a few. There is internal synergy between these causes that imparts them further complexity.

Forests cover about one fifth of India's land mass and is the single largest land based resource that has the potential of reducing poverty of the people of this country and, indeed, it has supported the poor to meet their basic requirements over the long and chequered history of this country. But in the preceding few decades the capacity of the forests to cater to the poor has eroded. The reasons ascribed above to poverty in general also apply to the forestry situation. There is lack of understanding of the true role of forests in the well-being of the people, forest lands have become degraded on account of overuse and mismanagement, the investment in the sector has not kept pace with the removals and the few resources available to the forestry sector are often put to non-productive uses. Further, the knowledge of the people about the utility of the various components of forest ecosystems in their surrounds, particularly medicinal plants, remains largely untapped

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and there is illegitimate profiting by a few at the cost of most. And the human energies of the people most affected that, properly utilized, could have led to a revival of the sector, are dissipated in activities which only puts further stress into the system without achieving much as is evident in the nature of some of the futile agitations and disturbances noticed in several parts of the country.

JOINT FOREST MANAGEMENT

About three decades back initial hesitant steps were first taken in India to address some of these problems and enhance the potential of forests in reducing poverty in the countryside by the involvement of the human energies and genius of the people living in the neighbourhood of the forests. The Joint Forest Management (JFM) was indeed the first focused approach to address the issues of poverty and ecology in a synergistic manner. Over the years the JFM has evolved into a fairly mature forest management system with its own underlying principles and standardized practices.

There has been much deserved praise of the JFM in enhancing the reach of the poor to the forestry resource and it has doubtless provided relief in some areas to the very poor but there is indication that results are falling short of the expectations of the people leading to a falling interest in JFM. There is a realization that the income generation from many of the JFM areas may have already peaked. One reason for this is the limited product base of the JFM that is largely restricted to the fuel wood, non-timber forest products (NTFP) and small timber. Further a large part of the fuelwood and NTFP collected falls in the non-monetized part of the economy where barter, semi-barter and collection for self-consumption predominates. While there is much to commend in these market systems in physically isolated communities these systems tend to work to the disadvantage of the poor in places where the only isolation from the others is the isolation of poverty. The reason is that the prices of products traded in these systems do not keep pace with the general inflationary trends in the society and the relative prices of these goods remain depressed compared to the rising costs of other goods and services that the poor has to pay in the general market. The barter system also limits the price negotiating capacity of the poor thereby compounding his disadvantage.

Increasing value additions and market access

Another reason for low-income accruals to the JFM participants is the meager value additions and poor market access that characterizes the forest based rural economy. Enhanced levels of value addition and better market access has good potential of bringing increased incomes and a lot of attention has been paid to this aspect in the preceding decade. But these efforts have had limited success for a variety of reasons one of which is that these activities can benefit only those who have the capacity for requisite skill acquisition and ingrained or acquired entrepreneurship abilities. This may keep a large part of the women and older poor outside reach, as many may not have the time, social permission or the physical ability to acquire skill and abilities. Another major cause is that of inability to create an enabling legal and policy environment in which the related processing industry accesses only the legally harvested and appropriately value added product from the JFM participants. Even where such laws and policies have been enunciated the implementation leaves much to be desired and unaccounted trade is the norm rather than exception.

Expanding area base of JFM for increasing incomes

Continued low levels of income accruals from JFM has led to demands for more forest lands being brought under the purview of the JFM communities in the hope that larger extent of forest lands would provide more resources to be shared. But there is a limitation on the extent of forests that can be transferred to the care of the individual JFM communities as it raises the possibilities of conflict between neighbouring communities and also reduces the forest lands under the exclusive conservation areas. It is because the individual JFM community areas can be increased only by transferring forests from adjacent conservation zones or from those under the care of another JFM community.

An alternative to expanding area base

Incorporation of high value forest goods and services within JFM may provide a very significant enhancement in return to the participating communities. These are carbon sequestration, raising bio-fuels to replace fossil fuels, water conservation, soil conservation, biodiversity conservation and aesthetics and ecotourism; but the JFM participants have not yet staked claims on these services produced by them. Their claims have been limited to the products that have been sold traditionally by the forest departments. Thus this semi-privatization

of forest resources has brought no new innovation in the product range yet and it is perhaps time to think of these possibilities.

Carbon sequestration

Forests role in carbon sequestration under the clean development mechanism (CDM) has major potential for income enhancement in JFM areas where lands are available for reforestation and afforestation, i.e., lands that were not forested as on 31.12.1989. Increased C-sequestration through appropriate forest management practices like protection and gap planting in an existing forest, however, does not qualify for financial benefit under CDM – a limitation at present which might be addressed at a later date by the United Nations Framework Convention on Climate Change (UNFCCC). Till that happens the JFM lands eligible for carbon credits under the Kyoto Protocol would be only those that were not forested as on 31.12.1989. Since most lands under JFM in India do not qualify for this description Kyoto Protocol may not bring much benefit to the existing JFM areas. But it can make expansion of JFM activities to presently non-productive common lands possible and thus contribute to poverty alleviation.

Too high hopes over the CDM might, however, be misplaced particularly in the context of JFM where the issues of additionality and leakage prevention may bring burdens over the JFM communities that they are ill equipped to handle and may discourage them. The high transaction costs and the prevailing low prices of carbon credits also are not very encouraging.

Replacement of fossil fuels

Replacement of fossil fuels by renewable energy sources qualifies for carbon credits under the CDM. Fuel wood is an excellent replacement for fossil fuels used in households and minor industries. JFM communities could grow firewood not only for themselves but also for sale and earn saleable carbon credits for fossil fuel replacement. This would also enable expansion of JFM into neighbouring common lands as discussed above.

Water conservation

Global fresh water consumption doubles every 20 years. There is thus a huge ever-increasing demand for fresh water and for quality drinking water. Forests in the watersheds greatly influence the local water cycle and improve water quality. Dry season water availability in forest streams and wells in the catchments near forests is considerably higher in well-forested watersheds. The increase in non-rainy season water availability and quality improvement due to afforestation of the watersheds is quantifiable. It should be possible for JFM participants to stake claim to the increase in water availability due to improved forests and negotiate for appropriate water prices from the down stream users for the additional waters.

Soil conservation

Siltation of ponds and small water bodies is a serious problem for rural communities and governments spend large sums every year to desilt these. Regeneration and protection of watershed forests decreases soil erosion significantly. This decrease in soil erosion is quantifiable and economic benefits from reduced siltation can be calculated and transferred to the JFM communities responsible for creating these services.

Biodiversity conservation

The international community and most national governments are deeply concerned about the threat to bio-diversity of the earth. This concern is now being widely shared by the civil societies in general. This concern is exhibited in a number of international treaties and increased allocations for bio-diversity conservation in multilateral, bilateral and national projects. JFM zones, being in the area of human influence, are specially vulnerable to biodiversity losses. The JFM participants, with technical and financial support, can ensure bio-diversity conservation in their areas of operation. Their impact on bio-diversity can be measured to a degree and they could be compensated for their efforts financially.

Aesthetics and ecotourism

Forests enhance aesthetics and may result in increased tourist traffic flows to existing tourism destinations and may even create new destinations. Increased earnings could be quantified and shared in an appropriate manner with those responsible for creating these aesthetic values.

Developing markets

These new goods and services require the creation of new markets as the existing markets either do not place value on these goods and services or discount them severely. New markets grow organically over long periods of time through errors and course corrections. This organic growth can also be speeded up by an appropriate research and development strategy to broaden the base of forest goods and services. Research is needed for optimization of production of these goods and services, measurement of goods and services delivered, economic valuation of these goods and services and determining the key players in the market. Research is also needed to make appropriate choices of forest species suitable for producing these new range of goods and services and maximizing their production at least cost. Another important area of research is on working plan prescriptions for managing forests to produce these results.

Production optimization

Production optimization would require research to establish ecologically sound models for optimizing the product mix to give greatest economic satisfaction to the participating JFM communities for all bio-geographic zones and JFM sizes. With this sharp change in the expected outputs from JFM a fresh look at the appropriate choices of forest species would be needed along with ways of maximizing their production at least cost in JFM settings. Another important area of research would be to translate these research findings into working plan prescriptions to enable the JFM communities to manage forests to produce these results at least costs.

Measurements

The methods of measurement of these goods and services available today are neither credible nor cost effective. Research is required to be undertaken for creating such credible and cost-effective measurement methods for carbon sequestered, increase in supply of water in dry seasons, decrease in soil wash with increased forest cover and for deciding the parameters indicative of bio-diversity conservation.

Economic valuation

The JFM communities would be able to enter the market with greater confidence if they have access to data on the true economic values of the goods and services that they produce. There is a general lack of a wide base of knowledge for these products and, therefore, research on economic valuation of all these goods and services and their various combinations is an urgent requirement. Related to this, and perhaps even more important, is the field of research on the issues of leakage, additionality and rotation in relation to carbon sequestration and bio-diversity conservation

Legal and policy research

In a normal situation of market development enabling policies and laws develop as a need of the society. However, to hasten the development of market for these goods and services it would be necessary to create an enabling environment to begin with. This calls for a thorough research in this field. Further in the case of these goods it would also be necessary to establish who, and to what extent, are the producers and to what extent they can demand payment for services rendered by them. Research would also be necessary to establish practices and benchmarks for fair negotiations between the producers and consumers.

CONCLUSIONS

Poverty alleviation capacity of JFM would be significantly enhanced by expanding the product base of the JFM by incorporating in its fold the environmental goods and services like carbon sequestration, fossil fuel replacement, water conservation, soil conservation, biodiversity conservation, enhanced aesthetics. But the market for these new goods and services has to be developed through the tool of research as its organic growth would take too long a time. The R&D efforts must concentrate on the optimization of production of these goods and services, measurement of goods and services delivered, their economic valuation and establishing an enabling legal and policy framework for such a market to function and flourish.

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7 JFM and poverty alleviation: an analysis

Mudit Kumar Singh*

ABSTRACT

The knowledge about interdependence between natural and social systems enforces the need to implement the Joint Forest Management Programme (JFM) in a more holistic, integrated and flexible development framework. The JFM Programme in India has great relevance for developing nations which have predominantly agrarian economy and the population is dependent upon forests for subsistence. The JFM in India has given a new thrust and direction through the 62 890 JFM committees covering 14.25 million ha of forest land in 27 states. This has resulted not only in rejuvenating the forest cover but also brought socio-economic changes in the life of the communities living in and around the approximately 175 000 forest predominant villages in the country. There has been a paradigm shift but the need is to have a holistic approach to forest and natural resource management with development of concept of livelihood initiatives through people's participation for forest enrichment. Poverty alleviation is linked not only to hunger satiation but for fulfilling the basic human needs of providing shelter, clothing, clean water, education and health care. It is a paradox that where more forests exist, there is higher degree of poverty and to mitigate this problem several policy initiatives have been tried but still much is required to be done. How productivity in the forest can be increased to meet the challenge of growing fuelwood, fodder and timber demands is the biggest challenge. The second challenge is to provide gainful employment and generate produce which can be harvested sustainably. The right approach is to manage JFM Programme by setting national objectives which should include multi-tier plantation, NTFP propagation and technological inputs which are low-cost and locally adaptive based on the principle of care and share. The enabling environment for sustainable livelihood option is participation of the forest communities with scope for local ingenuity, innovation and capacity building of the stakeholders for poverty alleviation through Joint Forest Management.

INTRODUCTION

Over the years, more than half of India's 76.53 million ha of forests have become degraded resulting in ecological crisis and immense hardships for the forest-dependent people in and around the forest areas. The dependence on forests is so much that over two-thirds of the rural population and half the urban population use fuelwood for cooking purposes. About a quarter of India's livestock population is almost totally dependent on forest lands. Nearly 70 percent of India's population uses traditional medicine which comes from the forests. Forest based activities are often an important source of cash income for the poor especially during lean season (MoEF 2002). The JFM Programme in India has given a new thrust and is of great relevance for developing nations who have predominantly agrarian economy and the population is dependent upon forests for subsistence.

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PRIORITIES AND PARADIGM

That forests and poverty alleviation have a direct relationship is proven beyond doubt. But it is also true that poverty is higher in vicinity of higher forest cover. Among the priorities that have become prominent in development policy planning worldwide since 1980, the followings have particularly influenced the JFM policy:

- The re-conceptualization of governance: responsibility for development planning and implementation is increasingly seen as a neglected set of partnerships among state, civil society and private sector partners.
- Participatory approaches to development based on empowerment through organizational development among poor and marginalized people.
- Faith in the value of micro-enterprise based on local initiative in small production units coupled with a desire to bring these under some degree of formal state support and control (Sundar *et al.* 2001).

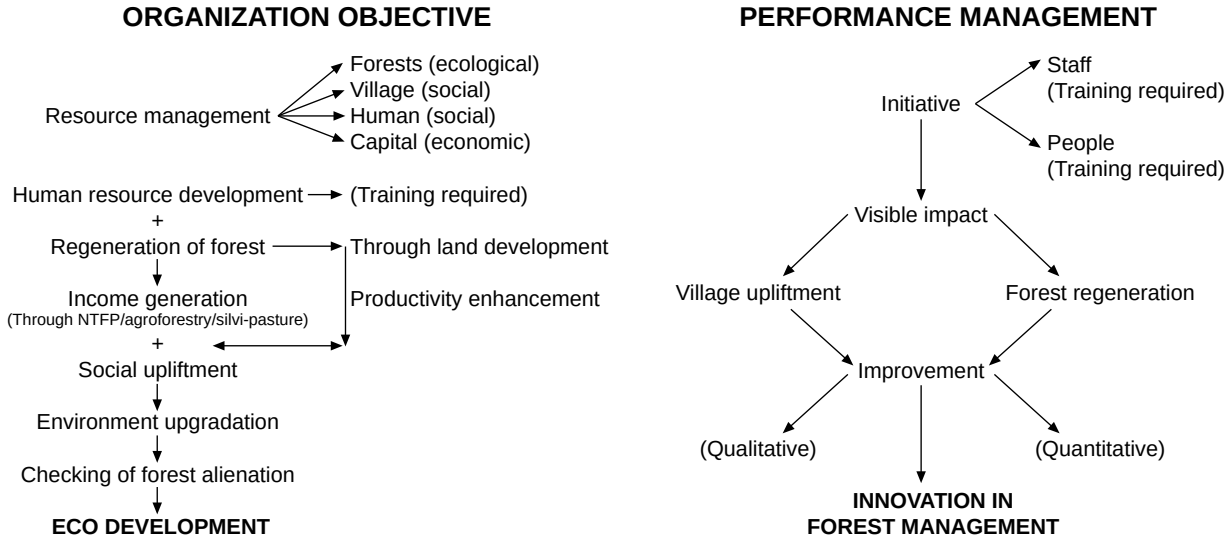
IMPACTS OF JFM

The JFM Programme has led to several positive impacts like:

- **Improvement in the condition of forests** – This is corroborated by the fact that in the past few years the overall forest cover of the country has increased by 3896 km^2 and dense cover by 10 098 km^2. Incidence of illicit felling has declined. A study carried out by the Andhra Pradesh Forest Department has indicated that between 1996 and 1999, dense and open forest covers have increased by 18 percent and 22 percent respectively. One of the more immediately visible ecological effects of JFM has been the recovery of fodder resources in JFM areas.

  In the study by Indian Institute of Forest Management (IIFM) of village forest committees in the Jhabua Division of Madhya Pradesh, it has been found that the average saving of a household by augmentation of fodder from the area has been Rs. 3000 per annum (Bahuguna 1993). The prolific growth of understorey vegetation in many instances, has led to increased bio-diversity and relatively rapid increase in wild herbivore populations.
- **Increase in income** – The committees have benefited from the employment generated under JFM Projects through micro planning, sale of non-timber forest products and bamboo yield, etc. Many VFCs have sustained the level of community funds, which are used for local developmental activities and personal loans, thus lessening the bondage of money lenders. In Jhabua alone the village fund is over Rs10 million as per UNICEF study. At the end of 2000–2001, total community funds under JFM were Rs.557 million (US$11.6 million) in seven states of Andhra Pradesh, Chattisgarh, Manipur, Tamil Nadu, Tripura, Uttar Pradesh and Uttaranchal (MoEF 2002).
- **Reduction in encroachment** – In many places JFM has helped reduce area under illegal encroachments. For instance in Andhra Pradesh nearly 12 percent of the encroached forest land (38 158 ha) has been vacated since the JFM programme was initiated (Mukherjii and Rangachari 2000). Many VFCs in Madhya Pradesh have got no encroachment resolution passed and previous encroachments were vacated.
- **Involvement of NGOs** – The JFM programme has led to a considerable involvement of NGOs and community-based organizations though the degree of involvement and number vary from state to state. In the six states, as per figures available from Andhra Pradesh, Manipur, Tamil Nadu, Tripura, Uttar Pradesh and Uttaranchal, 1061 NGOs are actively participating in JFM Programme.
- **Change in attitude and relationship** – One of the most significant impacts of JFM programme has been the change in the attitude of local committees and forest officials towards each other and towards forests. It was unthinkable in pre-JFM days that Divisional Forest Officer will sit and discuss with the villagers while now even top forest management is easily accessible to villagers as department has accepted the role of facilitator. Several JFM related training programmes have been initiated.

  The overall strategy of JFM is as described in Figure 1.



Source: Singh (2003).

Figure 1. Joint Forest Management (JFM) Programme

PRESENT SCENARIO

The JFM Programme covers 14.25 million ha of forest land in 27 states through 62 890 committees. Among the many independent and isolated attempts that were made by forest departments in different states for eliciting community participation during the 1980s and 1990s, the Jhabua experiment in the State of Madhya Pradesh was unique. The Jhabua District was reeling under frequent droughts, poor productivity of natural resources – forests and agricultural lands, mass out-migration in search of livelihoods, and illegal and illicit withdrawal of forest products, when the forest department undertook the Joint Forest Management Programme. This programme not only attempted to tackle problems of forest destruction, but was also aimed at generating options for poverty eradication and employment as a crucial step for reducing pressure on natural resources (TERI 2000).

Some states have shown a spurt of initial growth and subsequent stagnation while others who were dormant for years have shown remarkable progress in later years. Yet many others, with enormous forest wealth, despite facing extreme difficulties in managing them, have not made significant strides. In some cases, the JFM movement gathered steam with the thrust coming from externally assisted projects, but lost the momentum when the projects came to an end.

The enhancement of the quality of life of forest dependent communities, through efficient, participatory, multiple-use management, equitable distribution of returns and establishing long lasting demand-spurred systems of environmental governance and justice, is possible by:

- integrated development of land based resources along watershed approach;
- ensuring institutional, financial and ecological sustainability;
- establishing accountability and transparency in management practices;
- creating institutional mechanism for empowering local communities to meet the objectives.

Forests have been identified and recognized as one of the natural resources on which the local people are dependent and extract fodder for their cattle, fuel for energy, non-timber forest produce (bamboos, cane, medicines, fruits, fibre and flosses, etc.) for their domestic needs and timber for house construction and furniture.

Ecological security is the foundation of equitable and sustainable development. Forest conservation through community participation ensures ecological security and sustainable development (Roy 2003). However, mere subsistence is not enough to ensure long term sustainability. Therefore, while ensuring sustainable forest management over a period, JFM should contribute more than subsistence needs and in the 'JFM Plus' phase it should help in raising the living standard of the community through value addition of forest produce (ICFRE 2001).

The need is to have a holistic approach to forest and related natural resource management. The Dr C.H. Hanumanth Rao Committee, which looked into the working of the Drought Prone Area and Watershed Development Programme in the country during the last 30 years found that it had not worked primarily because people were not involved in the planning, implementation and management and the programmes made no provision for capacity building.

LIVELIHOOD SYSTEM

The 'Livelihood System' means developing the forests in a manner that the outputs from the forest provide the community with substantial economic benefit in perpetuity to attain a satisfactory level of life. The schematic representation in Figure 2 explains the concept of Livelihood Initiatives through Forest Enrichment (LIFE).

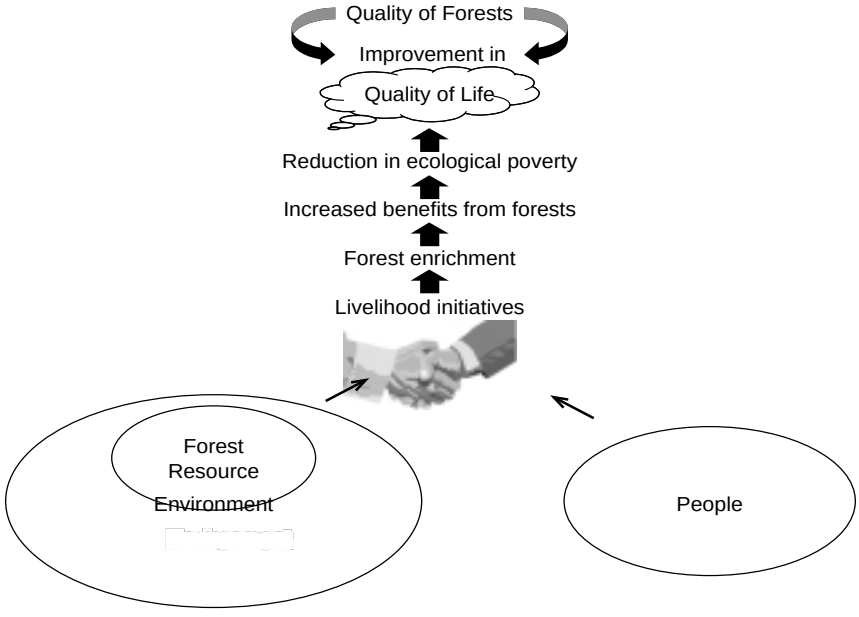


Figure 2. Livelihood Initiatives through Forest Enrichment (LIFE)

The following criteria for success of such initiative are envisaged based on the performance indicators:

Criteria	Parameters for success	Performance indicators
Technical	Improved ecological conditions	i. Better availability of fodder, fuelwood and other NTFPs, etc. ii. Status of regeneration by Regeneration Survey iii. Increased availability of fodder, fuelwood and timber from non-forest land
Institutional	Effectiveness of training and operationalising of principles of shared responsibility	i. Behavioural change in Forest Department staff ii. Relationship between Forest Department and community
Institutional	Performance of villages and District level initiatives	i. In terms of meeting, activities, participation, and responsibilities
Sustainability	Cost-effective eco-development activities	i. Employment generation and diversification ii. Value addition of goods
Equity	Empowerment of marginalized groups and women	i. Economic empowerment ii. Social empowerment
Participatory	Voluntary contribution	i. Increased development fund
Participatory	Better forest management	i. Rotational grazing ii. Rotational patrolling iii. Decrease in forest offences iv. Control of forest fires v. Removal of encroachment from forest land
Financial	Expected returns on investment	i. Intermediate returns ii. Expected final return

It has been found in the programme that, until an analysis of the socio-economic conditions and forest dependency for various goods and services is done, it is not possible for the Forest Department to involve local communities. Therefore a sound knowledge of their culture, tradition, social and economic conditions is a must. To take these measures, an exercise of priority setting by communities is essential. The priorities should be clear and their solution should come from the stakeholders mainly.

THE RIGHT APPROACH

The JFM Programme has to be managed in future with the following objectives:

- suitable silvicultural practices especially the raising of nurseries like use of mulches, clonal propagation, etc.;
- quick growing species to be developed;
- suitable model of multi-tier plantation to be evolved and demonstrated;
- the high yielding varieties of NTFPs to be propagated and demonstrated;
- multiple uses, high yielding varieties of fuelwood, fodder, and fruit bearing species, are to be planted for improving the economic condition of the people.

Once the JFM Programme provides the local people with alternative solutions as per the above objectives, the local communities' response to the programme will be positive and they will be convinced not to overexploit the available forest resources in the vicinity of the villages. The keenness to work in collaboration with the Forest Department shall also be more and all activities that are detrimental to forests will be reduced.

The technological inputs should stress on strengthening the existing forests by enrichment planting, soil and moisture conservation works, multiple shoot cutting in coppice species for clean boles and availability of fuelwood and fodder production linked to increased milk production. The stress should be on the principle of care and share through socio-silviculture planning process.

The heart of enabling environment for sustainable livelihood option is participation by the forest based communities living close to forest land. It is not sufficient that forest community is 'involved'. In planning process promoted through JFM Committee, forest communities should be motivated and organized into an institution which should undertake micro-planning of public and private lands for afforestation. The planning process has to be democratic and well informed.

The PRA exercises separately with men and women groups and then jointly with all are extremely useful and should cover:

- forest resources in the village: public and private lands;
- its status in terms of degradation;
- uses and availability of various tree species in the forest land, other public lands and farmlands;
- gaps between local availability of produce and the requirements of the forest community;
- uses and availability of various grasses and shrubs;
- uses and availability of various non-timber forest produce;
- seasonality of employment opportunities and needs in the village.

For participatory management to be genuine, there should be enough scope for local ingenuity and innovations to contribute to management practices that would be owned by the JFM Committee. Capacity building by way of practical and theoretical training, and dissemination of success stories in vernacular language have to be the inbuilt components in all programmes (Katwal and Singh 2002).

HOW TO SUSTAIN JFM GAINS?

The approach of JFM has created a positive environment to improve livelihood systems of forest dependent communities and address the root cause of rural poverty in remote areas. Forestry alone, however, cannot provide the necessary linkages and mechanisms affecting the multifaceted problem of rural poverty. Therefore, a multi-pronged approach is needed to develop sustainable livelihood support systems under JFM.

The key areas which need attention are:

- Income generation activities for landless and women.
- Food security through Grain Banks especially in the forest fringe villages which suffer from crop failure due to low irrigation potential and difficult terrain.
- Grazing and livestock management and promotion of non-conventional energy.

NGOs can have a major supportive role in initiating and operationalising Income Generating Activities (IGAs) on collective basis. They can work as catalyst in solving marketing issues, value addition and raw material availability.

FUTURE PROSPECTS AND CONCLUSIONS

Several questions arise concerning implementation of JFM on a sustained basis. Studies have to be undertaken to find out whether the impoverished women and men, who are compelled to resort to unsustainable forest use for survival are able to switch to sustainable resource use through JFM programme.

There is a growing trend to increase the number of JFM Committees. The increase would need to be guided by the capacity of the field level forest staff and their ability to effectively coordinate and monitor the progress. Otherwise these committees remain only on paper with not much of attitudinal change. The other issues which need attention are resolving intra committee and boundary conflicts. The entire JFM mechanism has to be process-based rather than individual-based.

Given the broader concept of poverty and the broader framework for understanding poverty, as well as the global context for poverty alleviation, the framework of actions to attack poverty should be built on three pillars, empowerment, security and opportunity. These are well engraved in the JFM mandate.

Poverty alleviation is linked not only to hunger satiation but for fulfilling the basic human needs of providing shelter, clothing, clean water, education and health care. It is a paradox that where more forests exist, there is higher degree of poverty and to mitigate this problem several policy initiatives have been tried but still much is required to be done. To achieve higher progress, land has to be made productive and cattle have to be healthy. A combination of short and medium rotations and coppice system needs to be evolved for a variety of tree species being planted under JFM for faster economic gains. How productivity in the forest can be increased to meet the challenge of growing fuelwood, fodder and timber demand is the biggest challenge. The second challenge is to provide gainful employment and generate produce which can be harvested sustainably. The right approach is to manage JFM Programme by setting national objectives which should include multi-tier plantation, NTFP propagation and technological inputs which are low cost and locally adaptive. The emphasis has to be on participatory process through community based economic development, sustainable management of local resources and policy feedback.

JFM has to be taken as a means of forest development and not an end in itself. There is no short cut. Each area has specific requirements and no two JFM Committee areas can be similar in problems and solutions. Though basic approach may be the same, still implementation techniques differ. But such an integrated approach shall benefit the people, government and civil society in general. Agriculture, water harvesting and land conservation practices have to be meticulously adapted to local conditions.

Participatory forestry programmes must develop mechanisms to distribute benefits down to individuals, households and targeted groups within committees to play a meaningful role in poverty alleviation. In addition we have to put governance in 'mission mode' for a more pragmatic approach to JFM.

Every technology should have an ideology behind it to give it direction and meaning and every technology to be socially relevant should have a strategy to give it realism and experience. For achieving this in renewed perspective, the theme of any technology package under JFM programme should be to give maximum production in the shortest period; conserve forests and utilization of all that grows in the forests to meet people's needs.

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8 Wood science and technology R&D can contribute to poverty alleviation

K. Satyanarayana Rao*

ABSTRACT

Mankind is currently re-discovering the values of wood, especially its value as an environmental friendly material that is reusable, recyclable, and biodegradable, besides its carbon sink effects. This important bioresource is one of the most useful materials around the world and its usage is both extensive and widespread. In India, it fulfills several key needs of the society. Production and use of wood in a way that sustains its supply will be a key element in sustainable forestry. R&D in Wood Science and Technology is aimed at generating environmentally sound technologies that promote usage of wood in a more responsible manner through better process and product technologies. Extensive use of these technologies can play a significant role in value addition, higher income and employment generation, tree biodiversity conservation, and enhancement of carbon sink, with least ecological costs. However, in the changing global and domestic scenario, Wood Science and Technology R&D cannot limit itself only to technology generation but to gear itself to develop pro-active/ catalytic strategies in developing Researcher-user linkages. This paper attempts to identify areas that R&D institutes could consider for realizing their full potential in addressing these issues and aiding poverty alleviation. The need for developing Institute-Industry-user group "Partnerships" is emphasized as this approach is paying rich dividends elsewhere in bridging the gap between knowledge providers and users.

INTRODUCTION

It is increasingly becoming clear that Research Institutes should aim not only at technology generation but also address and tackle socio-economic problems through appropriate development and technology transfer activities. This is reiterated in the new "Science and Technology Policy 2003" of the Government of India enunciated by the Honourable Prime Minister in January 2003. One of the main objectives of this policy is "to mount a direct and sustained effort on the alleviation of poverty, enhancing livelihood security, removal of hunger and malnutrition, reduction of drudgery and regional imbalances, both rural and urban and generation of employment, by using scientific and technological capabilities along with our traditional knowledge pool. This will call for the generation and screening of all relevant technologies, their widespread dissemination through networking and support for the vast unorganized sector of our economy". The need for Science and Technology to be more directly linked to social needs, and to use it as the key problem-solving instrument in all endeavours is recognized in the new policy and is one of its major thrusts. (Anonymous 2003a, Joshi 2003).

R&D in Wood Science and Technology is aimed at generating environmentally sound technologies that promote usage of wood – the only naturally produced, renewable structural material we have – in a more responsible manner, through appropriate 'process and product technologies'. More extensive use and improvements in these technologies can play a significant role in tree biodiversity conservation, enhancement of carbon sink, with least ecological costs in management and use, besides generation of income and employment through improvements in product quality, value addition. This is expected to increase a stable forest enterprises

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base and aid in poverty alleviation. To guarantee that Forest Product Institutions continue to progress in this challenging work and provide tools for optimal use of wood, it is necessary that forest products R&D to gear itself up and make necessary adjustments for advancing Sustainable Forestry.

Pursuit of a strategy for achieving an economic growth rate of 8 percent during the Tenth Plan period, in a country like India, where natural resources are under immense pressure while aiming at the same time "eco-efficiency" and "sustainable communities", calls for bold departures from existing practices in each of the major sectors. "Eco-efficiency" aims at "producing more from less resources" while "sustainable communities" are realized only when all stakeholders are able to achieve both "sustainable production" as well as "sustainable use/consumption" (Moni 2003). Many gaps that are impeding rational utilization of this most ecological of raw materials need to be urgently addressed.

ISSUES

- Minimize curiosity-driven research and step up research driven by society's needs, giving due consideration to socio-economics.

The National Forestry Research Plan (NFRP 2000) developed by the Indian Council of Forestry Research and Education (ICFRE), is an excellent example and a right step in this direction. This plan is the outcome of 26 state level workshops followed by eight institute-level workshops, a national-level workshop and developed through a multi-stakeholder participation. During the workshops, the research users, managers, and researchers identified and prioritized research problems and research themes. Being transparent, participatory and bottom up in its approach, it has ensured the involvement of all the SFDs and other stakeholders, thus minimizing "curiosity-driven" or "fancy" research and is in operation since 2000.

- Adopt a mission mode approach for wood product development encouraging the full tree-to-product cycle.

India has launched a "National Mission on Bamboo Technology and Trade Development" (NMBTTD) and its action plan was released in April 2003. This plan charts out a strategy for organized production, processing and use of bamboo as a major poverty eradication tool. It is projected that the bamboo mission programme will enable about 5.01 million families of artisans and farmers to cross the poverty line (Anonymous 2003b). The Planning Commission, Government of India is also proposing a National Mission on "Bio-diesel" which aims at production in quantities sufficient to enable its blending with HSD to the extent of 20 percent in 2011–12. This would require planting of *Jatropha curcas* on 11 million ha of land in and outside the forest. The demonstration project envisaged under the plan is proposed to be implemented in a mission mode with six more missions (Anonymous 2003c). Such initiatives are very useful in the present context and address a long-felt gap.

- In developing forest products, forest product research will have to continue and increase its effort paying attention not only to the technical quality of the product itself, but also the environmental quality of the product and of the production processes.
- Conduct Life-Cycle Assessments (LCAs) on wood products that take into account the environmental effects of a product over its entire life span, from extraction and production to use and eventual disposal.

Wood, in recent years, has been facing substitution pressure from other materials such as synthetics, concrete, cement, steel, ceramics, glass, aluminum and other non-renewable materials. It is to be understood that the ultimate competition for timber markets, whether the source is from "certified" or "non-certified" forests, is from those who want to displace wood with non-wood substitutes. Forestry and forest products researchers have paid too little attention to produce reliable figures of the environmental advantages of using wood products. Such analyses need to take into account both raw material acquisition and use of products during their entire life span, from extraction of raw material, and production to use and eventful disposal. Such studies, known as Life Cycle Assessments (LCAs), are aimed at indicating how advantageous it can be to use wood from an environmental perspective. Such information, at present, is very scanty and the special benefits of using wood forest products for the environment, including extension of carbon sink effects of using wood products, are not getting addressed in the methodologies of LCAs yet. Future competitiveness of wood products depend on their environmental quality "not the quality which is claimed but that one which can be proved" (Thoroe 2003). Researchers in Wood Science and Technology have a great responsibility to provide such data and help forestry and forest industries to use them to try to convince consumers, traders,

architects and decision makers of the advantages of wood. The environmental advantages of using of wood, vis-à-vis other materials, need to be urgently established through LCA studies. The prevailing negative image of the forest products industry in some quarters, as the main cause for deforestation has to be reversed. LCA studies that extend producer responsibility to include the entire life cycle of products remain both a challenge and opportunity to forest product research, to moderate such concerns.

- Facilitate development of wood industry through innovative research that aims at production and use of wood that sustains its supply, integrating wood science and technology with tree improvement programmes where necessary.
- Strengthen both vertical and horizontal linkages between various stakeholders. Encourage multidisciplinary research and institutional collaborations.
- Facilitate a favourable operational regime for adopting scientific processing and improvements in utilization through strengthening/developing R&D institute-academia-industry-user group linkages. At present, the user-manufacturer-researcher linkages are extremely weak and "inter-twinning" arrangements between R&D institutes and industry are virtually non-existent.

Innovative approaches are necessary to enable industries and enterprises (eg. saw millers and processing units) to adopt and popularize sustainable technologies through approprite "partnerships" and "inter-twinning arrangements", with other stakeholders, especially the R&D institutes and user groups. Investments by private sector in promoting environmentally sound technologies need to be compensated appropriately. This is crucial for speeding the much needed technology absorption by the society.

An examination of the wood processing industry in India indicates that it is characterized by a large number of small-scale units that are generally unorganized and disperse with the exception of a few paper mills and panel product manufacturing units, which are in the large/medium-scale sector. The pace of technology adoption and change in the industry has also been extremely slow. Improvements are needed at all stages of operations – when wood is harvested, processed and utilized. For instance, even though with a rate of return of as much as 175 percent, if a monetary value is placed on the wood saved through prophylactic treatment alone, there is little evidence of this simple technique being adopted (Bajaj and Bhat 1996). Studies have also shown that pressure treatments enhance durability of a variety of timbers. Adoption of such simple and well proven treatment technologies has the potential to save a huge quantity of timber every year amounting to saving millions of well grown timber trees. This is in addition to other benefits such as reduction in investments, widening the choice of species for different end-uses, etc. However, the quantity of timber being treated in the country is negligible. Unfortunately, the potential of wood preservative technologies as an important tool for forest/tree conservation has never been fully realized in India (Kumar 1999). Reasons are many, but certainly a favourable operational regime for scientific processing, especially wood treatment, does not seem to exist. There is no legislation, no incentives or disincentives warranting a new wood use policy. There is also considerable scope to enhance the processing efficacy of saw mills and wood recovery rates by following simple improvements. The rate of return on investments in a programme of saw milling could produce improvements of as much as 120 percent (Bajaj and Bhat 1996). It is against this backdrop that the development of partnerships assume paramount importance.

A recent example of the institute-industry partnership initiative from India is the Advanced Wood Working Training Centre (AWWTC) at Bangalore. This centre is established by the Institute of Wood Science and Technology (IWST), Bangalore, recently in partnership with the Italian Wood Working Machinery and Tools Manufacturers Association (ACIMALL), Milan, and the Italian Trade Commission (ICE), Mumbai. This training and research centre aims to enhance and enable the Indian wood products manufacturing industries capabilities, promoting them to attain a globally competitive position in the areas of manufacture of value-added wood products by using state-of-the-art machinery. The centre is located at the Institute's premises in Bangalore. IWST provides the necessary infrastructure facilities for the centre. The machines are provided by the ACIMALL. The ICE, which promotes Italian technology and products in different countries operating through a network of hundred branches all over the world, provides the recurring costs of the centre. In today's highly competitive environment, the stringent market condition demands products and services of high quality and at a competitive price. Despite its vast potential in employment and income generation and availability of some of the best-known tropical timbers, the wood product industry in India has generally remained underdeveloped. This is particularly so in the mechanized wood processing segments aiming for domestic and international markets. Three of the identified critical needs in development of this sector are (i) properly trained personnel, (ii) precise, state-of-the-art machinery, and (iii) strong, industry–R&D institute–user group linkages. This international collaborative effort is expected to:

– Provide direct links between the wood manufacturing industry, R&D institutes and the government;
– Enhance technical levels and competitiveness of Indian wood-product manufacturing industry;
– Develop customized training programmes;
– Promote and catalyse industry support applied research, and
– Help solving technical as well as shop floor problems.

As the Italian woodworking machines are among the best in the world, the proposed centre has a potential to eventually develop into a research, education and technology transfer centre of excellence, through this international partnership. The response of the industries has been overwhelming so far, and the outlook very promising.

- To ensure wide access and to popularize technologies to user groups, develop CFC's (Common Facility Centres) jointly with local communities, industry, NGOs and concerned government departments with R&D institutes acting as catalysts/facilitators).

Example: A Common Facility Centre (CFC) for development of bamboo handicrafts at Angamaly, Kerala.

Angamaly, a small town in the Trichur district of Kerala is one of the 'bamboo clusters' in the country. *Bambusa arundinacea*, *Ochlandra travancorica* (a reed) and other bamboo species are abundantly available in and around Angamaly. The livelihood of over 25 000 artisans, engaged in mat weaving craft is dependent on income from bamboo. They possess skills such as bamboo cutting, splitting and slicing. Their income, however, remains very low as they are engaged only in bamboo mat weaving. The Development Commissioner (DC), Handicrafts, Ministry of Textiles, Government of India, has facilitated through a partnership involving a local NGO, the local Panchayat and the user groups to operationalise a Common Facility Centre (CFC) to upgrade their traditional skills. The DC made available the machinery for operations. R&D institutes, like IWST and the National Design Institute, Ahmadabad, are involved in the training of the artisans. In this model, the Development Commissioner, acting as a facilitator, has mobilized funds to be used for machinery, arranging training programmes, consultations, etc. The local Panchayat has come forward to provide land and building for establishing the CFC and the work shed. The local NGO, the Christian Association for Rural Development (CARD), has taken initiative to implement the programme. During the project period, the NGO will facilitate formation of a society to have a larger representation and identify up-market centres so that the standard of living of artisans will improve. After the project period, the society will function on a self-sustained basis. This CFC is in operation since 2002 and the progress is very promising. There is need for establishment of more such partnerships/arrangements for improving the quality of products, income and living standard of the artisans.

CONCLUSION

With a contribution of over US$400 billion to the global market economy, of which US$130 billion is traded internationally, wood continues to be an important bioresource in the economics of many countries. Despite the introduction and availability of many modern materials, wood accounts for nearly 46 percent of industrial raw materials. Worldwide, the industrial use of wood approximates that of cement and steel and far exceeds the plastics. The total harvested volume of wood (3.5 billion m^3) exceeds the volume of all the other materials combined. Contrary to the common, but erroneous perception, use of wood, is in fact, ever increasing, more so in a developing country like India. This is partly because mankind is currently re-discovering the values of wood, especially its value as an environment friendly material that is reusable, recyclable, biodegradable and more importantly, a renewable natural resource.

The wood products industry in India is one of its oldest and most durable industries. In spite of tremendous pressures and market downturns, this industry has survived and has fulfilled several key needs of the society. However, the woodworking and manufacturing is mostly unorganized. The traditional craftsmen and carpenters constitute its major workforce and the income generated never really reflect their potential. Upscaling this sector to open the doors for augmentation of economic opportunity, income and employment, is a long-felt need. Value-added wood products have immense economic and marketing opportunities. Fortunately, India is bestowed with over 4500 wood yielding species that include some of the best known and highvalue tropical hardwoods like teak, rosewood, mahogany, red sandal, etc. Yet, we are, today a nett importer of wood and wood products and exports are marginal. This situation needs to be reversed.

In the post-GATT environment and in the globalised context, competitive ability is an imperative for achieving success in both external and local markets. Science and Technology (S&T) are key tools to achieve this competitiveness. The rapidity with which S&T is moving ahead calls for new strategies like inter- and multi-disciplinary, multi-institutional approaches and in some cases, multi-country participation. Today, more than ever before, there is a need for partnerships – between R&D institutes, market/business developers, financial bodies, and policy markers. Developing industry-institution partnerships proved an effective strategic tool in almost all developed countries in achieving competitiveness and success for Industries. A new vitality needs to be infused to the woodworking sector in India. R&D in wood science need to be pro-active in keeping pace with the changes to realize their tremendous potential to play a beneficial role in advancing the well-being and economy of our society and in poverty alleviation.

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9 NWFPs for poverty alleviation: research issues

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ABSTRACT

For most of the world's rural households, NWFPs (non-wood forest products) provide essential food and nutrition, medicine, fodder, fuel, thatch and construction materials, mulch and non-farm income. These products are particularly important in relieving the 'hunger periods' in the agricultural cycle, and in smoothing out other seasonal fluctuations. Sustainable management of NWFPs, therefore, can provide employment during slack periods of the agricultural cycle, and provide a buffer against risk and household emergencies. Poor households in forest fringes in particular, depend on these products for their livelihood because they usually have more access to the forest than to other resources. Furthermore, for the same reason – greater dependence on open-access forests and, for lack of other options women usually rely more than men on NWFPs for household use and income. In many places, women are responsible for the household activities that involve forest-based foods and medicine, as well as fuelwood. In this respect NWFPs are particularly important to women, addressing their needs for food security and nutrition. Moreover, in local, national and international markets, forest foods and medicines contribute substantially to national economic growth. NWFPs are therefore important to three main groups; namely (a) rural populations (the largest group) who have traditionally used these items for livelihood social and cultural purposes; (b) urban consumers (a smaller group, but growing faster), who purchase these items; and (c) traders and product processors, whose numbers in the NWFP sector increase as urban markets for these products grow. However, not much attention has been paid to various research needs to examine the sustainable management of these products for rural development. The paper highlights these research needs, which are essential to achieve sustainable NWFP management leading to poverty alleviation of forest dwellers and also identifies the changing roles of research institutes, forest managers and training institutes in light of these research needs.

INTRODUCTION

At the national level, India produces more than enough food to feed its people, but regional disparities leave a significant segment of the population without access to adequate nutrition and basic services. Official data show a reduction in the number of rural people living below the poverty line, however there are pockets where poverty is concentrated, particularly in remote rural areas where the level of development is low. Labour migration from these pockets to economically productive areas is an increasing phenomenon. Populations living close to fringes of forests – the ecosystem people are one such category of masses, which have been reported to be poor. Furthermore, a number of tribal communities, in different forests of India have a long tradition of growing and using NWFP plants. However it is also true that these species do not result in adequate remuneration to these communities, which is not commensurate to their sale price in national and international markets.

Non-wood forest products have attracted considerable global interest in recent years due to increasing recognition of their contribution to household economies and food security, to some national economies, and to environmental objectives such as the conservation of biological diversity. Some 80 percent of the population

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of the developing world uses NWFP for health and nutritional needs. Several million households world-wide depend heavily on these products for subsistence consumption and/or income. At a local level, NWFPs also provide raw materials for large scale industrial processing, including for internationally traded commodities such as foods and beverages, confectionery, flavours, perfumes, medicines, paints or polishes. Presently, at least 150 NWFPs are significant in terms of international trade, including honey, gum arabic, rattan and bamboo shoots, cork, forest nuts and mushrooms, essential oils, and plant or animal parts for pharmaceutical products. However, all over world these commodities are characterized by inequitable distribution of usufruct, which is biased towards national and international traders.

It is somewhat surprising, therefore, that in spite of all the current analysis, discussion, and debate, several basic questions related to the ecological, socio-economic and technical aspects of non-timber forest products sustainable management have yet to be addressed. For example,

- Why protocols for resource survey have not been developed?
- Despite the potential for disaster, why only few of the vulnerable NWFP species are today protected by legislation?
- What are the actual ecological impacts of harvesting commercial quantities of non-timber products from a forest?
- Are some species or resources more resilient to the effects of continual harvesting than others? What can be done to minimize these impacts?
- What sort of monitoring activities, management practices, and silvicultural techniques can be used to insure that the resources being harvested are not overexploited?
- What forces have prevented the development of an organised market channel for NWFP species?
- Why is there a general lack of awareness amongst the masses and especially the gatherers / collectors about these species?
- What prevents farmers from adopting the cultivation technologies for NWFP species developed by research institutes?

The discussion in the previous section clearly indicates that NWFP management and trade are regulated by forces such as market, industrial demand, tribal needs, international pressures, forest management and government policies. Therefore, a successful management strategy for NWFP species should involve these economic, ecological, social and environmental inputs. An effort based only on ecological considerations such as creation of *ex situ* and *in situ* conservation areas or reserves without addressing the socio-economic, and technical issues is not a viable option. The present paper is intended to address the interaction of such factors and provides suggestions for the sustainable management and conservation of NWFP species.

RESEARCH ISSUES

The sustainable management of NWFP resource essentially must take into account the ecological, economic and socio-cultural sustainability aspects.

Ecological Sustainability

Inventory

Resource inventory and assessment of NWFPs is a problematic area. Inventory has often been restrictively understood as a listing of species (both of economic and environmental values or importance). In fact, the inventory besides listing of species must always consist of the actual state of occurrence, density and potentially harvestable quantities per unit area with reference to a specific management unit of a forest. The inventory must also prescribe the safe harvesting limit of each species that is being extracted or is likely to be harvested.

Given the current status of scientific knowledge, reliable information is not available on the total resource availability of any of the NWFP species, not even of such species that are being extracted on commercial scale. In the absence of any such information/data, therefore, it is not possible to achieve sustainable management and monitoring for the development of the NWFP resources for subsistence use and trade leading to poverty alleviation of forest dwellers. Therefore, a greater emphasis has to be given to address these issues, before NWFP based forest management can be realized successfully.

Table 1. Production of non-wood forest products during 1987–2000

Products	Year												
('000 tonnes)	1987–88	1988–89	1989–90	1990–91	1991–92	1992–93	1993–94	1994–95	1995–96	1996–97	1997–98	1998–99	1999–2000
Sal seed	21.29	23.81	54.58	0	0	0	0	18.53	27.62	87.51	12.58	57.78	78.74
Bidi leaves	505.53	531.5	556.04	0	0	0	0	542.76	322.16	112.25	744.35	384.94	400.81
Canes	1.61	6.26	42.6	0	0	0	0	65.14	345..38	5.02	2.1	18.69	2.02
Resin	98.32	105.59	117.59	0	0	0	0	88.23	169.24	26.02	18.34	14.35	0.96
Gums	13.82	4.09	1.39	0	0	0	0	21.1	3.04	3.56	1	2.14	2.42
Lac	9.11	68.97	1.06	5.77	6.01	8.28	7.28	9.07	0.1	0.08	0.75	0.02	0.31
Drug and spices	12.05	11.49	18.66	26.53	62.81	23.33	18.16	21.57	59.78	41.21	62.7	0	0
Grass and fodder	304.49	332.47	119.98	1021.95	161.79	421.62	113.34	74.91	64.06	62.98	418.53	213.85	45.78
Tanning material	20.22	23.4	22.4	20.27	20.42	8.39	11.52	10.46	8.35	19.06	4.93	0	0
Others	318.44	229.7	68.58	0	0	0	0	10039.27	7782.12	111.91	197.94	69.94	165.95
Bamboo	642.38	829.76	1934.59	660.12	754.64	721.34	455.4	822.63	632.54	1186.05	3629.79	1119.67	1261.86
Total national production	**1947.36**	**2337.64**	**2937.47**	**1734.64**	**1005.67**	**1182.96**	**605.7**	**1171.67**	**9069.01**	**1655.65**	**5093.01**	**1881.38**	**1958.51**

Source: Data modified from Indian Forest Statistics Report (ICFRE), 1987, 1996, 2000 and 2001.

Conversion Table

Weight of standard bag of Bidi leaves: 40 kg

Resin: 1 blaze (Lip and Cup Method) = 1 kg, (Rill Method) = 3 kg

Bamboo: 1 Notional tonne = 2400 running metre

Weight of 1000 clums of bamboo = 1 tonne

Canes: Kaps = 1 billet, 1 bundle = 50 billet

1 billet = 3.65 metre, 1 running metre = one-metre billet

Weight of one-metre piece = 0.5342 kg

Grass and fodder: 1 bundle = 35 kg

At Forest Research Institute (ICFRE) Dehradun some studies have been conducted on the resource assessment of few NWFP species, especially the medicinal plants in Garhwal Himalaya as well as the Shivalik hills of Haryana in India. Forest Survey of India has also taken lead in resource quantification of NWFP resources in the country. In the absence of any standard methodology for assessing the resource quantitatively and also due to the fact that realization of such an inventory has to be updated time and again, this venture becomes not only time consuming but a very expensive proposition. It is, therefore, suggested that at the beginning of this process the field knowledge of the local communities may be utilized under JFM (Joint Forest Management) programmes for assessing the extent of resource, its abundance and density in the project areas and identifying such areas for potential extraction of the produce.

Auto-ecology and syn-ecology

Another aspect that requires consideration for sustainable management is the need for an integrated ecological approach to achieve sustainable management of the NWFP resource. It is well known that plant species in any given community coexist and interact in such a fashion that the resources of a microclimate are optimally utilized by all the components of the community. However, very limited information is available in the literature on these auto-ecological and syn-ecological interactions with regards to NWFP species. Therefore, it is possible that removal of one species may disturb the dynamics of the others and vice versa and subsequently may affect the existing community equilibrium. Greater scientific inputs are, therefore, desirable in this direction. The local communities, especially living in and around the forest areas, have adequate indigenous knowledge of maintaining the ecosystem on sustainable basis. This traditional knowledge treasure could be effectively made use of by the Forest Managers in developing site-specific programmes for assuring ecological sustainability of the ecosystem and planning wise use of the resources for the community interests and involvement in forest management simultaneously.

Production of NWFP

It is a well-accepted fact that 60 percent of the NWFP production in the country is traded as unrecorded removal. Further, the data on recorded and unrecorded removal or extraction of NWFP is neither systematic nor structured. However, in recent years, there has been proliferation of studies aimed at estimating their contribution to household income, consumption and employment generation potentials and opportunities. The production data for this paper has been essentially modified and adopted from Forest Statistics Report (ICFRE, 1987–2001) and pertains to only the recorded removal of NWFP from different state forests of India (Tables 1 and 2). It is clear from these tables that the increasing or decreasing trends of production reflected therein cannot be relied upon as indicators of sustainability of forest ecosystems or production. For example sudden increase in production of Sal seeds during the years 1997, 1999 and 2000 – could be due to exceptionally good seed years, which is characteristic to many tree species, while a lower resin production could be due to availability of imported resin, which is much cheaper than that extracted from national forests. In general, however, the trends for removal of medicinal plants show a continuous increase over the period under reporting (1987–2000), while there is a recorded decline of gums, resins, canes, lac and tanning material during the years. In order to solve this problem, it is suggested that for recording NWFP production from forests the active participation and help of local communities under the JFM programmes must be sought. The state forest departments may also take serious efforts in recording the production with the computerization of its establishment.

Sample plots

Since NWFP represent removal of specific plant parts to whole plant, different range of values will represent sustainable limits. The cyclic nature of flowering, fruiting, seed production and sporadic nature of distribution of species further complicate the issues of estimation of production potentials etc. Establishment of sample plots is required in various management units in different forest areas for determination of potential production of various NWFPs and for the estimation of sustainable harvest limits, which can be used without impairing the natural regeneration of the species. These plots may be monitored on long term basis with the active help and cooperation of the local communities and research institutions.

Table 2. Trends of export, import and demand of medicinal plants

Medicinal plants 000' MT	1996–97	1997–98	1998–99	1999–00	2001–02*	2004–05*
Export	32.88	37.23	37.98	36.62	NA	NA
Import	4.18	3.00	4.66	4.19	NA	NA
Demand	NA	97.79	106.45	120.82	160.54 GR** (15.1)	272.62 GR** (16.7)
Total	**37.06**	**138.02**	**149.09**	**131.63**	**160.54**	**272.62**

* Projected

** Growth rate

Source: Demand study for selected medicinal plants, Vol-1 (a), 2001–2002, Centre for Research Planning and Action, New Delhi

Sustainable harvesting limits

Majority of the NWFP species especially the shrubs and herbs are largely extracted by destructive harvesting. This aspect is very critical not only for the regeneration/sustainability of the resource in the long run but also for ecological stability and sustainability of the ecosystem. Collectors of NWFPs are usually illiterate and are not conversant with the scientific methods of harvesting. Research institutions can play a key role in creating the awareness by the respective states amongst the collectors as well as the forest staff by supplying the scientific information on how to harvest different species on non-destructive basis. More often the local people are far more conversant with the identification of various NWFPs especially the medicinal plants existing in the area than the foresters. This knowledge of the local communities can be used in training the forest staff to effectively manage and prevent the pilferage of these vital resources from the project areas by unauthorized agencies and individuals. These efforts will also bring in the mutual understanding between the local communities and the forest staff, which in fact is a key issue in assuring the success of JFM activities. Research institutes can help the state departments to further train the forest staff in identification of various NWFP species by organizing a need based training courses.

Resource augmentation

Another important aspect of ecological sustainability is augmentation of the existing resource. Various research and development institutions have recently developed the techniques for mass multiplication of a number of NWFP species especially the medicinal plants. These technologies can be effectively utilized by states to undertake restorative and enrichment planting of the degraded forest areas for augmenting their existing resources.

Economic Sustainability

It is a fact that the success of any NWFP management is predominantly dependent on the economic returns to the stakeholders (local communities). The programmes must ensure equitable distribution of economic proceeds from various NWFP items to all members of the forest community. In order to make the programme more successful and economically vibrant, technical inputs like grading, preliminary processing and value addition of the produce using local or simple energy efficient technologies are required. Many research and development institutes have developed simple and effective techniques and tools to this effect. For example, solar or drum dryer techniques of drying the NWFPs, extraction of dyes from forest biomass waste and bio-fertilizers has been developed recently by various institutes. Research organizations thus can play a significant role in value addition of the NWFPs to ensure better economic returns to the stakeholders. Moreover, such institutions can help the states to develop technologies to suit their local or regional needs. Further, these institutions can also help in developing product development and quality control mechanisms to ensure competitive marketing of the produce. These initiatives would bring in stability in the current uncertainties of marketing the produce and facilitate conversion of the sporadic income through NWFP into a regular sustained income generating activity and thereby assuring better community involvement in the management programmes as well as enhanced economic returns and development of the stakeholders.

Socio-cultural Sustainability

In order to build a strong and sustainable partnership forest management must take into account the issues of human sensitivity in terms of local needs of the people, their specific cultural and traditional norms, rituals and beliefs. It must be borne in mind that ecological and environmental issues are although of prime importance for the resource managers, it is the economics that is more important to the community participants. Therefore, it is also important to use the wisdom and knowledge of the local communities with respect to specific species that would give more efficient methods in terms of sustainability of the resources and ensuring greater community participation. This wisdom, however, must be amalgamated with the scientific inputs to achieve the desired results. Local communities can be trained and actively involved in the collection of seeds and other planting materials, nursery development and production of planting stocks etc. As such due emphasis must be placed on capacity building of people at all levels. In this context, the scientific knowledge gained by research institutes can be effectively used to train the local communities in various aspects of cultivation, nursery establishment and production of planting stock, non-destructive harvesting and collection, processing and value-addition of NWFPs.

APPROACH

The studies on the aspects explained in preceding section should aim to assess the current status of database, resource inventory, harvest and management systems, marketing aspects, interest and perception of various stakeholders, utilzation and processing, and finally national and international trade and policy issues of these species. The SWOT should succeed this, ETOP analysis of these various aspects involved in the sustainable management of NWFPs. The main aim of the study should be to suggest modifications and improvements in the above mentioned socio-economic, ecological and technical aspects of NWFP management.

DEVELOPMENT OBJECTIVE

The long-term development objective of the studies should be: “to contribute to the conservation of national forests and enhance the well-being of local communities and people in India through the sustainable management, use and development of non-wood forest resources by local people”.

TARGET GROUPS

The research should address the (potential) needs and concerns of institutions and people whose policies, programmes and actions are affecting the management, use and development of Non-Wood Forest Resources. They can be grouped in four:

- Those who collect, organize and analyse information to provide the analytical basis for formulating policies and defining development plans and strategies involving NWFPs;
- Those who define and choose policies, programmes and strategies, including the prioritization of projects, activities and the allocation of resource inputs to these;
- Those who execute programmes and strategies, and implement the projects and activities; and
- Those who derive income and have their livelihoods dependent on NWFP gathering, processing and trade.

IMMEDIATE OBJECTIVES, OUTPUTS AND ACTIVITIES

The immediate objectives of the research projects should be:

- To enhance national and state institutional capacity for the development of Non-Wood Forest Resources and Products, involving relevant governmental, scientific and educational institutions, NGOs, (inter/ national) development organizations and individuals.
- To contribute to national and state policy development with respect to the sustainable management, use and development of non-wood forest resources.

- To contribute to sustainable, community-based forest management, improved NWFP resource assessment and harvesting techniques, and improved production, processing, trade and marketing of important NWFPs in India.
- To provide support to activities and initiatives that aim to enhance the organizational and entrepreneurial capacity of local people using NWFPs, incorporating social and cultural values and traditional knowledge information and communication systems and practices.

CONCLUSION

Discussion in the previous sections has identified various ecological, environmental, technical and socio-economical aspects, which need to be addressed comprehensively by developing organizations and research and training institutes. Moreover, there must be a clear-cut delineation of the duties and responsibilities of all the stakeholders to ensure an effective implementation of the NWFP management. Role definition is thus very important and must be addressed seriously. Further, collaboration may be required in different stakeholders due to overlapping nature of NWFP management, harvesting, value addition and marketing aspects (Table 3).

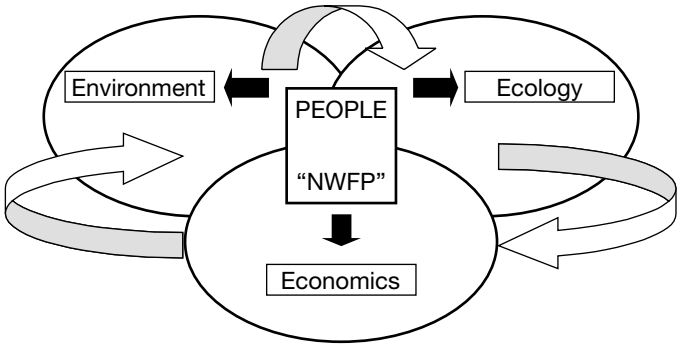

Figure 1. Components of sustainability of NWFP for poverty alleviation.

Table 3. Role identification of the Forest departments, local communities and research and development organizations leading to NWFP sustainable management and poverty alleviation

Stakeholders activity	Forest departments	Local communities	R & D institutes
Protection and augmentation of resource	–	–	–
Resource quantification	–	–	–
Determination of harvest limits	–	–	–
Harvesting of resource	–	–	
Grading and processing		–	–
Product development		–	–
Marketing	–	–	–
Capacity building	–	–	–
Legal issues	–		–

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10 Non-wood forest produce (NWFP) for poverty reduction

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ABSTRACT

Besides timber, India's forests are a great repository of many non-wood forest produce, which can be harvested on a non-destructive basis. Medicinal plants are among the most important NWFP in India. According to World Health Organization (WHO), 80 percent of the people in developing countries rely on traditional natural medicines and 85 percent of the traditional medicines involve the use of plant extracts. In India, millions of people residing in and around forests rely on NWFP for their subsistence and more than half of the employment generated in the forestry sector is related to NWFP. Medicinal and aromatic plants provide critical livelihood support as well as affordable and culturally relevant sources of health care for a large number of South Asia's poor. The dependence of tribal and marginalized population to eke out their livelihoods based on the income drawn from these and other related plants is more pronounced in the uplands of South Asia than other parts of the region. At present, 90 percent of medicinal plants are collected from the wild, generating about 40 million man-days employment. Under the Vanaspati Van Scheme of the Department of Family Welfare, 275 000 ha would be allocated for medicinal plants conservation and generating 50 million man-days by involving NGOs, federations, societies, cooperatives and individuals. The National Medicinal Plants Board is actively involved in poverty alleviation by way of involving rural people in the cultivation of medicinal plants. Quite a large number of projects have been funded through contractual farming system by the board with the involvement of all types of stakeholders associated with the sector. Cultivation of medicinal plants may become an economic activity, which would eventually bring prosperity to the growers.

NWFP FOR POVERTY REDUCTION

Geography of India with climatic conditions varying from tropical to alpine has resulted in an enormously rich biodiversity. It is amongst the 12 mega-biodiversity countries of the world. Of the total land area of 328 million ha, about 22 percent (74.74 million ha) comprises the notified forest area in India. This is only 1 percent of the productive forest area of the world, it supports 15 percent of the world's human population and massive livestock population. On the world map of forest resources, India is classified as a forest deficit zone. Out of 74.74 million ha, 25 million ha contains only sparse growth and 14.74 million ha is unproductive. Thus, only 35 million ha of forest is well wooded.

Besides timber species forests are also a repository of many non-wood forest produce (NWFP). By definition, NWFP is the forest produce other than timber, which can be harvested on a non-destructive basis. It includes all goods of biological origin other than wood in all its forms, as well as services derived from forests. They include a number of goods such as fodder, fibres, flosses, food and food additives, fertilizer (bio-mass), medicinal plants and herbal potions, phyto-chemicals and aromatic chemicals, fatty oils, latex, gums, resins and other exudates and different kinds of animal products (honey, wax, lacquer, silk, etc.).

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Medicinal plants are among the most important NWFP in India. According to WHO, 80 percent of the people in developing countries rely on traditional natural medicines and 85 percent of the traditional medicines involve the use of plant extracts. Medicinal plants grow in about 80 percent of forest in India. Around 70 percent of India's medicinal plants are found in tropical areas among the dry and moist deciduous vegetation, *viz*. Western and Eastern Ghats, Aravali and sub-tropical regions of Himalayas. Although less than 30 percent of the medicinal plants are found in the evergreen and temperate habitats, they include species of high medicinal value.

In India, millions of people residing in and around forests rely on NWFP for their subsistence and more than half of the employment generated in the forestry sector is related to NWFP. Medicinal and aromatic plants provide critical livelihood support as well as affordable and culturally relevant sources of health care for a large number of South Asia's poor. The dependence of tribal and marginalised population to eke out their livelihoods based on the income drawn from these and other related plants is more pronounced in the uplands of South Asia than other parts in the region. The increasing interest in medicinal, aromatic natural dye and other NWFP plants especially their growing commercialization, has raised important socio-economic and ethical issues. These have also highlighted vital gaps in the knowledge about the sustainability of the trade based on these plant resources, the impact of exploitative trading on local economy, and the deteriorating status of the natural habitats. At present, 90 percent of medicinal plants are collected from the wild, generating about 40 million man-days of employment (part and full). Under the Vanaspati Van Scheme of the Department of Family Welfare, 275 000 ha would be allocated for conservation and cultivation of medicinal plants and this would generate 50 million man-days of employment by involving NGOs, federations, societies, cooperatives and individuals.

International market of medicinal plants is over US$60 billion per year, which is growing at the rate of 7 percent. India at present exports herbal material and medicines to the tune of Rs.4.463 billion only, which can be raised to Rs.30 billion by 2005. China and India are the two largest producers of medicinal plants, having more than 40 percent of global biodiversity.

The National Medicinal Plants Board is actively involved in poverty alleviation by way of involving rural people in the cultivation of medicinal plants in the country. During recent past, quite a large number of projects have been funded through contractual farming system by the Board with the involvement of all types of stakeholders associated with the sector. During the last two years the Board has sanctioned 324 projects on different aspects (Table 1) worth Rs.230 million and generating 3 million man-days of employment during the project period.

Table 1. Total projects sanctioned by the National Medicinal Plants Board, 2001–2003

	Number of projects		**Number of projects**
Ex-situ conservation	43	Contractual farming	79
In-situ conservation	16		
R&D	36	Promotional (GOs)	67
Extension	24		
Demonstration plots/Herbal gardens	17	Promotional (NGOs)	34
Marketing	8		
Total for 2001–2002	144	Total for 2002–2003	180

Cultivation of medicinal plants may become an economic activity, which would eventually bring prosperity to the growers.

11 Value addition of NWFPs

P.L. Soni* and V.K. Varshney*

ABSTRACT

Managing forests sustainably in order to improve rural economy, NWFPs hold prospects. An important concept in exploitation of NWFPs is adding value locally. Value addition of NWFPs has attracted attention because gathering and processing activities can be managed by the rural people, with a greater portion of the end product revenue accruing to those who manage the forest resources. Local processing includes grading, purifying, storing in congenial conditions to reduce post-harvest losses, and improving thereby the product quality to fetch higher price. NWFPs in India are derived from over 3000 species. These include medicinal plants, edible plants, starches, gums and mucilage, oils and fats, resins and oleo-resins, essential oils, spices, tannins, insecticides, natural dyes, bamboo and canes, fibers and flosses, grasses, bidi leaves, etc., which have been traditionally used for livelihood, and social and cultural purposes. However, processing of NWFPs into value-added products through simple technologies is limited. Research needs for improving the situation include prospecting, screening, evaluation and classifying NWFPs' yielding plant species, and identifying candidate species, and adequate technology for development of value added products.

INTRODUCTION

Realization of the great dependence of the poor on forests is quite recent. Bringing poverty focus into forest management implies more deliberate efforts to link sustainable livelihood for poverty reduction with sustainable forestry. However, increased population pressure, continuing loss and degradation of forest resource, increased market demand or newly found needs make the situation difficult. Non-wood forest products (NWFPs) are goods of biological origin other than wood derived from forests. NWFPs are a group of under-exploited but potentially promising resource for sustainable livelihood of poor people in rural areas. An important concept in understanding these prospects is sustainable exploitation of NWFPs and adding value locally.

In India, most rural people use some forest products and many obtain part of their income from forest-based activities. For instance, collection of tendu leaves provides part-time employment to about 7.5 million people. A further 3 million people are employed in bidi processing; and another 3 million people are involved in lac (resin) production. About 0.75 million earn income from sericulture; about 0.55 million people are employed in bamboo-based craft enterprises and about 0.13 million households are involved in tassar silk cultivation (Jha and Jha 1985, Arnold 1995). At the local level, NWFPs also provide raw materials for large scale industrial processing, including processing of internationally traded commodities such as foods and beverages, confectionery, flavourings, perfumes, medicines, paints and polishes, etc. At present at least 150 NWFPs (e.g. honey, gum arabic, rattan, edible bamboo, cork, forest nuts and mushrooms, essential oils, and plant and animal parts for pharmaceutical products, etc.) are significant in international trade.

Many people living in and near forests are unaware of the potential of the resources for income generation because they lack access to information on processing possibilities. Processing of NWFPs adds value to them. Value addition of NWFPs has attracted international attention because gathering and processing activities

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can be managed by the rural people, with a great portion of the end product revenue accruing to those who manage the forest resources. Market oriented production often goes through several levels of processing. The higher the level of processing carried out near the source, more of the product value can be retained locally. This offers the prospect for improving local employment, income and livelihood. At the national level this can also support production of consumer goods from NWFPs (e.g. perfumes, cosmetics, fiber extraction, ropes, handicrafts, etc.) and help increase foreign exchange earnings (FAO 1995). Included amongst the value added processing activities are to reduce post-harvest losses through grading, purifying, storing in congenial environment, to reduce the weight and volume of raw products, to increase their standardization and guarantee consistent quality and acceptability in multiple markets (Clay 1995). NWFP- based industries are generally less polluting, less destructive of environment and amenable for vertical and horizontal integration (FAO 1995).

Several reports and studies provided indication of the current and potential importance of NWFPs in the Asia Pacific region. The region is reported to be the richest in terms of product diversity and the volume and value of trade of NWFPs and every country of the region has a long list of species, either used locally or traded in the local or international markets (Nair 1995). China and India are by far the world's largest producers and consumers of NWFPs. China dominates the world trade in NWFPs followed closely by India.

NWFPs of India

India is one of the 12 mega-biodiversity centres and harbours about 50 000 plant species accounting for 7 percent of the world's flora (Dayal *et al*. 1999). Out of these, about 3000 species yield economically exploitable NWFPs (FAO 2002). These include medicinal plants, edible plants, starches, gums and mucilages, oils and fats, resins and oleo-resins, essential oils, spices, drugs, tannins, insecticides, natural dyes, bamboos and canes, fibres and flosses, grasses, bidi leaves, animal products and edible products. According to the Centre of Minor Forest Products, Dehradun, 325 species producing NWFPs are very common and have a base in major industry, 879 species are used locally, 677 species are potentially useful only locally, and 1343 species can be described as 'other lesser known' (FAO 2002). Most of India's 50 million tribal people receive a substantial proportion of their cash and in-kind income from NWFPs, while about 200 to 300 million village people depend upon products from forests in varying degrees (Shiva 1995).

The estimated total value of the most economically important NWFPs in world trade is about $ 11 billion annually (Wilkinson amd Elevitoh 2003). At the national level over 50 percent of forest revenue and about 70 percent of forest export revenue comes from NWFPs, mostly unprocessed and raw (Prasad 1999). Small-scale forest-based enterprises, many of which rely on NWFPs, provide up to 50 percent of the income for about 25 percent of India's rural labour force (Tewari and Campbell 1995). The forestry sector provides about 2.3 million man-years of employment. Of this about 1.6 million man-years are related to NWFPs. It is estimated that NWFPs are capable of generating 4 million man-years of employment annually, if their full potential is exploited. Most of the NWFPs are collected in a particular season although they are utilized all year round and as much as 50 percent spoil during storage (FAO 2002). Most NWFPs currently provide employment during only part of the year because processing of these NWFPs is still poorly developed. Since these products occupy an integral place in the international market, ample opportunities exist for enhancing export earnings by developing suitable facilities for processing, drying, storage, packaging and marketing. Improved labour intensive technologies for processing NWFPs would increase the employment opportunities for longer periods of the year and ensure high prices for the product(s).

Major constraints in processing of NWFPs

Harvested products reach the market, local or foreign, after primary processing in the form of cleaning and grading. The potential of many NWFPs is not being utilized fully because of insufficient knowledge and experience on appropriate processing techniques and lack of product development. In addition, extracting, processing, production and marketing of most NWFPs are carried out in traditional ways using worn-out equipment or obsolete methods. Development of processing technologies has stagnated at the level of preliminary processing. Most processing of NWFPs for local use is carried out in units which are small, dispersed, financially weak, primitive in technology and poorly managed. They lack infrastructure and employ unskilled persons, often working on part time basis. These constraints restrict immense potential for value addition, especially in the case of pharmaceuticals and cosmetics (Nair 1995). This has also put negative impact on producers/ collectors of NWFPs.

Value added transformation of NWFPs is labour intensive and stresses on quality and reliability of supply. But lack of technology, skilled manpower, management expertise, capital for investment and marketing skills, coupled with inadequate information on resource and resource development, limit sophisticated or refined downstream processing and often export is confined to primary products. The products of comparatively larger

establishments carrying out primary processing for export, undergo further processing/refinement in developed countries. These impact adversely on enterprise survival rates (FAO 1995). Significant value addition is done in importing countries, the benefits of which seldom trickle down to the raw material suppliers.

The NWFP scene is still trader dominated where the emphasis is on generating income through trading. Impact of research on resource conservation, management and development of new products has been negligible and research tends to be preoccupied with traditional products with uncertain future. The substantial efforts on taxonomy and chemical characterization are not effectively followed up to develop marketable products. Enhanced awareness on the long term potential is yet to be translated to action and the efforts to take advantage of the widening product market are far from adequate (Nair 1995).

Research efforts are far from adequate and spread too thinly in several aspects, contributing to their ineffectiveness. Impressive achievements with respect to production and processing have occurred mainly for plantation crops cultivated on a large scale. Technological improvements with respect to production and processing especially with regard to a large number of products in the subsistence sector have been negligible. Research is focused on traditional areas and products, with very little efforts to develop new products and uses. Another weakness identified is the lack of linkages between different institutions. Interaction between universities, R&D institutions and industries is poor, resulting in a substantial proportion of the research remaining unused or no research being undertaken on priority concerns of the processing sector (Nair 1995).

To improve the situation, there is an urgent need for a well defined approach to research. One of the specific areas is: prospecting, screening, evaluation and classifying NWFP plant species and identifying candidate species, and adequate technology for development of value added products. New technologies will substantially alter the scope for utilization of NWFPs' new products and usage will emerge while traditional uses will fade out.

STARCHES FROM FOREST TUBERS AND SEEDS

Starch, after cellulose, is the principal carbohydrate photosynthesized by plant. The most important sources of starch are cereal grains (40–90 percent), pulses (30–70 percent) and tubers (65–85 percent). Total world production of starch is estimated to be 18 million tons (Guilbot and Mercier 1985), extracted mainly from maize (10 million) and potatoes (2.5–3 million), and the rest is derived from wheat, rice, manihot, sorgham and sago. About 50 percent of the starch produced in the world is intended for food purposes. Other than as a food stuff, starch can also be used as a coating, sizing and flocculating agents, chemicals and building materials (Guilbot and Mercier 1985). Starch or its derivatives also find industrial applications as an auxiliary material to provide special functions such as binder, thickener, protective colloid, etc.; raw material for production of new products, fillers for polymers to improve their total properties; components of synthetic polymers for synergistic effects; active material for production of pharmaceutical and agro-chemicals. Through simple process technolgies, native starch can be modified into useful products as it is dispersible in cold water and exhibits a higher reactivity than cellulose. In addition, starch is very susceptible to partial or total hydrolytic degradation by acids or enzymes to yield oligomeric or monomeric products which can be further modified.

Realizing the potential of hitherto untapped potential of forest tubers and seeds as alternatives for production of commercial starch and its value added transformation into products, investigations were made in which a number of tubers seeds such as *Pueraria tuberosa, Dioscorea ballophylla, Amorphophallus campanulatus, Stephania glabra, Pueraria thomsonii, Canna edulis* and seeds of *Shorea robusta, Cassimiroa edulis, Careya arborea* and *Aesculus assamica* were screened for their starch contents and evaluated for their physico-chemical properties and compared with those of commerical starches i.e. maize and tapioca starches (Soni and Agarwal 1983, Soni *et al*. 1985, and others). These studies have shown that starches isolated from forest tubers and seeds have comparable properties with commercial starches. Five starches from tubers of *Pueraria tuberosa, Dioscorea ballophylla, Amorphophallus campanulatus, Canna edulis* and seeds of *Careya arborea* have higher water binding capacity then maize and tapioca. Unique feature of the forest origin starches is that their gelation temperature are higher than the maize and tapioca starches. Amylograph studies of most of the starches have shown high peak viscosity and less retrogradation than the maize and tapioca starches. Starch isolated from defatted sal seeds has more N, P, lipids, amylose and water binding capacity than those of other starches studied. Despite its low and seemingly restricted swelling, the sal starch is much more soluble at any particular degree of swelling. Paste viscosity curve showed that it was stable on continued cooking. These unique physico chemical properties of sal starch has generated interest in the starch industry.

Above studies have led to identify following candidate species for their exploitation as alternative source of commercial starches: *Canna edulis, Pueraria tuberosa, Amorphophallus campanulatus, Careya arborea, Cassimiroa edulis* and defatted sal seeds. *Canna edulis* is known to have been used for making noodles in China and Viet Nam.

Starch is an abundantly available source for making dextrin. Dextrin as understood commercially are the degradation products obtained by treating starch in a variety of ways. Dextrin is being marketed in several forms such as powders, granulated particles, thick viscous liquids and white paste. Dextrin exhibits greater solubility and a wide range of solution viscosities. Dextrin finds important application in industries like adhesives, cosmetics, electro plating, textile, paper, food and pharmaceuticals, etc. (Bhatt *et al.* 2000). However, the process used for the transformation is complex involving the use of catalyst or enzyme, time consuming and expensive. A simple process has been developed for conversion of starch into dextrin which completes in a short period of two hours without the use of catalyst/enzyme. Rheological and adhesive properties, and tackiness of dextrin so produced was found better than those of the commercial samples.

SEED GUMS

Galactomannan gum industry is a fast developing industry because of many uses of these gums in food, paper, textile, petroleum, pharmaceuticals, cosmetics, paints, detergents, agriculture and a large number of related industries (Rani *et al.* 2000). In the past two decades, this biopolymer has provided solution to a large number of industrial problems. Industrial applications of these gums are due to their wide range of solubility and solution viscosities which depend upon their structures, molecular weight, and mannose-galactose ratio.

Source of these gums are in the endosperm of plant seeds of the family Leguminosae. The leguminous crops owing to their capacity to utilize the atmosphere N for their growth generally do not require expensive nitrogenous fertilizers and increase the soil fertility and can be cultivated on marginal land. A great diversity of legumes is found in India, enough potential to cope with the increasing demand of seed gums in national and international markets. Development of seed gums thus would boost the galactomannan gum industry in the country which in turn would not only generate livelihood opportunity to reduce the poverty but also would improve the productivity of soil without costly fertilizers. Development of simple processing methods for value addition of these gums is also seen as a practical proposition for generation of additional employment opportunities for the rural people.

During the past several years, studies on galactomannan gums have been carried out at the Forest Research Institute, Dehradun. Studies have isolated gums from seeds of *Leucaena leucocephala* (Subabul) in 30 percent yield and *Cassia tora* in 32 percent yield through simple and cost effective processes (Soni *et al*. 1984, *and others*). The gum derived from Leucaena was also found to be suitable as a wet-end additive in paper making (Soni *et al*. 1984) and as a thickener in textile printing using reactive dyes (Teli *et al.* 1996).

Physico-chemical studies of *Cassia tora* gum has revealed its viability in industrial applications. The gum acted as a flocculant when used for mud settling in sulphited sugar cane juice and in treatment of water of paper mill (Soni *et al*. 2001). In textiles printing, the thickening properties of the gum was found to be comparable with that of sodium alginate (SA), the commercial thickener used in textile printing. However, blending of the SA with the gum in 1 : 1 ratio was found to be a suitable alternative (Soni and Teli 1999). It has also been found effective to achieve optimum strength properties of mill pulp consisting mainly of bleached eucalyptus pulp supplemented with bamboo (12 percent) and pine (2 percent) pulps and bleached bagasse pulp mixed with 20 percent softwood pulp (Soni and Pal 1996).

Through chemical derivatization, *Cassia tora* gum has also been transformed into value-added products such as carboxymethylated, cyanoethylated, carbamoylethylated quarternized and grafted *Cassia tora* gum for their utilization in various industries (Sharma *et al.* 2002, and others). Similarily guar gum (*Cyamopsis tetragonoloba*) the commercial gum, was also modified into derivatives (e.g. carbamoyethylated and grafted guar gum) of industrial importance (Sharma *et al.* 2003d). These modified products of *Cassia tora* and guar gum have good potential as effective and ecofriendly substitutes of synthetic flocculants which are expensive and cause environmental and health hazards in their production and use. Flocculation is a process whereby finely divided or dispersed particles are aggregated together to form large particles of such a size so as to cause their settling or agglomeration of tiny particles to form flocs which settle and cause clarification. Materials which are used in fast solid-liquid separation are called flocculants. Flocculants have wide spread applications to treat chemical effluents in various chemical industries. Modified *Cassia tora* gum was also used as beater additive in paper making. It was found to be effective in improving the dry strength properties of paper (Soni *et al.* 2000).

Extensive work to find out new sources of seed gums has been carried out at NBRI, Lucknow (Kapoor 1999). It includes the chemical investigation of about 200 species belonging to different genera of Leguminosae. It is found that almost all the species of *Cassia, Crotolaria, Sesbania* and *Indigofera* occurring in India are rich in gum content whereas few species of *Bauhinia, Caesalpinia* and *Desmodium* contain appreciable amount of gum. Genera like *Acacia, Canavalia, Erythrina, Tephrosia, Pterocarpus*, etc. are poor in gum. It has been demonstrated (Kapoor 1999) that the seeds of *Cassia angustifolia* could open new avenue for the production

of seed gum. The seeds are bigger in size and contain about 50 percent of endosperm. The gum is characterized by having high range of mannose with useful viscosity properties. The studies have also shown that the seeds of *C. alata, C. grandis, C. siamea, C. nodosa, C. didymobotrya, C. occidentals* have great potentialities to become the new source of gums. Similarly various species of *Crotolaria, Caesalpinia, Mimosa, Gleditsia, Priotropis* and *Sesbania* could also be exploited for the commercial production of seed gums. However, for commercial viability factors like habitat, availability, cost of collection, seed size and endosperm content are required to be considered.

GUM EXUDATES

Exudate gums, also known as natural gums, are the secretions from trees and bushes. Today several of these natural gums are still common articles of commerce. Important gums such as gum karaya (*Stercuilla urens*), and gum ghatti (A*nogeisus latifolia*) have got immense use as food additive. These exudates when secreted by the plant are viscous, gummy liquids but when exposed to air and allowed to dry, form hard, glassy masses. The physical appearance and properties of natural gums are of utmost importance in determining their commercial value and their end uses. These vary considerably with botanical sources, climate, soil, age, absorbed impurities, treatment after collection and storage. India produces 20 000 tonnes of exudate gums in which gum karaya alone contributes about 15 000 tonnes. India earns around Rs. 1200 million by the export of gums (Soni and Bhatt 1999). However, the trade suffers a draw back of adulteration of the gums which make them unfavourable for their incorporation into formulation of products.

Gum ghatti is the exudate of *Anogeisus latifolia* but it is always mixed, sometimes to the extent of 40 percent, with the gums from other sources such as *Albizia, Azadirachta*, etc. This admixing restricts its acceptability in food applications. A simple process was developed to purify the gum ghatti and shaped to noodle form.

Mesquite gum obtained from *Prosopis juliflora* contains high content of tannin compounds which inhibits its application as a commercial food additive. A simple process to purify the gum and remove tannin compounds has been developed. The purified gum in tablet formulation by direct compression and wet granulation method was evaluated and compared with commercially used *Acacia* and *Tragacanth* gums. Results of binding and suspending properties of mesquite gum showed its suitability to be used in pharmaceutical formulation like other natural gums (Khanna *et al.* 1997).

ESSENTIAL OILS

Essential oils are highly volatile aromatic oily substances that can be found in many plant parts. Such oils are called essential because they are thought to represent the very essence of odour and flavour. These oils are stored as microdroplets in specific cells, glands or ducts, either in one particular organ of the plant or distributed over many parts, e.g. leaves, barks, roots, flowers or fruits. They are used in many industries for adhesives (e.g. cements, pastes and glues and tapes), pharmaceuticals (e.g. medical and veterinary preparations), cosmetics and toiletries (e.g. perfumes and sprays, creams, deodorants, colognes, shaving preparations, powders, soaps and detergents), paints (e.g. distempers, diluants, paint removers, air fresheners and cleaning fluids), paper and printing (e.g. carbon paper, crayons, ink, labels, wrappers, writing papers and ribbons), insecticides (e.g. sprays, repellants, attractants and disinfectants), foods and beverages (e.g. liquors, convenience foods, flavouring agents, preservatives and sauces), petroleum (e.g. cream deodorant, solvents and lubricating oils/waxes), textiles printing (e.g. deodorants, upholstery materials, finishing materials), rubber and plastics (surgical gloves, rubber toys, water proofing compounds, general plastics), motors (e.g. polishes, cleaners, seat upholstery and other plastic goods) and dental preparation (e.g. tooth pastes, mouth washes, antiseptics and cements) (De Silva and Atal 1995). The important essential oils produced in India come from sandalwood, lemongrass, palmarosa, *Eucalyptus* spp. and khus.

Apart from the above described applications of the essential oils in various industries they are widely used in aromatherapy. Aromatherapy can help in easing a wide assortment of ailments, aches, pains, and injuries while relieving the discomforts of many health problems. It also helps in restoring both physical and emotional well being by relieving depression and anxiety, reducing stress, relaxing, uplift spirit, sedation or stimulating. It is the active chemical composition and aroma of the essential oils which provide therapeutic benefits. Oils such as eucalyptus, sandalwood, lemon, bergamot, etc. have powerful antibacterial and anti viral properties, which unlike other pharmaceutical drugs do not leave behind dangerous toxins. There are many ways to use essential oils for their therapeutic and balancing properties. These include inhalation, bath, massage or breathing. About 55 essential oils are known for their therapeutic effects (Varshney *et al.* 2001). Some of the good examples of the essential oils having therapeutic properties and obtained from forest species are sandalwood (from *Santalum album*), cedar wood (from *Cedrus* spp., *Juniperus* spp.), eucalyptus (from *Eucalyptus globulus*), pine (from *Pinus sylvestris*), citronella and palmrosa (from *Cymbopogon* spp.) etc.

Steam distillation is the most common method for isolation of essential oils. This involves generating steam and passing it through the plant material to carry off the volatile constituents. Though the process sounds simple in theory, the actual commercial process for greatest efficiency and quality varies widely, depending upon the characteristics of the raw material and the final product (De Silva and Atal 1995). Other processes such as enfleurage (e.g. oils from flower of jasmine and rose), solvent extraction (e.g. oleoresins from species such as ginger, pepper, cardamom, etc.), cold expression (e.g. citrus oil), etc. are also used.

The world trade in essential oils and their value-added products is vast. World production of essential oils (excluding turpentile oil) is estimated to be about 105 000 tonnes to the tune of US$ 922 million. India stands at third position with a share of about 16 percent. Indian production of the essential oils is estimated to be 17 000 tonnes valued about US$ 195 million (S.C. Varshney, Personal Communication, 2001).

Primary processing of the essential oil in form of post-harvest operation, e.g. drying and storage of the plant material, and down stream processing (e.g. rectification) add value to the oils. The requirement for post-harvest operations are beyond the means of most rural enterprises. However, such processing centres may be operated near the source by the government or cooperative societies to feed national industries improving thereby the local employment and income.

Rectification of the essential oils can produce pure isolates of added value. Depending on their end uses this may consist of one or more of the following:

- removal of moisture, colour and sediments
- removal of undesirable compounds in order to improve the odour characteristics, stability and sustainability
- isolation of highly valued compounds
- enrich the oils by removing or adding other fractions

Rectification of the oils is done by fractionation. As suggested by De Silva and Atal (1995) it could be carried out in some developed rural areas having small scale processing with backup from national research institution to carry out the analysis and develop the fractionation parameters. This needs more training and equipment and may not be possible in certain rural communities or for forest dwellers. Alternatively fractionation of the oils could be carried out at a central facility which can afford to invest the funds and personnel required for this activity. These pure isolates could further be processed to produce high value aromatic chemicals which have an export market. These aromatic chemicals can be used in blending of perfumes and flavours for local industries.

Essential oils produced in India could be divided into the following categories (S.C Varshney, Personal Communication, 2001):

- Essential oils for fragrances (exotic): 40–45 tonnes
- Essential oils for flavours (exotic): 1200–1400 tonnes
- Essential oil for processing: 16000 tonnes.

It is evident that most of these oils are meant for processing and therefore, there exist innumerable possibilities for their value addition. This includes isolation of valuable constituent in high purity and their transformation into useful derivatives. For example, processing of eucalyptus oil obtained from *Eucalyptus globulol* could isolate valuable constituents (e.g. globulol, eudesmol, viridiflorol and farnesol) constituting 5–6 percent of the oil. The residual oil left after separation of these constituents can be sold at lower prices. Isolates of various essential oils such as citral, citronellal, caryophyllene, geraniol, cis-3-hexanol, himachalene, pulegone/ isopulegone, isomenthol, l-limonene, linalool, methones, neomenthol, 3-octanol, α and β-pinenes, terpinolenes, etc. are available with processing units. Many value-added products can be obtained by further processing these isolates.

Besides above, R&D efforts should also be directed to explore new oils having greatest economic potential as flavours, fragrances and therapeutic agents. Efforts should also be extended to locate such oils, which contain valuable minor constituents, e.g. germacrene-D, β-damascenone, β-and γ- endesmol, isoeugenol, lavandulol, cis-rose oxide, etc.

Vitex negundo is of medicinal/pesticidal value. The leaf oil of this species is found to contain 66 compounds. The main compounds were viridiflorol (19.55 percent),β-caryoplyllene (16.59 percent), sabinene (12.07 percent) and α-terpineol (9.65 percent) (Singh *et al.* 1999). The oil also showed 100 percent mortality against the stored grain pest, *Sitotroga cereallela*, infesting wheat, seeds and thus has potential to be developed into a pesticide (Singh *et al.* 2002). The oil isolated from flowering twigs shows the presence of 94 compounds of which 28 compounds were identified with viridiflorol as chief constituent (Singh *et al.* 2000). Both these oils could be a good source of viridiflorol, which has biological acitivity as antiacetylcholinesterase agent, IC 50 = 25μg/ml (Duke 1995).

Needles of *Cephalotaxus harringtonia* var. harringtonia is of medicinal value. Investigations were made to isolate essential oils from the needles and flowering twigs produced oil with 31 compounds. 17 compounds were identified with β-caryophyllene (27.9 percent, 31.3 percent); α-humulene (11.4 percent, 10.6 percent), germacrene-D (9.5 percent, 13.0 percent), γ-cadinene (8.9 percent, 5.5 percent) and β-elenene (8.3 percent, 10.9 percent) as major constituents. (Mehndiratta *et al.* 2003).

Essential oils from different parts of *Shorea robusta* were isolated and characterized (Kaur *et al*. 2001 and others). The oils obtained from leaves, heartwood and resin showed the presence of 20, 24 and 37 compounds of which 8, 9, 17 and 9 compounds, respectively were identified. α and β-caryophyllens (4.55 percent and 28.27 percent, respectively) were the main constituents in the leaf oil while germacrene-D was the chief constituent in resin oil (29.57 percent) and heartwood oil (31.79 percent). Presence of caryophyllenes in leaf oil suggests its possible use as anti carcinogenic as the caryophyllens are reported to be potential anti carcinogenic agents. Heatwood oil can be a good source of germacrene-D as it is a valuable sesquiterpene needed by many perfumers.

Agar oil, obtained by the steam distillation of agar wood, is highly priced in perfumery. Distillation of this oil is very slow, and the odoriferous constituents distill over only towards the end of the distillation. An inexpensive modification was suggested which employs hydrodistillation of the chips in which a solution of common salt is used in the place of water. Water from the distillate is returned to the still in the beginning of the distillation and at the end of distillation. Clear separation of the oil could be achieved by saturating the distillate with common salt. The oil obtained was comparable to that obtained by the indigenous method and the yield (0.54 percent) was higher by about 20 percent.

Bulk of the camphor produced in India is synthetic camphor produced from α-pinene. Investigations have revealed that leaves of *Ocimum kilimandscharicum* on distillation yield an essential oil (2.5–5.8 percent) which contains more than 50 percent camphor. A cheap method of isolation and purification of camphor from this oil was developed. Production of camphor from *Ocimum kilimandscharicum* can easily be adapted as cottage industry because of the inexpensive nature of process, and the plant can be cultivated easily using techniques developed by FRI.

Perfumery compounds have also been prepared from pine needles which are plenty in the pine forests. On an average, one ha of well stocked chir pine forest sheds about 10 tonnes of pine needles per annum. Pine needles, by chlorofom extraction, gave 1.08 percent wax which on hydrolysis gave a mixture of hydroxy acids in 62 percent yield. The acid mixture was converted to a mixture of macrocyclic lactones with long lasting musk odour in 61 percent yield (Dayal *et al*. 1989).

LEAF PROTEIN CONCENTRATES (LPC)

Short supply of good quality protein to meet the requirement of increasing animal and human population has necessitated the search for additional sources. The unconventional sources of protein which include oilseed meals, fish protein concentrate, single cell protein and perhaps algal and leaf protein have tremendous scope for developing of low cost protein foods. Out of all the unconventional sources of protein, leaf protein appears to have better exploitation in the light of excessive photosynthesis and availability of abundant lush green vegetation (Srivastava and Mohan 1989).

Leaf proteins have been found to have greater nutritive value than most of the pulses, resembling skimmed milk in the diet of infants recovering from Kwashiorkor. Leaf protein has been advocated as a potential source for human consumption (Oelschlegel *et al*. 1969). Trees have also been suggested as a possible source of leaf protein food (Mohan and Srivastava 1981) in addition to already identified weeds, cultivated crops and wild plants. Moreover production of leaf proteins from trees have unique scope as they do not involve recurring cost of cultivation.

Realizing the importance of the leaf protein concentrate (LPC) in poultry and human nutrition, and potential of trees for production of LPC, a number of tree species such as *Morus alba, Cassia fistula, Sesbania grandiflora, Gliricidia maculata, Moringa oleifera* and *Leucaena leucocephala* have been studied for leaf protein extractability and chemical composition of recovered LPC to judge their suitability for the bulk production of LPC (Mohan and Srivastava 1981). *Cassia, Sesbania, Gliricidia* and *Morus* showed fairly good extracability of protein N (45.1, 45.9, 37.4 and 33.8 percent, respectively). They also yielded crude products having good nitrogen content of 6.58, 6.86, 7.00 and 6.44, respectively. *Sesbania* leaves showed the highest LPC recovery of 9.44 g/100 g of fresh pulp while *Gliricidia* LPC showed highest percentages of protein and ether extracts of 43.8 and 15.1, respectively and lowest ash of 3.60 percent.

Studies carried out by Srivastava and Mohan (1989) have demonstrated that LPC from mulberry leaves could be utilized as human food or as nutritious feed for silkworm, poultry and cattle. The importance of leaf protein fractionation which results in chloroplastic and cytoplasmic fraction has been emphasized in poultry

and human nutrition (Mohan and Srivasatava 1984). Variability in composition and nutritive value of these fractions from various plant species has been reported (Betschart and Kinsella 1974). The biochemical composition and nutritive value of the leaf protein fraction from *Morus alba*, *Gliricidia maculata* and *Sesbania grandiflora* have been reported by Mohan and Srivasatava (1981). Cytoplasmic leaf protein fraction from *Sesbania grandiflora* were found to be suitable for human consumption while the choloroplastic fraction for use in poultry feed.

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12 Participatory agroforestry for poverty alleviation in Coimbatore District, India

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ABSTRACT

Population pressure and inadequacy in rural income generation have resulted in increased degradation of forests in many countries. Land, which provides incomes, for both the landowners as well as the landless, can be sustainably managed to prevent rural poor from over-exploiting the forests. The basic issue is to optimize land use and maximize the turnover of investment. This requires comprehensive research and management inputs. Working towards this approach the Institute of Forest Genetics and Tree Breeding (under ICFRE) and Shanti Ashram, a non-governmental organization, implemented a project with the assistance of United Nations Development Programme (UNDP). The objectives were to capacitate the institutions in the study area, develop village and land-use plans and guide in agroforestry development and further catalyse other income generation activities. The project was implemented in a block of 26 villages with the goal of achieving poverty alleviation through creation of self-help groups. The project also trained community-based organizations in participatory rural appraisal and further implemented agroforestry strategies in the farmers' lands. The research institute provided quality planting material, land-use plans and training to several hundred farmers. The non-governmental organization fine-tuned the income generating activities. The synergy of research institution and the non-governmental organization resulted in effective technology implementation by rural self-help groups. That can be replicated for blocks across the state and the country with appropriate modifications.

INTRODUCTION

The Earth Summit 1992 produced the United Nations Framework Convention on Climate Change (UNFCCC), Convention on Biological Diversity (CBD), the Agenda 21, non-legally binding authoritative statement of principles for global consensus on the management, conservation and sustainable development of all types of forests, as well as decision to embark on efforts to negotiate a convention to combat desertification. Many of these obligations can be put in practice only if interest of the community are incorporated with the overall protection of the environment. Much of the fringe areas of forests are surrounded by villages whose sustainability and livelihood are dependent on the forests. Very often, even the agricultural practices in the area are dependent on the water yield from the forests. Therefore, the vagaries of weather affect the farm yield and the pressure on the forests. Also, the landless and the poor exploit the forests, as they do not have any resource to depend on.

Therefore, the need for involving local people in managing the forests enable them to optimally utilize their farmland. Forest research institutions can provide inputs and facilitate extension services to optimize the objectives of poverty alleviation programmes on sustainable basis. The concept of sustainability, whether it is for forests or farm revolves around the following factors: (a) growth, (b) yield of marketable product, (c) financial yield, (d) profitability, (e) creation of value, (f) working capacity, and (g) infrastructure performance like water supply and protective functions. Only when these criteria are adequately addressed, the people will fulfill the obligations of managing and preserving forests with respect to environment. Keeping this in view, the Institute of Forest Genetics and Tree Breeding (IFGTB) applied the research technologies in a composite

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block around Coimbatore through participatory agroforestry systems addressing the issue of poverty alleviation so that environmental restoration can be stimulated. The work was carried out under the UNDP project by Shanti Ashram, a non-governmental organization and IFGTB. Various developmental activities were carried out in the Perur Block.

PROJECT SITE

Perur Block consists of four town panchayats and 26 villages, with a population of 120 000. The total area is around 10 000 ha of which the nett sown area is 25 percent. According to available statistics, more than 30 percent of the area falls under wasteland. Considering the availability of land for tree cropping and the technical expertise available locally, Shanti Ashram and IFGTB implemented participatory agroforestry for poverty alleviation and environmental restoration with UNDP support.

OBJECTIVES

The main objectives of the project were:

- Enhancement of capacity of the people of Perur Block and surrounding areas to carry out and support agroforestry and tree planting activities.
- Development of comprehensive village-level land-use plans and detailed implementation plans to guide agroforestry development, tree planting and improved land-use in Perur Block.
- Catalyse the agroforestry tree planting and market-oriented value-adding initiatives for farmers, farmwomen and villagers in Perur Block with technical inputs and supporting services.

EXPECTED OUTPUTS

- Establishment of work plans and implementation mechanisms
- Set up farmers' training centre to provide technical support and training
- Train 250 farmers and 250 farm women in agroforestry practices
- Constitute youth and women groups to promote and sustain agroforestry and environmental awareness
- Train and develop participatory rural appraisal and gender teams

ACTIVITIES

The activities designed for the project were:

- Gather gender-based data for land-use plans
- Develop land-use plans involving farmers and farm women
- Gather data on rainfall, temperature, soil characteristics, women workload, fuel, fodder and water availability for land-use plans and suitability maps
- Develop sustainability through market linkages in agroforestry produce
- Establish village nurseries and procure planting materials
- Conduct information dissemination workshops/seminars
- Assist villagers/community-based organizations with financial assistance from the local banks

WORK DONE

- Awareness creation on agroforestry, land-use planning and tree species preferred by the farmers were carried out through participatory rural appraisal technique, implemented in all the 26 villages.
- Enhancing the capacity of the people was achieved through the workshops conducted at Shanti Ashram, IFGTB and at the villages.
- Village land-use plans were prepared by collection of data on soils, rainfall and soil analysis and expert discussions in all the 26 villages with farmers on their existing agricultural and tree crops and other preferences.
- Dissemination of information on agroforestry was done through display of charts at prominent places in the villages, and pamphlets and posters distributed to the villagers.

- Seedlings raised by IFGTB were supplied by Shanti Ashram as per the requirements of the people.
- The farmers were taken to other model farms in neighbouring areas where agroforestry is being practised as exchange visits for on the spot study.
- The farmers were also given hands-on training on vermicompost making, grafting and propagation and raising of seedlings by IFGTB.
- The Ashram also utilized the services of 200 school children from over 10 schools in Perur Block (the Green Brigade). With necessary training in environment and agroforestry, their services were used to promote awareness in tree planting and environmental restoration.

To enable the farmers to establish nurseries to meet the seedling requirements, trainings was offered by IFGTB on nursery care and management and grafting techniques. The trainings was conducted in the institute so that the farmers could see the various stages of nursery management. They were given hands-on training on grafting and supplied with tools required for grafting. To identify site-specific trees, IFGTB collected soil samples in the 26 villages of the block for analysis. Based on the soil analysis, the farmers were given soil health cards indicating the nutritional status of the soils and the trees suited for each area. Apart from this, an expert from the State Department of Agriculture visited the 26 villages and held meetings with the villagers to discuss about the crops cultivated and the trees preferred by the villagers. For this purpose, 35 meetings were arranged in the villages attended by 1186 farmers.

Since the aim of the project was raising trees in wasteland to protect the environment, meetings were organized to create environmental awareness to the villagers. Apart from villagers, students selected from 10 schools in Perur Block, which formed the Green Brigade, were also exposed to agroforestry and tree planting. During the period of the project, 28 such meetings were organized benefiting 2091 villagers and school children. The Green Brigade planted trees specifically in schools and in houses and conducted environmental rallies.

The objective of preparation of village level land-use plans was achieved using Participatory Rural Appraisal technique. To start with, the field staff of Shanti Ashram and selected members of community-based organizations were given training in PRA. Three such trainings were organized involving 94 participants. These PRA teams visited all the 26 villages in Perur Block and carried out the exercises. In all, 1304 villagers, including women and youth, participated in the PRA exercises. In PRA exercise, the techniques of village mapping, seasonal calendar, matrix scoring, etc. were used to gather details on the land available for planting. The Institute of Forest Genetics and Tree Breeding, utilizing the soil, rainfall, temperature and other information, prepared the detailed land-use map for all the 26 villages.

To catalyse agroforestry with technical and supporting services, the Shanti Ashram with help of IFGTB prepared extension materials like posters, pamphlets, videos and charts and displayed them in prominent places in the villages for wider exposure. The members of the Green Brigade through songs and street plays during the Sarvodaya Fortnight, created awareness on agroforestry in the villages. With the help of the IFGTB, more than 80 000 quality seedlings were distributed to the farmers for planting. For wider exposure of the farmers on agroforestry, six tours were arranged to places of importance on agroforestry in Tamil Nadu, Kerala, Andhra Pradesh and Karntaka, benefited 295 farmers. IFGTB also arranged farmers exchange visits to nearby areas where farmers had already taken up agroforestry. To provide income during the gestation period, training in income generation activities were conducted on mushroom cultivation, bee keeping, fruit juice, jam and pickle making, paper bag making, and areca sheath plate making.

OUTPUTS

- Creation of well-equipped farmers' training centre
- Nine tree growers' associations with more than 250 members
- Well-trained PRA team
- Several hundred farmers and farm women trained in agroforestry

SUSTAINABILITY AND REPLICABILITY

In any development programme, the most important aspect is the sustainability of the project after withdrawal of implementing agencies. In the present project as regards the sustainability, the major issues expected were, supply of quality seedlings in the villages at a reasonable price, demonstration of agroforestry to willing farmers to take up tree planting and solving the problems of felling, transporting and marketing of the trees. This has been achieved in the project through the establishment of ten village level nurseries in panchayat common lands along with the development of infrastructure facilities like fencing, watering and implementation sheds.

The villagers trained in nursery care and management are expected to take up raising of tree seedlings in these nurseries to meet the local demand. Quality seedlings will be supplied at reasonable prices. To serve as demonstration units, ten model farms were established in Perur Block. These model farms have various combinations of tree crops that can be raised for optimal use of land to have a regular flow of incomes. These farms were established in individual holdings, provided with facilities like fencing and watering. The farmers maintain such model farms to help demonstrate to neighbouring farmers the need for taking up similar activities in their areas. To act as a link between the villagers and the officials, tree growers' associations have been established. These associations help in promoting agroforestry and help the farmers in felling, transporting and marketing of the trees. They will act as a link between the villagers and Department of Forestry and the commercial banks.

The participatory agroforestry project for poverty alleviation and environmental restoration in Perur Block has allowed for the creative partnership between the different stakeholders. It has given Perur a model where governmental and non-governmental agencies can collaborate in newer initiatives of poverty alleviation. The dimension of "technology transfer" has seen the coming together of a premier institute like the Institute of Forest Genetics and Tree Breeding, a network of community-based organizations across Perur with a rich experience of over a decade and Shanti Ashram. This model can provide a template for further replication across the state and indeed the country.

When large numbers of villages are involved, extending services to the scale required is a big challenge for IFGTB. In this approach, it was handled through Shanti Ashram and village – villager interactions. The network of voluntary trainers was created. The data analysis village-wise, farmer-wise, category-wise and land utilization and profitability require more refinement. Appropriate sociological software development is required to determine acceptable strategies, hesitancies (with warning flags) and market knowledge. Continuous value addition is essential to overcome low value trap. Wiring up of villages is important but no proper methodology is available for demand forecasting. This is important to move the people out and away from the forests. More efficient farm management is the key to ensure social fencing of the forests.

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13 Forestry for poverty alleviation – the fourth generation paradigm

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ABSTRACT

The paper distinguishes the radical shifts of forestry in its objectives and concepts as generations. Four generations are recognized. They are Forestry for Conservation, Forestry for Economic Development, Forestry with People and Forestry for People, respectively. The current generation is the fourth one. The results and experiences of the past three generations are briefly narrated. The First Generation 'Forestry for Conservation' led to the consolidation and appropriation of forests to state ownership. The alienation of rural people from forest access began. The Second Generation 'Forestry for Economic Development' emerged at states' interest to generate income from forests. It had experimented with different silvicultural systems. This generation had ended with the loss of forest capital and biodiversity. 'Forestry with People' is the third generation. It had recognized the indispensability of the support of rural people for the restoration of degraded forests. Social Forestry Project was implemented with the objectives of meeting the forest requirements of rural people. It advocated participation and joint venture in forestry. The people whose participation is sought for a joint venture are poverty prone. Now, the concern of foresters extended beyond forests to poverty alleviation of people at the forest interface. 'Forestry for People' is the fourth generation. The characteristics of Indian poverty in general and rural poverty in particular are spelt in order to show the dimension of the problem. The paper calls for radical transformation of socio-economics and integration of forestry in the rural life in order to establish a composite system in theory and practice. The systems approach as suggested therein is recommended as the way to alleviate the problem of rural poverty.

INTRODUCTION

Forestry in India is more than 150 years old. During this long span of practice, forestry experienced radical changes and transformations with the changing socio-economic scenarios. At every changing scenario, forestry had to regenerate itself to suit the new paradigms that emerged along with the change. The planks on which forestry is placed and the focus, with which forestry is concerned mark the distinctions between generations. Forests and villages are the two principal planks, and forests and people are the two principal focuses. Together they recognize four generations (Table 1).

Table 1. Four generations in Indian forestry

Hierarchy \ Focus on	Forests	People
Forests	Generation I	Generation II
Village	Generation III	Generation IV

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Looking back at the changing situations from the inception of scientific forestry under the British, three generations have been born. To day forestry is at the doorstep of the Fourth Generation. There are three players who constitute the paradigm of forestry; they are the state, forest department and people. The state functions as the stipulator of policies, forest department as provider of technology and the people as recipients of the benefits. In all the generations forests are at stake. Therefore the survival of the forests depends on how well the players are prepared or qualified to play effectively. The impacts on forests from the past three generations are recalled in order to prepare us for safeguarding the interests of forests in the fourth generation.

GENERATION I

'Consolidation of Forests' was the First Generation Forestry. Borrowed from British it began in the later half of the nineteenth century. It was pursued chiefly to consolidate the existing forests and then to appropriate them into the ownership of state. In the process, forests were protected from the access by rural people. In order to sustain the state ownership of the forests a system was set in motion. Accordingly the forest department was established, and forest policies were enunciated with the enactment of forest statutes. The process was justified stating that the forests were to be conserved for safeguarding the environment. Forestry of the first generation built up its expertise in consolidation and protection of forests from people. Forests referred to in village revenue records were notified and brought under the state ownership through forest acts. Reserved forests were delineated into sections and beats as protection units and placed under the responsibility of exclusive uniformed personnel of the state. Forest laws enacted with punitive provisions dealt with those indulging in anti-forestry activities.

The intention of the First Generation, namely consolidation of forests and appropriation to the ownership of state, was virtually achieved. The extent consolidated as reserved forests in this manner at national level was about 22 percent. People at the forest interface were alienated from forest use for the first time in history.

GENERATION II

'Forests for Economic Development' was the Second Generation Forestry. It emerged at the instance of the states' interest to generate new income for the government and to increase aggregate income of the country through supply of timber, fuelwood and other forms of wood and non-wood forest produce for the development of industry-based and allied business activities. Forest department was geared up for this new generation. Forests which were deemed in the first generation forestry as the protector of environment and hence a resource to be conserved were now treated as resources of material harvest. Forest colleges and research institutions provided the technology for the harvest. The term scientific forestry was introduced. The knowledge on forestry was chiefly on harvest systems in different forest formations. This generation had experimented with different silvicultural systems for the sustenance of material production and development of forest produces.

Eventually two sets of activities emerged, harvest systems and plantation systems. Both systems were of European origin but tested in Indian forests. 'Selection' and 'clear-felling followed by plantation' systems were adopted for harvest of timber and allied wood forms. 'Clear-felling with coppice regeneration' or 'clear-felling followed by plantation' systems were adopted for harvest of fuelwood and small timber. While wet evergreen forests and in certain cases moist deciduous forests were subjected to selection system, dry deciduous, dry thorn and dry evergreen forests were subjected to 'clear-felling with coppice regeneration' system.

Enormous quantities of timber, fuelwood, bamboo and many kinds of non-wood usufructs were harvested from forests. Economic benefits accrued and it helped to increase the State's income and the aggregate income of the economy. Concurrently new markets for these produces came into existence and new kinds of utilization of forest produces were invented. A new genre of forest contractors was born who mattered much in the making of forest policies, forestry technology and produce markets.

The 'clear-felling systems with coppice regeneration' was not suited to the forests where it was tested. Cox (1920) had forewarned the danger of adopting the clear felling system of harvest stating that the system designed for the oak forests of Europe was not suited to Indian conditions. Nevertheless the system was continued for a long period. As a result the forests underwent serious degradation, terms of forest structure, green cover, biodiversity, density and productivity.

The system of 'economic plantations' did not yield the expected economic benefits. It had met with success only partially. Plantations raised with teak and eucalyptus species alone were available for harvest at their rotations and others were not. The primary cause of failure was the lack of organization to manage the newly created plantations. Wherever new organizations in the form of corporations were constituted plantations yielded benefits to the economy. The earlier organization (forest department) that was meant for

First Generation Forestry had least applied to the production forestry of the Second Generation. While economic benefits from forest plantations were not forthcoming for want of organization, wood harvest from natural forests had ended in forest degradation due to inappropriate technology. The economic benefits that accrued from this generation did not flow to the interface people. Benefits least trickled down to reach them. Once again the interface people were alienated from forests and forest uses.

The sum total of the end-results of the past two generations was that vast stretches of forests had become degraded. The estimated figure of degraded forests in Tamil Nadu State was about 7000 km^2. It accounted for 41.86 percent over the area of the allocated forest types and 30.84 percent over the area of the forests of the State.

Forestry was now concerned with repairing the damage done to forests. The authority had initiated measures to restore the degraded forests. Firstly, ban on felling of natural forests for harvest of materials was imposed as a state policy in 1975. The ban was contemplated under the assumption that forests were resilient, hence would revert back to their original composition and structure if given rest from disturbance. Secondly, restoration was attempted on degraded forest areas through artificial regeneration under 'afforestation' schemes. This too did not achieve its objectives.

The alienated interface people had continued to remove from forest growth whatever that emerged, graze their white cattle and goats, set fires thereby giving no chance to the renewing ability of the forests. The newly created forest market during the Second Generation provided an enlarged demand for forest produces. When the Second Generation was called off, the institutions emerged under the generation should have become defunct but it did not happen. It not only continued to survive but became functionally more active. The impact was on forests. Eventually the expected resurrection did not take place and forests deteriorated further.

GENERATION III

Under the circumstances the realization came that restoration of forests was feasible only in association with the people. Therefore restoration of forests was planned with the cooperation of people. Forestry with the People was the Third Generation Forestry. For the first time the process to reverse alienation of interface people was seriously contemplated, but the focus still remained on the forests. In accordance with this new concept many new but radically different strategies were devised to enlist people's cooperation and participation. The strategies were contemplated under the assumptions that people resorted to theft for want of wood and non-wood requirements. Hence by providing forest resources close to villages the needs of the people could be met, which in turn would desist people from going to forests. People who had resorted to smuggling of forest goods were unemployed poor, hence by providing employment and thereby a source of income, it would end forest theft. In accordance to these premises Social Forestry Project was conceived and implemented.

New organization within the parent forest department was brought in to implement this new generation of forestry. Village wastelands in the category of village commons were utilized for raising wood lots. In Tamil Nadu State tank foreshores had accounted for an extent as large as 270 000 ha for raising Karuvel (*Acacia nilotica*) plantations. These plantations were subjected to 'clear-felling with coppice regeneration' system with 10-year felling cycles. The project was in operation for over 15 years commencing from 1981.

The contribution of the project to the state was very significant in respect of wood production, revenue generation and employment opportunities. Wood production in the form of fuelwood and small timber was in the order of 24.75 million tonnes The revenue generated from corresponding harvest of plantations was about Rs 1165 million. The revenue was shared equally between government and the *Panchayat*, the democratically elected village body. Free technology was provided to encourage tree cultivation in private holdings with commercial timber species. Many new policies were stipulated in support of the project.

The results were at great variance to the objectives. The materials particularly fuelwood and small timber were moved away from villages to cater to the demands elsewhere. The paradigm created in the Second Generation subverted the benefits of the Social Forestry to its advantage. In other words the recipients of materials produced and the revenue generated thereon were not the rural poor for whose sake the Social Forestry Project was conceived but the urban non-poor. The portion of revenue placed at the hands of village body was not duly channelled to benefit the poor. The opportunities of employment that were provided by the project were temporary.

In the implementation of Social Forestry Project the government insisted on the policy of handing over the woodlots for the ultimate management by the *Panchayat*. The policy did not spell out details of the management system. Rules and regulations in the management of woodlots were not laid. Eventually when the control of social forestry plantations was handed over to *Panchayats* it was done without any proper definition of authority either to exclude out-group members or to regulate the behaviour of in-group members who had participated in the project. Hence such handing over of authority invariably ended in failure. In pursuance of the policy, the newly created social forestry wing of the forest department gradually dissipated. Under these circumstances the Third Generation Forestry with People did not take off.

GENERATION IV

Close on the heels of the Social Forestry Project, new schemes such as Interface Forestry and currently the Tamil Nadu Afforestation Project were launched. These new schemes addressed the interface people directly seeking cooperation and participation for the restoration of degraded forests of the state. The scope of ascertaining the cooperation and participation of interface people was widened with an offer of forests cooperation and participation for the welfare of rural people. In other words mutual cooperation and participation were contemplated for addressing the problems of the others. Forest department is advocating joint ventures.

The people whose participation is sought for a joint venture are poverty prone. Now concern for forestry cannot go to forests alone and it has to extend to the people of the forest interface. The first priority concern of the rural people is poverty. This is a new arena, and foresters have neither the understanding nor the skills to manage problems of rural poverty.

FORESTRY FOR POVERTY ALLEVIATION

There are two types of poverty, one that is inherited due to social distinctions and the other acquired from the development policies followed over the years. The former is concentrated in the rural areas and the latter in urban areas. Forestry of the Fourth Generation places the forest resources at stake for alleviating rural poverty. It lays its hope on the assumptions that constitute the two elemental strategy of poverty alleviation. The first element of the strategy is generation employment. Forestry by the nature of technology is labour intensive (nearly 70 percent of investment goes towards labour). It is equally intensive in both harvest systems and plantation systems. Labour is employed in very large numbers and at many stages of operation of the system. Establishment of 1 ha of plantation generates 200–250 man-days of labour per year. The second element of the stated strategy is to provide basic economic and social services. Forestry of the Fourth Generation looks further ahead and adds a third element to the strategy. It is to augment the productive capacity of forests and lands at the forest interface.

Primarily the life style of rural population is agricultural occupation. Forests are the biological resources situated in the neighbourhood of rural settings. The material wealth of forests is accounted in the form of fodder, manure, timber, fuelwood, medicines and in times of scarcity food as well. These materials satisfied the household and occupational requirements of rural people. Thereby, historically a cultural linkage has evolved between rural people and forests of the neighbourhood. Rights for the forest produce from the neighbourhood forests have turned out to be a tradition. The tradition was extinguished during the First Generation Forestry. The rural people lost their viable source of materials required for their livelihood. The Fourth Generation Forestry would reassert the mutual and holistic dependence between forests and people. In short it is the revival of the age- old healthy tradition.

Next, this Fourth Generation would generate employment by undertaking series of labour-intensive activities both in the forests and the interface villages. The activities include afforestation, water harvest and soil conservation works. The employment would facilitate money flow to the poor. The water harvest and soil conservation measures would augment the ground water resources at the interface villages. A syndrome effect is foreseen; restoration of forests back to nature would ameliorate the climate for better life, the augmentation of water resources would lead to change in land-use pattern of the village for better utilization; increased source of income to the otherwise marginal land holders; agricultural sector would provide new employment opportunities etc, etc. Ultimately an economic process would set in towards its logical end namely the removal of poverty from the rural scene. Optimism in deed!

THE PARADIGM

Rural social life is ridden with class conflicts. There is an ethics that prevails in rural society, which stipulates ‘what class of people to what kind of employment’. It makes an ethnic divide among rural population, which is far more superior to any kind of structural change mooted towards poverty removal. No institution exists to redress the class conflicts and ethnic divide. *Panchayat* is the only institution legally established but it is a political institution hence irrelevant for effecting socio-economic process in favor of development.

Rural economic life is in a land trap. People who once got into agriculture as an occupation could neither live in it nor could leave out of it. Any kind of improvement in land use is of little significance. Benefits of increased production or productivity from improved land use or technology are appropriated by the prevailing market mechanism, which works to the benefit of urban rich. The same entrapment would hold good for the forest produces generated from forests, community lands or private holdings as well.

The target people are not a motivated lot for freeing themselves from poverty. Their enrollment to employment is not an occupation but a lifestyle. There is a cultural link to this attitude. The motivated lot if any, looks at urban life and migrates. The migrating section of the population is educated or professionally qualified and skilled. It seeks employment from manufacturing and service sector in the urban market. This is a drain on human resources from rural to urban areas, very akin to the drain from the country. The people who stay back in villages are those in land trap, less resourced folks and the unmotivated fatalists.

The assumption that labour employment would alleviate people from poverty is not tenable because the kind of employment would only provide at best a day-to-day escape from poverty but not permanently. Further it is a temporary phenomenon, not sustainable.

Under the prevailing rural characteristics placing forests at stakes for alleviating rural poverty could be a misplaced objective. It is like betting on the proven lame horse.

CONCLUSIONS

- The feasibility of freeing rural people from poverty trap probably lies in consolidating all resources of villages, which includes forests as well, into a composite. Village with its composite resources has to be made into an estate and treated as multi-product enterprise. The economy of the village estate has to be deemed as the country but in microform.
- Rural compatible and friendly technology, transfer of not only the technology but also human resource to village has to be institutionalized.
- Migration of human resources from villages has to be monitored and such migrated human resources should be subjected to certain specified commitments to parent villages.
- The norms of production and pricing between manufacturing and primary sectors have to be universalized.
- Budgetary exercises should address material production and distribution as well and the exercises should start from village estate to national level.
- The organization of forest department needs to be reconstituted with establishment of watershed-based village units at the base level, in place of sections and beats and the hierarchy built there upon.
- Studies have shown that resurrection of forests is highly correlated to the intensity of monitoring composed to the technological input. Therefore, in order to intensify the field monitoring, the system that prevailed during the First and Second Generation Forestry should be made a mandatory function for all the cadres of the forest department.
- All cadres of forest department need to be transformed from police to sociological mindset. Forest education and research institutes have to impart this transformation to the foresters' genre. Socio-economic and anthropological subjects may have to dominate the forestry curricula.
- Forest policy shall explicitly stipulate the mutual rights and duties between forests and the people. Similarly forest policy on utilization of forest-based produces has to be stipulated. The policies have to be incorporated under appropriate laws made specifically for the purpose.
- Forestry of this paradigm is socially and economically interlinked with people. Therefore it is politically relevant that forest portfolio is always placed under stewardship of the chief minister of the state or prime minister of the country as the case may be.

Poverty is now an integral part of rural economy. Rural economy is in shambles because of the poverty entrapment. Until the rural economy is freed from the trap, staking forest resources to poverty alleviation is a serious risk. We need a kind of forestry that is capital-safe and at the same time people-supportive.

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14 Forest and poverty: a survey study

K.D. Singh*

ABSTRACT

The paper aims to develop a methodology for a survey and study of relationship between forests and forest dwellers using the Adilabad district of Andhra Pradesh, India, as an example. The first part describes the research on establishing an integrated information system for such studies by geo-referencing forest cover, forest reserve and census village data. This is followed by a detailed analysis of spatial correlations in the distribution of tribal and non-tribal populations and their occupational patterns as a function of distance from the forest. Dynamic changes in the population during 1961–1991 and the resulting process of deforestation are presented with a view to illustrate the need for livelihoods in the face of increasing population in a subsistence economy. Finally, implications of findings for tribal development are discussed and conclusions drawn with a view to promote a location-specific (bottom up) approach to planning in the tribal regions.

INTRODUCTION

The highest concentration of the biological diversity occurs in the remaining natural forest and geographically inaccessible parts of the country. These are also the areas with highest concentration of the tribal population, who live in social and geographic isolation and partly survive on subsistence agriculture (both shifting and permanent) and partly on a range of products gathered from forests with very little processing and manufacturing activities. Thus, these people are among the poorest of the poor and most vulnerable of the vulnerable to natural calamities.

It is generally believed that the tribal people have lived in harmony with nature and customarily protect forests for their well being and to a vast number of them, forests are their well loved home, their livelihood, their very existence (Dhebar Commission Report 1961, p.125). The symbiotic relationship between forest and tribal people is well known and reported. They regard various species of forest as their kith and kin (Totems). Stephen Fuchs mentioned about the prevalence of 150 varieties of animals and 87 species of plants as totems by Mundas of Chota Nagpur in Bihar (Fuchs 1973). A recent study by the Forest Survey of India using multi-date satellite data shows (1997), however, a high rate of on-going deforestation in most of the tribal districts numbering about 150. The two observations *viz.* deforestation and tribal attachment to forest's, are difficult to reconcile. There must be some fundamental change in the region, which is giving rise to such improbable developments.

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OBJECTIVES

With the above background in mind, I tested the following hypotheses:

- Geography and ecology are major determinants of the life style and economic development in the tribal areas, resembling a land locked state.
- Deforestation is arising from the need for more subsistence agriculture land to feed the growing population in an ecologically fragile and land-locked region. This vicious cycle needs to be broken to achieve sustainable development.

MATERIAL AND METHODS

Adilabad Revenue Division, containing 325 villages of the Adilabad district, was chosen for the study. The division forms a part of the Tribal Sub-plan Districts and is reported to have poverty head count ratio of 50 percent unchanged since 1980. The area was intensively surveyed during 1970s by Pre-investment Survey of Forest resources, GOI, and again in 1996 by World Bank assisted Andhra Pradesh Forestry Development Project. The variables included in the research are:

Spatial (i.e. Map) data
- ecological zones (based on climate)
- topography
- reserve forest boundaries
- village boundaries
- road and railway network
- location of cities and urban centers
- multi-date satellite TM data for the study area

Attribute data (*viz*. Statistical tables: single date or time series) mostly from Census of India 1961–1991 at village level, which provide comprehensive information on ethnic composition, literacy, vocation and many other variables.

Data sources: The village level map was taken from National Census Report 1991; the control points from topographic map of the Survey of India, Dehradun and digital data like roads and cities taken from FAO Global Forest Resources Assessment 1990 GIS Archive. The Forest Cover Map was derived from Forest Survey of India.

GIS Procedure: The layers for reserve forests, blocks and villages were transformed from hard copy into digital format and geo-referenced. The following procedure was used:

- The borders of the different themes (forest reserves, villages, etc.) were drawn on an acetate with a 0.2 mm pen. At least four tic marks were drawn on the acetate and their ID and coordinates reported in a file.txt.
- The polygons drawn on the acetate were scanned at 200 dpi, black and white and saved as compressed .tif file.
- The files .tif were imported into Arc/Info GIS and vectorized. For corresponding tic marks, tic points were added.
- The cover was then edited to clean all the superfluous arcs. All the needed corrections were done.
- To geo-reference the map, a cover of just tics was created and projected. The cover with the polygons was “transformed” on the tics cover earlier projected.
- The polygon labels were added and coded.

Statistical analysis: A correlation analysis was performed using “proportion of tribal to total population in a village” (termed p**)** as the dependent variable and **“**other village characteristics (like altitude, distance from road, etc.)” as independent variables. In addition, a time series of demography and socio-economic data was compiled for tracing the increase of demand for more agriculture land on a per capita basis. To study the land use and forest changes, a special technique was used called interdependent image interpretation (FAO 1995).

MAJOR FINDINGS

Methodology of data integration

The study found that census maps in themselves do not provide an adequate basis for geo-referencing village maps. However, it is feasible to create a reliable village level GIS by supplementing Census village maps with control points extracted from Survey of India Maps. Other existing GIS data could also be integrated, as listed earlier, which enhance the value of village level GIS. It is hoped that the methodology of establishing village level GIS would be of wider interest in India and that National Census would consider using the approach to prepare a nationwide village level GIS database for the whole country. This will support planning of a bottom up strategy for tribal and rural development.

Correlation among village parameters

"Proportion of tribal to total population in a village" (termed p) was correlated with other village variables (see Table 2). Correlation analysis identifies key determinants of spatial distribution of tribal population: altitude, distance from road and city centers. The location on a higher altitude implies greater risks of land degradation and increased needs for soil and water conservation measures. These handicaps are over and above poor health and literacy cited earlier in Table 1. Progressive increase of distance from the market as well the nearest road means that tribal people have to spend systematically more of their energy and time than others in both selling their produce to and obtaining inputs from the market. Tribal cultivators, especially on the forest fringe, are among the poorest section of marginal farmers living under poverty line as shown in Table 1.

Table 1 shows that p is negatively correlated with distance from forest**,** in other words, tribal population tends to be located in forest proximity; a higher p is also associated with increasing altitude and distance from roads and city centers. Finally, the tribal population has negative correlation with total population meaning that the proportion of tribal declines as total population increases.

Table 1. Correlation among village characteristics

Village variables	Correlation with proportion of tribal population in a village
Distance from forest	-0.55
Village altitude	+0.47
Distance from road	+0.21
Distance from city	+0.46
Total population	-0.36
Vocation as cultivators	-0.39
Manufacturing vocation	-0.23
Non-workers	-0.57

Note: Villages with no population have been excluded to avoid division by zero.

Social stratification

Among the geographic variables, distance from forest was most significant. Therefore, data was tabulated by distance of villages from forest in three classes as given in the first column of Table 2.

Table 2. Characteristics of villages at varying distances from forest reserve

Forest distance class	Number of villages	Population density No/km^2	Ratio of tribal to total population (p)	Altitude (m)	Distance from road (km)	Distance from city (km)
< 1 km	122	74	78	418	3.3	8.3
1–5 km	145	135	56	372	2.6	5.7
5 km +	98	195	30	249	2.1	4.9

Source: Census of India, 1991.

Occupational pattern in village groups

To study land use and occupational pattern of tribal and non-tribal population, villages were reclassified in two ethnic categories: 1) dominantly tribal, if the proportion of tribal to total population (p) was more than 0.5; and 2) non-tribal if the proportion was less than 0.5, both with reference to census in 1961. Statistics on the occupational pattern in the two categories of villages by forest distance class is given in Table 3.

Table 3. Occupational pattern in villages by forest distance and ethnic classes

Type of village	Forest distance class	Number of villages	Village size (ha)	Population		Occupational pattern		
				Total	Tribal	Cultivators	Manufacturing	Non-workers
Non-tribal								
p < 0.5	1	33	1006	911	359	386	21	444
	2	91	752	1328	235	504	58	674
	3	79	614	1058	71	413	26	554
	All	203	740	1155	192	450	40	590
Tribal								
p > 0.5	1	89	776	396	328	192	3	185
	2	54	542	363	282	175	3	172
	3	5	512	420	284	201	4	202
	All	148	682	385	310	186	3	181

Source: Census of India, 1991 and 1961.

The following conclusions are drawn:

- Cultivation is the major source of livelihood. This is marginal in nature being upland with small farm sizes and low level of inputs. The handicap, caused by ecology and geography in the form of higher off-road and on-road costs increase as p increases.
- Manufacturing is the least important sector in tribal villages irrespective of the distance class. The average is 3 per village compared to 40 in the case of non-tribal villages.
- Non-workers are almost the same size as workers. They mostly live on seasonal jobs and forest gathering for their survival.

Forest dependence

Hours spent to various livelihood activities are a good indication of their livelihood means. The following data were taken from an intensive survey done in a development block of Orissa with dominantly tribal population. It may be noted that forests are the sole supplier of subsistence during January to March every year extending occasionally till May.

Table 4. Time spent on various livelihood activities by Kutia Kandha Tribes in Orissa

Activities/year	Total hours	% share	Days spent	Survey particulars
Wet Cultivation	374	12.8	47	Total HH :1025 (1990)
Shifting cultivation	590	20.2	74	Population: 4090
Wage earning	144	4.9	18	Size: 3.89 persons/HH
Forest Collection	928	31.8	116	Literacy : 2.9% in 1980
Others	544	18.6	68	: 7.92% in 1990
No work	340	11.7	42	Schedule tribes: 87.97%
Total	2920	100.0	365	

Source: Kutia Kandha Tribes of Tumudibandh Block Phulbani District of Orissa, 1998.

Dynamic changes in village population

A comparison of population in 1991 with 1961 shows that during the 30 years total population in non-tribal villages multiplied by 1.7, but in tribal villages by 2.3. However, tribal population in non-tribal villages grew by 2.2 times and in the tribal villages by 2.1 times. This finding is strange, but could be explained by the fact that some of the growth in tribal population is due to reclassification of non-tribal into tribal to get privileges intended for the latter and partly due to their migration into tribal villages to own land by illegal means.

Table 5. Population growth in villages, non-tribal and tribal, during 1961–91

Type of village	Forest distance class	Demographic development of village by decade and forest distance class							
		1961		1971		1981		1991	
		Tribal	Total	Tribal	Total	Tribal	Total	Tribal	Total
Non-	1	114	444	134	591	254	744	353	911
Tribal	2	105	802	117	985	178	1091	231	1328
	3	40	608	48	737	50	853	68	1058
	All	81	668	93	825	141	942	188	1155
Tribal	1	132	160	172	251	213	314	324	396
	2	156	183	174	236	240	301	276	363
	3	189	256	216	332	284	431	278	420
	All	142	172	174	248	225	313	305	385

Source: Census of India from years 1961, 1971, 1981 and 1991.

Deforestation trends and path of land use changes

Using the method described earlier, the following change matrix was obtained for the district.

Table 6. Land and forest cover change assessment in Adilabad district of Andhra Pradesh

Forest cover classes in 1988 image	Forest cover classes in 1994 image									Total historical image	
		Open forest	Long fallow	Fragmented forest	Shrubs	Short fallow	Other land cover	Water	Plantation	'000 ha	%
Closed forest		7.0			0.5		5.1			12.6	*30.6*
Open forest	0.1				3.3	0.2	6.9			10.5	*25.5*
Long fallow											
Fragmented forest											
Shrubs	0.1	0.1					15.7		0.1	16.0	*38.8*
Short fallow											
Other land cover	0.1								0.1	*0.2*	
Water					0.8		0.5			1.3	*3.2*
Plantation	0.3					0.4				0.7	*1.7*
TOTAL '000 ha	0.6	7.1			4.6	0.2	28.6		0.1	41.2	
recent image %	*1.5*	*17.2*			*11.2*	*0.5*	*69.4*		*0.2*		*100.0*

According to this study, the forest area of Adilabad district in 1994 was 649 600 ha and had declined by 29 400 ha during 1988–94 *viz*. by 7350 hay^{-1} (at the annual rate of -1.13 percent). As forests constitute major source of livelihood of the tribal people, progressive deforestation means their progressive impoverishment.

The last row in Table 6 shows that 69.7 percent of changes involve a transfer of land to other land cover (*viz*. agriculture). The other changes involve transformations like transfer of closed forests into open forests to shrubs, which could be termed as land degradation. The deforested and degraded lands, especially in hilly terrain, are prone to soil erosion unless proper control measures are taken to arrest it. Continuing subsistence and shifting agriculture result in reduction of yield per unit area and eventual loss of land for cultivation purposes.

If it is so happening, then what is the incentive for deforestation and whom does it serve and whom does it hurt? Continued overuse of forests also results in deforestation when all trees have been used up. The two result in less and less availability of forest produce to the local population, in absolute terms and much less in per capita terms. Worst hit are the non-workers (i.e. landless) within the tribal community.

DISCUSSION

The demographic expansion in villages in all forest distance classes, with increase of non-working population combined with decrease of forest area and land degradation must be adding to economic hardships of the forest dependent population in general. Forest Survey of India (1997) reports that deforestation is on-going in most of tribal districts of the country. This, in particular, is disturbing because the same report states: "Forests have played a key role in the tribal economy and have been a source of subsistence and livelihood to them. It is a common belief that tribals have lived in harmony with nature and customarily protected forests for their well being". Has some thing basic changed in the life and belief of the tribal people and why?

Agriculture, as practised today, contributes mainly to subsistence without securing a sustainable growth in economy to absorb the need of rising population. Investments in agriculture are not paying because the terrain is inhospitable and soils not suitable for getting high yielding crops without irrigation and fertilizer inputs. Even if they mange to produce enough, they do not have competitive advantage in marketing due to cost of transport off- and on-road. Agriculture will thus remain a source of auto-consumption only. On the other hand, financial incentive to agriculture motivates tribal people to cut down forest and engage in agriculture, even if it is not sustainable.

The agriculture production in the study area is also subject to uncertainty because of droughts, which occur every 2–3 years, when water becomes scarce even for drinking. There is urgent need to adopt water conservation and appropriate cropping practices to regulate the water supply. The impact of subsistence farming including shifting cultivation on the down stream water supply is not well known.

The productivity of agriculture outside the study area is continuously rising because of commercialization, use of relatively high level of inputs and better cropping practices. To give an example, during 1964–95 on an All-India basis, the area under wheat rose 1.6 times, total production 4.8 times and yield per ha 14 times. The increase of production is creating marketing problems and government has to intervene to support minimum prices to farmers through a procurement drive.

Instead of subsistence agriculture, the people could be provided food under the "food for work programme" of the government of India. This will take away the need for subsistence agriculture in the area and replace the same by a land use, which has competitive advantage and enables value addition and enhances the income and employment opportunities. This would, however, require techno-economic studies and land evaluation which will identify and promote ecologically as well as economically sustainable land use, keeping in view developments in side as well as out side the area. Such a change may be difficult to achieve in the existing administrative system run on departmental lines; but they have important bearing on the long-term economic development of the people in the area and need to be implemented to break the vicious cycle of incorrect land use and poverty.

The tribal people of Andhra Pradesh live in areas, which are geographically inaccessible and ecologically very fragile. Any strategy for their sustainable development must take into account these two constraints. In these areas, focus should be on building of forest assets owned by community and promotion of harvesting, processing and marketing of wood and non-wood products by the community. The greening of the deforested and degraded landscapes will result not only in sustainable development of the tribal people, but also result in direct benefits down-stream people through improvement in agricultural production due to improved soil and water conservation up-streams.

The Working Group of Tribal Development (1978–1983) recommended that tribal development and forestry development should become two integrated goals and meet the basic needs of tribal economy should be provided on priority basis in all forest schemes.

Forest products in the country have easy market outlet and are selling at relatively high prices. Many of the non-timber products have even an international market. India is exporting presently about 100 million dollars worth of non-timber forest products. A strategic question is: can the production, collection, processing and marketing of timber and non-timber products be organized which provides the tribal and non-tribal people, living in relatively inaccessible regions, a major source of income and employment, pride and power?

In the whole chain of processing and value addition, the share of primary production, which tribal people get, is a very small fraction. The idea should be to engineer a development alternative, which has comparative advantage and is sustainable in view of the local geography, ecology and social realities of the site in relation to the outside world.

CONCLUSIONS

With special reference to the area studied, the following facts have been observed which may help to solve the above puzzles:

- Geography is a major limiting factor, which makes buying inputs from market and selling outputs to it more expensive and adds to problems created by ecological factors.
- Ecology does play a key role in constraining the land use options available to the people. The land is marginal in nature and can support subsistence agriculture and does not provide a basis for agricultural self-reliance.
- The tribal population has more than doubled in the last 40 years, increasing the pressure on land, both under forests as well as agriculture. Non-working populations pose a serious social problem.

- There has been significant influx of non-tribal population in the tribal areas, which adds to existing pressure on forest and agriculture lands.
- The agriculture production outside the tribal lands, compared to the 1960 level, has increased four folds due to continuing R&D, availability of inputs and Government support to production in form of subsidized fertilizer, irrigation, etc; and price support to keep agriculture prices from falling.
- Land use incentives (in particular for agriculture) may be serving cross-purposes and providing incentives for deforestation and non-sustainable use of land and hurting the interest of forest gatherers, who survive on forests.
- Manufacturing is not well developed in tribal villages, in spite of the fact that it could add value to primary production, open opportunities for income and employment, and especially when forest resources are at hand, not available in non-tribal areas.
- A two-way exchange of goods and services in the form of agriculture from non-tribal villages and value added forest products from tribal villages seems to make ecological as well as economic sense. This, however, requires a system view of development, which transcends narrow departmentalized considerations.

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ANNEX 1

SOME STATISTICS ON KUTIA KANDHA TRIBES OF TUMUDIBANDH BLOCK PHULBANI DISTRICT OF ORISSA

Activities/year	**Total hours**	**% Share**	**Days spent**	
Wet Cultivation	374	12.8	47	Total HH :1025 (1990)
Shifting cultivation	590	20.2	74	Population : 4090
Wage earning	144	4.9	18	Size: 3.89 person/HH
Forest Collection	928	31.8	116	Literacy : 2.9% in 1980
Others	544	18.6	68	: 7.92% in 1990
No work	340	11.7	42	Scheduled tribes: 87.97%
Total	2920	100.0	365	Distribution of holdings
House hold observed	108	**Villages**	70	No land 23 (21%)
Land types (ha)		Area cultivated/HH		< 1 ha 54 (51%)
Total		2.011		1–2 ha 26 (24%)
Lowland		0.411		2 ha +5 (5%)
Mid/highland		0.474		All 108 (100%)
Hill slopes		1.126		
Source		**Income per HH (Rs/year)**		Forests sole supplier if
Agriculture		3024		subsistence during Jan to
Other (Non-forest)		821		March every year extending
Total		3845		till May
Total expenditure/HH		Rs. 4367		**Imbalance** =
Consumption including		3884		3845-4367= -522
food, clothing, wine		(2277,467,566,269)		
tobacco, festivities, etc.				
Cost of Cultivation		452		
Crops	**Area /HH**	**Yield(Q)/HH**	**Value /HH**	**Cost /HH**
Paddy	0.411	5.6	784	121
Ragi	0.333	2.9	580	74
Maize	0.141	1.5	300	32
Vegetable		0.5	100	
Pulses	1.126	0.7	420	225
Oilseed		1.2	840	
Total	2.011		3024	452
Crop (foothills)		**Yield (Quintals/ha)**		**Cost per ha**
Paddy		13.6 (Range13.4–15.5)		294
Ragi		10.0 (Range 6.7–12.4)		222
Maize		10.3 (Range 7.5–11.1)		227
Crops on hill slopes		12.1		200

(HH = household)

15 Relative socio-economic and human development profile of scheduled tribes in India

Abusaleh Shariff*, Prabir K. Ghosh* and Abhilasha Sharma*

ABSTRACT

The central and state governments and planners have formulated and implemented various policies aiming at raising the social and economic conditions of the communities such as the Scheduled Castes (SCs) and Scheduled Tribes (STs) who had remained traditionally backward for historical reasons. Few comprehensive studies based on primary data collected with the specific purpose of assessing the social and economic conditions of the SCs and STs have, thus far, been undertaken. The present study attempts an analysis of the household level data collected by the National Council of Applied Economic Research (NCAER) in its Human Development Indicator survey from a sample of 33 230 rural households – 7943 belonging to the SCs and 4220 belonging to the STs, to assess their level of development. The results of the study show that the number of STs has grown at a faster rate than others, increasing their share in total population over the decades. Among the major states in India, Madhya Pradesh has the highest percentage (23.3 percent) of ST population. Other states where the proportion of ST population is higher are Orissa (22.2 percent), Gujarat (14.9 percent) and Rajasthan (12.4 percent). Every alternate person belonging to SCs and STs is poor while every third person not belonging to SCs and STs is poor. Higher incidence and intensity of poverty between SCs and STs is perhaps a consequence of lower access to productive assets. Keeping in view the proportion of STs in rural population, proportion of landless households among them is quite high. However, there has been a decrease in the incidence of landlessness between STs. Regarding the availability of amenities STs are in much better position than SC population. As regards to the development of education STs clearly are not the better performers if the output parameters like literacy rate, ever enrolment rate, discontinuation rate and percentage of population (aged 15+ years) completing middle level are considered. Interstate variation in literacy between both STs and SCs as measured by coefficient of variation also shows a decreasing trend over time. This means that the backward castes are improving at a faster rate. On coming to some of the health and demography-related parameters, STs are better off than SCs as well as total population as far as major morbidity rates are concerned. Crude birth rate and total fertility rate are high and the contraceptive prevalence rate is also high among STs as compared to SCs.

INTRODUCTION

India is a vast country, inhabited by a large number of communities. Quite a few of these communities remained backward in several aspects of life. Since the inception of planning era, making the society more egalitarian, both in economic and other social aspects has remained one of the major objectives of state policies. The central and state governments and the planners have formulated and implemented various policies aimed at raising the social and economic conditions of the communities such as the Scheduled Castes (SCs) and Scheduled Tribes (STs) who had remained traditionally backward for historical reasons. Institutions and individual scholars have occasionally assessed the impact of these policies. Most of the studies, made so far, are either based on secondary data available from the census National Sample Survey (NSS) and other sources or localised

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when some primary data have been collected. These studies pertain to different time periods and different regions covering limited aspects of development. The results are therefore not comparable over time or space. Findings of these studies are, consequently, of limited use. Very few comprehensive studies based on primary data collected with the specific purpose of assessing the social and economic conditions of the SCs and STs have, thus far, been undertaken.

Comprehensive data on various aspects of development disaggregated by population groups such as the SCs and STs are rare. The National Council of Applied Economic Research (NCAER) in its efforts to compile Human Development Profiles of India and its states conducted a nation wide sample survey (HDI Survey) of about 33 000 rural households to elicit data on various aspects of development. Sampling has been done independently in 16 major states with households as the ultimate sampling units. The households belonging to SCs and STs often formed separate strata in the sample design. Valid estimates of various development parameters pertaining to SCs and STs could be derived out of these data. The present study attempts an analysis of the household level data collected by the NCAER in its HDI survey from a sample of 33 230 rural households – 7943 belonging to SCs, 4220 belonging to STs, to assess their level of development, both in absolute terms and relative to that of the total population. The analysis is supplemented by data from some secondary sources such as NSSO and Census and findings of other researchers.

GROWTH OF POPULATION

Of the 846 million Indian population enumerated in the 1991 census about 8 percent or 68 million are Scheduled Tribes and another 16 percent or 138 million belong to Scheduled Castes (Table 1). Faster growth of population among these two communities is reflected in a rising trend in their proportion in total population. The ST population grew at the decadal rate of 27.7, 35.8 and 31.4 percent respectively during the past three decades. Comparatively, SC population grew at a lower rate of 24.2, 30.9 and 32.0 percent during the same period. In 1961 the Scheduled Tribes constituted 6.9 percent of the population, while in 1991 it is up to 8.1 percent. During the same period the proportion of Scheduled Castes has gone up to 16.5 percent from 14.7 percent.

Table 1. Distribution and growth of population, 1951–1991 (in million)

Census years	Total population	Scheduled tribes (STs)	Scheduled castes (SCs)
1951	361.1	–	–
1961	428.4	29.9	64.4
	(21.5)		
1971	533.5	38.0	80.0
	(24.8)	(27.7)	(24.2)
1981	665.3	51.6	104.7
	(24.7)	(35.8)	(30.9)
1991	838.6	67.8	138.2
	(26.0)	(31.4)	(32.0)

Notes: * Excludes the population of Jammu and Kashmir
** Excludes the population of Assam
1. Figures in parenthesis are percentage changes over previous counts.
2. The percentage change is computed after necessary adjustments by the Registrar General for 1951–61 and 1961–71.

Sources: Census of India, 1981 Series 1, paper 4 of 1984; 1971 Series 1 part II-c (i); 1961, Volume 1, Part II-c(i).

The distribution of scheduled tribe population for the states in India for 1991 is shown in Table 2. Majority of (83 percent) the scheduled tribe population in the country numbering about 68 million lives in the so called central tribal belt running through the hilly terrains of Maharastra, Gujarat, Rajasthan, Madhya Pradesh, Bihar, West Bengal, Orissa and Andhra Pradesh.

Table 2. Distribution of ST population for major states, 1991 population

('000)

India/States	Total population	Scheduled tribes	
		Population	% of Total Population
India *	**838 584**	**67 758**	**8.1**
Andhra Pradesh	66 508	4200	6.3
Arunachal Pradesh	865	550	63.7
Assam	22 414	2874	12.8
Bihar	86 374	6617	7.7
Gujarat	41 310	6162	14.9
Haryana	16 464	–	–
Himachal Pradesh	5171	218	4.2
Karnataka	44 977	1916	4.3
Kerala	29 099	321	1.1
Madhya Pradesh	66 181	15 399	23.3
Maharastra	78 937	7318	9.3
Manipur	1837	632	34.4
Meghalaya	1775	1518	85.5
Mizoram	690	654	94.8
Nagaland	1210	1061	87.7
Orissa	31 660	7032	22.2
Punjab	20 282	–	–
Rajasthan	44 006	5475	12.4
Tamil Nadu	55 859	574	1.0
Tripura	2757	853	31.0
Uttar Pradesh	139 112	288	0.2
West Bengal	68 078	3809	5.6

Note (*): Excludes figures of Jammu and Kashmir where 1991 census was not taken. No ST population.

Source: Union Primary Census Abstract for Scheduled Castes and Scheduled Tribes, Paper 1 of 1993, Series 1, Census of India, 1991.

Among the major states in India, Madhya Pradesh has the highest percentage (23.3 percent) of ST population. Other states where the proportion of ST population is higher are Orissa (22.2 percent), Gujarat (14.9 percent) and Rajasthan (12.4 percent). In the northeastern states of Arunachal Pradesh, Meghalaya, Mizoram, and Nagaland, 90 percent of the population is tribal. However, in the remaining northeast states of Assam, Manipur, Sikkim, and Tripura, tribal population varies between 20 to 30 percent.

Tribal groups inhabit widely varying ecological and geo-climatic conditions (hilly, forest, desert etc) in different concentrations throughout the country with different cultural and socio-economic backgrounds. The economic life of the tribals is specific in nature. They are generally involved in food gathering and hunting, shifting cultivation, agriculture, artisanship, as pastoralists and cattle herders, folk artists and wage labourers.

Table 3. Percentage of forest area by state and percentage of tribal households by distance from the nearest forest

States	% forest area to geographical area	Distance (km)		
		Less than 1	1–5	6–10
Arunachal Pradesh	61.6	15.7	57.7	12.7
Assam	39.2	10.8	26.5	8.2
Gujarat	9.9	14.1	31.2	9.3
Madhya Pradesh	34.8	15.1	50.0	18.8
Maharashtra	20.8	15.7	57.7	12.7
Manipur	67.9	18.8	68.7	0.7
Meghalaya	42.3	57.1	37.5	1.6
Mizoram	75.6	19.3	70.8	1.7
Nagaland	52.1	–	–	–
Orissa	36.7	13.9	55.5	18.8
Rajasthan	9.3	16.9	33.3	20.0
Tripura	60.0	19.8	51.2	10.8
All India	23.3	15.7	47.1	15.1

Note: The table presents data for only those states where ST concentration is high.

Source: Statistical Abstract, 2001; Sarvekshana, April–June 1994

Historically, the economy of most tribes was subsistence agriculture or hunting and gathering. A large number of tribals in rural areas are still dependent on forests for their livelihood. In the forest based tribal economy provisions for basic necessities like food, fuel, housing material etc. is made from the forest produce. Table 3 shows that around 16 percent of tribal households live within a distance of one km from a forest. The proportion is higher in the northeastern states. Meghalaya reported the largest proportion of its tribal households living within 1 km of a forest. In almost all the northeastern states over 95 percent of the tribal households reside within 5 km of a forest. In most of the states more than 60 percent of the tribal population resides within that distance from the forest. Thus, out of 68 million tribal people, a large percentage of whom live close to forest areas constitute the most disadvantaged section of society based on Per Capita income, literacy rate, health status and lack of access to basic amenities. In the following sections we have discussed the socio-economic profile of ST's using the NCAER–HDI survey data. In the paper, a state wise analysis of only ST concentrated states namely Madhya Pradesh, Orissa, Gujarat, Rajasthan, Maharastra and Northeastern region is presented.

ECONOMIC CONDITION

The survey shows that there is a higher incidence of poverty among the ST population. Overall, the Head Count Poverty and Capability Poverty ratios are considerably higher for the STs compared with the all India average and the SCs. More than half of the ST population is reported to be below poverty line. Similarly, capability poverty ratio is also 68 percent for STs compared to 60 percent for SCs and 52 percent for the whole population.

The survey also provides distribution of household income for various caste categories for rural areas. The household income of STs is Rs.19 556 and the per capita income is Rs. 3504, which is higher than that of SC population (Table 4), but much lower than that of the national average. This brings to fore the lack of access to asset and other types of employment and wage stability for the STs and SCs as compared to general population.

The data suggest that the share of income from agriculture is relatively high among STs in comparison with SCs. ST households also report a higher percentage of landholdings. The work participation rate of STs, especially that of females is higher than that of SCs whereas in the case of males there is no variation. Interestingly, it is observed that about 15 percent of the total incomes of all the three groups are from salaried occupations.

Table 4. Levels on income and material well-being

		Scheduled tribes (STs)	Scheduled castes (SCs)	All
Household income (Rs.)		19556	17465	25653
Per capita income (Rs.)		3504	3237	4485
Work participation rate	Male	51.6	52.8	51.9
	Female	27.7	23.0	18.4
Source of income:	Agriculture+allied	55.6	37.7	55.0
	Salaried	14.8	15.2	16.5
	Agricultural wage	11.7	19.7	7.9
	Others	17.9	27.4	20.6
% households reporting land holdings		69.0	46.6	63.4
Poverty head count ratio %		51.0	50.0	39.0
*Capability poverty %		68.0	60.0	52.0

*CPM is a simple average of percentage of births unattended by trained health personnel, percentage of stunted children and female illiteracy rate.

Source: NCAER–HDI Survey, 1994.

Table 5. Levels on income and material well-being for selected states among STs

States	Per capita income	Head count ratio	HH income	Source of income				% HHs reporting land holdings
				Agri + allied	Salaries	Agri wage	Others	
Gujarat	3720	53.7	21952	54.6	14.9	23.8	6.7	52.8
Madhya Pradesh	3158	50.7	18123	64.0	6.9	13.1	16.0	76.0
Maharashtra	3496	51.7	18863	55.8	10.5	19.6	14.1	57.2
*North Eastern Region	4684	–	26214	41.2	31.5	1.4	25.9	79.8
Orissa	2306	64.5	11615	62.8	6.8	9.2	21.2	72.0

Note: North Eastern Region includes Assam, Nagaland and Tripura

Source: NCAER–HDI Survey, 1994

In all the states more than half of the ST population is living below poverty line (Table 5). Among the states, the highest per capita income of tribals is found in the northeastern region. Similarly, among the states household income is also high in the northeastern region of the country. Data show that the main source of income for ST's is allied agriculture activities. In Madhya Pradesh around two-thirds of income of ST's is from allied agricultural activities. Madhya Pradesh, Gujarat and Maharastra also report agricultural wage as a source of income for ST's. A large number of ST's in the northeastern region are working as salaried employees. In all the states, more than half of the ST's have reported possession of landholdings.

SIZE OF LANDHOLDINGS AMONG STs AND SCs BY STATES

In rural India land is the most important productive asset and is also a symbol of power and privilege. Its possession enhances one's economic and social status. A look into the ownership pattern of land among STs, SCs and others may therefore be revealing in the context of their relative social and economic position.

Following the recommendations of several committees and commissions, many states with sizeable STs in their population have enacted laws prohibiting alienation of tribal land and also restoration of alienated land. Some of the states like Karnataka, Orissa, Uttar Pradesh and West Bengal enacted similar laws for the SCs as well.

Since Independence, comprehensive agrarian reform measures have been launched to reduce the glaring inequality in land distribution and to ensure land to the tiller. These measures constituted the largest body of agrarian legislation in the country. Several scholars have studied the impact of these measures on agrarian relations (Appu 1975, Bandopadhyay 1986). Researchers have also studied the trends in the distribution of landholdings in rural India (Sanyal 1977, 1988, Vyas 1979, Nair 1990, Sharma 1994). These studies, however, fail to throw much light on the changing access of SCs, STs and others to land and also the distribution of land among these communities separately. Again, not many studies are available which exclusively focus on the land distribution between SC and ST households. These two communities, particularly SCs, have been the target group of the numerous land reform legislations in the country since the 1950s. For example, it has been routinely reiterated in plan and other policy documents that while distributing surplus land, priority shall be given to landless SC and ST households.

The pertinent questions to be answered in this context include:

- What is the relative share of STs, SCs and other households in the total land, and how it has changed over time?
- What is the incidence of landlessness among STs, SCs and others and how it has changed over time?
- What is the extent of inequality in the distribution of land within these communities?

We make an attempt to answer these on the basis of data collected by the NSSO. The data on land distribution among all households are available since 1953–54 (8th Round), but that on SCs and STs are available since 1982 in the Report on landholdings (37th Round, NSS Report No. 300) and Report on some aspects of household ownership holdings (1) (48th Round, NSS Report No. 399). The percentage share of SCs, STs and other households separately in the total population and their share of land in the selected states or obtained from the NSSO data are presented in Table 7.

In rural India as a whole the share of land owned by other households declined from 82 percent to 78 percent. These changes, pari passu, imply an increase in the share of land owned by SC and ST households. And in fact the share of SC households increased from 7.89 percent to 10.34 percent and that of ST households

from 10.10 percent to 11.72 percent for the country as a whole (Table 6). The proportion of land owned by ST households also increased in most of the states.

Table 6. Percentage of SCs, STs and others in total rural population and their share of land, 1982 to 1992

Year	Scheduled tribes (STs)		Scheduled castes (SCs)		Others	
	Population	Land	Population	Land	Population	Land
1982	9.2	10.1	16.8	7.9	74.8	82.0
1992	10.0	11.7	17.9	10.3	72.1	78.0

The ST households constitute nearly one-fourth of the rural population in Orissa and Madhya Pradesh and one-fifth in Gujarat (Table 7). During the decade 1982–92, the proportion of STs in rural population did not change substantially in any of the states. However, their share in land increased markedly in Maharashtra, Orissa and Rajasthan. In 1992, the percentage of total land owned by ST households was higher in relation to their share in rural population in Orissa.

Table 7. Percentage of STs in rural population and their share of land, 1982 to 1992

States	Year	Scheduled tribes (STs)	
		Population	Land
Assam	1982	–	11.6
	1992	14.1	15.7
Gujarat	1982	19.1	10.4
	1992	21.0	10.2
Madhya Pradesh	1982	27.8	23.8
	1992	28.9	23.8
Maharashtra	1982	12.7	8.9
	1992	13.3	11.4
Orissa	1982	24.3	26.0
	1992	24.5	36.1
Rajasthan	1982	14.9	6.4
	1992	15.4	9.4

Sources: (i) Report on landholdings (1); 37th Round, NSS Report No. 330.
(ii) Report on some aspects of ownership holdings (1), 48th Round, NSS Report No. 399.

INCIDENCE OF LANDLESSNESS

The proportion of STs and SCs in rural population, as well as proportion of landless households among them, is quite high. However, overall there has been a decrease in the incidence of landlessness among all population groups except STs (Table 8). The incidence of landlessness among ST, SC and other households, along with the changes, during 1982–92 for selected states is shown in Table 9. It can be seen that the incidence of landlessness declined between STs in most of the states except in Madhya Pradesh and Orissa.

Table 8. Trends in incidence of landless households between the SCs and STs, 1982 to 1992

States	Year	Scheduled tribes (STs)	Scheduled castes (SCs)	Others
All India	1982	12.6	17.1	10.2
	1992	13.3	11.5	10.5

Table 9. Trends in incidence of landless households between STs for states 1982 to 1992

States	Year	Scheduled tribes (STs)
Assam	1982	13.6
	1992	5.7
Gujarat	1982	25.6
	1992	10.9
Madhya Pradesh	1982	14.0
	1992	16.6
Maharashtra	1982	28.8
	1992	25.2
Orissa	1982	10.1
	1992	11.0
Rajasthan	1982	8.7
	1992	5.5

Sources: (i) Report on landholdings (1); 37th Round, NSS Report No. 330.
(ii) Report on some aspects of ownership holdings (1); 48th Round, NSS Report No. 399.

The proportion of landless households declined in Gujarat, from 25.6 to 10.9 percent, in Assam from 13.6 to 5.7 percent and in Rajasthan from 8.7 to 5.5 percent. This may be perhaps due to the fact that many states with a sizeable ST population have enacted laws prohibiting alienation of and restoration of alienated tribal land. However, there is no such law for the SCs. SCs and STs have been the target group of the numerous land reform legislations in this country since the 1950s. Despite this the majority of SCs and STs still work as agricultural labourers. In 1987–88 the proportion of agricultural labourers was 52 percent among SCs, 42 per cent among STs and only 23 percent among other households.

Table 10. Average days worked per adult wage earner

	STs	SCs	All
Agricultural wage work			
Male days	133	143	145
Female days	115	119	124
Total days	125	133	137
Non-Agricultural wage work			
Male days	131	155	157
Female days	95	127	133
Total days	120	149	152
All wage work			
Male days	157	172	172
Female days	128	130	137
Total days	145	158	160

Source: NCAER–HDI Survey, 1994.

Table 10 shows average person days of wage employment in agricultural and non-agricultural work. Overall, access to wage employment is only 145 days for STs and 158 days for SCs respectively. Average no. of days worked per adult wage earner is less for STs both in agricultural as well as non-agricultural work.

Table 11. Adult wage rate for agricultural and non-agricultural wage work

	STs	SCs	All
Agricultural wage work			
All	16.8	21.8	20.9
Male	18.6	23.9	23.4
Female	14.5	17.8	16.4
F/M Ratio	0.78	0.74	0.7
Non-agricultural wage work			
All	23.0	28.6	28.4
Male	24.6	30.5	30.5
Female	18.1	18.5	18.7
F/M Ratio	0.74	0.61	0.61
All wage work			
All	18.9	24.2	23.6
Male	21.0	26.6	26.4
Female	15.3	17.9	16.9
F/M Ratio	0.73	0.67	0.64

Source: NCAER–HDI Survey, 1994.

Wage rates in both agricultural and non-agricultural sectors are also lower for STs (Table 11). The average daily wage rate for agricultural and non-agricultural work for STs is only Rs. 16.8 and Rs. 23 compared to 21.8 and 28.6 for SCs respectively. Similarly, the total wage rates for STs are also as low as Rs, 18.9 as against Rs. 24.2 for SCs. But gender differences in the wage rates are lower for STs as compared to SCs or total population. The f/m ratio for wages is high among the STs with respect to the total, agricultural and non-agricultural work.

ACCESS TO BASIC AMENITIES

As regards the availability of amenities such as percentage living in pucca houses, percentage having toilet facilities and percentage using PDS, STs are in much better position than the SC population. They are relatively disadvantaged when the access to protected water and electric connection are concerned (Table 12). Overall, however STs who are at the lowest levels in many spheres of economic indicators are worse off compared with the all India average.

Table 12. Access to basic amenities among ST, SC and total population (in percent)

	Scheduled tribes (STs)	Scheduled castes (SCs)	All
Kutcha houses	47.0	66.6	55.4
Electric connections	29.7	30.7	42.9
Protected water	61.6	72.8	72.0
Having toilet	12.2	8.3	15.3
Using PDS	37.5	32.1	33.2

Source: NCAER–HDI Survey, 1994.

Among the states more than 70 percent of ST population in Madhya Pradesh, Orissa and Maharastra lives in kutcha houses (Table 13). Such houses generally lack adequate ventilation or natural lighting. A sizable population of tribes shares living rooms with cattle (Basu 1999). Only 5 percent of the ST population in Orissa reports electric connections. Similarly, use of PDS is also very low in Orissa. Data show that the STs have better access to protected water except in Madhya Pradesh and Orissa.

Table 13. Percentage of access to basic amenities for selected states among STs (in percent)

States	Kutcha houses	Electric connections	Protected water	Using PDS
Gujarat	48.2	43.6	71.9	46.9
Madhya Pradesh	70.7	35.6	55.1	37.6
Maharashtra	79.6	30.8	81.0	62.0
North Eastern Region	61.4	46.4	84.9	33.2
Orissa	89.8	4.9	41.5	5.3

Source: NCAER–HDI Survey, 1994.

EDUCATIONAL LEVELS AND SCHOOLING

Educationally, STs are worse off than the SC population and much worse off than the total population (Table 14). Literacy is a stock measure and it changes slowly over time. But a matter of concern is that the enrolment rate between the STs is only 60 percent compared with about 72 percent for all India and 63 percent for the Scheduled Castes. The enrolment is a flow variable and can be improved within a relatively shorter period of time. But a lager disparity in enrolment among the STs compared with the disparity in levels of literacy suggests that the STs female enrolment rate in elementary schooling have been falling in the immediate past. This also suggest that some sections of the STs are unable to utilize the schooling and educational opportunities provided by the respective state governments.

Another important fact to highlight is the onset of private schooling across India, more so in northern Indian states such as Uttar Pradesh, Punjab, Haryana, Bihar, Andhra Pradesh and Kerala. STs send their children relatively less to the private elementary schools compared with SCs as well as total population. Since, schooling and education is a state subject, important policy initiatives have to be taken by the states to set right this anomaly in providing equal opportunities and appropriate education at least at the primary and elementary levels. Considering education as one of the main parameter of human development, clearly the STs are lagers in most of the output indicators such as the literacy rate, enrolment rate, discontinuation rate and percentage of population (aged 17+ years) completing matriculation.

Table 14. Levels of literacy and schooling among ST, SC and total population

		Scheduled tribes (STs)	Scheduled castes (SCs)	All
Literacy rate 7+ age	Total	39.9	41.5	53.5
	Male	51.4	53.4	65.6
	Female	26.0	28.2	40.1
Enrolment rate	Total	60.3	62.5	71.4
	Male	67.6	69.6	77.1
	Female	51.5	54.7	64.8
Discontinuation rate (Average for 6–14 years)	Total	7.2	7.0	6.0
	Male	6.6	5.7	4.8
	Female	8.0	8.8	7.6
% matriculates 15+ years	Total	4.9	4.9	8.6
Percent students aged 6–14	Total	3.2	5.8	9.8
years in private schools	Male	3.8	6.9	10.8
	Female	2.3	4.2	8.3
Annual household expenditure on schooling	Govt. schools	397	450	539
	Ailed schools	664	544	665
	Private schools	869	832	1262

Source: NCAER–HDI Survey, 1994.

Table 15. Level of schooling for selected states among STs

States	Literacy rate 7+ age			Ever enrolment rate			Discontinuation rate (Average for 6–14 years)		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Gujarat	38.5	49.2	27.3	65.4	72.8	56.4	10.7	10.5	11.1
Madhya Pradesh	30.3	42.8	16.8	50.4	57.1	42.9	9.6	9.6	9.6
Maharashtra	39.1	52.9	25.6	75.4	79.7	70.7	10.5	8.3	13.3
North Eastern Region	75.3	82.0	66.1	90.2	90.2	60.2	0.3	–	1.0
Orissa	28.1	40.8	15.5	42.9	54.7	31.9	7.3	7.4	7.1

Source: NCAER–HDI Survey, 1994.

Among the states, northeastern region has an exceptionally high literacy rate between the STs. Madhya Pradesh and Orissa have very low literacy rate especially among the females where only 15–16 percent of female above the age of 7 years are literate. As in the case of literacy rate, ever enrolment rate is also highest in the northeastern region where more than 90 percent of the children were ever enrolled. Discontinuation rates, especially among the females, are high in the states of Gujarat and Maharastra.

VARIATION IN LITERACY ACROSS STATES

Coefficients of variation in general literacy rates across states are shown in Table 16 separately for each of the population groups. Variation across states has diminished over time among each of the population groups as is evident from the falling trend in the coefficient of variation. The decrease is more in rural areas, among females as also between SCs and STs. Literacy in the states lagging behind is rising at a faster rate among each of the communities.

Table 16. Coefficient of variation across states in literacy rates, 1961–91

	Scheduled tribes (STs)				Scheduled castes (SCs)				All population			
	1961	1971	1981	1991	1961	1971	1981	1991	1961	1971	1981	1991
Total												
Person	68.6	61.1	64.9	54.8	55.9	47.0	43.2	37.0	41.8	31.9	28.3	23.7
Male	61.9	53.0	48.4	47.7	46.7	36.4	31.9	27.0	35.0	23.1	19.8	17.4
Female	117.0	98.5	82.3	75.3	113.1	85.8	75.5	59.0	62.0	52.9	46.0	39.0
Rural												
Person	69.7	61.4	55.6	56.3	60.0	51.3	47.9	40.5	50.9	38.9	35.2	30.4
Male	63.2	53.3	48.9	48.7	49.2	39.1	35.1	29.2	41.1	26.8	24.0	20.6
Female	120.6	102.1	86.1	79.4	117.2	98.7	87.6	66.6	92.6	70.8	61.3	49.8
Urban												
Person	74.9	57.6	53.1	48.0	39.0	29.7	28.3	24.2	28.8	11.9	12.6	11.9
Male	65.0	52.3	46.8	43.7	34.1	21.9	20.2	17.4	27.5	8.3	9.1	8.6
Female	103.8	74.6	67.0	57.1	64.6	52.6	47.6	37.2	33.6	18.9	19.4	17.3

Source: Computed from data presented in Census of India 1961–91.

Interstate variation is the lowest among urban males while it is the highest among rural females in each of the three population groups, *viz.* SCs, STs and all population.

HEALTH AND DEMOGRAPHICS

The health problems need special attention in the context of tribal communities. Studies have shown that tribals have distinctive health problems governed by their habitat, difficult terrains and ecological conditions (Basu 1999). When aspects of health and demographic rates are discussed a contrasting picture emerges. Both the fertility rates as well as infant mortality rates have been lower between the STs. Similarly, the morbidity and the disability rates are generally also lower between the STs compared with SCs and total population (Table 17) except the short duration morbidity rate, which is high among ST population. The contraceptive practice is high between the STs as compared to SC population. However, a dynamic look at the changes in all these factors over time suggests that relative differentials in fertility, mortality and family planning practice are declining over the past four decades and the differentials found recently are the lowest. Research has also conclusively proved that as the human development parameters improve the rate both of fertility and mortality falls. Thus there is a great prospect of India reaching the third and fourth level of demographic transition in the early decades of the next century and STs will be not lacking in contributing to important achievement.

The utilization of government provided health care services is relatively low between the STs. For example the percentage of women receiving ANC (5.7 percent), the numbers of deliveries conducted under the care of trained professionals such as the ANMs (31.9 percent) and the child immunization rates (39.5 percent) among the STs are low compared to SCs and the total population.

Table 17. Indicators of health and demographics among STs, SCs and total population

		Scheduled tribes (STs)	Scheduled castes (SCs)	All
Short duration morbidity ('000)		130	124	122
Major morbidity (Per 100 000)		3377	4527	4578
% receiving ANC care		5.7	11.6	9.8
% delivery attended trained person		31.9	37.6	40.0
% children immunized (8 doses)		39.5	42.6	48.5
Immunized (All 8 doses)				
Disabilities:	0–4 years/100 000	1881	2058	2042
	5–12 years/100 000	2406	3325	2896
Severe malnutrition	0–4 years %	38.0	40.3	37.2
	5–12 years %	30.2	30.3	29.0
Crude birth rate		35	35	32
Total fertility rate		4.4	4.7	4.3
Infant mortality rate		98	99	84
Contraception		33.9	31.4	35.7
% spacing methods		4.4	4.7	5.6

Source: NCAER–HDI Survey, 1994.

Scheduled Tribes generally report high infant and maternal mortality due to unhygienic and primitive practices for parturition. Moreover, expectant mothers are not immunized against tetanus. From the beginning of the pregnancy, no specific nutritious diet is consumed by women. On the other hand, some pregnant women start eating less to ensure that the baby remains small and the delivery may be easier. Also, the habit of alcohol consumption is also prevalent among the tribal women. They also continue with their hard labour during pregnancy. Deliveries are generally conducted at home, which also increases the susceptibility to various infections (Basu 1999).

Table 18. Health and demography indicators for selected states among STs

States	Short duration morbidity ('000)	Major morbidity (per 100 000)	% delivery attended trained person	% children immunized (All 8 doses)	Crude birth rate	Total fertility rate	% EMW using family planning methods
Madhya Pradesh	225	4681	35.9	37.0	35	4.5	29.6
Gujarat	52	1445	48.2	72.2	36	4.2	46.1
Maharastra	91	3082	37.8	81.6	32	4.6	50.0
North Eastern Region	85	5773	35.4	24.3	24	5.0	35.9
Orissa	176	4430	7.6	33.2	32	4.1	24.8

Source: NCAER–HDI Survey, 1994.

Among the states, lowest short duration as well as major morbidity between STs is found in Gujarat (Table 18). On the other hand, Madhya Pradesh records the short duration morbidity rate of as high as 225 per 1000 population. Similarly, major morbidity in Madhya Pradesh between STs is also as high as 4681 per 100 000 population. As regards the utilization of MCH services, delivery attended by trained personnel and full immunization between STs is lowest in Orissa. Utilization of family planning services is high in Maharastra where at least half of the ST population has ever used any method of family planning. This percentage is lowest in Orissa.

SUMMING UP

Widespread poverty, illiteracy, malnutrition, absence of safe drinking water and sanitary conditions, poor maternal and child health services and ineffective coverage of national health and nutritional services are the factors responsible for the dismal health conditions prevailing among the tribal population in India (Basu 1999).

The number of STs has grown at a faster rate than others increasing their share in total population over the decades. The ST population in India has remained traditionally backward, in both economic and other social aspects, for historical reasons. Various policies of protective discrimination in favour of STs have been formulated and implemented. As a consequence both economic and social conditions of this community have improved. The impact of these policies has been in the desired direction but falls far short of the desired magnitude.

There is a higher proportion of poor among the ST population. Every alternate person belonging to SCs and STs is poor while every third person not belonging to SCs and STs is poor. Higher incidence and intensity of poverty between SCs and STs is perhaps a consequence of lower access to productive assets. In rural India land is the most important productive asset. Analysis of data on land ownership pertaining to the years 1982 and 1992 collected by NSS indicates that proportion of land owned by ST households also increased in most of the states. The STs had a higher share in land relative to their share in population in five states (Bihar, Karnataka, Orissa, Uttar Pradesh and West Bengal). It was nearly equal in Andhra Pradesh, Assam and Tamil Nadu. At the all India level the share of STs in population was 10.0 percent who had a share of 11.7 percent in land in 1992. Keeping in view the proportion of STs in rural population, proportion of landless households among them is quite high. However, there has been a decrease in the incidence of landlessness between STs. For instance in Gujarat the proportion declined from 25.6 percent to 10.9 percent during the same period.

Many states with sizeable ST population have enacted laws prohibiting alienation of and restoration of alienated tribal land. However, there is no such law for the Scheduled Castes. Scheduled Castes and Scheduled Tribes constituted the target group of the numerous land reform legislations in this country since the fifties.

As regards the availability of amenities such as percentage living in pucca houses, percentage having toilet facilities and percentage of using PDS, STs are in much better position than SC population. They are relatively disadvantaged when the access to protected water and electric connection are concerned. Overall, however STs who are at the lowest levels in many spheres of economic indicators are worse off compared with the all India average.

Taking education as one of the dimensions in the determination of the level of human development, STs clearly are not the better performers if the output parameters like literacy rate, ever enrolment rate, discontinuation rate and percentage of population (aged 15+ years) completing middle level are considered. Data on literacy disaggregated at the level of states and social groups analyzed here indicate that literacy among population groups who were lagging behind initially (1961) such as the females, those living in rural areas, those belonging to SCs and STs, has been rising at a faster rate. Consequently, disparity in literacy among population groups has reduced over time. Interstate variation in literacy as measured by Coefficient of variation also shows a decreasing trend over time. This means that the backward states are improving at a faster rate. The population groups with still awfully low levels of literacy include ST females in rural areas of Andhra Pradesh (5.8 percent), Madhya Pradesh (7.6 percent), Orissa (7.6 percent) and Rajasthan (2.9 percent). Even after prolonged efforts we have failed to make satisfactory progress in raising literacy among such population groups. This is despite the claim of adequate infrastructure to ensure access to primary education and other incentives. The reason perhaps, lies deeper into the economic and social fabric including basic attitudes to education among certain socio-economic groups. Planners, administrators and academicians should pay serious attention to such deplorable conditions. A comprehensive evaluation study of various incentive schemes currently being implemented should be undertaken and necessary changes made on the basis of the findings of the study.

On coming to some of the health and demography related parameters, the following picture emerges. While as far as major morbidity rates are concerned, STs are better off than the rest. However, it is for variables like percentage of currently pregnant women receiving ante-natal care, percentage of married women having delivered last year with delivery being attended by a trained person, percentage of children immunized that the ST population loses out. Crude birth rate and total fertility rate are high and the contraceptive prevalence rate is also high between STs as compared to SCs.

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Annex

SAMPLE DESIGN OF THE HUMAN DEVELOPMENT INDICATOR SURVEY

The rural sample of the Human Development Indicator (HDI) Survey covered 16 major states. The sample consists of 35130 rural households spread over 1765 villages in 195 districts. Out of these 33230 sample households could be successfully contacted to elicit data for analysis. The non-response rate, about 5 percent, is within tolerable limit for such a large-scale survey.

Sampling unit

The units of observation and analysis of this study are households. Many of the attributes of interest in this study pertain to individuals in the households such as currently pregnant women and children aged 5–12 years. However, preparation of a sampling frame of individuals would be prohibitively costly both in terms of time and money. As a compromise households have been selected as the final stage of sampling in this survey. Even the sampling frame in the form of a list of all households is neither available nor easily prepared. Therefore, a multistage sampling design had to be adopted for this survey. Multistage designs are generally less efficient from the viewpoint of sampling variability than sampling of individual units directly in a uni-stage sample. Utilizing some auxiliary information for stratification and varying probabilities of selection of sampling units at various stages could more than recover this loss of efficiency. The multistage sample design adopted here has been chosen on considerations of cost, both in terms of money and time, operational feasibility and precision of the estimates to be derived for various population groups of interest.

Stratification

Sampling error of the estimates derived from survey data depends on the design adopted and the sample size. This also depends on the variability in the universe from which the sample is drawn. The wider the variability in the universe the less precise will be the estimates derived from a sample. The stratification technique is to divide the universe into several strata with lower variability within each stratum and consequently more variability between strata. Since variability within strata is reduced the relevant parameter within a stratum can be estimated with more precision. These estimates pertaining to each stratum can then be suitably aggregated to arrive at the estimate pertaining to the universe. The ideal criterion for stratification is the same variable for which an estimate is sought. This, however, is not feasible to follow in practice. The second best way is to stratify the universe according to some other variable(s) highly correlated to the variable of interest. Stratification variables are chosen depending on availability of data and at times such data are collected before selecting the sample. In a certain situation a stratum itself may be of special interest for which separate estimates may be needed. A stratified sample readily provides such estimates. Technique of stratification has been used here at the stage of selecting sample districts and sample households from selected villages.

Varying probabilities of selection

It is sometimes advantageous to select sampling units with unequal probabilities instead of drawing a simple random sample. Simple averages as estimates turn out to be biased in such cases. However, the bias can be estimated and general for to get an unbiased estimate of the parameter. Such unbiased estimates often have lower sampling errors compared to the corresponding estimate obtained from a simple random sample. The technique has been used for selection of districts only by making the probability of selection proportional to the size of rural population in the district obtained from 1991 census.

The sample size

For any scientifically selected sample, sampling errors of the estimates will decrease as the sample size increases. This will be zeroing for the largest sample size such as in the case of census. Non-sampling error generally increase as the sample size increases due to various reasons such as involvement of a large number of persons and consequent difficulty in administration. Total errors in the estimates derived will be the sum of sampling and non-sampling errors. If one increases the sample size sampling error decreases while the non-sampling error increases. Sampling error also depends on the actual value of the parameter being estimated. If the actual value is small, as in the case of child mortality, we shall need a larger sample size to estimate the parameter with tolerable precision. However, in this study the absolute magnitude of such estimates is not so important.

The real objective is rank various population groups according to these estimated parameters. In this also one will feel really concerned only where the differences are large. A moderately large sample may be adequate for such purposes. A large sample, however, will tend to increase non-sampling error. Further, in a multipurpose survey like this different parameters will dictate different sample size. One has to choose a sample size taking account of these variations so that the total error in the estimate is minimized.

Selection of the rural sample

Selection of districts

Most of the parameters to be estimated out of the data collected through this survey are known to be correlated with income and female literacy. Data on female literacy are available in census publications. Detailed data on income are not easily available. However, in rural areas crop cultivation accounts for a major part of income for the majority of the households. Income from agriculture will thus be a good proxy for total income. Data on income from agriculture are available in publications of Centre for Monitoring Indian Economy. Keeping these and data availability in view rural female literacy and income from agriculture were chosen as stratification variables for the districts. In each state, districts were cross classified by income from agriculture and rural female literacy rate to form homogeneous strata in terms of these two variables. The number of such strata in a state was determined on considerations of the range of the stratification variables and the resulting frequency in each stratum. From each of these strata a preassigned number of districts depending on the size of the stratum were selected with probability proportional to rural population in the district.

Selection of villages

List of all villages in the selected districts was obtained from census records. A preassigned number of sample villages were, then selected linear systematically after arranging the villages in a tahsil alternately in ascending and descending order of rural female literacy. Sampling interval in each district was suitably chosen to make the design partially self weighting.

Selection of households

The households in the sample villages were listed along with some auxiliary information such as religion, caste, major source of income, cultivable land operated where major source of income was cultivation and other social and demographic attributes of the households. For large villages only a part of the village, selected at random, was listed and sample households selected out of these. These attributes of the listed households were used for stratification of the listed households.

Composition of population in terms of attributes like religion, caste, occupation are different in different states. Also population groups of interest are different in different states. The nature and number of strata of households formed in the states were therefore different. Two groups of listed households were separated as stratum 1 and stratum 2 in each of the states. These are:

Stratum 1: Households containing at least one pregnant woman.
Stratum 2: Households containing at least one child aged less than 12 months but no pregnant women.

The remaining households were stratified according to religion, ethnic group and occupation of the head of the households. The strata thus formed in various states along with allocation of sample households are shown in the following tables. Sample households from each of the non-empty strata, so formed, have been selected linear systematically. Sampling intervals were suitably chosen to make the design partially self weighting. Allocation of sample households in states and various strata are shown in the tables 1 to 6.

The rural sample across states

Name of state	Total number of districts	Number of sample			Households surveyed
		Districts	Villages	Households	
Haryana	16	11	90	1808	1722
Himachal Pradesh	12	8	65	1260	1225
Punjab	12	8	70	1373	1303
Bihar	42	12	116	2338	2155
Uttar Pradesh	63	23	217	4251	4036
Madhya Pradesh	45	25	217	4320	4162
Orissa	13	11	102	2040	1971
Rajasthan	27	12	106	2102	1984
Gujarat	19	10	88	1768	1606
Maharashtra	30	16	151	2998	2765
West Bengal	17	8	78	1560	1515
N.E States	60	8	66	1276	1233
Andhra Pradesh	22	12	113	2244	2100
Karnataka	20	15	135	2747	2523
Kerala	14	8	75	1500	1474
Tamil Nadu	20	8	76	1545	1456
All States	**433**	**195**	**1765**	**35130**	**33230**

16 Tribal development and marketing of NTFPs for poverty alleviation – a case study in Andhra Pradesh, India

A. Vidya Sagar*

ABSTRACT

Collecting NTFPs is not only a traditional tribal activity for survival but it could also be converted into an effective instrument for eradicating poverty. This paper presents three concepts that may be examined further. Though NTFPs has value as economic good, imperfections in marketing result in very low realization or at times disastrous sale. Unless we address the problem of marketing we cannot really make NTFP collection a reliable source of income. Tribal Development Cooperative Corporations (TDCCs) are expected to protect the tribal communities from exploitative middlemen and traders, but they are not in a position to buy the entire produce in order to command the price of that commodity. The other concept is closely related to the above – though commercial crops have support prices, the most perishable items like NTFPs do not have any such support. Perhaps this is because the tribal communities who collect the NTFPs are total dependents on the generosity of successive governments and do not belong to the vocally strong sectors. One could easily notice that the people who are vulnerable to environmental degradation are from the same sectors that have been discouraged from utilizing the resources efficiently based on their own knowledge gained over time. The present arrangement of self-help approach to resource utilization is in fact creating conflict between various implementing agencies, ultimately affecting the members of the self-help groups.

INTRODUCTION

Poverty alleviation should be an essential part of efficient utilization of resources since socially vulnerable sectors will be economically unprepared to participate in nation building in its true sense. Only active partners can realize the responsibility of conserving and utilizing the resources in an optimal way. Optimal utilization and equitable distribution of assets among its citizens is the hallmark of efficient administration.

Poverty in a developing country is therefore the result of under-utilization or inadequate access to natural resources. Rural Poverty is the result of under-utilization due to environmental degradation and tribal poverty is the result of inadequate access to resources. In the process the medium (i.e. the administration) has gobbled up the message (of development and empowerment). Proliferation of programmes has perpetuated poverty, and now poverty alleviation is an industry by itself. Poor have been reduced to mere raw material for the formation of successive dispensations irrespective of their colour.

NTFP IN POVERTY ALLEVIATION

The tribal areas, though widely known as regular source for most of NTFP commodities and the tribes depend on NTFP for their sustenance, there is no substantial market development for the NTFPs. Open market forces are playing havoc with tribal economy.

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The TDCCs continue to have a significant role in the tribal economy as they procure major quantities brought by the tribes offering best possible prices irrespective of their demand and supply positions even in extreme market conditions. The trading of NTFP commodities by TDCCs is expected to achieve:

- Monetary inflow into tribal economy
- Significantly higher prices and income for NTFP collectors.
- Gradual stabilization of prices in the market preventing all vagaries of supply and demand conditions.

A glance at the prices paid by Girijan Cooperative Corporation (GCC) would reveal that the policy of TDCCs is to ensure reasonable prices and insulat the tribes from wild market fluctuations. The purchase prices paid by GCC during the last five years are given in Annex I. In contrast, the private traders purchase only certain NTFPs in a limited quantity of selected quality by offering occasionaly higher prices. In order to protect the interest of NTFP collectors and provide remunerative purchase prices, the TDCC needs to maintain the price line without making downward revisions in the purchase prices even when there is a significant downward trend so as to ensure steady income to all the tribal NTFP collectors across the state. The resultant loss is being borne by TDCC from thin margins generated on sale of other NTFP commodities. A glance at the purchase prices paid for the 25 NTFP items handled by GCC would give us a clear picture on market trends and fluctuations in the prices of NTFP. There are about eight NTFP items like gums and resins, tree born oil seeds and honey shikakai, where GCC can expect margins. Whereas bulk commodities like tamarind, myrobalans, marking nuts, soapnuts, and gum dikamal, the GCC has to react according to market fluctuations either by downward revision of purchase prices or by incurring losses.

Procurement of tamarind

Tamarind is the single largest bulk NTFP commodity, and as many as 100 000 families of coastal districts of Andhra Pradesh depend on tamarind collection for their livelihood. Hence GCC procures as much as possible and tries to pay remunerative purchase prices year after year and make efforts to dispose stocks through negotiations, auction cum tenders, value addition for retail sales, etc. (Table 1).

Table 1. Seeded tamarind procurement and average purchase prices for 1995 to 2003

Year	Quantity (Qtls.)	Value (100 000 Rs)	Average purchase price (Rs)
1995	29 900	130.14	433
1996	56 906	293.60	515
1997	65 038	330.60	516
1998	33 610	183.62	546
1999	44 833	317.29	707
2000	51 500	385.92	750
2001	146 787	846.74	578
2002	33 731	124.25	368
2003	50 000	200.00	400

The above figures clearly show GCC's commitment to pay remunerative purchase prices year after year up to year 2000. During 1999 and 2000 seasons, GCC has entered into an advance tie up with Tribal Marketing Federation (TRIFED) for marketing of tamarind and paid Rs. 650 to 750 per quintal in 1999 and 2000 seasons. Despite a glut in market for tamarind, in order to maintain the price stability, GCC has paid around Rs.600 per Qtl during 2001 season and procured 146 000 Qtls of seeded tamarind and efforts are being continued to dispose of the stocks. During subsequent years, GCC was forced to revise purchase prices downward during 2003 season to act according to market conditions and the tribal communities were deprived of support prices.

Procurement of Myrobalans

Myrobalans is another major NTFP collected by a 100 000 tribal communities to a tune of 20 000 Qtls per annum on average. The principal user is the leather processing industry. Based on the market trend, the GCC is paying remunerative purchase prices to the tribal communities and the marketing efforts are being made to sell the product to different user industries through auctions and tenders. Due to the availability of synthetic substitutes in leather processing industry, the usage of Myrobalans has come down drastically. Now virtually there is no market. The GCC is forced to cut down the purchase prices to keep in tune with discouraging market conditions.

Constraints in the disposal of other NTFPs

The other commodities like markingnuts, soapnuts and mohwa seed and gum decamali, also experience inconsistency in sale due to violent market fluctuations, government policies, seasonality, heavy influx, etc. TDCC has to act according to market situations, revising purchase prices upward or downward. This is often leading to unrest among the tribal community But there is no mechanism to pay steady prices to all NTFP items to ensure their earnings by assuring at least the price paid in the previous year (Table 2).

Table 2. The trends of purchase prices of some commodities during 1999–2003

Year	Markingnuts	Soapnuts	Gum dikamali	Mohwa seed
1999	300	1100	1000	1000
2000	300	1200	1000	700
2001	200	1200	1700	650
2002	200	600	1500	900
2003	250	800	1100	–

Need for minimum support price for NTFPs

In light of above, till the tribal economy is geared up and empowered with requisite knowledge base, the GCC has proposed to the Government of India to implement a national policy on NTFP trade providing minimum support prices for all NTFPs. In the absence of such policy, the tribal communities are deprived of opportunities in terms of increased purchase prices. The Minimum Support Price (MSP) mechanism prevailing for agricultural produce and which is benefiting the farmers should also be extended to tribal NTFP gatherers, as they are the poorest of the poor.

Developing NTFP trade to eradicate poverty

Collecting NTFP is not only a traditional activity of tribal communities as means of livelihood but also could be an effective instrument of eradicating poverty. In this context there are three concepts that worth examining further.

Creating markets so as to command a price

Though NTFP has value as economic goods, the market imperfections result in very low realization or at times distressed sale. Unless we address the problem of marketing we cannot really make NTFP collection a reliable source of income. Apart from innocence on the part of the tribal communities, grinding poverty compels them to dispose off the produce at whatever rate it fetches. Further, the very nature of the produce compels them to dispose it off as early as possible. This vulnerability is exploited by the buyer. TDCCs are expected to protect the tribal communities from exploitative middlemen and traders, but they are not in a position to buy the entire produce due to financial constraints. Unless the entire produce is controlled by the TDCC it cannot command the price of that commodity. Unfortunately TDCCs have become one of the buyers instead of emerging as the sole buyer. This has continued the strangle hold of local traders on the NTFP market. Even the TRIFED whose objective is to develop markets for NTFP, has become one of the TDCCs at national level. Fortunately it is now seriously thinking of reorienting itself to market development.

Recognizing the right to support price as creation of market for NTFP

The other effective measure could be to ensure support price but most perishable items like NTFP do not have any such support. Perhaps this is because the tribal communities who collect the NTFP are dependent on the generosity of successive governments. Since tribal communities do not command the recognition that the vocal sectors get, their labour also does not get the value it deserves. Over the years this situation is further worsened as the tribal communities are made more dependent on the doles of the government.

Perspective planning based on traditional wisdom

One could easily notice that the people who are vulnerable to environmental degradation are from the same sectors who have been discouraged from utilizing the resources efficiently based on their own knowledge gained over time. Peasants who are dependent on agriculture, artisans whose activities are centered around agriculture, fishermen dependent on water, tribal communities dependent on forests have not been given any meaningful role either in the conservation of the resources or their optimum utilization. With increasing

degradation of our natural resources these sectors have become victims of socio-economic discrimination. Disuse of minor irrigation sources, especially the small tanks, is the result of negligence on the part of administration and recurrent natural calamities either in the form of drought or untimely rains. Rural economy has been completely destabilized with the gradual disuse of minor irrigation sources.

In order to alleviate rural poverty with special reference to tribal communities we need to have a two-pronged approach:

- Respectable and meaningful role to the local communities in the conservation of resources; and
- Marketing strategies to generate income through value addition to local resources.

The current state of participation of local communities as stake holders/ users groups is not satisfactory, since they are still apprehensive of their role and status in the conservation and utilization of resources. They are still treated as beneficiaries under one or the other programme which gets them some temporary monetary benefits. It is necessary, therefore to create awareness among them about the need for a perspective plan based on native wisdom and local knowledge.

The present arrangement of self help approach to resource utilization is in fact creating conflict among various implementing agencies, ultimately affecting the members of the self help groups. At times the members are of the opinion that the institutional network created in the past is an obstacle. This view is the result of fragmented visions of various government departments aiming at reaching the goal of alleviating rural poverty all by themselves.

TRIBAL ECONOMY IN ANDHRA PRADESH – THE ROLE OF GCC

In Andhra Pradesh, the government has established GCC in 1956 for socio-economic uplifting of tribal communities in the state with the following objectives:

- To ensure remunerative purchase prices for the NTFP collected by the tribals from the forests of Andhra Pradesh.
- To ensure availability of essential commodities even in the interior agency areas through a network of DR depots.
- To provide support to the tribal communities in their agricultural activities through extending credit facilities.

The government vested GCC with monopoly rights on 25 NTFP (Annex II) commodities available in the forests. The primary purpose of having state control on NTFP is to ensure competitive price to tribal gatherers on one hand and keeping the rampant exploitation by private traders under check on the other. With the help of monopoly rights for NTFP items and guidelines issued by government on pricing policy, GCC is purchasing entire quantities of NTFP from tribal communities irrespective of their commercial viability and efforts are being made for disposal of the stocks.

Concentrating on certain NTFP

Though there are many commodities collected by the tribal communities only certain NTFP has continuous demand. Buying all the NTFPs with shrinking markets because of substitutes would result in locking up of meager financial resources. This would compel the TDCC to decrease the purchase price or abandon the purchase of the NTFPs in the following year. In order to utilise the financial resources effectively GCC is concentrating on certain NTFPs, which have market, at least within the country such as gums, honey, shikakai, soapnut, nuxvomica, pungamseed, naramamidi bark, hill brooms, sugandipala, and mohwa seed.

It would be appropriate for TDCC to become the sole buyer of these commodities. Similarly, all TDCCs should concentrate on certain NTFPs that have market in that state. Further TRIFED has to develop markets for at least 25 kinds of NTFPs either at national level or international level. Initially, these 25 kinds should be given support prices so that the tribal communities would be assured of reasonable income.

Increasing the quantum of procurement

As many primitive tribal groups (PTGs) are still totally dependent on NTFPs, increasing the quantum of procurement is giving them employment at least for nine months a year. Procurement of NTFPs from drought prone areas like Rayalaseema has become a continuous activity throughout the year.

Identification of new NTFPs for sustainable income

Recent shift to herbal medicines and increasing demand for natural products resulted in growing dependence on forests, the rich source of these herbal plants. However, due to unorganized exploitation, most of these species are either degenerating or under threat from external environment. GCC has made some organized efforts in this new area.

With its long time experience in handling and marketing NTFPs, GCC can take up the procurement and can become dependable supplier of medicinal herbs too. GCC foresees tremendous business potential as a continuous source of income. GCC plans to train tribal communities in the identification, collection and handling of herbal plants to prevent wrong handling and over exploitation. GCC organises training programmes for field staff and tribal farmers on the identification of plants, hygienic handling, techniques of shade drying, preserving, packing and transporting the material.

The GCC has carried out a quantitative resource survey in East Godavari District to scan and quantify medicinal herbs in these areas. As many as 210 medicinal herbs (plants and tree species) were identified and their average densities determined. Of these 210 items, 42 medicinal plants were found having high economic value, which would help to increase the income level of the tribal communities if collection was permitted.

Medicinal Herbs Department, with a library and a herbarium, was established at GCC's Corporate Office to identify the species and to liaise with divisional offices for procurement and marketing.

Depending on the availability of herbs in A.P. forests and the demand, GCC has been requesting the government for extending the monopoly rights for procurement of herbs.

The role of forest department

The Rayalaseema tribal area is inhabitated by two Primitive Tribal Groups (PTGs), Chenchus and Yanadis. This region is a drought prone area. The PTGs are mainly depending on collection of medicinal plants and selling them in the open market stealthily, since there is no agency equipped with suitable system for encouraging the collection and marketing of medicinal plants. The existing enactments are causing problems to the PTGs in the collection of medicinal plants. In this situation the middlemen are operating invisibly and getting the benefit. In view of the above it has been proposed that GCC be allowed to procure medicinal herbs from PTGs.

Based on the findings of the quantitative resource survey, GCC could assist in collection and marketing of medicinal plants in East Godavari district. GCC is procuring 25 items of MFP in the tribal area on monopoly basis since1956. GCC and forest department are cooperating to serve the tribal communities for increasing income level by regularizing the procurement and marketing of medicinal plants.

Forest department shall promote cultivation of medicinal plants in coordination with divisional managers of GCC in phases replacing the commercial crops, with the financial aid of Integrated Tribal Development Agency (ITDAs). GCC and forest department in joint coordination with ITDAs shall promote the regeneration of high valued species of medicinal plants as part of Vana Samarakshana Samithis (VSS) activity.

The forest department is promoting people's organizations known as VSS, for preservation and conservation of forests. The forest department has promoted the concept of VSS not only for providing avocation but also to ensure the people's participation. While enlightening them in regular meetings, the VSS members may be encouraged to put main thrust on plantation, nursery raising, preservation and procurement of medicinal plants, which would pave way for generating more income to tribal communities. The forest department may extend its helping hand in identification and training of the tribal members for promoting medicinal plants and marketing.

Role of the government

The effective implementation of regeneration programme is only possible with the intervention of the Government and inflow of funds. Meanwhile GCC made a provision of Rs.3 million exclusively for the purpose of raising nurseries of other NTFP and requested ITDA and TRIFED for a matching contribution. A similar proposal was also made to Government for release of Rs.200 million so that Rs.30 million can be earmarked exclusively for regeneration programme.

Forward sale

In order to stabilize the price of NTFPs, GCC is now going for advance sale agreements with the buyers. This ensures the sale of commodities with better purchase prices to the NTFP collectors. The purchase price is decided on the basis of sale price offered by the prospective buyers. An additional benefit of this system is that the funds can be utilized efficiently. By utilising the sale proceeds new stock of NTFPs is being purchased, so that the locking up funds is avoided.

Processing centers and value addition

NTFPs as raw material cannot command a price due to its perishable nature whereas processed NTFPs could be stored for a longer period. Improving the shelf life will enhance the scope for processing large quantities of NTFP. Processing centres are set up for value addition that would fetch better price for NTFPs. There are processing centres for five kinds of NTFPs, honey, shikakai, soapnut, amla, tamarind and soap making.

Retail marketing of NTFPs

- ***New processing units***
  Value addition to NTFPs would realize better value than disposing them in raw form. With this concept, the GCC has established the following processing units to convert raw NTFP into ready-to-use products and steps have been initiated to market these products in branded form through a distribution network.

- ***Introduction of new products***
  To capture the full market potential for forest based value-added products, a new range of products has been introduced to the existing product line. The major thrust has been given to promote the sale of the following Girijan products in consumer packs: honey, turmeric soaps, neem soaps, flower tamarind, pulp tamarind, tamarind (deseeded & seeded), Shikakai powder, soapnuts, soapnut powder, amla powder, hill brooms, rajmah (red, white & kashmiri), white beans, and dry chilies.

- ***Improvement in retail sales***
  There is a steep rise in sales, recording 100 percent growth rate year after year from the financial year 1999 onwards. The following are the details:

Year	Performance (100 000Rs)
1999–2000	88.00
2000–2001	150.49
2001–2002	316.31
2002–2003	450.00

- ***Strengthening the distribution network***
  As many as 70 distributors are appointed in all the major cities and towns in Andhra Pradesh. GCC is also supplying the consumer products to welfare hostels, jails, endowments and PSU Cooperatives, etc.

- ***Brand building activity***
  All the products developed have been brought under the umbrella of "Girijan" brand name and marketed through distribution networks. Campaigning activity through various promotional media to complement the retail efforts is in progress. This has enhanced the corporate and product image among the public and consumers.

Regeneration programme

GCC has taken up regeneration of important NTFP species in the forest areas of north coastal districts of Andhra Pradesh with a total outlay of Rs. 4980 000. The implementing agency is the AP Forest Department. Advanced operation and nursery rising of ten important NTFP species in these districts have been completed. Plantation work is in progress at Visakhapatnam district.

Training to NTFP collectors for quality control

Imparting training to tribal communities on a continuous basis is in progress for the last ten years on scientific collection of NTFPs. This has resulted in improving the quality and realization of higher sales value. Adoption of new techniques in tapping the gum karaya has led to increase in the quality yields and in turn passing on higher purchase prices to tribal communities from Rs. 30 per kg to Rs. 125 per kg.

CONCLUSION

- Socially vulnerable sectors will be economically weak and naturally unprepared to participate in the developmental programmes.
- Tribal poverty is due to inadequate access to natural resources.
- Creating markets should be the aim of the governments so as to command reasonable and sustainable prices.
- Recognizing the right for support price is a step towards creating market for NTFP.
- Perspective planning based on traditional wisdom and sustainability is needed.
- Concentrating on selective NTFPs that have continuous demand is the need of the hour.
- TRIFED should develop markets for at least 25 kinds of NTFPs in the country.
- Value addition and processing centres should be developed on a large scale.
- Retail marketing of NTFPs is an effective outlet.

ANNEX I

PURCHASE PRICES (RS. PER QUINTAL)

Commodity	1998–1999	1999–2000	2000–2001	2001–2002	2002–2003
Gum Karaya – I	10000	11000	12500	12500	12500
Gum Karaya – II	7000	7500	9000	9000	9000
Gum Karaya – III	5000	5000	6000	6000	6000
Gum Tiruman – I	3000	3000	3000	5000	5000
Gum Tiruman – II	2000	2000	2000	3500	3500
Gum Olibanum – I	2400	2500	2500	2000	2000
Gum Olibanum – II	2000	2000	2000	1500	1500
Gum Kondagogu – I	10000	10000	10000	10000	10000
Gum Kondagogu – II	6000	6000	6000	6000	6000
Gum Kondagogu – III	4200	4200	4200	4200	4200
Gum Dikamali	1000	1000	1000	1500	1100
Nuxvomica	375	300	500	550	1000
Shikakai	475	500	900	1000	1200
Amla pulp	700	700	2000	2000	2500
Maredueddalu	800	1000	1400	1500	1700
Hill brooms	900	900	900	1200	1300
Cleaning nuts	400	400	400	400	800
Wild brooms	1100	1100	1100	1100	1200
Mohwa seed	1000	700	650	900	–
Rock Bee Honey	3000	4000	4000	4000	4500
Apiary Honey	3500	4000	4000	4000	4500
Mohwa flower	400	350	350	400	400
R.S.Roots	4000	4000	5000	5000	5000
Seeded tamarind	650	700	600	400	400
Deseeded tamarind	1500	1500	900	900	600
Pungam seed	375	500	450	525	550
Markingnuts	300	300	200	200	250
Naramamidi bark	1200	1200	1900	2000	2000
Bees wax	5000	5000	7000	7000	7000
Adda leaf	250–500	250–350	350	350	350
Soapnuts (Forest)	1100	1200	1200	600	800
Soapnuts (Akkaram)	1200	1500	1500	1200	1200
Tamarind seed	200	300	150	200	250
Myrobalans	400	700	700	300	150

ANNEX II

THE LIST OF NTFP ITEMS UNDER LEASE AGREEMENT WITH GCC A.P.

Local Name	Botanical Name
Addaleaf	*Bauhinia vahli, Imblica officinalis*
Hill brooms	–
Wild brooms	–
Shikakai	*Acacia concinna*
Amla fruit & seed	Indian goose berry
Cleaningnuts	*Strychnos potatorum*
Chiranji	–
Rock bee honey	–
Apiary honey	–
Kusum oil seed	–
Myrobalans	*Terminalia chebula*
Mohwa seed	*Madhuca longifolia*
Mohwa flower	*Madhuca longifolia*
Markingnuts	*Semecarpus anacardium*
Nuxvomica fruit & seed	*Strychnos nuxvomica*
Pungam fruit & seed	*Pongamia glabra*
Naramamidi bark	*Polyalthia longifolia*
R.S. roots	*Rovwelfia serpentina*
Soapnuts	*Sapindus emerginatus*
Rella bark	*Cassia fistula*
Bees wax	–
Gum karaya	*Sterculia urens*
Tamarind (shell, seeded, deseeded, green, seed)	*Tamarindus indica*
Teripods	
Sugandhipala	*Hemidesmus indicus*

17 Forest for poverty alleviation: Chhattisgarh experience

R.C. Sharma*

ABSTRACT

Poverty is a multidimensional complex phenomenon. Apart from the macro economic problems, the degradation and restricted access of the poor to the available material and environmental assets also fundamentally trap the poor in their circumstances. There is an urgent need to revisit the forest–poverty nexus because forest ecosystems are capable of offering interesting opportunities and security nets for poverty alleviation. By targeting on a broad range of goods and services in terms of physical, material, human, social and environmental assets in conjunction with appropriate entitlement regime, Chhattisgarh Forest Department has envisioned People's Protected Areas (PPA), as a proactive and people's friendly matrix for poverty alleviation, sustainable forest development and bio-cultural diversity conservation, which can work as poor people's pool of assets for meaningful poverty alleviation. In Chhattisgarh 32 PPAs, extending over nearly 500 000 ha covering more than 300 villages, have been established as models of "conservation through use" for addressing core concerns of livelihood security with integrated ecosystem approach. The New State Forest Policy and Resolutions with built-in equitable benefit sharing mechanism are motivating forests dwellers to become curator and custodian of their bio-cultural habitat.

INTRODUCTION

The ever increasing anthropogenic pressure and archaic managing institution on forests, particularly in tropical countries, have led to depletion of the vegetation, land degradation, distortion of hydrological cycle and consequent decrease in productivity resulting in poverty and misery. Problem becomes acute in forest fringe areas where there is neither enough land fit for cultivation nor industries to provide employment. Due to disadvantaged geographic location (DGL) syndrome, Human Development Index (HDI) is at its lowest in these areas. People still practise primitive subsistence agriculture with very low productivity and to meet their growing food grain requirements they opted for more extensive cultivation including shifting cultivation or encroachment in forest areas. Degradation of forests as a result of exploitation for fuelwood and illicit felling of trees is yet another facet of the same problem. In this process steep slopes and areas unfit for growing of annual crops are brought under the plough, creating near ecological disaster.

The water-balance in the situation described above is totally upset by the destruction of vegetation. Distortion of the hydrological cycle and consequent decrease in productivity per unit area leads to enhanced poverty and misery. Poverty and illiteracy coupled with malnutrition are again the main causes of increased population growth, which further accentuate the natural resource degradation process. Thus poverty in these areas becomes both the cause and the effect of natural resource degradation (Sharma 1999).

It is a debatable point whether poverty with its pressure to survive or affluence with its pressure to consume leads to environmental degradation but it is more than obvious that poor people cannot be signatory to conservation if it is in conflict with their survival needs. The 21st century challenge is to facilitate a devolution

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of greater authority to forest-based communities while minimizing conflicts, and to support new partnership among communities, government and the private sector to ensure the meeting of community needs, forest resource conservation and sustainable use. Clarifying forest use rights and responsibilities and creating adaptive policies and programmes that allow for intensified access controls can lead to more sustainable forest management. This requires appropriate institutional arrangements (Poffenberger 1996).

The fundamental role of forests in national development, poverty alleviation and food security has again been recognized at the World Food Summit (WFS 1996) and (2002), the United Nations Millennium Summit (2000) and the World Summit on Sustainable Development (WSSD 2002), where in following priorities for action have been identified:

- Developing the contribution of forests and trees to poverty alleviation and food security by (i) securing subsistence needs; (ii) generating income and provision of forest inputs and services to non-forest income generating activities; (iii) raising the bargaining power of the poorest people through better access to natural capital assets; and (iv) reducing vulnerability to environmental and economic shocks.
- Enhancing the provision of essential public goods by forest and trees by recognizing the multiple benefits of forests to protect watersheds, mitigate climate change and act as reservoirs of biological diversity.

For the Asia-Pacific region poverty is a serious concern. The twin problem of rural poverty and continuing degradation of forest are posing a real challenge. Therefore in this paper the role and potential of forest sector in reducing poverty will be examined in terms of identifying the opportunities and capturing and strengthening them by revisiting the fragile link and vexed issues between the ecological security and livelihood security of the dependent people. During this journey we will try to learn the ABC of forestry (where "A" stands for appropriate entitlement regime, "B" for benefit sharing arrangement and "C" for conservation) because our strong belief is that to reach "C", we have to move through "A" and "B" sequentially. Finally, a proactive and people friendly framework with actual operational modalities and lessons learned from the newly created state of Chhattisgarh, India, will be cited which is a modest attempt to reconcile the dichotomy of threat perceptions arising out of conservation-development orthodoxy by taking into account the human sensitivities in terms of the felt needs of the people, their social norms, beliefs and systems borne out of history, culture and traditions.

SETTING THE SCENE

Poverty is a complex phenomenon. Apart from the macro economic problems, the degradation and restricted access of the poor, to the available material and environmental assets also fundamentally trap the poor in their circumstances. Poverty in turn leads to further degradation of the natural assets and circumscribes the limited access the poor have over the natural resources. This constitutes the vicious circle of poverty particularly in the resource rich but underdeveloped areas with undefined and inequitable access of the poor to the common property resources.

Chapter 3, Agenda 21 of the Earth Summit (1992), reiterated that to provide all persons urgently with the opportunity to earn a sustainable livelihood there should be an integrating factor that allows policies to address issues of development of sustainable resource management and poverty eradication simultaneously.

Livelihood security

A livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living: a livelihood is sustainable which can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes nett benefits to other livelihoods at the local and global levels and in the long and short term. Accordingly, sustainable livelihood approach permeates the entire concept of People's Protected Area.

As a corollary to this, to begin with, food security, health cover and dependable wage labour become areas of prime concern. Goods and services from the forest ecosystem more importantly non wood forest products (NWFPs) originating from diverse sources ranging from large plants to micro flora consisting of heterogeneous products, constitute a critical life line for poor forest dwellers by providing family sustenance and livelihood. Due to their recurrent availability on annual/seasonal basis and immense socio-cultural, economic, environmental and industrial development potentials, NWFPs hold a promise for developing interesting mechanism for sustainable livelihood.

Food security

Food security envisages adequacy, stability as well as economic and physical access to food to all people at all times. There may be enough food but if the poor don't have access to it, the food security will not be complete.

Besides ameliorating the soil and water conservation regime, which adds substantially to the enhanced agricultural food production, forest products reinforce the food security in many ways. Human history corroborates that forests have always been a source for large number of non-wood forest produces which directly contribute to the food basket of the people in form of edible fruits, flowers, gums leaves, roots, tubers etc. During lean agricultural season, even the agricultural communities supplement their food requirement from the forests. Furthermore, income generated from sale of surplus NWFPs enables the poor to have access to food.

In the Indian rural context where mixed farming is in vogue, cattle are important component of the socio-economic set up. In the complex chain of food web, cattle are secondary food producers too. They derive their food from the forests, which they convert into animal proteins in form of milk, fat, meat and other dairy products to be used by human beings. Although excessive grazing pressure, more importantly the one beyond the carrying capacity, has been viewed as a constraint by foresters, PPA endeavours to accommodate multiple use of natural resource on sustainable basis so that food resources are available to the people as well as cattle.

Health cover

Forest have been source of invaluable medicinal plants since the time man realized the preventive and curative properties of plants and started using them for human health cover. Even when no synthetic medicines existed, our forefathers had been depending on herbs and medicinal plants and their derivatives to cure common ailments. Our age-old traditional Indian System of Medicine (ISM), one of the most ancient medicine practices known to the world, derives maximum of its formulations from plants and plant extracts that exist in the forests.

The general forest degradation process adversely affects the resources base of medicinal and herbal plants both in terms of quantity as well as quality. Rural poor, whose dependence on these products is very heavy, are the worst sufferer. The problem is compounded by market demand driven harvesting without any concern for regeneration and conservation. In this process essential regenerative component of a plant like bark, roots flowers and fruits are indiscriminately collected leading to degradation and depletion and even demise of particular species, if proper remedial measures are not taken. Many important medicinal plants like *Rauvolfia serpentina*, *Curcuma caesia, Dioscorea* spp., *Chlorophytum* spp., etc. are becoming rare and some of them are critically endangered. It is estimated that 10 percent of all plant species and 21 percent of mammal species are currently endangered in India.

Augmenting rural employment

Land and water are two most important natural endowments but they are finite. However, with judicious mix of interventions like development of irrigation facilities, application of improved and modern agricultural practices and creation of other income generation activities based on non-destructive use of locally available natural resources, the possibilities of creating dependable wage labour can be enhanced. The initial entry point activity would be to create awareness among the local people about their latent strength, availability of natural resources and potential of using them on sustainable basis by technological up gradation. Broadly, this may be achieved by developing the hardware of the system comprising of physical activities eg. water harvesting structures, drinking water facilities, common facility centers, village level processing units, storage units etc. On the other hand, interventions like raising awareness, bridging credibility gap, confidence building, soliciting meaningful participation of the local communities and empowering them, creating income generation opportunities through skill development etc. would constitute the software of the system.

Keeping in view that for the poor communities, economics precedes ecology and conservation and in tune with their priority, there has to be sharp focus on productivity enhancement so that they can reap better economic returns. For those who possess land, a programme is initiated to upgrade the productivity of the agriculture system by land shaping, constructing stop-dams, tube wells and making available to them other inputs for better crop, husbandry practices, so that the land under rain fed condition is transformed into double cropped or in certain cases even triple cropped land. Enhancing the productivity of the land provides good harvest as well as gainful employment round the year. All these on-farm activities can be adopted as a package for improving the socio-economic conditions of the people who otherwise practise subsistence agriculture. For landless persons off-farm activities leading to income generation can be devised by using

forest biomass and other resources. In the first category, activities like NWFP collection, rope making, honey collection, nursery etc can be considered, whereas in the latter category schemes like, mushroom cultivation, shop keeping, grocery, etc. can be envisaged (Sharma 1997).

NWFPs, with their attendant instrumentalities, play a meaningful role in bringing sustainability to the system because the employment generation from these enterprises is around 20 million man days per year, which is approximately half of the forestry sector. NWFP related activities take care of both the unemployed as well as underemployed and NWFP based small scale enterprises can further strengthen the linkage of the socio-economic base on account of:

- Low capital and low energy requirements.
- Proper utilization of local renewable resource and technological know-how.
- Checking migration from rural to urban areas; and
- Being a family activity it provides satisfaction of "creation".

These are some of the illustrative and by no means exhaustive interventions, which can provide a conducive environment for socially acceptable and dependable wage labour.

To translate this premise, the concept of People's Protected Area (PPA) has emerged which by targeting on broad range of goods and services in terms of physical, material, human, social and environmental assets in conjunction with appropriate entitlement regime, PPA envisions a proactive and people's friendly framework so that it becomes people's pool of assets for meaningful poverty alleviation and their enhanced well being alongwith conservation.

A NEW STATE IS BORN

As per provisions of the Madhya Pradesh Reorganization Act, 2000, a new state of Chhattisgarh was born on 1st November 2000. The 16 districts of erstwhile Madhya Pradesh spread over an area of 135 000 km^2 constituted the new state. The state has rich endowment of natural resources in terms of minerals, forests and water bodies. Important mineral deposits are of iron, coal, bauxite, uranium and diamond. The state has a forest cover of around 44 percent, which represents diverse tropical flora and fauna. Mahanadi, Shivnath, Son, Arpa, Kharoun, Hasdeo and Indrawati are the main rivers. With an average annual rainfall of 125 cm. the state produces some of the best rice varieties and hence aptly christened as "Rice Bowl" of the country.

With the population of slightly over 20 million people, Chhattisgarh has got a high proportion of scheduled castes (SCs) and scheduled tribes (STs). Whereas for the country as a whole the SCs and STs population is 23.6 percent, in Chhattisgarh the combined population of SCs and STs is 44.7 percent, consisting of 32.4 percent of STs and 12.3 percent of SCs.

The state has around 20 000 villages of which 9500 villages are forests adjacent, which have more than half of the population belonging to tribal groups. *Gonds* form the largest proportion (55 percent) of the tribal population. The tribal and other backward classes are concentrated in the hilly southern and northern districts where the hillocks are covered with forests. Most of the SCs are located in the central and north central parts of the state, particularly in the districts of Raigarh, Kawardha, and Mahasamunda.

Chhattisgarh has got 59 772 km^2 of forests, which have been classified as sal, teak and miscellaneous forests including bamboo forests. Some of the best sal forests of the country are in this state. Apart from timber, these forests provide many non-wood forest produce (NWFP) like tendu leaves, sal seeds, mahua flower and seeds, amla, harra, gum, lac, tamarind and mahul leaves, etc. Besides these, several important medicinal plants are also found here. These non-wood forest produces are important source of income and also serve as food supplement during famine and scarcity, which are quite recurrent in this area. More than 50 percent of the people living in and around forest area depend for their subsistence on forests. Furthermore, forests find a place in the rich socio-bio-cultural matrix of the local populace. It is against this background that Chhattisgarh has enunciated a new state forest policy (CGSFP) 2001, with the following main objectives:

- Unlocking of the vast array of forest resources on sustainable basis for enhanced well being of local people by converting these open access resources (OAR) into community controlled, prioritized, protected and managed resources.
- A shift in accent from major to minor forest produces, from crown to multi tier forestry and from flagship species to smaller denizens of the forests.

MAHANADI PROTECTED AREA (MNPA)

To reconcile the conservation-development orthodoxy, the concept of People's Protected Area (PPA) has emerged which by targeting on a broad range of goods and services in terms of physical, material, human, social and environment assets in conjunction with appropriate entitlement regime, envisions a proactive and people's friendly framework so that it becomes people's pool of assets for meaningful poverty alleviation and their enhanced well being alongwith conservation.

The People's Protected Areas delineate sites containing predominantly unmodified natural systems, under management to ensure the long term protection and maintenance of biological diversity, whilst providing at the same time a sustainable flow of natural products and services to meet local community needs.

While JFM has been perceived as a forest department programme in which people participate, PPA involves a paradigm shift from forest management to integrated eco-system management in which socio-economic well being is the goal and forests are viewed as a means to achieve it. Moreover JFM is process oriented and does not lend itself to becoming a target and product oriented programme (Saxena 1997).

Furthermore PPA makes liberal use of social capital, which includes norms of trust, reciprocity and network that facilitate mutually beneficialy cooperation in community. The affirmative social capital acts as a catalyst to promote sustainable forest management as well as socio-economic development of the people (Anderson 1998).

To translate above premise, 32 PPAs each extending over 15 000 to 20 000 ha covering more than 300 villages, have been established as a model of "conservation through" use. Thus every forest division in the State has one People's Protected Area. It is proposed to extend the coverage gradually to other forests of the State.

Goal of MNPA

The area identified under MNPA is inhabited mostly by poor forest dwellers including tribals and other Primitive Tribe Groups (PTGs). In spite of more than 50 years of planned economic development in the country, positive aspects of the same have not percolated down to these areas. The human development index (HDI) in these areas is therefore very low. Under this scenario the primary goal of the MNPA is:

- creating a hunger free zone.
- preventing distress migration from this area; and
- ensuring job opportunities to every capable person.

Further, the MNPA will focus the highest level of conservation efforts for protecting the pure and wild germplasm of the wild buffalo, the "state animal", besides tiger. MNPA will also focus on conservation of natural features, habitat/species management, i.e conservation through active management, protected landscapes and sustainable use of natural ecosystems.

Learning from the experience of Asian economic miracle of rapid growth with reduced inequality, mechanism will be developed for transmitting the gains throughout the economy and particularly to the poor.

Focusing on the role of water as a precious and finite resource, which has a direct relationship with the food security, livelihoods and human health, MNPA endeavours to understand the relationship between forests and freshwater and to manage the forest for sustaining the productivity of uplands without affecting the soil and water on which they depend. It has become all the more important because more than 3 billion people on earth do not have access to clean water. Of the more than 3 million deaths that are attributed to polluted water and poor sanitation annually, more than 2 million are children in developing countries.

Area and location map of MNPA

The total area of MNPA is 516 000 ha encompassing 572 villages falling in Dhamtari and Raipur districts of Chhattisgarh. The details of the forest area and number of villages in division/range is given in the following table:

Division	Range	Forest village	Rev.e village	Total village	Forest area in km^2				Tot. revenue area in km^2	Tot. area in km^2
					R.F.	P.F.	Orange area	Tot. forest area		
Dhamtari	N. Singpur	6	53	59	233.67	1.86	0	235.53	846.46	
	Keregaon	6	42	48	203.7	20.64	0	224.34		
	Dhamtari	3	67	70	78.01	44.9	0	122.91		
	S.Singpur	5	18	23	245.25	1.82	0	247.07		
	Dugli	7	0	7	207.79	0	0	207.79		
	Birgudi	17	82	99	192.9	0	0	192.9		
	Nagri	10	21	31	181.25	0	0	181.25		
	Sankra	4	23	27	155.2	0	0	155.2		
	Sitanadi (S)	10	0	10	261.57	0	0	261.57		
	Risgaon (S)	19	8	27	296.98	0	0	296.98		
E. Raipur	Gariaband(Part)	0	35	35	0	158.25	4.16	162.41	575.85	
	Nawagarh	1	22	23	0	236.79	10.22	247.01		
	Dhawalpur	2	24	26	0	256.96	0	256.96		
Udanti	Mainpur	0	31	31	0	218.08	14.6	232.68		
	Kulhadighat	2	7	9	0	231.37	0	231.37		
	Tauranga	5	29	34	32.16	209.97	0	242.13		
	Udanti (S)	1	12	13	109.94	137.65	0	247.59		
TOTAL		**98**	**474**	**572**	**2198.42**	**1518.29**	**28.98**	**3745.69**	**1422.31**	**5168**

VISION, VALUES AND MISSION

Vision

Network of People's Protected Areas (PPAs) as poor people's pool of assets for sustainable livelihood by unlocking forests for people through integrated ecosystem approach.

Values

- Highest respect and concern for people and their traditional knowledge.
- Care and share.
- Capacity building at all levels.
- Up gradation of local technologies including use of information technology.

Mission

- Community based participatory mapping and management plan.
- Appropriate resource assessment methodologies.
- *In-situ/ex-situ* conservation and propagation.
- Forests and freshwater.
- Non-destructive harvesting.
- Grading, processing, value addition, certification, eco labeling and marketing.
- Bio-cultural diversity conservation, biodiversity prospecting and bio-partnership.
- Ecotourism.
- Carbon Sequestration.
- Entrepreneurship development.
- Public–Private Partnership (PPP).
- Gender sensitivity.
- Equitable benefit sharing arrangements (BSA).
- Improved food security and health cover.
- Enhancement of social capital.
- Monitoring evaluation and people's indicator of SFM.
- Enabling policy and legal framework.

A multidisciplinary team, headed by a senior forest officer has been constituted and it is expected that the first preliminary report will be available by the end of this year, the contents of which will be firmed up in a seminar/ workshop of all concerned stakeholders and subject matter specialists.

FROM PROMISES TO PERFORMANCE

Creating enabling environment

The National Forest Policy 1988, the State Forest Policy 2001, the JFM Resolutions and directives as well as decisions of the Supreme Court of India provide the basic policy framework of PPA.

The legal framework for the People's Protected Areas flows from the Indian Forest Act 1927 and the 73rd Amendment of the Indian Constitution, viz, Provisions of the Panchayats (Extension to the Scheduled Areas) Act 1996, which *inter alia* provides for conferring the endowment of ownership rights of NWFPs on Panchayati Raj Institutions (village level institutions). In line with this, the state is endowing the ownership in consonance with the following principles:

- Harvesting of NWFP will be on non-destructive basis.
- The members of the *Gram Sabhas* will be free to collect NWFP for their own consumption.
- The Manner, frequency and intensity of NWFP collection for any use other than *bona-fide* domestic use by the members of the *Gram Sabhas* will be in accordance with the prescription of a management plan prepared by *Zila Panchayat* in conformity with the guidelines as may be notified from time to time.

Besides the remunerative wages paid to the NWFP collectors, the nett profit from the trade will be shared among the stakeholders on an equitable basis. Under the existing system of tendu patta (*Diospyros melanoxylon*) trade, the nett income generated by the collection and trade of tendu leaves is distributed in following proportion:

- 70 percent to the primary collectors.
- 15 percent for the development of NWFP and regeneration of forests.
- Balance 15 percent for infrastructure development/Cash Payment (CGFD 2003 a).

This modality aims at developing positive stakes of all concerned so that rather than working at cross-purposes, each one is motivated to contribute towards a common goal. The state has further developed an equitable benefit sharing mechanism for timber and bamboo also as evident from the salient features of various JFM resolutions given below:

- Every family of the JFM committees will be entitled to receive *Nistar* forest produces subject to their availability.
- All the forest committees shall be eligible to get 100 percent of the forest produces obtained from time to time, from mechanical thinning and cleaning of rehabilitated area and cleaning of bamboo clumps in degraded forests as per prescriptions of micro-plan/working plan, on payment of expenditure incurred on harvesting.
- Forest products equivalent to 15 percent of the amount calculated (of timber/bamboo) by deducting the expenditure incurred on harvesting (of timber/bamboo) from the total value of forest product or cash equivalent to that shall be given to the Forest Protection Committee (FPC).
- Forest produces equivalent to 30 percent of the amount calculated by deducting the expenditure incurred on harvesting (of timber/bamboo) from the total value of timber/bamboo obtained on final felling in plantation/rehabilitation of degraded forests, shall be given to the Village Forest Committee (VFC).
- Forest produce equivalent to 100 percent of the amount calculated by deducting expenditure incurred on borrowing capital (both cash or kind) and expenditure incurred on harvesting from the total value of timber/ bamboo obtained on final felling in plantation of degraded forests shall be given to the Village Forest Committee (VFC). The entire operation will be as per prescription of micro plan, prepared on location specific basis.

As a result of these benefit sharing arrangements (BSA), the forest dwellers have received around Rs. 600 million as their share form timber, bamboo and tendu leaves, besides wage employment opportunities to the tune of Rs. 1200 million.

Establishment of "herbal state"

- Chhattisgarh has been declared as "Herbal State".
- CG MFP Federation has prepared a comprehensive project for sustainable development, conservation and utilization of medicinal plants with active participation of locals including traditional *vaidyas*.
- A State Medicinal Plant Board has been constituted to formulate policy for medicinal plant resource conservation and sustainable utilization.

- An interdisciplinary task force has been constituted to prepare and implement the project.
- Herbal dispensaries are being established in interior forest areas.
- FRLHT (Foundation for Revitalization of Local Health Traditions), Bangalore, Shristi herbals, Raipur and other NGOs have been associated.
- Srishti Herbal University has been opened in the private sector.
- State Biodiversity Action Programme has been formulated.

Chhattisgarh State Minor Forest Produce (T&D) Co-op. Federation Limited

Chhattisgarh State Minor Forest Produce (Trading and Development) Cooperative Federation Limited (CGMFP Federation), Raipur, is an apex organization of approximately 2 million forest produce gatherers comprising 913 primary cooperative societies and 32 district unions. It is also the nodal agency for all aspects relating to management, development and trade of minor forest produce/non-wood forest produce sector in the state.

Under the three-tier cooperative structure the primary cooperative societies have been constituted with the membership of actual pluckers and chairman of the society is chosen from amongst the members only. At present there are over 10 000 collection centers spread over the length and breadth of the state and the annual turnover of the trade is over Rs. 2500 million. In line with the time tested philosophy of care and share and to ensure that harvesting of NWFP has essentially to be on a non-destructive basis, serious and concerted attempts have been made to convert these poor people from gatherers to owners. With proper research focus, sustainable harvest and appropriate utilization pattern including godowning, processing and marketing, the turnover from NWFP may cross even the Rs. 10 000 million mark a substantial sum by any standard for the rural poor.

The state has initiated appropriate measures through the CGMFP Federation for sustainable utilization and long term conservation of all NWFP found within the forests of the State. Some of the measures taken are:

- The rate for pruning (branch-cutting) was raised from Rs. 10 per standard bag to Rs. 20 per standard bag in order to improve the quality of tendu leaves as well as the earning capacity of the tribals and other economically backward communities.
- An amount of Rs. 292.7 million was distributed as bonus to the tendu patta collectors for the year 1998, (50 percent of the profit of Rs. 585.4 million).
- 30 percent of the profit i.e. Rs. 175.6 million was invested in the development of infrastructure in the rural areas and rest 20 percent of the profit i.e. Rs. 117.1 million was ploughed back to the development of forests.
- For the year 2001, out of the total profit of Rs. 445.15 million, Rs. 311.6 million (70 percent) was given back to the tendu patta collectors as bonus, Rs. 66.7 million (15 percent) was invested in the development of infrastructure development in the rural areas and Rs. 66.7 million (15 percent) was used for the development of the forests. This year about Rs. 450 million will be paid as incentive bonus, out of the profit of the tendu patta trade.
- 474 225 quintal of sal seed was collected in the year 2001 and an amount of Rs. 152 million was distributed to NWFP collectors. This year around Rs. 200 million will be disbursed to the sal seed collectors.
- State Government has delegated the powers of Registrar, Cooperative Societies, to the Executive Director of CGMFP Federations and Deputy Registrar to the Managing Director/DFO (Dist. Union), to create an enabling environment for the smooth conduct of business by the primary cooperative societies and the district union.

These interventions by the MFP Federation have led to increased assured wages to the NWFP gatherers in the interior areas where there are no employment opportunities otherwise. In this process, they got around Rs. 930 million in wages in the year 2001 alone. Series of such well-orchestrated interventions can substantially enhance the well being of the poor forest dwellers.

Integrated ecosystem approach

In order to formulate a people friendly framework for poverty alleviation, sustainable forest development and biodiversity conservation through integrated ecosystem approach, two models have been evolved namely 'Dhamtari Model' and 'Marwahi Model'.

Dhamtari model

Outcome of execution of a programme is determined not just by new policies but by institutions as well. Presently in the forest fringe the institutional framework responsible for developmental administration consisting of various line departments is not truly effective because there are no infrastructure facilities in the interior

areas and programme implementers look for softer options. Under these constraints, forest fringe areas suffer from disadvantaged geographical location (DGL). That is why the poverty map of the country approximately tallies with the forest map. It is in this context that an innovative development administration system should be thought of. Forest management, on account of their physical presence in those areas could be considered as practical alternate agency for facilitating, coordinating and in some cases even executing programmes of the line departments responsible for the socio-economic development. This agency can be designated as Forest Fringe Area Development Authority (FFDA).

The rural development funds for any administrative unit can rationally be divided between the existing agency and FFDA management as per the following formula.

If X is the number of the villages within the forest or 5 km of the forest (fringe area); Y is the number of villages outside the fringe area, A being the total funds available and B and C, the funds to be spent by the FFDA and DRDA respectively, then

$$B/A=X/(X+Y), \text{ and } A=B+C$$

i.e. the funds made available are in direct proportion to the ratio of the villages existing in the fringe area to the total number of villages. This apportionment must be laid down at the State headquarter level to obviate any chances of favouritism, with the *Panchayat Raj* Institutions (PRIs) having the option of allocating more funds than this share to the fringe areas (Chadha and Sharma 1998).

In Chhattisgarh about 50 percent of the villages with population of more than 10 million people are located within 5 km from the boundary of the forests. In a large number of these villages, poverty is rampant due to variety of reasons. The State Government is committed for overall development of these poverty stricken people and conservation of their natural resource base. Forest department has been made a nodal agency for integrated development of all the 401 villages situated within 5 km periphery of forests in Dhamtari District, the first venture of its own kind in our country. Thus, villages situated in the fringe areas of the forests have been brought under the umbrella of forest administration for implementing the integrated ecosystem approach at landscape level by convergence of all development schemes. The State Government has also made budgetary provision for these developmental activities.

Marwahi model

It has been observed especially in case of donor driven forestry projects, that during time span of the project implementation wage employment increases but immediately after the project is over, the employment falls down, adversely affecting the sustainability and credibility of the programme. This can be taken care of by evolving a carefully crafted withdrawal strategy. If the project can create durable assets, even after the project is over, the assets so generated can continue to provide regular job employment/income. This basic principle has been operationalised in the Marwahi Model.

In line with this, for rehabilitation of degraded forests of Marwahi forest division, an innovative scheme has been conceptualized. This scheme is unique in the sense that it gives enough flexibility to carry out works at many appropriate sites, which will activate many forest committees. In the working plan total degraded forests of the division has been kept in 19 treatment series. In these series, no coupes have been demarcated. Accordingly, as per provisions of working plan the rehabilitation work is to be done by the committees after taking up 30 hectares of treatment unit at one place after preparation of micro plans.

In working plan, about 60 000 ha area has been identified as the degraded forests. This year 5000 ha of degraded forest has been taken up for treatment. Considering 60 percent as workable area, 3000 ha area is being worked this year and around 100 sites have been selected for the treatment. For area wise preparation of micro plans experts and NGOs as well as Samitis are being involved. After careful scrutiny and screening, 40 NGOs, forest experts and research scholars have been selected and the job of preparation micro plans is in progress.

ECOTOURISM

Ecotourism is basically low impact utilization of the forest ecosystem services, which has a great potential for socio-economic development in remote areas. Besides being a great repository of biological diversity, forests of Chhattisgarh contain various sites of archeological, cultural and religious importance. Some of these unique combinations of natural and cultural heritage can form nuclei of ecotourism Accordingly three circuits of eco tourism namely Raipur, Barnawapara, Turturia, Sirpur (Raipur District), Achanakmar (Bilaspur District) and Kanger valley (Jagdalpur District) have been started which are controlled and managed by the committee of forest dwellers. All the benefits accrued are passed over to the communities

APPROPRIATE RESOURCE ASSESSMENT METHODOLOGY

At present, there is no systematic and reliable data regarding the availability of non-wood forest products. Local people, on the other hand have sound knowledge about the different kinds of NWFP species and their natural occurrence in the adjoining forest areas. The State aims at assessing and preparing a data bank on quantity, quality and value of various NWFPs existing in an area, by active involvement of local people, using local resources and local technology. Using the sample survey methods and based on sound statistical principles, a Comprehensive Community Based Participatory Mapping and appropriate Resource Assessment Methodology (RAM) has been developed.

The resource assessment methodology adopted includes laying of stratified systematic sampling plots, regeneration plot for knowing the regeneration status of the area and medicinal plot for getting an accurate idea about production potential and regeneration status of medicinal plants.

For estimation of the production potential and regeneration number of medicinal and NWFP plants of each species in northeast quadrant of the sample plot will be counted. Thereafter, the weight of useful part of five plants (in the case of bigger species such as *baibidang, malkangni, marorfalli, safed musli, kali musli,* etc.) and 50 plants (in the case of smaller species like *kalmegh, bhui aanwla, bhringraj, punarnava, dudhi,* etc.) will be taken in wet and dry conditions. If by any chance the number of plants in this quadrant is less than the above numbers, the available quantity will be used.

All these observations will be entered into prescribed proformas specially designed for this purpose. After collecting the various data and details mentioned above, different results like number of trees/ha, species wise volume/ha regeneration status, species-wise number and yield/ha. of medicinal plants and NWFP species etc. will be obtained. For the computation of growing stock prevailing conversion factors will be used. Details and data collected about medicinal plants and NWFP species will be used in deciding about the target species and their treatment prescriptions etc.

SUSTAINABLE FOREST MANAGEMENT (SFM), FOREST CERTIFICATION AND NON-WOOD FOREST PRODUCE (NWFP)

Global awareness towards sustainable forest management and economic implications along with market forces and consumer preferences for quality forestry products is necessitating a management paradigm that ensures the sustainability of forests. Since last decade, many international/national processes have been labouring hard to formulate Criteria and Indicators (C&I) of Sustainable Forest Management (SFM). However, in spite of extensive scientific, social, economic and political debate, no consensus has been arrived at as to what constitutes the SFM. This is further compounded because, varied objectives, value systems, temporal and spatial scales coupled with inherently long time-period to determine the efficacy of methodologies used for defining and ascertaining sustainable forest management defy clear and acceptable formulations.

On account of difficult conceptual issues, it is evident that sustainable forest management with all its attendant paraphernalia for formulating the criteria and indicators will remain an impracticable proposition, at least in developing countries, where poverty is rampant. Therefore, while maintaining health and vitality of the forest ecosystem, what is needed is to evolve a package of proactive and people's friendly minimal damage forest management practices which could contribute incrementally towards sustainable forest management or avoid those practices, that are clearly destructive and simultaneously enhance the well being of people. This indeed will be a practical approach towards attaining the desired goal rather than perusing the elaborate and illusive theoretical matrix of SFM. Unless it is so, all laudable initiatives of JFM or SFM will wilt before bloom.

Currently a wide range of actions are underway concerning certification. Although main emphasis to date has been on timber and timber products, attention has recently expanded to include pulp and paper products. There is an urgent need of developing certification system for non-wood forest products too.

The forests of Chhattisgarh state are being managed as per prescriptions of the Working Plans which are based on sound principles of forest management and have got the approval of the Government of India. Working plan provisions have been made mandatory for the working of the entire forest area, as per the directions of Supreme Court of India.

There are a total 6687 Forest Protection Committees/Village Forest Committees in the state, which are managing approximately 28 890 km^2 of forest area of the state. The collection of NWFP is being done on the 'principles of ecological sustainability, economic sustainability and social sustainability'. There has not been tradition of using chemical fertilizers or insecticides in the forest areas of Chhattisgarh. Thus the NWFP of forest areas of Chhattisgarh are organically grown.

In recognition of the fact that certification of NWFPs can provide remunerative price to the collectors/ growers and side-by-side the industry will get quality raw material in conjunction with sustainable forest

management, a one-day Workshop on "Certification of Non-wood Forest Produce including Medicinal, Aromatic and Dye Plants" was organised at Raipur on 9 April 2003. After general deliberations, four specific working groups were constituted to look into the entire gamut of issues such as the fair average qualities (FAQs), quality assurance through laboratory testing facilities, forest management issues pertaining to certification, and basic points of certification process in forest management (general principles). The outcome of the workshop, the Raipur Report, is available on the website: www.cgforest.com.

Towards this end, we are constituting an autonomous certifying agency consisting of representatives of following stakeholders:

- Growers/primary collectors
- Village level committees
- University/research organizations
- State Government
- Autonomous bodies
- Expert bodies like C.I.M.A.P., C.D.R.I., or any other National institute/body, having expertise in medicinal plants/NWFP.

PUBLIC PRIVATE PARTNERSHIP (PPP)

Chhattisgarh Forest Department has initiated many schemes to ensure active participation of local people, NGOs and industrial houses for the sustainable livelihood of the poor through integrated ecosystem approach including reclamation of degraded forests. The economic implications of tangible goods of the forest ecosystem are proposed to be enhanced through high quality inputs in form of cash as well as kind, non destructive harvesting, value addition, processing and marketing and equitable benefit sharing, in partnership with the dependent people, entrepreneurs and other interested organizations.

After formation of the state the following steps have been taken up in this direction:

Reclamation of degraded forests

Keeping in view the fact that about 80 percent of the people living in the vicinity of the forests, in one way or the other are dependent on the forests, the State is trying its best to arrest the pace of degradation and simultaneously rejuvenate the depleting forests for providing sustainable livelihood. However looking to the extent of degraded forests and existing budget allocation, this is proving to be a Herculean task. The rason d'etre for exploring other avenue is: undue long time frame to rehabilitate these areas by the Government efforts alone with limited financial resources, the quality and general performance of the previous efforts being what they are and the lessons learned from modalities of the private sector participation in various countries including China. Hence it is felt that the task of restoration of degraded forests can be accomplished faster with the active participation of private sector and accordingly arrangements are being worked out within the ambit of Government of India JFM Resolution December, 2002 and the guidelines issued relating to National Afforestation Programme (NAP). This model of Public Private Partnership (PPP); with symbiotic relationship among the various stakeholders can contribute substantially towards greening of degraded forests without actually giving private sector any access to forestlands. In fact this could be a win-win situation for the Government, the forests dependent people and the private sector.

Forward and backward linkages of NWFP and medicinal plants

Till now villagers were getting returns from nationalized NWFPs like *Tendu patta, Sal Seed, Harra, Gums* only. But after establishment of PPA non-nationalized NWFPs including medicinal plants are being mainstreamed for reinforcing the livelihood security of the people. Memorandum of Understanding (MOU) incorporating buy-back-guarantee agreement between village *samities* and traders/herbal industries are being encouraged and forward and backward linkages are being established. The overall outcome is very promising and it is expected that in next NWFP season many more such MOU's will be signed.

Mining and revegetation of rocky areas

As already described, Chhattisgarh is a storehouse of many important minerals, most of which are found in forests. The mining strategy in these areas should be based on "green technology" with built in safeguards for mitigating the negative impacts. Possibilities are being explored to plough back a part of revenue generated from mining for forest development and generation and also for the welfare activities of the local population.

Some parts of degraded forests in the State are rocky in nature. Such areas are completely devoid of any vegetation. There is no biological productivity derived from such areas and consequently, villagers living nearby do not derive any benefits. However, these areas can be brought under green cover by digging pits and or by opening up of the rocky area and then filling these gaps by enriched soil. This will not only revegetate the rocky areas but the forests committee can also use the stony byproducts for construction works or for road repairs etc. An initiative in this regard is being taken up in the State to create livelihood sustainability for the people as well as to bring such rocky patches under vegetal cover. Furthermore, such interventions will improve the hydrological cycle of the locality.

Forest development agency (FDA)

The scheme entitled National Afforestation Programme (NAP) has been formulated by merger of four centrally sponsored afforestation schemes of Ministry of Environment and Forests with common funding pattern to be implemented through Forest Development Agencies. FDAs' decentralized institutional structure would allow greater participation of the community both in planning and implementation of the appropriate afforestation programmes. This would ground the people-centered approach in afforestation programmes and provide a firm and sustainable mechanism for devolution of funds to JFMCs for afforestation and related activities. Organic unity in this structural framework will promote efficiency, effectiveness, accountability through decentralization and devolution of authority and responsibilities, both physical and financial. Village will be reckoned as a unit of planning and implementation and all the activities under the scheme will be conceptualized at the village level. The two-tier approach apart from building capabilities at the grassroots level would also empower local people to participate in the decision making process.

- FDA will be constituted at the territorial/wildlife forest division level and shall have a general body and an executive body. FDA will be a registered society under the Societies' Registration Act.
- At the grassroots level, the Joint Forest Management Committee(JFMC) will be the implementing agency. In the proposed structure, one JFMC will cater to a village.

In Chhattisgarh, 29 FDAs have been constituted. 22 FDA proposals have been sent to Government of India out of which 12 FDA proposals have been sanctioned. Under FDA, different types of activities have been taken into account such as assisted natural regeneration, fuelwood plantation, silvipasture development, bamboo plantation, mixed plantation of trees having NWFPs including medicinal, aromatic and dye plants (MADP).

SUMMING UP

It is hoped that the proactive and people friendly matrix of poverty alleviation, sustainable forest development and bio-cultural diversity conservation conceptualized by the state will provide a roadmap for addressing the complex scenario of rural poverty and forest conservation with an effective conservation strategy to counter act the deforestation pressure that may increase as livelihood options improve. We do not claim that we have been able to find answers to all the problems but we strongly believe that as the programme will unfold, variety of issues and conflicts will crop up and the community will provide their solutions. That is why we have placed very strong emphasis on highest concern and respect for the people and their traditional knowledge along with care and share philosophy.

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18 Forests for poverty alleviation: the Orissa experience

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ABSTRACT

This paper asserts that "the poverty debate" in India has been brought into the mainstream since early 1970s and that our understanding of poverty issues has gradually evolved. Policy-makers, scholars, concerned citizens and external donors all have contributed to this debate and understanding. Poverty is currently perceived as "multi-dimensional deprivation". The incidence and special characteristics of poverty in Orissa, one of the poorest states in India, are also analyzed. The paper also explores the role of forests, an important land-based natural resource, in providing livelihood support to millions of the rural poor in Orissa. It is premised that forests can substantially impact poverty reduction. Two past projects that aimed at natural resources development, i.e., (i) evolution of kendu leaves trade and (ii) Orissa Tribal Development Project (OTDP) have also been critically examined with a view to learning from these experiences. The paper concludes that high broad-based economic growth is necessary for faster poverty reduction and that desirable poverty reduction strategies should focus on: (i) enabling policy framework that improves the investment climate and expand income generating opportunities, (ii) mobilizing and empowering the poor and developing their employable skills, (iii) building productive infrastructure, and (iv) strengthening social sector. R&D institutions can significantly contribute to developing appropriate policies and strategies for poverty reduction.

INTRODUCTION

Poverty in India

Though policy-makers, academics and concerned citizens have remained pre-occupied with issues relevant to economic development and poverty reduction in India from early 1950s, the poverty debate was brought into mainstream only in the early 1970s. The seminal work of Dandekar and Rath (1971) fuelled this debate. They estimated that, at 1960–61 prices, the desirable national minimum level of consumer expenditure was Rs. 180 per capita per annum for rural households and Rs. 270 per capita per annum for urban households and that about 40 percent of the rural population and 50 percent urban population lived below this poverty line in 1960–61. Thereafter, intellectual contributions to this continuing debate have been very rich and varied. Several scholars and organizations (including Bardhan 1973, Ahluwalia 1978, Minhas 1978, Sen 1984 and others), many expert groups and task forces appointed by the Planning Commission (e.g. Lakdawala Committee 1993), and external donors (e.g. World Bank 1990 and 1998) have added, and continue to add, to this debate.

Measuring poverty in economic basis

Attempts have been made over time to define and measure absolute poverty and relative poverty. Measures of absolute poverty in economic basis are generally based on some form of "minimum subsistence needs". Initially poverty lines were defined on the basis of biological requirement of specified calories (Ahluwalia

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1978). However, needs for an ideal measure of poverty have been articulated from time to time with a view to reflecting levels of living based on: (i) basic physical needs of food, shelter, clothes and health, and (ii) basic social and cultural needs of education, security and leisure (Bardhan 1973). Planning Commission have periodically estimated the incidence of poverty in terms of head count ratio (HCR, i.e. percentage of people below poverty line) from 1973–74 at a regular interval of five years on the basis of consumer survey data generated by National Sample Survey Organization (NSSO). Direct attacks on poverty also began in early 1970s. In order to effectively target the poor households, the Ministry of Rural Development, Government of India, has also surveyed below poverty line (BPL) households in 1992–93, 1997–98 and 2002–03. The latest BPL household survey is an attempt to measure relative poverty on the basis of thirteen objective criteria.

There is also recognition that widely spread higher economic growth is absolutely necessary for reduction of poverty. There is a good deal of evidence that long term change in extent of poverty in Orissa and other states has been largely determined by the growth factor in mean per capita income (Panda 2003). In fact, poverty reduction has been higher in those states which have grown more than 5 percent per annum. Thus, our understanding of poverty issues has been gradually evolving.

Measure of poverty on non-economic bases

The concept of poverty is no longer confined to only material deprivation. It has acquired several dimensions. In most general terms, poverty can be defined as "deprivation in well-being" (Brandis 1873). Poverty encompasses several dimensions of deprivation:

- Material deprivation (lack of income; poverty of assets)
- Social deprivation (discrimination on account of caste, gender, region and religion; unable to enjoy social relationships in their full scope)
- Political deprivation (a sense of voicelessness and powerlessness; not able to influence political decisions that profoundly affect their lives)
- Intellectual deprivation (poverty of education and skills; lack of opportunities)
- Deprivation in health (health poverty; poor or no access to health services)
- Inability to cope with vulnerabilities and risks.

A full understanding of poverty in its multiple dimensions requires extensive qualitative and quantitative data. The poor need to be heard and treated with empathy.

POVERTY IN THE STATE OF ORISSA (INDIA)

Status of poverty in Orissa

Orissa is the major poorest state in India. 47.15 percent population lives below poverty line, the highest HCR as per 1999–00 NSS survey (55th round). Table 1 summarizes poverty HCR for Orissa and India from 1973–74 to 1999–2000. Table 2 compares the poverty in 13 major states in India from 1973–74 to 1999–00. The depth of poverty and extent of inequality in consumption/income distribution in Orissa is given in Table 3.

Table 1. People below poverty line (percent) in Orissa and India

Year	Orissa (percent)			India (percent)		
	Rural	Urban	Total	Rural	Urban	Total
1973–74	67.28	55.62	**66.18**	56.44	49.01	**54.88**
1977–78	72.38	50.92	**70.07**	53.07	45.24	**51.32**
1983	67.53	49.15	**65.29**	45.65	40.79	**44.48**
1987–88	57.64	41.53	**55.58**	39.09	38.20	**38.36**
1993–94	49.72	41.64	**48.56**	37.27	32.36	**35.97**
1999–00*	48.01	42.83	**47.15**	27.09	23.62	**26.10**

Note: 30-day recall total poverty.

Table 2. Incidence of poverty in Orissa compares with other major states

State	People below poverty line (percent)					
	1973–74	1977–78	1983	1987–88	1993–94	1999–00
Andhra Pradesh	48.86	39.31	28.91	25.86	22.19	15.77
Bihar	61.91	61.55	62.22	52.13	54.96	42.60
Gujarat	48.15	41.23	32.79	31.54	24.21	14.07
Haryana	35.36	29.55	21.37	16.54	25.05	8.74
Karnataka	54.47	48.78	38.24	37.53	33.16	20.04
Kerala	59.79	52.22	40.42	31.79	25.43	12.72
Madhya Pradesh	61.78	61.78	49.78	43.07	42.52	37.43
Maharasthra	53.24	55.88	43.44	40.41	36.86	25.02
Orissa	66.18	70.07	65.29	55.58	48.56	47.15
Punjab	28.15	19.27	16.18	13.20	11.77	6.16
Rajasthan	46.14	37.42	34.46	35.15	27.41	15.28
Tamil Nadu	54.94	54.79	51.66	43.39	35.03	21.12
Uttar Pradesh	57.07	49.05	47.07	41.45	40.85	31.15
West Bengal	63.43	60.52	54.85	44.72	35.66	27.02
ALL INDIA	**54.88**	**51.32**	**44.48**	**38.36**	**35.97**	**26.10**

Table 3. Poverty and related indicators for Orissa: 1957/58 to 1993/94

Year	Rural				Urban			
	HCR	PG	SPG	GINI	HCR	PG	SPG	GINI
1957–58	65.06	23.180	11.129	32.15	64.07	23.338	10.619	39.45
1958–59	56.09	18.967	8.474	30.73	46.79	20.991	12.646	36.95
1959–60	62.49	19.494	7.723	27.30	64.79	28.756	16.047	39.08
1960–61	61.72	20.129	8.287	29.78	69.12	25.752	12.081	29.55
1961–62	46.89	13.909	5.912	29.54	50.81	17.760	8.016	41.33
1963–64	58.04	17.954	7.468	27.89	54.88	18.437	8.258	33.12
1964–65	61.36	18.528	7.548	26.83	60.07	19.023	7.639	30.89
1965–66	59.98	18.280	7.806	27.57	64.84	23.051	10.676	33.45
1966–67	62.86	19.001	7.963	24.93	65.47	23.314	10.503	36.09
1967–68	63.40	19.980	8.449	29.46	59.11	21.315	10.125	36.58
1968–69	70.29	24.308	11.070	28.73	61.90	20.050	8.426	36.21
1969–70	66.20	22.902	10.637	29.12	49.19	16.567	7.473	34.14
1970–71	64.77	22.137	10.162	28.54	54.43	17.162	7.121	32.24
1972–73	67.03	23.693	10.952	31.45	55.53	18.133	7.853	35.46
1973–74	58.67	17.662	7.108	26.75	59.99	20.203	8.778	34.94
1977–78	62.52	20.443	8.955	30.63	57.26	19.743	9.057	33.28
1983	56.76	16.962	7.126	27.01	54.94	16.701	6.710	30.59
1986–87	44.95	11.950	4.462	27.35	49.81	14.793	5.789	37.70
1987–88	47.86	11.699	3.840	25.58	47.53	13.371	5.014	30.62
1989–90	39.48	8.454	2.403	25.37	41.09	11.599	4.385	32.20
1990–91	27.14	5.376	1.532	24.92	40.42	10.913	3.928	34.84
1992	36.57	8.195	2.530	29.37	48.74	17.120	7.366	47.96
1993–94	40.28	8.724	2.79	24.57	40.76	11.257	4.148	30.69

Source: World Bank (1997).

Notes: HCR – Head Count Ratio, PG – poverty gap, SPG – squared poverty gap, GINI – Gini Coefficient.

Incidence of poverty in rural Orissa has also been estimated and compared for 1999–2000 and 1993–94 in Table 4 by social groups: scheduled tribes (STs), scheduled castes (SCs), other backward castes (OBCs) and others. It may be observed in Table 4 that the STs and SCs communities are poorer than the others. 73.1 percent of STs and 52.3 percent of SCs are poor. About two-thirds (64 percent) of the total poor in rural Orissa belong to either the STs or SCs groups.

Table 4. Incidence of poverty by social groups in rural Orissa

Social group	HCR	Contribution to poverty	MPCE	Sample households (number)
		1999–2000		
Scheduled tribes	73.10	41.01	284.55	861
Scheduled castes	52.30	22.74	351.10	747
Other backward castes	39.70	26.02	394.96	1069
Others	24.01	10.23	477.80	800
Total	48.14	100.00	372.95	3477
		1993–94		
Scheduled tribes	71.31	35.98	175.10	816
Scheduled castes	49.79	18.51	212.02	628
Others	40.23	45.51	242.30	1894
Total	49.81	100.00	219.80	3338

Notes: MPCE: Monthly Per Capita Consumption Expenditure.

Source: NSSO unit level data from consumption expenditure schedules of 50th round for 1993–94 and 55th round for 1999–2000.

Spatial ditribution of poverty

There are substantial regional variations in extent of rural poverty in Orissa. The southern Orissa is not only the poorest region of the state, it is one of the poorest in the country. Based on an analysis of NSSO data, Table 5 reports poverty in three regions: coastal, northern and southern. District level poverty estimates have also been made for 13 districts of Orissa and are given in Table 6. The old Koraput, Kalahandi, Phulbani, Mayurbhanj and Keonjhar districts have very high incidence of poverty.

Table 5. Incidence of poverty by regions

Region	HCR	Contribution to poverty	MPCE	Sample households (Number)
		1999–2000		
Coastal	31.81	31.44	425.18	1795
Southern	87.14	33.40	246.29	575
Northern	49.84	35.15	368.59	1107
Total	48.14	100.00	372.95	3477
		1993–94		
Coastal	45.33	43.03	226.57	1590
Southern	68.84	25.26	179.22	638
Northern	45.87	31.71	232.04	1110
Total	49.81	100.00	219.80	3338

Table 6. Incidence of rural poverty by districts, 1999–2000

Undivided Districts	HCR	Contribution to poverty	MPCE	Sample households (Number)
Sambalpur	42.99	8.32	407.09	358
Sundargadh	38.40	3.04	401.11	96
Keonjhar	59.45	5.58	328.20	186
Mayurbhanj	70.04	9.39	325.13	192
Dhenkanal	46.65	5.51	375.88	179
Bolangir	48.89	6.43	338.61	144
Phulbani	75.42	3.97	288.45	143
Kalahandi	80.19	10.38	275.12	168
Koraput	92.24	20.28	224.74	300
Baleshwar	38.11	6.61	387.21	288
Cuttack	24.53	8.77	472.49	550
Gamjam	40.73	7.52	383.73	489
Puri	20.09	4.21	447.31	384
Total	48.14	100.00	372.95	3477

Source: NSSO 55th round unit level data from consumption expenditure survey.

Special characterstics of poverty in Orissa

On the basis of analysis of NSSO data, the households with the following characteristics constitute the Core Poverty Group in Orissa:

- Belong to ST/SC households;
- Are engaged as hired labourers;
- Are landless or marginal farmers with 0.5 hectares (or less) of land;
- Have household size of 5–7.

The falling trend in poverty ratio witnessed from mid-1970s onwards in Orissa seems to have been halted during the 1990s. The poverty HCR fell by a mere 1.4 percentage points between 1993–94 and 1999–2000 as against about 10 points for India as a whole during the same period.

Rural poverty is highest in Orissa. Rural people depend mostly on agriculture and forest resources to eke out their subsistence. However, Orissa's agriculture is virtually stagnant. Agricultural productivity is roughly half that of the national average. Use of improved inputs (better seeds, irrigation and management practices) is also far below the national average. Want of adequate irrigation facilities (except in certain pockets) is a major limiting factor that keeps agriculture undeveloped.

It is not only that growth rate is low in Orissa, but annual fluctuations in GSDP have also been large mainly due to frequent natural calamities and other reasons. While the Indian economy has been able to absorb shocks due to natural calamities more smoothly in recent years, the Orissa economy continues to heavily depend on 'vagary of nature'. The instability in the state income leads to high fluctuations in poverty incidence.

Poverty is spatially concentrated in Orissa. Southern and northern Orissa are poorer than the coastal region. Orissa is also deficient in infrastructure (railways, paved roads, ports and telecommunication). Optimal exploitation of its vast natural resources demands heavy investments in infra-structural development. For want of improved connectivity, the poor in general and ST and SC people in particular lack access to quality education, safe drinking water and quality health services.

Though extensive forest resources are an important source of sustenance to a majority of rural poor, they are highly degraded and lack desired financial and managerial inputs. Large forest areas are devoid of regeneration and, therefore, cannot provide livelihood support on a sustained basis unless substantial investments are made in them.

FORESTS IN POVERTY REDUCTION STRATEGIES

Forests have historically provided, and continue to provide, sustenance to many people and are, therefore, an important natural resource that can substantially impact poverty reduction in general and livelihood security in particular. For about six months from April to September, most households in forested regions in western and southern Orissa subsist on nearby forests. A socio-economic survey (Singh 1997 and 2002, Datta and Ravallion 1991) of 329 households, living in four villages on the fringes of forests in Sambalpur, Mayurbhanj and Ganjam districts, has revealed that an average household draws as much as 49.2 percent of total annual income/benefits from forests. Labour including wage labour contributes another 24.6 percent to the mean annual household income. Incomes from cultivation and cattle amount to about 18.6 percent and 7.6 percent respectively. Further analysis of socio-economic survey data suggests that grazing is the most important benefit that the villagers, close to forests, derive from forests. This benefit is of the order of 38 percent of total forestry contributions to rural household subsistence. Other benefits, drawn legally or illegally from forests, include: timber (25 percent), firewood (19 percent), bamboo (5 percent) and NTFP (13 percent). About 44 percent of average annual household forest income is not accounted in the state GDP.

Singh (1997) has also observed a number of inefficiencies and inequities in the use of forests by the rural people. First, a glaring social inefficiency is in the use of forests for cattle grazing. On an average, cattle contribute income worth Rs. 1672 per annum to a household and consume fodder worth Rs. 4241 per annum. This is a case of divergence between private and social benefits and costs. In this case, a household privately benefits from cattle income and passes larger parts of cattle maintenance costs in the form of forest grazing to society. It is, therefore, necessary that divergence between social and private benefits and costs need to be reconciled. Second, heavy removals of timber, firewood and bamboo are illegal and, therefore, undervalued in the hands of the poor in the absence of socially desirable trading arrangements. Larger gains of illegal forest trade accrue to unscrupulous middlemen. There is a need to create socially desirable harvesting and trading arrangements for timber and other forest products so that the welfare of the poor can be enhanced. Third, the State also sacrifices its share of revenue. A resource starved Government cannot adequately invest

in forests and other income generating assets. Fourth, failure of regulating agencies to effectively control theft of forest products and poaching of wildlife increases conflicts between people and the agencies and impose greater transactions costs on the state forest Department. Social welfare can be enhanced if transactions costs are lowered by way of increasing cooperation between different stakeholders. Fifth, richer villagers are generally able to draw larger benefits from nearby forests than their poorer neighbours. The trust of the poor and other weaker sections can be gained only if all stakeholders share benefits and costs in an equitable manner. Sixth, in the absence of commensurate investments in forests, huge removals from forests would continue to deplete them. Therefore, it seems desirable that, if investment of managerial, technical and financial inputs in forests is increased and the rural communities are actively involved in forest management, the problem of forest degradation and that of their acute poverty can be simultaneously addressed.

These concerns are not entirely new. As early as in 1873, Brandis, the first Inspector General of Forests of India, observed that "the maintenance and good management of [forests] was of much greater moment for the welfare of the peasantry, and that this point was not well recognized in India". In support of his contention, he compared the land uses in Saxony, a principality in Germany with Gorakhpur, a district of UP that shared some common characteristics (see Table 7). He argued that though Gorakhpur and Saxony had the same proportion of land under cultivation, which was extensive in Gorakhpur and intensive in Saxony. While the remaining land was allowed to be put to low value uses and wasted in Gorakhpur, Saxony had well-managed 26 percent forest land which significantly contributed to social welfare. Timber and other forest products of these well-managed forests provided means to diversify the Saxon economy and created opportunities for additional employment and income generation. This helped absorb the increasing labour force. This also afforded higher level of living to the people and relieved pressures from cultivation. In contrast, the increasing population in India continued to add pressure on cultivation and swell the landless labour force. The extensive cultivation helped only a small segment of population. It could not relieve pressure from cultivated land. Nor could it improve levels of living of the people and the economy remained trapped in subsistence mode. These observations still seem relevant in case of Orissa.

Table 7. Comparison of land-uses in Gorakhpur (India) and Saxony (Germany)

	Area (km^2)	Density (number per km^2)	Land-use (percent)			
			Cultivation	State forests	Private/communal forests	Other wastes
			Around 1601 AD			
Gorakhpur	11,852	34	11.00			89.00
Saxony	14,893	NA	NA	NA	NA	NA
			Around 1895 AD			
Gorakhpur	11,852	654	73.40	3.80	Not significant	22.60
Saxony	14,893	658	74.00	11.30	14.70	0.00

Source: Singh (1997).

While strong regulatory measures are desirable in a state like Orissa, pure regulatory mechanisms are not expected to yield outcomes that are sustainable, efficient and equitable. It has been increasingly realized that: (i) since forests and other common lands are a significant source of livelihood support to the rural people, their involvement in management of forests is essential, (ii) since local people have considerable site specific knowledge of forests, they can effectively and continuously monitor the impact of their actions on local forests, and (iii) participation of most local communities in management of forests requires enabling these communities and instilling faith in them in discharging their new responsibilities. That is, local communities are to be encouraged to evolve into viable organizations, which can manage their assigned forests in an efficient, equitable, stable and environmentally sustainable manner. It is in this context that the National Forest Policy 1988 asserted that involvement of local people in forest management and conservation was desirable. It was a major policy shift as regards future management of country's forests. However, participatory forest management practices need to be carefully evolved as comprehensive tenurial reforms exercises. This requires considerable intellectual, managerial, technological and financial inputs and has several implications for both policy-makers and R&D Institutions.

SOME RESOURCE DEVELOPMENT INITIATIVES IN ORISSA

Orissa has taken a number of initiatives to develop forests and other resources with a view to improving livelihood support to the rural people in general and the poor in particular. Two such past projects: (i) Evolution of Kendu Leaves Trade, and (ii) Orissa Tribal Development Project (OTDP) are analyzed here.

Kendu leaves trade in Orissa

Orissa accounts for about 15 percent of the country's total production of kendu leaves (KL) (Govt. of Orissa 2000a) and is the second largest producer of KL after Madhya Pradesh, which produces about 40 percent of the total production. Orissa has, however, pioneered *processed* production of KL and the institutional arrangements for production and marketing of KL have gradually evolved since 1948. Each year, about Rs. 1 billion flows to local economies and employment opportunities worth 15 000 000 person-days are generated. The programme benefits mainly the rural poor including women and tribals at a time when other employment opportunities are generally not available. The KL trade in Orissa is well established and successful. Some salient aspects of this programme are:

- The programme is self-targeted.
- It is economically efficient. The average production has increased from about 80 000 quintals in 1950s to 450 000 quintals in 2000s. Nett revenue has increased by about 5 times from Rs. 57 800 000 in 1948–72 to Rs. 315 200 000 in 1973–2000 periods. Local value-addition is encouraged. The State also earns decent revenues (of the order of Rs. 700–800 million per annum).
- The programme has met equity objectives in that the operations are labour intensive and labour share in production has risen from about 30 percent in 1970s to 40 percent in 2000s. Orissa generates employment opportunities worth about 43 person-days per quintal of processed production as compared to only 19 person-days in MP. An income of about Rs. 2270 per quintal is passed to KL workers and Gram Panchayats. KL purchase prices have increased 32 times in 1973–2000 period as compared to only 20 times increase in minimum wages during the corresponding period. 50 percent of nett benefits flow to Gram Panchayats. Orissa Forest Department (OFD) also extends a welfare programme, through World Food Programme, to KL binders and other workers, whereby an additional food subsidy worth Rs. 16 per food-day is passed on to the participating labourers. In a single year, about 1 million food-days are generated.
- The programme is self-sustained. It does not depend on any external loan or State budgetary support.
- The programme has evolved imbibing local knowledge, employing locally available skills and taking into account local needs and is, therefore, politically acceptable.
- The evolved institutional arrangements are very robust and stable.

Orissa Tribal Development Project

Orissa Tribal Development Project (OTDP), an IFAD-funded project, was implemented in Kashipur block of Koraput district from 1988 to 1997. The projected outlay was of the order of USD 24.4 million. The project targeted mainly 12 500 tribal households and 400 non-tribal households and was implemented by the State Tribal Department. It was not a typical forest development project. Though OTDP was successful in creating some physical infrastructure, it generally failed to create a visible impact on the targeted households. Some salient aspects of OTDP implementation are:

- The project did not attempt to assess the strengths and weaknesses of available local knowledge. Nor could it identify the training needs of local people in terms of skill development, decision-making capacities and social mobilization. Therefore, targeted families were not prepared to internalize suggested changes in their life styles (e.g. new agricultural practices, crop diversification and introduction of new technologies) and human development aspect was neglected.
- The project, on the other hand, emphasized hardware aspects (e.g. physical infrastructure, agriculture development, land allocation, etc.) for the development process.
- An effort was made to wean away tribals from shifting cultivation on steep hill slopes. They were rather encouraged to undertake settled agriculture on these encroached lands, which were also surveyed and settled in their favour. However, the programme, though well meant, was misconceived and poorly implemented. The people who had excellent skills in shifting cultivation were not adequately prepared for undertaking settled agriculture of improved variety. The suggested changes in their life style were too much and too drastic and, therefore, could not produce desired impact.

It may be observed that in his 1877 report, Col. Beddome, then Conservator of Forests, Madras Presidency, appreciated shifting cultivation skills of the tribals of Koraput district. He wrote (Govt. of Orissa 2000b), "*I have no where in India seen this Kumri cultivation so systematically carried out…*". Their agricultural skills are, however, still very primitive. It is, therefore, a great challenge if suitable tenurial arrangements could be devised and these tribals were encouraged to undertake tree cultivation (both forestry and horticulture) and to derive more economic benefits. This would benefit all: tribal families, local ecology and the State. This would, however, call for suitable modifications in forest policy.

- Poor participation of beneficiaries in programme design and implementation was a limiting factor and this was a contributing factor to the mixed results obtained by the project.
- The project management was generally too bureaucratic and unimaginative. It failed to draw upon local socio-cultural strengths to improve programme design and its implementation. Therefore, the programmes had poor acceptability.
- The project objectives and programmes could not be sustained after the project withdrew.

LESSON LEARNED

Persistence of poverty ought to be, and is, a cause of concern. For poverty reduction, it is necessary that the poor's access to income generating assets is increased and that the poor are able to derive intended benefits from the assets on a sustained basis. This calls for substantial efforts and investments in developing human resource: employable skills, good health, quality education, affordable and adaptable technological choices. In addition, an enabling environment and productive infrastructure are also necessary for the poor to benefit from the emerging economic opportunities. The following strategies, therefore, seem desirable to have a frontal attack on poverty:

- Enabling policy framework that improves the investment climate and expands income-generating opportunities, particularly for the poor.
- Mobilizing the poor, developing their employable skills and empowering them to participate in and benefit from economic growth.
- Building productive infrastructure: improved rural connectivity, roads, expanded irrigation potential, watershed development programmes, storage and marketing support to farmers and other economic agents and conserving and enriching natural resources (e.g., forests, soils, water bodies)
- Strengthening social sector: promotion of rural/tribal literacy, female literacy; better health for all; safe drinking water supply; food security; and other social safety net programmes.

There are also lessons for policy-makers and R&D institutions. Creating an enabling policy environment and crafting appropriate institutional arrangements that may help manage forests and other ecological resources in an efficient, equitable and sustainable manner and effectively reduce poverty is a challenging task. This requires considerable intellectual, managerial and financial resources that need to be directed to address the problems faced by the poor. R&D institutions need to generate new knowledge including affordable and adaptable technologies and techniques that may help enhance assets and income generating capacities of the poor. R&D institutions may also help suggest as to how poverty reducing growth could be propelled and how poverty reduction programmes be progressively improved.

CONCLUSION

Poverty reduction has become a wide spread concern. Our understanding of poverty has been gradually evolving and poverty is being perceived as a multi-dimensional deprivation. It is premised that forests can play an important role in reducing poverty. Like other land-based resources, forests provide means to diversify local economies, to absorb excess labour and to significantly contribute to livelihood and food security of the rural poor. If it is accepted that people are the ultimate owners of State forests, the first step is to ascertain through participatory appraisal how they can be productively involved in forest management on a sustained basis and how they can benefit from forests in an economically efficient and equitable manner. This requires a sincere and repeated dialogue with the major stakeholders and to arrive at a mutually agreeable solutions based on a social cost–benefit analysis and available technologies. The rights, responsibilities and roles of all stakeholders should be clearly spelt out and their implementation must be enforced and periodically monitored. A pro-active role of policy-makers and R&D institutions can accelerate this process.

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19 Participatory forestry and poverty alleviation: the Himachal Pradesh experience

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ABSTRACT

Himachal Pradesh (HP) has rich and varied experiences in participatory forest management (PFM) right from the first half of the last century when forest cooperatives were started in Kangra. PFM in HP has had strong direct or indirect linkages with poverty reduction, mainly by facilitating additional sources of livelihood and employment generation, thus increasing the income levels of the rural communities. This paper is based on the experiences of poverty reduction through participatory forest management. It deals with various PFM projects that have led directly or indirectly to increased income levels for the local communities. The lessons learned from these projects are presented. Different approaches and issues concerning poverty reduction through PFM in HP have also been analyzed. It is expected that these will help planners, researchers and practising foresters to move forward.

INTRODUCTION

Since earliest times, forests have played a dominant role in the lives of the people living in the Himalayan mountain bed. The primary needs of fuel, fodder, small timber and timber for construction were met from forests. Without proper management, the natural resources in general and forests in particular underwent severe degradation.

The forest department has remained the custodian of the rich forest wealth for more than 150 years when as in the nineteenth century many rulers established forest departments to manage the forests of their territories. When these areas were occupied by the British, regular forest departments were established and continue until this day.

Himachal Pradesh is rich in forest resources, with about 23 percent of the total geographical area being under forest cover. In recent decades, much stress has been laid on the need for conserving and protecting the valuable forests of the state for the following reasons (Negi 2000):

- degradation of the forest ecosystem in the uplands has an adverse impact not only in the mountains but also in the low-lying areas;
- for sustaining all types of development;
- forests are the lifeline of millions of tribal people living in and around forest areas;
- ecological balance and stability depends on the condition of forests and how they are managed.

Participatory or Joint Forest Management is a term used to describe a process in which the local communities are involved in planning, establishing, protecting, managing and using the forest resources through collective action, with the role of the forest department being that of a facilitator.

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PFM has vital linkages with poverty reduction. These include:

- providing additional sources of livelihood
- employment generation
- uplift of socio-economic status
- greater access to community resources

KANGRA FOREST COOPERATIVE SOCIETIES

The setting up of forest cooperative societies (FCS) in Kangra District of Himachal Pradesh to manage the forests was a unique experiment. Though the recommendations of the Corbett Commission were to set up local level forest Panchayats, the forest department advocated the setting up of forest cooperative societies. As a result the Kangra Forest Cooperative Scheme was finalized in 1938. The forest department also created a Kangra Village Forest Division for actual implementation of this scheme.

The numbers of forest cooperative societies set up in Kangra as part of this scheme are as given in Table 1 below.

Table 1. Cooperative societies in Kangra

Period	Number	Forest area (in acres)
1941–45	40	43749
1945–50	21	9290
1950–53	8	3431
1953–54	1	1752
Total	70	58222

The salient features of forest management through forest cooperative societies in the Kangra area of Himachal Pradesh are:

- the villagers living in the area came together to constitute the forest cooperative society;
- they elected an executive body from amongst them for the day-to-day management of the society;
- the forest cooperative society gradually took over the management of the forest areas allotted to it;
- they were responsible for protection, management and up-keep of the forest areas;
- a number of societies engaged part-timeers, known as rakhas, to assist the societies in forest protection and management;
- most of the forest cooperative societies tapped the Chir pine trees for resin. This became an additional source of income for them;
- other sources of income were sale of timber and grass from the forest;
- the FCS also allotted trees to its members for the construction of their houses. This was done with approval from the executive committee;
- each FCS also undertook regeneration of forests by raising plantations. However, in many cases this was not successful.

The forest cooperative scheme was a novel experience in participatory management of natural resources with the following advantages:

- Forest management and protection was handed over to the cooperative forest societies.
- The societies became responsible for forest management and protection.
- The FCS had the right to sell the forest produce or distribute it among the members.
- The needs and problems of the local communities with regard to forests were adequately taken care of.
- The FCS had the power to make all major decisions for forest management and protection.

However, there were a number of limitations to this scheme:

- In general, the local villagers entrusted with the responsibility of managing the forests lacked the required experience and skill.
- The mechanism for decision-making was largely inadequate.

- The roles and responsibilities of different members were not clear and most of the activities were left to the executive committee.
- Most FCS had a tendency to overexploit their forest resources.

INDO-GERMAN DHAULADHAR PROJECT

An integrated project was conceived to treat selected areas of the upper Binwa catchment in Kangra district. Known as the Indo-German Dhauladhar Project (IGDP), it was launched in 1980 as a joint project of the Indian and the German governments. This project was very successful and developed a model that was later replicated elsewhere.

Objectives

The main objectives of this project were:

1. to rehabilitate the ecosystem of the project area along with a sustained improvement of the living conditions of the people living there;
2. to evolve a replicable approach to mountain region development in the western Himalaya.

The main problems of the project area were:

- degradation of forest lands due to biotic pressure;
- suppression of natural regeneration in forest lands as a result of over-exploitation of fuelwood, fodder and timber;
- degradation of pastures and other grazing lands;
- increase pressure on the natural resources, mainly on the land;
- scarcity of fuelwood, fodder and timber;
- low agricultural production;
- lack of access to markets for the sale of various products;
- low-income levels of the population.

Approaches

The approaches adopted by the project were:

Reduction of demand for natural resources

- introduction of productive cross-breed cattle, promotion of stall-feeding and cut-and-carry feeding
- reduction of unproductive cattle
- selection breeding among sheep and goats
- introduction of Angora rabbit for wool production
- intensification of agricultural production
- intensification of horticulture, mainly citrus and nut tree cultivation
- introduction of fuel saving devices
- introduction of fuel saving crematoria

Increase in the supply of natural resources

- afforestation
- pasture improvement
- conservation of soil and water
- improvement of public hygiene
- creation of non-agricultural employment
- improvement of public infrastructure like paths, schools, culverts and irrigation channels
- generating ecological awareness
- promotion of self-organization and self-responsibility
- promotion of resource management at the village level

TRUCO

This project adopted the TRUCO approach meaning trust and confidence. It means gaining the trust and confidence of the local population before the start of operations in a village.

Village Development Committees

Towards the middle of the project period Village Development Committees were organized to facilitate project implementation and also for serving as a link between the project and the local people. Some of these VDC's have performed well and became sustainable in the post-project period

INDO-GERMAN CHANGER ECO-DEVELOPMENT PROJECT

Following the success of the Dhauladhar project, the Indo-German Changer Eco-development Project (IGCEP), was launched as bilateral integrated multi-sectoral project of the Indian and German governments (IGCEP 1996).

The project area forms part of the lower Binwa catchment and Changer area of Palampur sub-division of Kangra district. The Palam valley in the north, Mandi district in the east, the River Beas in the south, and Dehra and Kangra sub-divisions in the west, form the boundary of the project area.

Objectives

The main objectives of this project were:

- to significantly reduce the imbalance between production and use of renewable natural resources;
- to considerably narrow the existing gap between biomass production and biomass consumption;
- to improve the living conditions of the inhabitants of the project area and enable them to sustainably manage the available resources.

Problems

The major problems affecting the project area were:

- rugged terrain and high soil erosion
- chronic water shortages
- heavy biotic pressure on the forests and grasslands
- small size of holdings
- large human and livestock population
- shortages of fuelwood and fodder
- low socio-economic status of the people and less opportunities for non-agriculture livelihoods
- heavy pressure on natural resources, leading to their depletion

ECO-BASED INCOME GENERATION

This activity is being taken up with the help of non-governmental organizations. It is based on sustainable use of local resources and products. The project supports women's groups for fruit, and in future also bamboo, processing and marketing, mainly in the form of training and technical support. This is being facilitated through a non-governmental organization.

A saving scheme encouraged by the project is enabling groups to start their own enterprises. Marketing of the products is also supported by the project

INTEGRATED WATERSHED DEVELOPMENT PROJECT

The Integrated Watershed Management Project or IWDP is a World Bank supported project whose first phase was implemented in selected catchments and watershed of the Shiwalik hills of the states of Himachal Pradesh, Jammu and Kashmir, Haryana and Punjab from 1990 to March 1999. Following the success of the first phase, the follow-up phase, known as IWDP-II, was launched in mid 1999 in selected catchments of these states and also in parts of Uttaranchal (Negi 1998).

This project follows a multi-disciplinary approach that includes PFM.

HP FORESTRY PROJECT (ODA/DFID)

The HP Forestry Project supported by the Overseas Development Agency (later Department for International Development) of the UK Government was launched in October 1994 with a 3-year pilot phase till September 1997, in Kullu and Mandi districts.

The milestones to be achieved by the pilot phase were:

- Introduction of PFM into the existing forest management activities of the forest department.
- Improvement of existing forestry practices particularly those traditionally governed by the forest working plans.
- Development of new planning and management practices and forest interventions for bottom up micro planning.

HP FOREST SECTOR REFORMS PROJECT (HPFSRP)

The HPFSRP has been recently launched as the second phase of the HP Forestry Project. Towards the end of the first phase a detailed impact evaluation was done and recommendations outlined. A core team formulated the project proposals for the HPFSRP. The project period is from 2002 to 2006 with the project being funded by the DFID. The main aim of the project was to establish and implement an integrated and cost effective strategy for sustainable forest management and enhanced livelihoods of the poorest forest dependent women and men in Himachal Pradesh.

Components and outputs

The following five project components and outputs have been laid down:

Output 1: Developing a multi-stakeholder forest sector policy and strategy for Himachal Pradesh.

Output 2: Strengthening government, especially HPFD to enable them to provide integrated livelihood support mechanisms.

Output 3: Strengthening non-government institutions to enable them to provide integrated livelihood support mechanisms.

Output 4: Developing a cost effective model for empowering and supporting the poorest forest dependent women and men to strengthen their own livelihoods.

Output 5: The dissemination of project experience and lessons through reports, process documentation, workshops and networks.

LESSONS LEARNED

Involvement of communities in PFM – It is important to involve the local communities in such programmes right from the beginning.

Direct or indirect short term benefits essential for success – Success depends on how quickly and sustainably the local communities are able to derive tangible direct or indirect benefits like additional income, employment. etc.

Role of women and marginal groups – Women and marginal groups also play an important role in poverty reduction through PFM as they often are the immediate beneficiaries of such approaches.

Broad base – Another important factor is the broad-base representation of the institution involved in PFM.

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20 Forests for poverty alleviation: the changing role of R&D institutions in Nepal

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ABSTRACT

The mountainous country of Nepal is rich in cultural, environmental and biological diversity. Out of 14.72 million ha total land area, forest covers about 29 percent with an additional 10.6 percent of shrub land, both categorized as forest land. Forest area in the hilly region alone occupies about 26.1 percent of total forest area. Forest contributes over 70 percent of rural energy requirement and about 42 percent of livestock feed in Nepal. Most of the people living around forest fringes are subsistence farmers. Agriculture contributes about 78.5 percent of the total employment in the country. Because of heavy dependency of people on forest, expanding agricultural lands and development of infrastructures, the forest area has decreased at an annual rate of 1.7 percent between 1979–1994. Since the inception of Community Forestry Programme in the late 70s, and the introduction of Conservation Area and Buffer Zone Management Programme in the late 80s, and the poverty reduction focused Leasehold Forestry Programme in 1993, the levels of awareness and participation in conservation and management of forest resources have been increased. As a result, community forestry has been a successful model in natural forest management. To date, about 1.3 million farming households are engaged in managing about one million ha of state forest as community forests, deriving daily needed forest products and also collecting and marketing high value non-timber forest products. Likewise, 1600 smaller groups of different communities are engaged in leasehold forestry activities, mostly concentrated in agroforestry, conservation farming, livestock raising and other income generation activities. Although Forest Policy of Nepal has been ever-evolving through the experience and consultative process with its stakeholders, both from government and non-government sector, the sector as a whole is facing several new challenges and suffers severe technological, financial and human resource related problems. A wide gap between technology generation and its effective dissemination is evident. More focus on generation, verification and dissemination of appropriate technologies to suit rural communities for the management and sustainable utilisation of the natural resources is needed.

INTRODUCTION

The Himalayan Kingdom of Nepal is a country of cultural, ecological and biological diversity. Located at the transitional zone between eastern and western Himalayas, Nepal houses 118 ecosystems and 35 forest types (Dobremez 1970) within a small land area of 147 181 km^2. These ecosystems offer shelter to a large share of the world's flora and fauna, including some endemic and indigenous ones. Nepal's richness of biological diversity is the reflection of unique geographical positioning and sharp variation in altitude (65–8848 m asl) and climate.

Of the total land area, 39.6 percent is forest, about 21 percent is cultivated and the rest is under different categories of land-use. A total of over 23 million people (CBS 2001) in Nepal derive their livelihood from natural resources such as arable land, forests, water and protected areas. Agriculture is the main occupation of more than 70 percent of the Nepalese people. The per capita GDP (expected) in 2001 was US$ 240 with an annual growth rate of 5.8 percent (MoF 2001).

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Forest plays a vital role in maintaining ecological balance and promoting economic development. Mountain forests contribute in water recharge, protect watershed areas from landslides and soil erosion, and prevent hydropower stations and farmlands from siltation and floods. The luxuriant forests of Nepal are the major source of tourist attraction (the second main source of income) and offer goods and services to subsistence farming communities. Forests offer over 70 percent of rural energy requirement, 42 percent of livestock feed, leaf litter for animal bedding and composting and non-timber forest products (NTFPs) for income generation. There is a close interrelationship between arable land, forests and livestock population that makes the farming system complex.

Farming in Nepal is characterised as high labour demanding but with low return. Because of growing population, lack of income and employment in the mid hills and high mountains, people are migrating to already saturated valleys and Tarai. The subsistence economy coupled with increasing population, and high demands for forest products have threatened the forest resources. Forestry and agriculture together can contribute in maintaining this regional and economic balance through concentrated and collaborative efforts in research, development and sustainable utilisation of natural resources.

EXTENT OF NATURAL FOREST COVER

Of the total land area (14.72 million ha), forest and shrub cover 29 percent (4.27 million ha) and 10.6 percent (1.56 million ha) respectively (DFRS 1999a). Agriculture land covers about 21 percent. Forest area also includes protected area system (PAS, 18 percent), which consists of national parks, wildlife reserves, conservation areas, hunting reserves and buffer zones (DNPWC 2001). Most of the forest land is under natural forest as total plantation in Nepal is estimated to be less than 0.25 million ha. The per capita forest area is 0.025 ha (Shrestha and Nepal 2002). Reachable forest area of Nepal is 2.18 million ha (52 percent of the total forest area). The largest reachable forest area (0.58 million ha) lies in the Eastern Development Region (EDR) and the smallest (0.26 million ha) in the Western Development Region (WDR).

FOREST COVER IN THE HILLS

Except the Tarai and Siwalik regions (totalling 27 percent of the land area), the rest of Nepal can be considered as hilly with the highest percentage of land area (30 percent) in the mid-hills. The latest data revealed that the total forest area in hilly region is 2.90 million ha and total shrub land area is 1.57 million ha (DFRS 1999b). The forest and shrub account for 26.1 percent and 14.2 percent of total land area of the hilly region, respectively (Table 1). The most dominant forest type in the hilly area is Upper Mixed Hardwoods, which constitutes 28.5 percent of reachable forest area followed by Tropical Mixed Hardwoods, 17.7 percent (DFRS 1999b).

Table 1. Area statistics of the hilly region ('000 ha)

Region	Forest area	Shrub area	Total land area	Forest percent of total land area	Shrub percent of total land area	Forest and shrub total percent
FWDR	494.3	274.6	1545.9	32.0	17.8	49.7
MWDR	955.1	503.7	3782.9	25.2	13.3	38.6
WDR	427.3	227.7	2157.2	19.8	10.6	30.4
CDR	494.4	238.4	1652.8	29.9	14.4	44.3
EDR	529.1	326.9	1958.4	27.0	16.7	40.3
Hilly area total	2900.2	1571.3	11097.2	26.1	14.2	40.3

Source: DFRS 1999b.

RATE OF CHANGE OF FOREST COVER

Because of increasing human population, their heavy dependency on forest, expanding agricultural farms, poverty, development infrastructures and several illegal forest cuttings, Nepal has been facing serious problems of deforestation and land degradation. Hence, forests are disappearing at an alarming rate (Table 2).

Forest and shrub covers have changed at different proportions in the hills and Tarai. In the Tarai plains, forest area has decreased at an annual rate of 1.3 percent from 1978/79 to 1990/91. In hilly area, forests

have decreased at an annual rate of 2.3 percent from 1978/79 to 1994, whereas forest and shrub together have decreased at annual rate of 0.2 percent in the hills over the same period. In the whole country, from 1978/79 to 1994 forest area has decreased at an annual rate of 1.7 percent whereas forests and shrub together have decreased at an annual rate of 0.5 percent (DFRS 1999a.).

Table 2. Percentages of forest and shrub cover changes in Nepal

S.N.	Source	Year	percent of forest	percent of shrubs	Total percent
1	Forest Resource Survey Office	1964	45	–	–
2	LRMP (1986)	1978/79	38.0	4.7	42.7
3	MPFS (1989)	1985/86	37.4	4.8	42.2
4	NFI (1994)	1994	29.0	10.6	39.6

Source: Bajracharya (1986), LRMP (1986), MPFS (1989) and DFRS (1999a).

Table 2 shows that the forests are gradually decreasing in terms of both quality and area. The increasing trend of the percentages of shrub land indicate that the forests are increasingly being degraded and converted into bushes.

HISTORY OF FOREST FRINGE DWELLERS

Historically indigenous people have been conserving and utilizing forest resources for generations. They continued with the system even when the government of Nepal nationalized all forests in 1957. When more destruction occurred after nationalization, the government gave back the peoples' forest as community forests.

About 86 percent of the 23 million people in Nepal live in rural areas and these people have been highly dependent on forest resources, such as for fuelwood, livestock feed and grazing, collection of fruits, nuts, wild vegetable, medicinal herbs, fiber, leaf litter for animal bedding and composting, agricultural implements, growing food crops in forest land (shifting cultivation) and hunting. Some people such as the woodcutters, charcoal manufactures, traditional healers, and ethnic minorities are much more heavily dependent on forest resources. However, such a sole dependency is gradually decreasing.

Nowadays collection and marketing of NTFPs have been the major source of off-farm income for many of the high altitude communities. Single communities have been using over 90 different forest-based plant species for medicinal purposes, over 20 wild vegetables and equally high number of wild fruits for health and nutrition (Paudel 2003).

SOCIO-ECONOMICS OF FOREST DWELLERS

The economy of the country largely depends on the use of its natural resources and is dominated by the agrarian sector. People depend on forest for food, medicine, energy, shelter, bedding materials, wood and non-wood forest products to maintain subsistence farming system in rural Nepal. About 70 percent population depends on the forests for their energy requirement and over 42 percent of total digestible nutrients for livestock is estimated to come from the forests (MOPE 2000).

The agriculture-based economy has influenced major proportion of population as forest dependents. Main sector of employment is agriculture contributing about 78 percent and non-agriculture sector contributes about 22 percent (CBS 1996). There are complex and inseparable relationships between forests, agriculture and human subsistence in the mountains (Gilmour and Fisher 1991, Mahat 1987). A large proportion of the forests in the hilly regions have been protected and managed by the local communities for centuries. Major forest species of the hilly region include *Schima-Castanopsis, Alnus nepalensis*, mixed hill sal forest, pines, oaks, juniper and rhododendrons with varied proportion of other species.

The government of Nepal has taken initiative to involve local people in the management and utilization of the forest as a means to improve the livelihoods of these people. The major programme includes Community Forestry Programme and Leasehold Forestry Programme for the poor. The Community Forestry Programme was started during the late 70s and has been the most successful programme. Similarly, the Leasehold Forestry Programme for the poor has proven to be a priority programme within the forestry sector, which can really benefit the poor. The achievement of these programmes by the end of the April 2003 is presented below (Table 3). Likewise the Buffer Zone Management Programme has been a supportive one to the people living at the fringe of protected areas who get up to 50 percent of the income generated mostly from tourism in the protected area.

Collection and trading of the NTFPs has been one of the income opportunities for forest users in the rural Nepal. Studies have reported that about 2000 plants in Nepal have medicinal properties and 1463 plants are known to be used locally (Shrestha and Shrestha 1999). Over 700 different medicinal and aromatic products are reported from Nepal (FAO 1982). The contribution of NTFPs in the national economy is reported to be over 4 percent (Edwards 1996).

Table 3. Local communities involved in forest management

Programme	No of households	No of groups	Forest area (ha)
Community Forestry	1 341 973	12 540	955 358
Leasehold Forestry	10 500	1600	6600

Source: DoF 2003

MANAGEMENT SYSTEMS/OWNERSHIPS OF FORESTS

The Forest Act 1993, which governs forest management of the country, has broadly categorized forests of Nepal into two types based on the ownership as national forest and private forest. Under this definition, a forest maintained in privately owned land is private forest and the rest is national forest. Based on the management system, national forest has further been divided into five types as community forest, government managed forest, protected forest, leasehold forests and religious forest.

Generally speaking, there is very little privately owned forests in the country. However, there is an initiative to transfer the use rights of the government owned land to the local people in the form of community forests. The largest forest management approach of the country is community forestry involving more than 12 540 committees. Similarly, the leasehold forest committees (1600) are taking the rights to use the lands for 40 years.

Most of the Tarai and Inner Tarai forest are managed by the government, which are under the charge of 24 respective district forest offices. However, the real benefits of scientific forest management in Nepal have yet to be realized. The extension of protected forest under protected area system (PAS) has achieved significant success in Nepal. About 18.11 percent of total forest area are classified as protection forest. Nepal has also taken initiative to involve local people to conserve her biodiversity including in the wildlife and had gained significant success (e.g. Annarpurna Conservation Area in the western hills of Nepal).

GOVERNMENTAL AND NON-GOVERNMENTAL INITIATIVES

This is a paradigm shift in forestry policy to involve local people in the management of forest in Nepal. The chronology of policy changes in forestry sector in Nepal is published in Shrestha and Nepal (2002). Government of Nepal introduced community forestry approach in 1978/79 to involve local people in the management of forest resources as a means to improve livelihoods of these people. It is one of the successful development programmes of Nepal, involving more than one-third of the households. It is the highest priority programme within the forestry sector and is implemented all over the country. Similarly, in the late 80s, the government introduced Conservation Area and Buffer Zone Management Programme to involve local people to manage protected areas. The Leasehold Forestry Programme to reduce poverty has been introduced since 1993 and is successful in addressing the livelihood strategy for rural poor. Realizing its success, the programme has been extended from 10 to 26 districts in 2001.

From all these programmes the major achievements worth mentioning include: protection of hill forests and production of wood and non-wood forest products of daily use, capacity building of local forest users in terms of their ownerships, forest management, options for improved income and employments, democratization in participatory resource management, improved conditions of community managed forests in terms of regeneration, and growth and development. Park and people conflicts have been reduced and revenue sharing mechanisms developed. Similarly, gender sensitization and women participation have increased in forest management. In the Tarai, collaborative approach of forest management has been introduced.

The forestry research in Nepal though started in isolation in the early 60s, has now become common concerns in natural resource management. The major stakeholders have been the universities, agriculture and animal sciences departments NGOs/INGOs, and local communities. As an outcome, forestry research has performed considerable work in the past. Among the success stories include propagation and plantation establishment of multipurpose species such as fodder trees, fruit trees and bamboo; identification and selection of tree species for different uses and for different site conditions; management of major forest types in the Tarai and mountains; preparation of volume and growth tables for major tree species; estimation of fodder and fuelwood biomass. Similarly, the effort has been encouraging in conducting trials in forestry and agroforestry

experiments. Recently, efforts on Participatory Action Research with incorporation of social and environmental issues have emerged as an outcome of the long-term experience on participatory resource management.

Likewise, identification of superior mother trees and establishment of seed orchards/stands for major tree species such as *Dalbergia sissoo, D. latifolia, C. axillaris, B. butyraceae, Pterocarpus marsupium, Artocarpus lakoocha*, have been successfully demonstrated. As a sustainable means for continuity, establishment of seed cooperatives has been initiated.

Moreover, appropriate technologies for the harvesting and processing of key NTFPs have been developed and disseminated. As a result, forest users and local communities have additional income and employment opportunities. Recently, the Government of Nepal has constituted a high level coordination committee for the promotion of high value NTFPs including medicinal and aromatic plants under the chairmanship of the Minister for Forests and Soil Conservation, giving high priority for the sector. All together over 30 different institutions in Nepal are involved in the research and development aspects of forestry sector (Amatya 1999). The initiatives taken by non-governmental sector are more focused on development agenda and are encouraging. However, very few of them are engaged in forestry research.

CONSTRAINTS

Forestry resource in Nepal is playing a vital role to sustain rural livelihoods and generating national revenue. However, productive scientific forest management has yet to be realized. As a result forests are becoming degraded in quality and quantity. A number of social, political, financial and technical factors have been identified as major constraints for the sustainable forest management that is related to poverty issues. Some of the key constraints identified are as follows:

- Appropriate technologies and resource information required for planning and management are limited.
- Available technologies are not reaching the intended beneficiaries – the forest users, the mechanism for technology transfer are not efficient.
- Poor linkages and collaboration between research, training and dissemination processes.
- The priority sectors that can really address rural poverty have not been properly identified and sufficiently networked.
- The potential contribution of forestry research on conservation, scientific management of natural and plantation forests and sustainable development, has not been fully realized.
- Investment in research is much less than required (less than 1.5 percent).
- Institutional capacity to deal with increased responsibility for managing large number of user groups in community and leasehold forests is not adequate.
- Mechanism for equitable sharing of benefit is still in its infancy.

IMPROVING FOREST RESEARCH

The paradigm shift in forest policy from policing to participation has enormously increased the scope in forestry for rural development. This needs to increase the level of awareness of all the stakeholders. The forestry research programme, however, needs strategic planning, research prioritization and multi-stakeholders' partnership approach to contribute to reducing poverty.

Forestry research can have significant positive impact in the area of leasehold forestry, community forestry, and private forestry by providing appropriate technical information and technology to forest users. The management and propagation of selected high valued NTFPs such as Lokta, Panchaule, Chiraito, etc. can increase the income of the rural people. Likewise, buffer zone management, soil and water conservation and promotion of rare and endangered plant resources could be improved with better technical inputs. The area of biodiversity conservation and bio-prospecting could be yet another area needing technical inputs. The potential areas where forestry research can significantly contribute to address rural poverty in Nepal includes:

- **NTFPs:** domestication, value added processing and marketing.
- **Soil conservation**: watershed management, soil fertility, rehabilitation of marginal and degraded lands, nutrient recycling.
- **Agroforestry:** domestication of high value agroforestry trees including wild fruits, management of fodder and multipurpose trees, suitable tree crop combinations and enterprise development through agroforestry.

- **Silviculture:** identification, selection and improvements of fast growing tree species of multiple use.
- **Forest health:** ensure quality of seed and planting material, management practices and choice of species to prevent forest and trees from epidemics.
- **Forest management:** development and demonstration of improved forest management techniques for higher productivity considering employment and income opportunities for the local communities.
- **Bio-prospecting:** identification, selection and promotion of biological resources and associated traditional knowledge for the benefit of indigenous people. This should link with the national and international market for better income opportunities. However, care should be taken to ensure the property rights of local communities and individuals.

RECOMMENDATIONS

- Forestry research should be given due recognition and suitably placed at higher priority to meet increasing demands of forest products and face new challenges.
- Research needs adequate funding and for this additional resources should be explored and mobilized. In order to ensure the long-term sustainability of forestry development programmes, necessary research components should be inbuilt and appropriately implemented.
- Research extension linkage in terms of sharing of information and technology is weak. Research results are not transferred to the grassroot level. One of the root causes of such a situation could be that research were conducted in isolation, and development partners, especially the territorial responsibility holders were neither consulted nor made mandatory for implementing new technologies. In order to make research useful:

  – research priorities needs to be re-visited
  – research and development should be geared towards developing workable partnership mechanism between research and development responsibility holders.
  – research objectives should be linked with development priorities such as poverty reduction, conservation and sustainable use of biodiversity, sustainable development, etc.
- In order to share scarce resources, limited expertise and valuable time, effective mechanism for collaboration needs to be instituted.
- Dissemination and adoption (with modification if necessary) of available research findings should be encouraged at regional and international level.
- Technology generation, verification, adoption and modification is a continuous process. In this continuum, each actor has to jointly work with farming communities, academic institutions and other relevant stakeholders while planning, implementing and monitoring of research activities.

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21 Forests for poverty alleviation: the response of academic institutions in the Philippines

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ABSTRACT

Deforestation has taken on alarming proportions in the Philippines during the post Second World War decades, and it is now among the six countries that account for three-quarters of recent deforestation in the region. The Philippine government has formulated the Medium-Term Philippine Development Plan (MTPDP) for 2001–2004 of which a key component is the Community-Based Forest Management (CBFM), a national strategy in managing the forestlands resources and seeks to address the interlinked problem of forest destruction and upland poverty. While forestry research in the Philippines is handled principally by government research agencies, there are also non-governmental organizations (NGO) and academe-based research institutions that conduct various related researches. The Forestry Development Center (FDC) based at the College of Forestry and Natural Resources (CFNR) of the University of the Philippines at Los Baños, was established to conduct basic policy researches in forestry and develop, or help develop, an effective machinery for forestry policy formulation and implementation. In view of changing demands for research on poverty reduction, especially in the uplands, the research thrusts of FDC have shifted to focus on areas such as improvement of the socio-economic well-being of the upland farmers and harnessing forests for poverty eradication.

THE PHILIPPINE FORESTRY SECTOR

The Philippines has a total land area of slightly less than 30 million ha. From a high of 21 million ha in 1900 (70 percent of land area), the country's forest cover was reduced to 5.5 million ha in 1999 (18.3 percent). Deforestation has taken on alarming proportions in the Philippines during the post Second World War decades. The scenario for 2010 has been described as "nothing short of disastrous" with the country's forest cover reaching a low of 6.6 percent of the total land area.

The UN Commission on Sustainable Development through the Intergovernmental Forum on Forests (IFF) identified the following causes: poverty, lack of secure land tenure patterns, inadequate recognition of the rights and needs of forest-dependent indigenous and local communities within national laws and jurisdiction, inadequate cross-sectoral policies, lack of participation, lack of good governance, absence of supportive economic climate that supports sustainable forest management, lack of capacity, among other factors. These are the same factors contributing to the massive destruction of the forests during the past two decades: the tremendous pressure from an increasing population in search of land; ever increasing demand of fuelwood; the over-exploitation of timber resources; and inadequate forest development, management and conservation efforts. Consequently, soil degradation due to massive conversion of forestlands and grasslands to urban use and increased cultivation in upland areas remains a big problem. It was estimated that 45 percent of the country's total land area suffers from moderate to severe soil erosion, most of which is still unabated (MTPDP 2001–2004).

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Meanwhile, poor rural households have increased with the poverty incidence at a high 28.4 percent in 2000. This means that more than one-third of the country's population is living below the poverty line (MTPDP 2001–2004). Aggravating the problem is the observation that rural income distribution has worsened with nearly 50 percent of rural income being accounted for by the upper one-fifth of rural households in 1997 (MIPDP 2001–2004).

To remedy the above situation, the Medium-Term Philippine Development Plan (MTPDP) for 2001–2004 intends to promote sustainable management and use of its natural resources. To achieve this goal, the government will use four key strategies: (a) environmental sustainability; (b) broader participation of stakeholders in the management and protection of natural resources and environment; (c) equitable access to productive resources and services; and (d) technology-based production in the forestry and natural resources sectors.

A key component of the MTPDP is the Community-Based Forest Management (CBFM), which is the national strategy in managing the forest resources and seeks to address the interlinked problem of forest destruction and upland poverty. Based on current estimates, there are about 20 million Filipinos living in the uplands most of which had been characterized to be of low forest cover. This is based on the concept of "people first and sustainable forestry will follow" wherein upland communities are empowered to directly manage and benefit from the forest resources entrusted to them. The hypothesis is that when the issues of poverty and inequitable access to resources in the uplands are addressed, local community itself will join hands in protecting and managing the forest because it has an important stake on the resources.

The CBFM programme has the following objectives:

- Sustainable management of forest and resources
- Social justice and improved well-being of the local communities
- Strong partnership among local communities and the Department of Environment and Natural Resources (DENR).

The DENR is the primary government agency responsible in the sustainable development of the country's natural resources and ecosystems. In implementing the CBFM programme, the DENR is guided by the following essential features:

- Security of tenure in the form of long-term tenure and usufructuary instruments
- Social equity by giving enough access to the natural endowments of the area, and internally through equitable benefit-sharing arrangements among the members of the people's organizations
- Strong partnership between the national government agency and the local government units to ensure local support to the programme.
- Investment capital and market linkages to sustain the increased economic conditions of the upland community without necessarily exhausting the natural resources in the area.

These very recent developments bring into focus the role of research and development institutions in the Asia-Pacific region in supplying the relevant information and research results for a clear understanding of the sustainable forest resource management-poverty reduction nexus. This is very important particularly for low forest cover but high upland population countries like the Philippines where the challenge of the natural resources governance has always been to uplift the socio-economic well-being of the upland people and at the same time maintain the health of its environment and natural resources systems.

FORESTRY RESEARCH IN THE PHILIPPINES

At present, state-sponsored forestry research in the Philippines is handled principally by DENR through its Ecosystem Research and Development Bureau (ERDB), and the Department of Science and Technology (DOST) through the research consortia being coordinated by the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD).

At the same time, there are non-governmental organizations (NGO) and academe-based research institutions that conduct various researches in support of their respected mandate. One of these academe-based research institutions is the Forestry Development Center (FDC), which is based at the College of Forestry and Natural Resources (CFNR), University of the Philippines, Los Baños, College, Laguna. The FDC was established under Presidential Decree No. 1559 issued in 1978 to conduct basic policy researches in forestry and develop, or help develop, an effective machinery for forestry policy formulation and implementation. Its objectives include:

- Generation of information/data on forestry related areas of concern
- Conduct of basic forest policy and related researches relevant to changing national priorities, goal and objectives
- Advocate policy reforms, which will enhance forestry development in particular and national development in general
- Promote healthy discussion of policy reforms and critical development issues in forestry among sectors concerned.
- Promote the publication and dissemination of forestry policy information.

It employs three main approaches, namely:

- Policy research and studies in the following areas: social forestry, environmental forestry and biodiversity, sustainable forest resources development.
- Forums wherein the FDC facilitates free and open discussion and experience of ideas through seminars, symposiums, conference, workshop and round-table talks for deeper analyses of environmental policies and issues for further reforms.
- Information dissemination through publications such as policy papers, occasional papers, seminar/ workshop proceedings, bibliographies of forestry and environmental laws/regulations.

In view of the changing demands for relevant research on poverty reduction programmes and strategies anchored on the natural endowments of the country, specifically in the uplands, research thrusts of the FDC and other academe-based research institutions will now have to focus on the following:

- **Impact studies of existing forestry programmes particularly on the improvement of the socio-economic well-being of the upland farmers –** There must be a conscious effort to determine whether existing development programmes in the uplands are really giving significant benefits to the poor on a sustained basis. In this regard, the FDC has conducted a series of assessments of both the bio-physical and socio-institutional components of the country's Community-Based Forest Management programme based on the targets agreed upon by the upland community and the government over a given area. This kind of research will disclose the impact of the development programme both on the forest and on the upland community. The data to be generated from this kind of research will be useful as cross-reference if indeed the country is on track with its commitment to reduce the proportion of people living in extreme poverty by at least one-half by 2015.
- **Policy advocacy to push the adoption of relevant policies at all levels geared towards harnessing forests for poverty eradication in the uplands –** An indispensable prerequisite to sustain the contribution of forests to the eradication of poverty in the uplands is the presence of enabling policy system. The research institution should therefore be concerned not only in the generation and interpretation of data but also in translating research results into hard policies, then be able to advocate for the formal adoption of these policies on a broader scale. This activity requires different expertise and methodology but remains a critical phase in the overall objective of establishing an enabling policy environment to eradicate poverty in the uplands using the forest resources. In the Philippines, the College of Forestry and Natural Resources, through the FDC, is very active in undertaking forest policy advocacy work. This is done by lobbying with lawmakers for the passage of laws affecting the natural resources sector, participating in important deliberations of proposed laws and even administrative issuance and submitting policy proposals for consideration of the policy makers.
- **Capacity building of upland community –** There are plenty of researchers on new technologies that would improve crop yields both in terms of volume and quality. The challenge is to bring these technologies to the doorstep of the upland farmer so that he can use them in his farm. This is one role which research institutions should give equal importance because no matter how good the technology is on paper if it is not being employed for the benefit of the upland farmers, then it has no extrinsic value at all. Trainings and information and education campaigns must therefore become integral components of the research programme of R & D institutions to ensure that the results of their researches and studies are applied at the grassroots level. The research institution in effect acts as transferor of practical technology direct to the end users.

- **Coalition formation –** Since sustainable forest management and poverty are both multi-dimensional in nature, R & D institutions should endeavour to join their efforts to take advantage of their respective talents, disciplinary strengths and resources. This strategy enables more integrated research programme among research institutions having complementary interests either on poverty eradication in the uplands or sustainable forest resource management. It will also strengthen the policy advocacy work designed towards the formal adoption of policy reforms resulting from researches and studies.

  The FDC is currently applying this approach in promoting the formal adoption of the Philippine Strategy for Improved Watershed Resources Management (PSIWRW). By convening an annual national watershed forum, almost all water-related agencies of the government, the private sector and civil society are gathered round the table. In the process, albeit informally, a coalition could be formed composed of these water-related agencies and institutions that could be mobilized for a concerted action in the future. In similar fashion, all the major agencies and institutions concerned with poverty eradication and sustainable forest resources management could organize themselves into a coalition that will advance their common objective of eradicating poverty through the sustainable management of forest resources.
- **Laying the scientific basis for policy making –** Policy-makers rely much on empirical evidence to support their policy initiatives. Oftentimes though, this relationship is missing such that research institutions continue to undertake research for the sake of research. At the other end, policy initiatives lack a solid foundation because these are not backed up by scientific data resulting in policy stalemate. Given this common situation in the Philippines and perhaps in many developing countries, academe-based research institutions could employ a proactive stance by configuring their research programmes along the country's macro-development plans and national policy agenda on poverty eradication and sustainable forest resources management. The finding of these aligned researches and studies would then be immensely relevant and valuable to the policy process of the government. In essence, the research institutions act as clearing house for information processing in support of policy making.

  For example, although nobody will argue the need to eradicate poverty in the uplands and at the same time, sustainably manage the forest resources there, the scientific predicate that would articulate the specifics of this relationship may not yet be ready. As a result, the passage of policies that would capture the ramifications of sustainable forest resource management and poverty eradication in the uplands could not catch the imagination of the public. This is the case in the Philippines where the country's main forest policy is already about 27 years old and amendments tabled remains pending for many reasons. One of which is the lack of snowballed public clamour towards approval. This lack of public support could be a function of the inability of the country's research institutions to articulate with conviction the scientific foundation of the pending amendments.
- **Deconstruct conventional theories on the environment–poverty nexus –** The research institutions should now look more closely at the validity of conventional theories surrounding the so-called environment–poverty nexus. For a long time, the tenet is that population growth will lead to environmental degradation because of poverty. This is unfairly blaming the upland farmers for the sorry state of the uplands. There is a need to review those conventional assumptions and come up with new ideas on how to solve the problem of poverty in the uplands. For example, in the CBFM programme that is being assessed by the FDC, one of the areas where the researchers are interested in relates to the non-forest-based employment opportunities of the upland farmers. The idea is to determine if the uplifting of at least the economic status of the upland farmers could be successfully detached from the forest resources existing in the area. If this is possible then the twin objectives of forest protection and economic growth in the upland community could be achieved through the programme.
- **Provide empirical evidence towards the design of academic programmes built on the philosophy that integrates poverty eradication and forest conservation –** It is high time that poverty eradication and forest conservation is placed in the centre of academic discussion so that future practitioners will be equipped with the necessary knowledge, skills and right attitude towards this human endeavour. Research institutions could immensely help influence the development of this kind of academic programmes owing to their rich database on the intimate link between poverty and natural resources and the consequent dynamics that emerge from this interaction. The advantage of academe-based research institutions is that they are organized and working within an academic community and this set-up gives them access to the planning and revision of academic programmes. Furthermore, the researchers are frequently seconded to teach or guide graduate studies and this gives these researchers adequate opportunities to convey the results of their researches to the faculty and students.

CONCLUSION

In its policy brief entitled "How forests can reduce poverty", the Food and Agriculture Organization (FAO) presented an agenda for action composed of four major components on how trees, forests and forestry can contribute towards increasing food security and reducing poverty:

- Strengthening rights, capabilities and governance – This component requires three strategies, namely: (a) support the poor's own decision-making power; (b) strengthen forest rights of the poor and the means to claim them; and (c) recognize links between forestry and local governance.
- Reducing vulnerability – This is achieved by: (a) make safely nets not poverty traps; (b) support tree planting outside forests; (c) cut the regulatory burden on the poor and make regulation affordable; and (d) reduce unfair obligations in forest management.
- Capturing emerging opportunities – This involves four key strategies: (a) remove the barriers to market entry; (b) base land use decisions on true value of forests; (c) ensure that markets for environmental services benefit the poor; and (d) support associations and financing for local forest businesses.
- Working in partnership – Strategies under this component are: (a) simplify policies and support participatory processes; (b) promote multisectoral learning and action; (c) enhance interagency collaboration and (d) make NGOs and the private sector partners in poverty reduction.

This four-point agenda for action presents a very good opportunity for academe-based research institutions to give a significant contribution to the global programme of poverty eradication using forest resources. Each of the strategies identified in this four-point agenda for action is a critical research area wherein academe-based institutions could innovate and seek their changed roles. As stressed in the World Development Report 2003, of the many interrelated drivers of socio-economic change and transformation, scientific and technological innovation is the first. Logically therefore, research institutions should be at the forefront in finding ways and means of combating poverty in the uplands.

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22 Forestry and poverty alleviation: the changing role of research institutions in the Philippines

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ABSTRACT

The paper discusses the present situation of the Philippines in terms of poverty conditions and proceeds to discuss the government efforts at poverty reduction especially with respect to community-based forest managements. The Philippine Agenda 21: Poverty Reduction Agenda, is an ongoing project on addressing poverty reduction in three watersheds of the Bicol Region (ranked number two as the most poverty stricken region) in the Philippines using the watershed approach. The approach is basically participatory (local government units, private sector, communities, military, academic, etc.) with a series of consultative meetings and workshops to draw up a comprehensive watershed management and development plan. Finally, the role of the forestry research institutions in the Philippines is discussed in view of the changing research landscape in the context of poverty reduction. This, in turn, is discussed in relation to the Philippine Agenda 21: Poverty Reduction Agenda.

POVERTY SCRENARIO IN PHILLIPINES

The link between poverty and the environment has been in discussion ever since the Rio Summit in 1991, particularly because the harm from environmental degradation falls more heavily on the poor. Poverty at the same time drives people into environmentally degrading economic activities for their survival. As such, the poverty-environment relationship is a critical concern in the country's sustainable development agenda.

A number of studies have shown that economic growth is a necessary element for reducing poverty. Hence, the key to bringing down poverty is to attain sustained economic growth. Despite substantial development efforts by government in recent years, the incidence of rural poverty in the country remains high. Out of 14.37 million families, 5.75 million or 40 percent live in poverty. A significant number of poor families (44.4 percent) live in rural areas. Along the same vein, a United States Agency for International Development (USAID) Mission reported that the trend in poverty occurrence since 1982 worsens as one moves from the lowlands to the uplands and from irrigated to rain-fed areas. This is due to the geographical remoteness and inaccessibility of the upland communities that deprived them of development efforts and investments.

At present, there are already 20 million poor upland farmers in the different regions of the Philippines. This figure comprises about 30 percent of the total population. The poor upland farmers, where most of the natural resources, especially forest based resources are found, were ranked as the poorest of the poor as early as the 1990s by National Economic Development Authority (NEDA); followed by the marginal lowland farmers, the landless rural labourers, subsistence fishermen, and the urban poor. The Foundation for Development Cooperation (FDC) (1990) defines the "poorest of the poor" as those who are unable to meet their minimum needs.

The indigenous people (IP) make up the majority of the upland dwellers in the past. This has changed over the last three decades. Previously, the indigenous people were coastal inhabitants but the need for land by other people forced the IP into the hills and higher elevations. Eventually, the IP became known as the

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upland dwellers. This too changed when the lowlanders were also displaced because of very few opportunities in the urban and lowland areas for them to progress economically. Thus they migrated to the uplands and mingled with the IP already there. This resulted in an increase of the population from 10 million in the 1960s to 18 million in the 1980s and to 20 million at present.

In 1997, there were 4.5 million families or 27 million people (about 54 percent) of the poor living below the food threshold of Peso 6478 per annum per capita. From 1985 to 1991, poverty incidence of families in rural areas (48.6 percent or 1.4 million) was 1.5 times than that in the urban areas (31.1 percent). In 1994, the ratio increased to 2:1 as poverty incidence in cities declined six times faster than in rural areas. Despite the smaller number of poor people in the cities, living and environmental conditions are often worse than their rural counterparts (ADB 1998).

From 1988 to 1997, contributions to the GDP from agriculture increased, but that from forestry decreased from 7.3 percent to 0.6 percent. The figures strongly imply that rural development anchored on agriculture and forestry cannot cope with increasing needs of the growing population. In terms of forestry, it was during this period that stringent restrictions on logging were imposed in several provinces. Timber License Agreements were cancelled and rigorous forest utilization requirements were imposed. This contributed to the unemployment of people dependent on forest resources.

Figure 1 below shows the current forest cover of the Philippines. In 1900, forest cover in the country was about 90 percent. However, by the end of the century, forest cover in terms of old growth was only 17 percent of the total 30 million ha of the Philippines. Some provinces of the country are down to less than 2 percent forest cover. Forest denudation rate was over 200 000 ha per year in the 1970s. It went down to 180 000 ha in the 1980s and still less in the 1990s primarily because there were no more vast tracts of forest to clear.

According to the ADB (1998), the GINI coefficient is 0.451, which showed that there was higher income inequality as compared to China, India and Indonesia. During the same period, the poorest 20 percent of Filipino households had income 11 times less than the top 20 percent. In the 1990s, the GINI coefficient remained basically the same. More than 50 percent of the total income still accrues to the upper 20 percent of households, while only 14 percent of total income goes to the lowest four deciles, which is about 13.7 percent amongst the poorest 40 percent.

Among the island groups of the Philippines, Mindanao has the weakest social and economic infrastructure. Budgetary allocations for Mindanao have been the lowest. In most rural areas (generally those found in the hinterlands and island municipalities) of Mindanao, inadequate road network impedes rural development and thus contributes to poverty. Road densities are considerably lower than the 1 km/km^2 standard of the Department of Public Works and Highways. Mindanao also has the lowest literacy at 89.9 percent, highest drop-out rate of 89.9 percent, and low school enrollment at 66 percent.

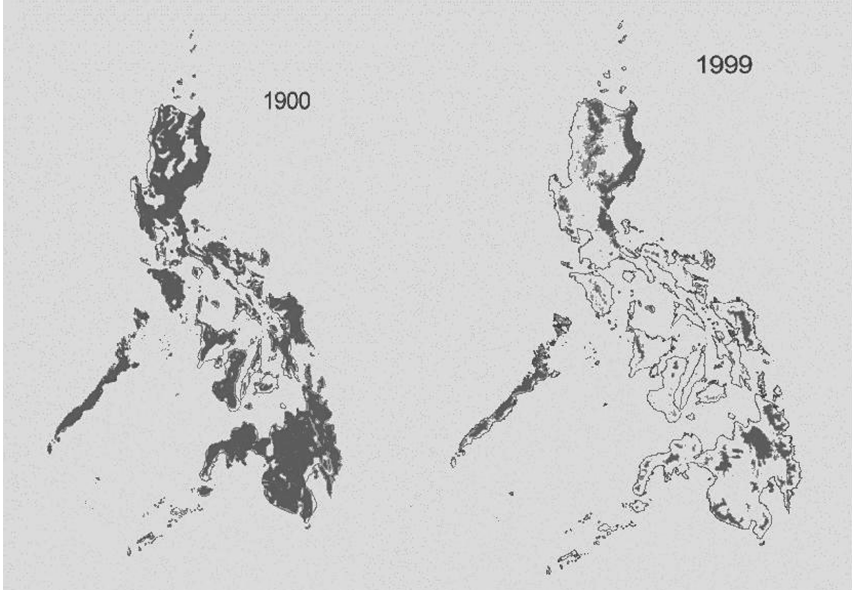

Figure 1. Forest cover of the Philippines in 1900 and 1999.

Although Mindanao lags behind in all aspects of development, it is composed of the progressive regions northern and southern Mindanao and the newly created administrative regions of CARAGA, and the disadvantaged regions consisting of western Mindanao, central Mindanao, and the autonomous region of muslim Mindanao. The capita and per capita family income of progressive regions are 40 percent higher, poverty incidence is 16 percent lower, literacy and enrolment rates are better, and infant mortality and anemia occur less frequently than in disadvantaged regions (ADB 1998).

GOVERNMENT EFFORTS AT POVERTY REDUCTION

The changing priorities of global concern to address poverty prompted governments worldwide to look into the plight of their constituents. The Philippines is one of them. After the 1986 EDSA Revolution, the government initiated more concrete efforts to address poverty in the country:

- The Presidential Commission to Fight Poverty

In 1995, this commission was created to address the poverty prevalent in the countryside and in urban areas. The commission defined poverty as "the sustained inability of a family to meet its basic needs for survival, security and empowerment".

- The Social Reform Agenda (SRA)

The SRA addresses the specific problems of the disadvantaged sectors while providing crosscutting measures for the poor of all sectors and in top-priority provinces to achieve economic empowerment. The agenda redefined parameters to measure poverty by including non-income variables along with income indicators into the "Minimum Basic Needs Approach" to improve quality of life (MBN). The MBN aims to increase the precision of identifying priority beneficiaries and addressing priority needs, while building area-based capabilities for local anti-poverty action to speed up improvements in social indicators. Such indicators are given below:

  - Survival Indicators – characterized to sustain life, as the family needs to be healthy, eat the right kinds of food, drink safe water and have good sanitation.
  - Security Indicators – measure how families are protected from harm or danger therefore has shelter within a peaceful and orderly environment. Further that families have the necessary livelihood support for all its members to satisfy basic needs.
  - Enabling Indicators – supply the means to attain survival and security needs. Family members are provided with education to be functionally literate in order to actively participate in community development and attend to its psycho-social needs.

The SRA provided the framework for a multi-dimensional government approach to address poverty reduction consisting of: (i) quality of life dimensions, (ii) social equity through access to quality basic social services, (iii) economic prosperity by way of asset reforms and access to economic opportunities, (iv) ecological security underlining sustainable development of productive resources, and (v) democratized governance through effective participation in governance.

- The National Anti-Poverty Commission (NAPC)

Created by virtue of Republic Act 8425, the Social Reform and Poverty Alleviation Act in 1997, the NAPC implemented the commitment of the government to the poor by highlighting the following: (i) institutionalizing SRA, (ii) establishing the framework for poverty alleviation, (iii) establishing People's Development Trust Fund, and (iv) providing micro-finance and micro-credit facilities for the poor through the People's Credit and Finance Corporation (PCFC).

- Community-Based Forest Resources Management (CBFRM) as a forestry strategy for poverty reduction

In 1995, the government adopted the CBFRM as the national strategy, through E.O. 263, to ensure sustainable development of forest resources within the country. The strategy focuses on: (i) security of long term tenure to forestlands, (ii) government assistance to forest plantations, livelihood activities and support/ infrastructure services, and (iii) involvement of local government and non-governmental organizations (NGOs) in strengthening and empowering communities to implement such projects.

The CBFRM programme integrates all people oriented and community-based projects and various tenure instruments issued to upland communities and indigenous people by addressing six out of the nine SRA flagship programmes. The plight of farmers, landless rural workers and IP is central to CBFRM. It develops

comprehensive and integrated delivery of social services, enhance institution building processes and participation in governance, and provide livelihood programmes as it expands micro-credit and micro-financing mechanisms.

The CBFRM is also used in management of protected areas in the country. However, in this case, it is the non-government organizations that handle this aspect in PA management. Success stories include those in the Mt. Canlaon Protected Area, The Mt. Kitanglad Protected Area and the Apo Reef Protected Seascape. Communities are tapped to protect the natural resources of the protected area. They are also empowered to implement livelihood projects such as ecotourism in their areas of jurisdiction.

For the government research sector, coupling poverty reduction directly with research becomes elusive primarily because of the nature of the research activities involved. The government through the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD), Department of Science and Technology, established the research system/network in 1976 to indirectly address poverty reduction, among others.

NATIONAL AGRICULTURE RESEARCH SYSTEMS (NARS)

The NARS, to which the forestry research sector also belongs, is a network of 128 agencies of academic institutions, research centres and agencies scattered in strategic places in the entire archipelago. The NARS was established so that scientists could share information as well as scarce resources. Central to the NARS are the Regional Consortia, a series of establishments providing the backbone of the NARS/National Agriculture and Resources Research and Development Network (NARRDN). The Regional Consortia is a conglomerate of research agencies located within a region and they cooperate and exchange information about their research activities.

THE FARMERS' INFORMATION AND TECHNOLOGY SERVICE (FITS)

This is one strategy in reaching out to the impoverished people in the rural and upland areas. Developed by the PCARRD, the FITS are one-stop information shops located in the base agencies of the Regional Consortia and other institutions that professed to house them. Technologies for increased food production, information on conservation of natural resources and other scientific information needed for the poor and upland farmers are easily accessible in print, video and electronic media. Most of the materials found therein are made in the vernacular for easy understanding and transfer to the local users.

Other services of the FITS centres are linking the experts and information with one another and also in sharing these experts where technical assistance is needed among the farmers and the upland poor. Other extended modules/strategies within the FITS are the farmer-scientists, the information caravan and model farmers.

PHILIPPINE AGENDA 21 (PA21): POVERTY REDUCTION AGENDA

Various consultations in updating the Philippine Agenda 21 (2002) resulted in a Poverty Reduction Agenda (PRA) for the PA 21. The PRA includes measures to create (i) an enabling economic environment for sustained and broad-based growth; (ii) improve employment, productivity and incomes; and (iii) attain food security.

For "creating an enabling economic environment for sustained and broad-based growth, the agenda includes, among others:

- addressing the welfare of the communities hosting public economic facilities and private enterprises, particularly large ones with adverse environmental and social consequences;
- reflecting the growing scarcity of natural resources, particularly in pricing and taxation policy.

Towards improving employment, productivity and incomes, some of the key elements of the agenda are:

- promotion of and assistance to small and medium enterprises through appropriate financing mechanisms, infrastructure and technology support, policy reforms and promotion of synergistic linkages with the large scale enterprise sector;
- strengthening and further development of cooperatives as economic instruments for empowering small economic players and achieving sustainable development;

- promotion of sustainable tourism, including non-consumptive and ecotourism, with a view towards increasing benefits to host communities while maintaining cultural and environmental integrity; and
- provision for an incentive and compensation system for environmental services rendered by households and communities.

In the pursuit of food security, including universal access to safe water, the following are some of the key elements in the PRA:

- promotion and transfer of sustainable agriculture technologies especially to the small farm sector;
- provision of increased food availability and affordability through improved harvest, food processing technology and management, equitable and efficient distribution systems and community-based partnerships linking urban and rural people and enterprises; and
- adoption of an integrated water basin approach towards universal access to safe water, reconciling cost recovery with the concern of ensuring access by the poor.

An ongoing World Bank funded project was implemented in relation to the above concern for poverty reduction. The strategy used was the watershed approach as a unit of land management to address the plight of upland people in the Bicol Region and, at the same time, addresses the flooding concerns of the lowland population. The Bicol Region had been declared by the NEDA as the second most poverty stricken region in the Philippines next to the Autonomous Region in Muslim Mindanao (ARMM).

The project conducted a series of consultative and participatory activities with the Local Government Units (LGUs), the private sector, besides the military, the academe and other sectoral entities to establish the scope of the watersheds and to assess the incidence of poverty in the areas of concern. Incorporated in this approach is the use of IEC to inform the upland communities of the project. Included also are the assessment of biodiversity levels and the valuation of the resources therein. Identification of livelihood projects based on the biological resources done, which were categorized into micro-enterprises.

CHANGING ROLES OF FORESTRY RESEARCH INSTITUTIONS

The dilemma of directly linking research with poverty reduction is quite real in the research sector because the research institutions are generally mandated not to go into development work. A paradigm shift has to be made for the forestry research institutions to be relevant in the light of the global priorities.

"Old school" research functions are the usual activities of research, that is, experiments, projects, technology generation, publications and just doing studies for the sake of scientific advancement. These are still being conducted today, but in addition, research institutions have to address the issue of poverty reduction. In doing so, they have to perform the following functions:

- Forestry research institutions need to transfer their generated technologies and information to those who are in direct contact with the upland poor. They are already linking with development organizations so that information and technologies could be used for appropriate decision-making and improving the work of these organizations. Networking is also being done to share the information with concerned organizations.
- Technical expertise is one thing the research institutions have an oversupply of. The experts are tapped to provide technical assistance to development and people's organizations, and local government units, so that they could improve their services to the upland farmers. In many instances, technical assistance has been extended to the marginal farmers themselves to improve their quality of life.
- Trainings are being conducted to capacitate the communities to sustainably manage their resources for their conservation. Trainings are also conducted to enhance their skills in improving productivity and management of their livelihood projects.
- The advent of electronic media has prompted the research institutions to adopt it as an effective vehicle for information and technology transfer to the target clientele.
- One of the strengths of the research and development institutions (RDIs) is that they work in the national arena and can shape policies that affect poverty in the country. Armed with information generated by research, policies could be revised or formulated that would favour the poor.
- Since RDIs cannot directly involve themselves in development work, the practical strategy is to link with those who do. The RDIs contribution to the work of development organizations is by providing them with information, technical assistance and technologies that would help the upland communities in alleviating poverty. As such, the role of the RDIs is to provide support to these organizations.

- Research institutions are known for being impartial and apolitical. Hence, an role for them is to mediate in conflicts especially when in clarifying issues and problems in communities. As resource persons dealing with forestry matters in the uplands, they are more acceptable and credible to the local people than those in other government agencies.
- Further, scientists/researchers are often tapped to do impact assessments because of the same credibility that they have among the regulatory and development organizations. Impact assessments are best conducted with scientific methodologies and what better people to conduct them than the researchers themselves. Within the system of impact assessments is the "social acceptability" requirement, which the local people could very well relate to the researchers.

With the priority of poverty as a global concern and the situation where research institutions cannot deal directly with poverty, the change in focus from basic to applied/action research becomes paramount. This paradigm shift becomes "demand–driven" wherein the needs of the communities are addressed rather than the needs of research for the sake of scientific enquiry. Of course, basic research cannot absolutely be discarded since it still has an important role to play but the focus of most researches would move more towards applied/action research.

CONCLUSION

Clearly a paradigm shift is necessary for the forestry research institutions to stay relevant in the light of poverty reduction priorities. The major roles that they have to perform are enumerated above. However, as national and regional research centers, they could be more effective in influencing the outcome of national and regional policies affecting poverty rather than "on-the-ground" due to limitations in their mandates and the nature of the research activities. On the other hand, the services they could offer are facilitation (in terms of referrals to experts, fund conduit, brokering projects, etc.), capacity building (training) and networking. Poverty is still high in the Philippines due to social, economic and institutional inadequacies. With the emerging roles of research institutions, we hope that their contributions would, in effect, help in alleviating or reducing poverty incidence in the upland communities.

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23 Forests for poverty alleviation – case of Bhutan

Doley Tshering*

ABSTRACT

Bhutan has a total area of about 46 500 km^2. About 80 percent of the country's population is rural. Forests form the single largest resource of the country covering about 72 percent and form integral part of the farming system of the local people. Household incomes are low with average income per person less than a dollar per day. Most of the rural people are subsistence farmers. Current government initiatives for involving local people in natural resource management include social forestry programmes consisting of community forestry and social forestry. Recently the Ministry of Agriculture adopted the community-based natural resource management, as a guiding principle for natural resource management in the country and the efforts to devolve power through decentralization are encouraging developments. Besides many grassroots projects involving local people in natural resource management and utilization initiated by both national and international NGOs are a step in the right direction. Research should be made more pro-poor and concentrate on finding ways for the forestry sector to meet the in needs through development of appropriate technologies and advocacy for the rights of the rural people. Similarly other actors such as training institutes, policy makers and development organizations have clear and paramount roles to play to make forestry pro-poor and assist in poverty alleviation.

COUNTRY BACKGROUND

Bhutan is a landlocked mountainous country with a total area of 46 500 km^2 in the eastern Himalayas. It ranges in altitude from about 300 m in the south to over 7000 m in the north. The wide variation in altitude means a corresponding variation in range of climatic conditions from hot and humid tropical and subtropical conditions in the south to tundra conditions in perpetual snow and ice in the high Himalaya zone (Gyamtsho 1996). There is substantial variation within these ranges and the climate and rainfall characteristics change dramatically within short distances and a simultaneous variation in diversity of vegetation within a limited geographical area. Ohsawa (1987) defines six vegetation types that correspond to six climatic zones (Table 1).

Owing to her mountainous terrain, Bhutan is very sparsely populated. The total population of Bhutan is estimated around 700 000 and a population density of 14 persons per km^2, with majority of the people still living in the rural areas. With the current population growth rate of 3.1 percent the country's population is likely to double by the year 2020 posing serious implications to the Bhutan's environmental resources (RGOB 2001a).

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Table 1. Vegetation zones in Bhutan

Vegetation zone	Altitude (m)	Characteristic species
Tropical zone	100–1000	*Acacia catechu, Bombax cieba*, *Daubanga grandiflolia*, *Shorea robusta*, *Terminalia myriocarpa*, *Tetra nudiflora*
Sub-tropical zone	1000–2000	*Castonopsis*, *Lithocarpus*, *Pinus roxburghii, Schima* (Wet valleys) *Quercus griffithii* (dry inner valleys), *Quercus lanata*
Warm temperate zone	2000–2500	*Castonopsis*, *Litsea Quercus*, Persea, *Pinus wallichiana* (inner notherly slopes)
Cool temperate zone	2500–3000	*Acer campbellii, Abies densa, Betula utilis*, *Quercus semicarpifolia, Picea spinulosa*, *Tsuga dumosa*
Sub-alpine zone	3000–4000	*Abies densa*, *Juniperus recurva, Larix griffithii, Picea spinulosa*, *Pinus wallichiana, Tsuga dumosa*
Alpine zone	>4000	Forest limit; scattered dwarf junipers and rhododendrons (shrubs) till 5000 m.

Source: Adapted from Ohsawa (1987).

The Bhutanese economy is still essentially agrarian. Agriculture contributed about 38 percent of the GDP of Nu 18 514.1 million in 1999, this have fallen from about 43 percent in 1990 (Table 2).

Table 2. Composition of GDP (1980–90–98)

Sector	(percent real GDP)		
	1980	1990	1998
Agriculture, livestock, forestry and fishing	55.7	42.7	36.7
Mining and quarrying	0.6	0.9	2.4
Manufacturing	3.2	8.1	11.1
Electricity, water and gas	0.2	7.8	11.0
Construction	7.9	8.1	10.6
Wholesale, retail trade, restaurant and hotels	10.9	6.6	7.0
Transport, storage and communications	4.3	7.1	7.5
Financing, insurance and real estate	6.3	7.7	5.1
Community, social and personal services (Govt.)	10.8	11.0	8.6

Source: Central Statistical Organization (CSO), RGOB (2001).

A surge in hydropower development and associated industries in the 1980s has increased the share of the mining, manufacturing and electricity from 4 percent of GDP in 1980 to about 25 percent by 1998 according to a report by the Planning Commission (RGOB 2000). The report further states that during the period 1990–99 the maximum growth was recorded by the mining and quarrying sector reaching about 12 percent per annum, followed by the manufacturing sector with an annual growth of about 11 percent while agriculture and allied industries recorded the slowest growth of about 3 percent. The GDP grew at an average rate of about 18 percent from 1996 to 1999 with the highest rate achieved in 1997 (22 percent) and is currently about 14 percent (RGOB 2001a)

The RNR (Renewable Natural Resources) sector includes agriculture, animal husbandry and forestry falling under the Ministry of Agriculture and continues to be the largest contributor to the GDP and is also the major source of employment and livelihood for the Bhutanese people.

Land area suitable for agriculture is estimated to be about 8 percent which contributes about 38 percent of the GDP and employs about 80 percent of the population (Dorjee 1995). Maize is the principle crop followed by paddy, the former grown extensively in the eastern and southern sub-tropical areas where the absence of irrigation and poor soil fertility limits paddy cultivation (Gyamtsho 1996). Cash crops grown for export include apples, oranges, cardamom, mangoes etc. Agriculture contributed about 17.9 percent of the GDP in 2000 (RGOB 2001a). Livestock rearing is done not just for milk and meat production but extends to draught power, organic farmyard manure (FYM) and its contribution to GDP in 2000 is estimated to be 7.6 percent (RGOB 2001a). Cattle dominated by the indigenous siri (*Bos indicus*) is the most important type of livestock and reared throughout the country, while yaks (*Bos grunniens*) provide the only means of livelihood for inhabitants of high altitude areas where harsh environments limit crop production and other means of livelihood (Gyamtsho 1996).

Forest products accounted for 10.4 percent of the GDP in 2000 with a growth rate of 5.9 percent for eighth five-year plan (1997–2002) (RGOB 2001a). The growth rate in seventh plan period was 22.5 percent, the growth being checked by the government decree that ordered a maintenance of at least 60 percent forest cover at all times in an effort for conservation (RGOB 1995). The main wood product from the forests is firewood: still the most predominant form of energy for cooking, lighting and heating especially in the rural

areas. Commercial timber production accounts for only a fraction of the estimated 169 million m^3 annual growth and logging concentrated more in the accessible areas, particularly where there are motor roads (Gyamtsho 1996). Wood based manufacturing firms and industries albeit growing in numbers are still few and mainly engaged in sawing and carpentry.

FORESTS: EXTENT AND LEGAL STATUS

Forests constitute about 72 percent (an area of 29 044 km^2) and represent the single largest natural resource of the country (Table 3).

Table 3. Land cover categories

Category	Area (km^2)	% of total
Conifer forest	10 636	26.6
Broadleaf forest	13 793	34.4
Mixed forests	1358	3.4
Scrub forests	3258	8.1
Pastures	1564	3.9
Agricultural land	3146	7.9
Snow and glaciers	2989	7.5
Water spreads	304	0.8
Rock outcrops	2008	5.0
Others	1020	2.5

Source: LUPP (1994) (adapted from Dorjee 1995).

The geographical distribution and area proportion of the forests is very heterogeneous (Table 4). Forests in the Bhutanese context consist of shrub vegetation of hard leaved species, intensively grazed tree stands and true forest stands. Conifer forest is the most dominant type of forest types in Bhutan with temperate hardwoods the second most common.

Table 4. Composition of forest cover in Bhutan

Forest type	Area (ha)	% cover
Fir	3453.02	11.9
Mixed conifer	4,868.27	16.7
Blue pine	1,285.93	4.4
Chir pine	1,008.99	3.5
Broadleaf with conifer	1,357.88	4.7
Broadleaf	13,747.82	47.3
Plantations	64.26	0.2
Scrub forests	3,258.12	11.2
Total	29,044.29	100

Source: LUPP (1995) (adapted from Dorjee 1995).

Much of the forest is degraded in terms of quality especially near the homesteads (Tshering 2000). Due to a generally poor transport facility wood is normally collected wherever found closest to roads. This entailed pushing the edge of the forest further away from settlements and only in some cases such clearings have been colonized by invasive and hardy species of pines (*Pinus* spp.) and rhododendrons (*Rhododendron* spp.).

Till 1969, all lands were regarded as common property unless explicitly claimed as private land. Similarly forests were also deemed common property whose use was dictated by the village customs and traditions. However, this changed in 1969 with the Forest Act, which decreed all land not privately owned to be Government Reserved Forests (RGOB 1969). The Government then had absolute ownership of trees and other forest products even on private land (Wangchuk 1995). All utilization and management of the forest is controlled by the Department of Forest and its functional divisions. However, with the passage of time and the changing priorities and demand on the forest resources, the Forest Act, 1969 was considered inadequate to deal with the increasing complexities. The Forest and Nature Conservation Act, 1995 was subsequently approved by the parliament which forms the legal basis for social forestry and community forestry.

Being an entirely mountainous country except for the southern part, most of the country's forests are on hills and vulnerable sites. About 80percent of the total forest areas are on hills and vulnerable sites. A combination of the steep terrain constrains utilization of forests commercially as evidenced from the fact that most of the degraded forests are in the southern Dzongkhags (Negi 1983).

RATE OF CHANGE OF FOREST COVER

Although a correct estimate on forest cover change is missing, most of the authors agree that much of the forest cover in Bhutan has remained largely intact (Norbu 2000, Pradhan 2001). However varying estimates of forest cover are quoted by different authors, which range from about 64 percent to about 72 percent. Official figures are in the range of 56 percent to 60 percent. Because of the protection afforded by the Department of Forests with its stringent rules combined with lesser incidence of forest fires and other catastrophes, forest covers are perceived to have increased by many of the Bhutanese (Tshering 2003). Local people explain this by indicating that past fallow lands and surrounding bare lands are now covered by invasive species such as Blue pine and Rhododendrons. Although the forest areas may have slightly increased as vouched by the local people, many of the forest especially near the homestead are degraded in terms of quality. Local people report that tree products especially firewood and timber have progressively decreased from the forests over the last few decades with them having to walk much longer and spend more time now to get the same amount of product they used to get few years ago (Tshering 2000).

POVERTY IN BHUTAN

There has been no attempt made so far to measure poverty using a definitive set of indicators. However data on a large number of poverty related indicators are collected and reveal that Bhutan has been successful in tackling and reducing certain types of poverty, particularly access to basic social services and infrastructure. This is evidenced from the increase in the Human Development Index (HDI) from 0.325 in 1984 to 0.581 in 1995 (RGOB 2000). Albeit there is a lack of national agreement on a definitive set of relevant poverty indicators for Bhutan, a rapid poverty assessment carried out by the Planning Commission with assistance from the UNDP states unambiguously that household incomes are low in our country. The average income per person is low at Nu. 40 which is less than a dollar per person per day (RGOB 2001). There is also a significant difference in income between the urban and rural areas with average household income per person are Nu. 70 in urban areas and Nu. 33 in rural areas. The Gini coefficient has been calculated at 0.365 (RGOB 2000).

The UNDP through a discussion paper recommends complementing and expanding the current set of poverty indicators already collected in Bhutan into a more rounded comprehensive set suitable for several purposes of monitoring poverty (UNDP 2002). The paper also lists activities such as expanding the human poverty outcome indicators, establishing a set of poverty lines and ascertaining the perception of the poor on their poverty. Hopefully such an exercise would make more meaningful and robust data available on poverty in the country in future.

SOCIO-ECONOMICS OF FOREST DWELLERS

The majority of the forest dwellers are subsistence farmers practicing an integrated mixture of arable farming and livestock rearing backed intricately by the forests. Main crops cultivated are cereals such as rice and wheat, the former being the staple and the preferred food in many parts of the country. Other crops include fruits, vegetables and oilseeds. Livestock include cattle, pigs, poultry, and horses and in the higher areas yaks (Tshering 2003).

Five categories of land holding for agricultural purposes exist namely, chuzhing (wetland), kamzhing (dryland), tseri (fallow land), pangshing (pasture land) and tsesa (kitchen garden). Thanks to the small population and the relatively later entry into the development sphere, most people in Bhutan own some amount of land. The Government has stringent rules on maintaining this status quo with a policy of land ceiling of 25 acres or 10 ha for any household. The households with less than 5 acres of land are also not allowed sell their land. As such forest dwellers should in principle own at least own some land and those who owned less than 5 acres in the past should still own the same amount of land. Chuzhing, till recently, was the most sought after land type with rice as a preferred staple crop of most Bhutanese people. However, now with the ability to grow more crops for cash income and the availability of imported rice from neighbouring countries like India and Thailand, there is a huge trend of land conversion towards dryland, one that is of major concern for the Ministry of Agriculture's mission of food self-sufficiency.

Forests constitute an essential support for the local people's economic activities: for agriculture, composts, farm implements, bedding materials and fodder for livestock; as only and never ending source of wood energy for cooking and water and space heating; and as a source of local enterprise of generating income through activities such as collection and sale of wild edibles, manufacture of handicrafts, etc.

Five categories of livelihood sources are important for these people: agricultural crop production, livestock production, forest products, on-farm tree products and non-agricultural activities. Agricultural crop production is the predominant source of livelihood. Paddy and maize are the major staple crops. Other crops grown include wheat, barley, potatoes, vegetables etc. Livestock kept are mainly cattle and horses, poultry and some goats. Non-agricultural activities contributing to household income include off-farm wage labour, petty business such as trading and retailing, and porter charges (for both tourist and government officials). On-farm trees are grown for the major tree products including fodder, firewood, fruits and nuts, and timber.

Property ownership in rural areas is mostly determined by inheritance (RGOB 2001b). In the western and eastern parts of the country, daughters usually took care of the parents and inherited parental property. Parental property of the household such as land, ancestral houses etc. are as such usually registered under the women's name. Decisions with regard to land are made by women and men are married into the family of the wives and cultivate land belonging to the women. Property ownership and inheritance in the southern parts of the country are however different. Sons inherit property and take care of the parents while daughters are wedded and sent to the in-laws home. Most of the household decisions relating to productive task are mainly taken by men and so explains men being the main decision maker in labour related matters (Tshering 2003).

MANAGEMENT SYSTEM OF FORESTS

Five different types of forest management systems exist in Bhutan. Selective clear cutting system where individual tree and group selection for harvesting and regeneration forms the core of the system. Most Forest Management Units (FMU) are managed following this system of management especially in areas serving the local use functions. Clear cutting systems include large scale, strip and wedge, and shelter wood clear cutting. Large-scale clear cutting system is not practiced in Bhutan for a variety of reasons, among the chief ones being also the inaccessibility of large areas. Strip clear-cut systems are amenable to cable crane logging which are predominantly practiced and as such is the most preferred clear-cut management system. Agroforestry systems include both forest and farm intercropping systems. Forest intercropping systems is mainly "tseri" or shifting cultivation and farm intercropping comprise of growing trees on-farm boundaries, or deliberate intercropping with certain crops. Social forestry systems include community forest, community plantations and private forest.

Lots of other systems exist in the last two categories, which are not readily recognized. The majority of forests in Bhutan are state owned although with the advent of social forestry programmes, private and communal ownership of forests in terms of private forestry and community forestry are emerging.

INVOLVING COMMUNITIES IN NATURAL RESOURCE MANAGEMENT

Involvement of local people in natural resource management or specifically management of forests started in Bhutan in 1979, when His Majesty the King, recognizing the importance of community involvement in the protection and management of forest resources, commanded the Department of Forestry to prepare a scheme to involve the local people in planting of trees in their own private land or village lands (SFES 1996).

The Department of Forestry then initiated a series of social forestry activities across the country. In 1993, following a National Workshop on Social Forestry and Forestry Extension held in Lingmethang, Eastern Bhutan in 1992 (RGOB 1993), community forestry and private forestry were recommended for implementation. Thus private forestry and community forestry schemes today constitute the social forestry programme as the main operational focus of the national-level forestry extension programme (Desmond 1996). Subsequently, the Forest and Nature Conservation (FNC) Act of 1995 contained the legal basis for policies and regulations providing tenure on common forest resources to local user groups. The FNC Act 1995, included a chapter on community forestry and defined community forestry as 'any area of Government Reserved Forest designated for management by a local community in accordance with the rules issued under this act (Wangchuk 1998). The provisions of the act beside other things allowed the Ministry of Agriculture to make rules for the establishment of community forestry on Government reserved land (RGOB 1995). The Social Forestry Rules, 2000 were approved by the National Assembly in the summer of 2000, which defines rules for private and community forestry activities by the people.

The goals of the social forestry programme in Bhutan are as follows (from FSD 1996, quoted by Bodt 2002):

- To maintain the biological diversity and ecological functions of the land (protection function)
- To maintain or improve the sustainable supply of forest products in order to contribute positively to self-sufficiency and the economies in rural areas (production function);
- To improve and strengthen rural institutions which are interested in the sustainable use of the forests and to ensure equitable decision making processes, implementation and the equitable distribution of forest benefits (social and economic function).

These goals have been largely derived from the following objectives:

- To transfer the responsibilities for the management, implementation, development and utilization to the local users;
- To strengthen the technical, institutional and organizational skills and the capacity of the local users;
- To assist the forest users in developing forest based home and cottage industries.

The sequence of events and the goals and objectives of the social forestry programme outlined above clearly indicates the Government's commitment to involve the people in the management of natural resources. The main assumption of such a move has been that if the forests are owned and managed by the users, the sustainability of the resource would improve (Wangchuk 1998). Twenty three community forests (15 community plantations and eight natural forest and plantations) have been handed over to the communities. Although the Dzongkhag Forest Offices are receiving a lot of requests for private forests, approval has been hindered so far due to the on-going cadastral survey, which has not finalized its results yet (Kinley, pers. comm 2003).

This commitment of the Government in involving the people in managing the natural resources is also reflected in the major emphasis and interest the Government has shown in development of a framework for Community Based Natural Resources Management (CBNRM). The CBNRM framework promotes understanding and importance and scope for CBNRM in Bhutan and suggest strategies for accelerating the translation of CBNRM objectives and policies into practice. Consequently a National CBNRM workshop held in February 2003 identified as possible action research projects such as community forestry, non-wood forest products, pasture, forest grazing and watershed management (RGOB 2003) whereby local communities would be involved in the management of natural resources. The action research projects identified will be operationalised in 2003.

Besides, the Integrated Conservation Development Programme (ICDP) of the various national parks under the Department of Forests and those implemented by the Royal Society for Protection of Nature (RSPN) has within them elements emphasizing on the enlisting of the local people for the management of natural resources. Smaller projects by the United Nations Development Programme working directly with the grassroots stakeholders also address the issue of involving communities.

CONSTRAINTS FOR POVERTY ALLEVIATION OF FOREST DWELLERS

Constraints for poverty alleviation of forest dwellers are many and vary according the kind of poverty one is dealing with. For instance, one clear constraint of poverty alleviation, particularly with regard to the 'poverty of income' is the fact that most of the forest dwellers are far-flung and remote with no or very little access to markets and income generating enterprises.

Lack of employment opportunities for these people, especially during the off-season is also a constraint. Majority of the rural people depend on off-farm employment during the lean seasons to offset their shortages. Moreover for some of these people, off-farm employment is the only source of cash income, very much necessary for buy the necessities of their daily life.

The size of the households also plays a paramount role in contributing towards the poverty of forest dwellers. More often than not, health advocacies on advantages of small families and family planning do not reach these people. Families average 10–15 for most of these households. With limited resource to fall back on and lack of employment opportunities, these households self-drag themselves into the poverty trap.

Education has been recognized as the key for children of the poor families to break out of the cycle of poverty. However not all of the children of the poor can benefit from education for various reasons. Their villages are so far away from the nearest school. Although education is free in Bhutan, there are still some expenses that need to be incurred for instance buying school dress or stationery, etc., some poor parents cannot afford to meet these expenses; because activities of individual household member brings home so little, all members have to contribute, thus keeping children away from school.

Specifically related to forestry, local appropriation of forest products are hindered because forest and forest products belong to the state. When required rural people need to go through lengthy processes of applying for permits which entailing long and repeated travels out of their villages. This means high transaction cost for them and consequently the opportunity of forest and forest products to contribute towards generating income is limited. Further penetration of market and commercial forces (often much bigger and powerful than the local population) into the forest and the helplessness of the local people to protect their forest has lead to degradation of the forest in terms of their quality – crucial products such as bamboo which have huge scope for generating income for the rural people, particularly the poor who are more often employed in this than the rich, are exhausted for commercial large scale exploitation (cf. Tshering 2001).

VISION FOR FUTURE DEVELOPMENT

There are several factors at different levels that offer opportunities for forests to play a role in poverty reduction. Devolution of powers for local development through decentralization whereby from the ninth five year plan (2003 – 2007) gups are entrusted with full executive and financial powers for planning and implementing development in their geogs. Much of the guiding principles for such a move are already in place. Most developmental works are now decentralized with power for decision-making on these activities vested with the local leaders and organizations such as the gup and the Geog Yargye Tshogchung (GYT). The GYT is also allowed to retain taxes collected for their geogs. This is encouraging as forest and forest based rents can accrue to the local people particularly to the poor although proper monitoring and evaluation is a must so that these benefits do not get captured fully by the local elites.

The policy and legal frameworks are also encouraging for community forestry and small scale tree growing by farmers as private forestry. This can greatly increase the local access to forest resources and management of natural forests. However, long chains of bureaucratic hurdles and lack of connections especially for the poor becomes a deterrent. Besides there is still a lot of confusion regarding the social forestry rules even among the professional foresters due to a slow and reluctant institutional change in the national forest agencies. A proactive role from the policy to break this caution and further the community forestry programme is crucial. Private forestry and community forests have a lot to offer to the rural poor especially with the growing demand for timber and wood products within the country.

Small scale wood-based industries can offer poor people some form of off-farm employment which can generate the much needed cash income for the resource strapped rural poor. This is particularly because the poor owns less land and as such have more time to work off-farm.

Forestry rules at present subsidize non-timber forest product appropriation by the rural people. There is a growing demand for non-timber forest products both within and outside the country. Rural poor people can earn cash income through sale of non-timber products such as bamboo mats and baskets. The poor are very often more likely to be engaged in such activities and as such facilitating manufacture and sale of these products are no doubt pro-poor.

Forest-based tourism, payments for off-site ecological functions, carbon storage and sequestration etc. offer promising future prospects for local people to tap by involving in tree growing and forest management through community forestry and private forestry.

ROLE OF RESEARCH, DEVELOPMENT AND TRAINING

The recognition that forestry sector needs to deliver goods and services not only for the national development but should also concentrate on the needs of the marginalized poor forest dwellers should be explicitly spelt in research statements and objectives. Research should be targeted to the farmer level so that research can address the needs of the poor. Current forest research at best remains irrelevant to the poor people. Attempts to incorporate the needs of the poor in conducting topical research would go a long way in the poverty alleviation effort in the country. Research into understanding the interactions between the rural people and the forests should be emphasized and involvement of the local people in forest management should be promoted and advocated backed with empirical and scientific proof. Research should work together with other stakeholders to influence policy decisions that support poverty and forestry inter-linkages. Constant review and conduct of forestry research to generate information that would enable policy makers make informed decisions should be done by research managers. Possible topics for research that would aim to do this include people's perceptions about forest resources, indigenous knowledge systems, indigenous institutions, etc. It is the poor who depend mostly have and depend on indigenous knowledge systems, promotion of this would get the poor to participate and benefit from research (Tshering 2003).

Research areas and topics for forest and poverty put forward by CIFOR (Table 5) are also relevant for Bhutan although priority accorded to each topic may be different.

There is a general lack of clarity on the contribution that forests make towards poverty alleviation due mostly to lack of proper forest valuation methods and lack of base line data. Forestry research should put forward convincing statements regarding the magnitude of forest contribution. Globalization and other emerging trends could bring in immense benefits for the poor. For instance farmers could trade carbon credits with companies for trees grown in private forestry or community forestry. Research and extension should explore and help farmers forge such links.

Table 5. List of poverty related forest research areas and topics relevant to Bhutan

Research area	Topic	Priority	Status in Bhutan
1. Exploring the present pro-poor role of forest	a. Forest products (subsistence and income in household livelihood strategies.	High	Number of completed research projects
	b. Small scale wood based processing enterprises	High	Few anecdotal studies
	c. Economy wide benefits of forest based rents	Medium	Currently debate on green accounting
	d. On-site ecological services from forests and trees	Medium	Few watershed studies
2. Emerging market trends and opportunities	e. Globalization, trade liberalization and markets	Low	None
	f. Small holder tree planting and private sector partnerships	Medium	None
	g. Payments for environmental services	Medium	Debate on-going
3. Cross-cutting institutional and extra-sectoral issues	h. Local resource control and land tenure	Medium	Few studies conducted
	i. Decentralization, governance and market deregulation	Medium	Anecdotal evidences as part of other studies
	j. Integrating forest into macroeconomic and poverty strategies	Medium	Advocacy by donor agencies e.g. UNDP.

Source: Adapted from Angelsen and Wunder (2003).

However research is very often determined by the interest of a number of stakeholders viz. research funding organization, national agencies etc. and unless these organizations actively and proactively put poverty alleviation on their agenda for research, research described in the earlier paragraphs and Table 5 would not be possible. Further national forestry programmes should take full stock of the importance of incorporating poverty alleviation strategies in forestry plans and policies. Policy plays an important role in any developmental effort. An enabling policy framework goes a long way in determining the success of development initiatives. It is important that policy interventions take into account priorities and strategies for poverty alleviation. Policy makers can consider a major shift in strategies in poverty alleviation and forestry to consider the role of forest carefully and critically. Enabling policies can activate local confidence and incorporate local community participation in forest management through community forestry, private forestry and other forms of partnership.

International organizations such as the UNDP and other donors can help in building the capacity of the local forest research and planning units to conduct poverty related research and help plan forestry programmes to focus on poverty alleviation. Empowerment of the rural poor through capacity building and advocacy can also help in giving them a voice and proper 'lobby weight' for negotiating access and rights with the government forestry agencies.

Training institutes such as the Natural Resources Training Institue (NRTI) should consider modifying the curriculum to include syllabus on the role that forests play in poverty alleviation strategies.

All in all, a well thought out plan of action incorporating the broader interest of national development, forest conservation and poverty alleviation through the involvement of all relevant stakeholders and working on these plans together would make the role of forests in poverty alleviation more meaningful, well received and effectively implemented.

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24 Community forestry in mountain development: a case study in Guizhou Province, China

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ABSTRACT

China is a country with vast mountainous areas stretching from west to east. Out of the 1500 mountainous counties, 60 percent are distributed in the western region with the highlands taking up as much as 69 percent of the total land area nationwide. Mountain population constitutes 56 percent of the country's total, and more than 80 percent of the minority groups inhabit the mountainous areas and enjoy a rich cultural diversity. Mountain development is the key activity for the Great Development of West China. The mountain population in China has, for many years, followed the principles of harmonized development of both ecology and economy. Management measures have been used to optimize the economic structure and improve the people's living standards in mountainous areas. As a result, this has led to an active exploration of an integrated management and development strategy for ecosystem improvement and sustainable development, and is also one important component for the Great Development of West China. Those pilot counties selected for integrated mountain development have continuously explored creative development mechanisms and models. Mountain forestry is community forestry, and is the key component for mountain community development. The basic feature is that it is owned, managed, administrated and benefited by the people. The adoption of participatory approach in integrated mountain development has speeded up mountain development pace and provided useful experiences and models in the application of community forestry in mountain development. This is particularly so where farmers are regarded as the main implementers, ownership system reform is the core issue, farmer's indigenous knowledge is respected, and a system of natural resources management is established.

MOUNTAIN DEVELOPMENT AND FORESTRY

China is a country with vast mountainous areas, up to as much as 69 percent of the total land area nationwide. Out of the total of 2300 counties in China, some 1500 are located in mountainous areas. The mountain population makes up 56 percent of the country's total, and more than 80 percent of the minority groups inhabit the mountainous areas. After the implementation of the Key Poverty Alleviation Programme in 1987, the majority of the poverty-stricken population remains concentrated in mountainous areas. Mountain people have accumulated, after hundreds of years' of practice, rich experiences in improving and protecting the mountains with their daily life and food heavily relying on mountainous resources. The National Government has adopted multiple measures to encourage mountain people to plant trees, construct new water conservancy facilities, prepare lands, improve low-yield agriculture lands, conserve soil and water, build new roads, establish power plants, develop economic forests at mountain valleys, carry out watershed management, and develop crop growing and animal husbandry industries which have all yielded remarkable achievements.

However, due to continuously deteriorating mountain environment caused by the vulnerability of mountainous ecosystem and inappropriate economic activities, these areas suffer from serious underdevelopment

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with impoverishment of the people's living conditions. This delayed development of mountainous areas, which also serve as resource and energy bases, has restrained the whole development process of relatively developed plain areas, and further influenced China's general socio-economic development situation by and large. The natural and socio-economic conditions of most of the mountainous areas in China can be roughly summarized as "Five Richness, Four Scarcities, Three Weaknesses and Two Massiveness", which can be explained as follows: "Five Richness" means mountainous areas are rich in slope lands, special local products, water resources, mineral resources and tourist attractions; "Four Scarcities" represent the lack of arable lands, thermal energy, funding resources and integrated utilization; "Three Weaknesses" stand for poor transportation conditions, poor economic management standards and poor scientific and technical capabilities; while "Two Massiveness" refers to sharp vertical changes and great development potentials. In general, we can regard the "Five Richness" as advantages, "Four Scarcities" as problems, "Three Weaknesses" as the key problems to solve, and "Two Massiveness" as favourable situations for development and utilization.

In early 1996, the Central Leading Group for Rural Development directed the former Ministry of Forestry to coordinate 11 ministries, commissions and financial institutions from the central level to organize and implement the pilot work for integrated mountain development nationwide. The implementation of integrated mountain development is one of a few "grand" strategies in the process of China's economic development and modernization. The major activities for integrated mountain development are improving soil conditions, harnessing water systems, planting trees, building new roads and establishing power plants. These activities are implemented in the 114 counties selected nationwide as pilot counties for integrated mountain development. People inhabiting mountainous areas in China have, after many years' practice, explored a few models of integrated mountain development, which are suitable for China's own conditions. For example, the "Taihang Mountain Model" combines scientific research, teaching and demonstration methods, as well as expert know-how and fund introduction. Another model called "Dabie Mountain Model" focuses on developing local key industries based on local strengths. The third model is called "Shanjiang Lake Model" which follows the principle of "harness lakes first to harness rivers, manage rivers first to manage mountains, improve mountains first to improve human capacities". The fourth model is called "Changbai Mountain Model" which industrializes agricultural resources in mountainous areas. The fifth model is called "Small Forestry Manor Model" which carries out an integrated development of crop growing, biogas and animal husbandry activities, and introduces multiple ownership economy into mountain improvement and development.

However, in the current situation, China's mountainous areas are not being well developed with the approaches for development also being inappropriate. Rich resources in mountainous areas have not been wisely used with many mountainous areas still suffering from backwardness and poverty. Problems are outstanding, for example, in aspects of regarding agriculture more important than forestry, paying greater attention to utilization than to rehabilitation, and giving more weight to major industries than secondary industries.

Unlike previous development approaches, China's current mountain development is being carried out according to the principle of sustainable development with the following characteristics:

(i) Have a new understanding of mountainous areas: this regards integrated mountain development as an important measure to build a strong nation as well as improve the people's quality of life and sustainable development. Major activities for integrated mountain development are improving soil conditions, harnessing water systems, planting trees, building new roads and establishing power plants. This integrated mountain development serves not only the mountain population, but is also an important issue relating to the state's security, peoples' survival and poverty eradication. This is, on one hand, a great measure for improving national land territory and harnessing river systems, and, on the other hand, a fundamental plan to vigorously develop mountain economy and enable the mountain population to eradicate poverty and have a improved livelihood. All these issues are of vital importance for the overall national development.

(ii) Carry out a systematic development and an integrated management in mountainous areas. Ecological and economic theories are to be pursued to guide mountain development and promote sustainable development. Without exploitation, all resources can only have potentials with no values for economic development. However, mountain development has to observe the principles of sustainable and integrated development. Integrated development refers to the overall development of all production elements, which include natural resources and also social resources such as human resources, scientific and technological resources and information and financial resources. Integrated mountain development actually refers to the effective combination of the tasks of three departments of agriculture, forestry and water resources. It means the effective combination of soil and water conservation, watershed management with agricultural production and afforestation as well as economic forest development in mountainous areas. It also requires taking into consideration all other related tasks (for example, scientific extension), and to incorporate the agriculture, forestry, animal husbandry, secondary industry and fishery industries. The new production

layout is therefore being formed with the strategies of integrated mountain development and more intensive agriculture development in mountainous areas. The previous isolated development of each department/ sector with uncoordinated tasks was changed, and mountain resources can be actually utilized appropriately. This integrated development, by combining production, ecological development and resource cultivation, is the only development strategy that could satisfy the complex characteristics of mountainous areas.

(iii) The major activities for integrated mountain development are improving soil conditions, harnessing water systems, planting trees, building new roads and establishing power plants. The policy of "revitalizing mountain development by using scientific and technological methods" was adopted. Most of the mountainous counties are poverty-stricken, where farmers' production and living conditions are very poor, particularly in terms of infrastructure development such as transportation. Roads are not well connected and are of low grade. Electricity grids are old and cannot guarantee the supply of electricity, and the market is immature with insufficient information available. On the other hand, most of these mountainous areas are the origins of big rivers in China, they shoulder the arduous tasks of water conservancy and soil conservation. Yet years of inappropriate development and utilization have led to severe soil erosion, deteriorated ecosystem, degraded land quality and low productivity in the mountainous areas of China. Ecological enhancement and infrastructure improvement must be strengthened in mountain development.

(iv) Forestry's importance has been raised to a high level in integrated mountain development, and its role in mountain development shall be replanned.

CHALLENGES OF MOUNTAIN FORESTRY

Mountain forestry regards mountain community as the basis, and the main managers for mountain forestry are the members of mountain communities. Therefore, mountain forestry is, in principle, one of the major socio-economic activities of the community within a certain territory, and the ownership and participation of farmers are its main characteristics.

Forestry provides all kinds of products and services to community inhabitants, and is the vital material base and ecological foundation for promoting integrated mountain development. The demands for forest goods by community inhabitants are diverse, and the objectives for forest management are also multifold. The current isolated sector-run forestry with timber production as the sole purpose cannot meet the various demands by the communities.

In China, mountain forestry is actually community forestry and is the key component of mountain community development. The basic feature is that it is owned, managed, administrated and benefited by the people. Some conflict-solving mechanisms, such as local rules and regulations, are provided for forestry related activities. Some traditional forest culture (for example, the "firs at an age of 18 years old" from southeast of Guizhou Province, which means that fir trees planted when a girl is born can be harvested as soon as she gets married), the protection of landscape forest, and forest management systems such as agroforestry and admiration of forests, have all made a vital impact on the protection and development of forests. Meanwhile, community authority or coordinating organization exerts a significant role in managing forest resources as public products for providing welfare to the whole community.

Mountain forestry is in the transition to market economy system. This transition regards ownership reform as a core issue and family management contracting system as basis. It is orientating towards a modernized enterprise system featuring clear ownership and responsibility, separating government functions from enterprise operations and carrying out scientific management. The rapid development of major and secondary rural industries and the maturation and improvement of rural markets have prompted the industrialized development of community forestry. Mountain communities play a increasingly important role in forestry development of mountainous areas.

APPLICATION OF COMMUNITY FORESTRY IN MOUNTAIN DEVELOPMENT — GUIZHOU PROVINCE EXAMPLE

This is a part of the project "Community Natural Resources Management in the Mountainous Areas of Guizhou Province" which commenced in 1995. The pilot zone of the project is located at the Kaizuo Township in one of the counties in Guizhou Province. The purpose of this pilot project is to study the application of participatory approach in integrated mountain development where forestry plays a leading role.

In 1991, six pilot villages belonging to the Kaizuo Township were enlisted as the Integrated Agricultural Development Pilot Zones of Guizhou Province. The implementation process was as follows: the selection and procurement of tree species were carried out by experts, and then seedlings were distributed as loans

(with no contracts being signed, the farmers were only required to sign their names to get the seedlings), and the farmers were responsible for planting. During the project implementation, a total of 66.67 hm^2 of economic trees were planted including pear, apple, peach, grape and chestnut, with an average of 0.27 hm^2 planted by each individual household. Due to the large planting area, labour inputs were insufficient and fertilizer applications were inadequate; the quality of planting therefore could not be guaranteed. The training on management techniques also lagged behind. In addition, some varieties were also unsuitable to either the local climate (such as apple) or market (such as pear as nearby there is a large pear farm which competed for the market). All these factors had led to the very low production of these species. According to the survey carried out in 1995, except for a few households, the majority of these farmers almost did not get any income, which had shaken their confidence to continue management.

In 1995, based on the rich resources of barren mountains in the pilot zones as well as the requirement by the community for developing commercial forests, the project team decided to establish forest plantation as one measure to improve the effectiveness of using barren mountains. The following methods were adopted after analysing the reasons for failures, and market demands:

Establish experimental orchards. In order to avoid blind development, the project team had discussed with villagers and village committee and agreed to first establish one experimental orchard each in Dabuyang Village and Xiaozhai Village. The following principles were defined together with farmers to set up such experimental orchards:

- Who can participate? All villagers who have the willingness can participate.
- How to plant? The initial area should not be too large and better be confined to a large plot for easy management. Coordinated by village committee, villagers can exchange their assigned plots.
- What tree species are going to be planted? Peach tree with its fast-growing and short period required for profit return was selected based on the market analysis and investment ability of villagers as well as the analysis on local ecological conditions.
- What varieties? It has been concluded that they should not focus on one single variety, instead, three to four varieties should be introduced first for experimental plantings, and then one's favorite may be selected after some observations. According to the experiences and information from the project technicians, combining with villagers' requirements, three varieties with different mature stages (early maturing, mid maturing and late maturing varieties) were introduced, and another over-late maturing variety and a new variety with different colour and fruit quality were introduced.

  Having solved the above problems, in January 1996, a 0.667 hm^2 experimental peach orchard with eight households participating and a 1.33 hm^2 experimental peach orchard with nine households participating were established in Dabuyang Village and Xiaozhai Village, respectively.

Clarify the responsibility, rights and benefits. These should be clarified by signing the contracts. The project team is responsible for introducing high quality seedlings and conducting training. Farmer households are responsible for guaranteeing all the labour, green manure required to establish and manage peach orchards, and digging holes, applying fertilizers, planting seedlings and watering trees according to the requirements to ensure the planting quality. After planting, farmers must build enclosures out of their own investments, take part in the training on time and guarantee that management is carried out according to the project technicians' instructions. The general policy is that those who plant and manage the trees will be the beneficiaries.

Set up management organizations and institutions. An administration group was set up each in Dabuyang Village and Xiaozhai Village for managing the experimental peach orchards. Detailed management procedures were also being developed, for example, clear punishment regulations were stipulated for activities such as stealing and trampling by cattle and horses. These were discussed and passed within village committees and announced in village meetings. The administration group was responsible for implementing these procedures as well as communicating and coordinating with village committees.

Conduct technical training. Corresponding technical training courses were to be held at different growth stages of the fruit trees (for example, planting, trimming, fertilizer application, pest and disease controlling, thinning, harvesting, product marketing, etc). Technicians from the project team often carried out on-the-spot guidance at the orchards. Attention was also being paid to train future trainers. Some study tours were also organized to exchange experiences and promote household-to-household technical dissemination.

Extend pilot zones. The fruit trees started to bear fruit in the third year according to expectations with remarkable results (average output was over RMB 600/667 m^2). Many villagers expressed their desire to plant fruit trees at their allocated barren mountains after seeing these fruit orchards and listening to the introductions by the farmer households involved. By summarizing the experiences of the Dabuyang Village and Xiaozhai Village, another 20.7 hm^2 have been planted in the experimental zones also with wonderful growth response.

Setting up natural resource management systems

In order to ensure the success and continuation of the project, it is vital to set up natural resource management systems. In the process of discussion on stipulating such management systems and establishing operational mechanism, the villagers reported that each village had its own conventions on developing village rules and regulations to maintain the normal order of production and livelihood of the local community. Although these village rules and regulations are only social products with closed, backward and incomplete legal features, the binding force comes mainly from comprehensive deals with familial and moral merits. However, since they are developed from self-motivated participation of all villagers, and the contents combine the actual situations of villages with a very detailed system of awards and punishments, after a long implementation history, they have been transformed into simple but effective operational mechanisms. Therefore, they are quite powerful with full binding authority. Hence, in the mountainous rural areas, particularly since the laws and regulations are being poorly enforced and people are lacking in legal awareness, these binding rules and regulations indeed play a unique role in guiding the villagers' behaviours and administrating the local communities.

The project team believes that this kind of resource management system from local village individually-based rules and regulations is closer to the actual situation of each village and is more comprehensive, detailed and applicable than a unified regulation for the whole township. The team therefore decided to graft their original thought for developing such a unified regulation to the existing local rules and regulations. After discussion, this idea was being thoroughly understood and agreed by villagers. All villages have, according to their real situations, developed natural resource management systems. The process for developing such systems is as follows: based on the extensive collection of villagers' opinions, a consultation meeting is organized at each village with village committee members and village representatives to initially define the contents of the management system. The project team prepares drafts, and meetings are organized to modify, add and improve these drafts. Once the systems are completely developed, village meetings are organized to publicize these systems, which will then be implemented according to the local rules and regulations accepted by the villagers. During the project time frame, by using this method, many management systems had been developed at each experimental village, including forest resource management system, management system on utilization of water resource facilities, cattle grazing management system and village road management system, which all contributed to the community's effective management of various resources. For example, one of the articles in the Forest Resources Management System in Dabuyang Village stipulates that "any villager who illegally cuts the trees belonging to the collectively managed forests or trees contracted to other villagers shall be fined RMB10 for each tree with the diameter smaller than 4 cm felled." It is not possible to stipulate such a detailed punishment article for similar destructions in the national laws and regulations. However, if such non-serious but frequent destructive actions were not stopped promptly, the overall natural resource management would lose its control. This kind of resource management system, combining local rules and regulations at village level, has been an effective strategy right at the very source. We can therefore say that the development of an effective village-level natural resource management system and mechanism suitable for local conditions, which is also in accordance with relevant national laws and regulations, is the key to realizing sustainable community resources management.

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25 Forest, population and poverty alleviation in Viet Nam

Dang Dinh Boi*

ABSTRACT

Forest cover in Viet Nam has reduced from 44 percent in 1943, to only 16 percent in 1993. Mitigation efforts by the government, increasing awareness of people towards the role of forests and support from international organisations, have slowly increased the percentage. Viet Nam is the 13th most populous country in the world with 76 million people from 54 ethnic groups, and growing by a million every year. Rapid population growth, migration and urbanization in Viet Nam have placed pressure on the environment and forest. Vietnamese government has numerous regulations, articles and policies to maintain and conserve natural forest. State forest management has divided forest into three classes and managed by the state forest management bodies that are state-run enterprises (mainly for production forest) and management board (for special use and protection forest). Forest land has been allocated to households and organizations to invest in reforestation and management. Government shares responsibility with the communities for protection and management of natural forests. There are several programmes that have been implemented to alleviate poverty such as forest land allocation programme, 5 million ha reforestation programme (Programme 661), bio-diversity action plan, Programme 135 (development of remote and difficult communes), and the fixed agriculture and sedentarisation programme. The achievements are that agriculture production has rapidly increased, forest degradation has been gradually reduced and rural conditions have been positively changed. Monthly income per capita was also increased.

EXTENT OF NATURAL FOREST COVER

Forest is a precious natural resource in Viet Nam. In 1943, 44 percent of the country was covered with forests. Since then, forest area has been reduced dramatically because of numerous reasons including over-exploitation, unclear management policies, shifting cultivation, food shortage, clearance for arable land, spontaneous migration, and development of export-oriented industrial trees. In 1993, forest cover was only 16 percent (Table 1). Due to mitigation of the government, increasing awareness of people towards the role of forest as well as its contribution, and the support from international organizations, the situation is improving.

Table 1. Forest cover in Viet Nam

Source	Proportion of forest cover (percent)			
	1943	1973	1983	1993
Ministry of Forestry(1991)	43.0	29.0	–	–
Do Dinh Sam (1994)	40.0	–	23.6	27.7
World Conservation Monitoring Center (1996)	–	–	–	16.0

(–) = not available. This table is adapted from Table 2 of De Koninck (1999).

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EXTENT OF FOREST COVER ON HILLS/VULNERABLE SITES

Vietnamese government has numerous regulations, articles and policies to maintain and conserve natural forest. However, uncontrolled forest cutting and illegal exploitation still prevail in many regions especially in the central highlands and middle part of the country. Forest fire is a persistent threat to both natural and planted forests. Since 1994, the government has closed the forest gradually. However this ban could not stop illegal felling and forest exploitation. Now the government allows limited forest harvesting in several provinces. This is similar to fuelwood production (Tables 2 and 3).

Table 2. Gross output of exploited wood (1000 m^3)

Year	1995	1997	1998	1999	2000 prel.
Out put	2793.1	2480.0	2216.8	2122.5	2570.6

Source: Statistical Year Book, 2000.

Table 3. Gross output of exploited firewood (1000 m^3)

Year	1995	1997	1998	1999	2000 prel.
Output	29 828.0	27 356.4	25 490.8	25 229.6	24 842.7

RATE OF CHANGE OF FOREST COVER

During the last few years, The government has put in multidimensional efforts: social policy, propaganda, cultural, educational and economic development, sanction and reward to stem the loss of forests. As a result, cases of violation and loss of forest are reduced (Table 4).

Table 4. Area (ha) of forest destroyed by fire and over-exploitation

Year	1995	1997	1998	1999	2000 prel.
By fire	7,457.0	1,750.2	19,943.3	4,817.0	1,045.9
By over-expoitation	18,914.0	7,123.3	7,503.4	5,196.3	3,542.6

POPULATION IN VIET NAM

Viet Nam is the 13th most populous country in the world with 76 million people (population census, 1999). Although the growth rate is reducing every year, it was still 1.4 percent in 2001. In the past ten years, the population has increased more than a million every year. Rapid population growth, migration and urbanization in Viet Nam have placed pressure on the environment and forest. Viet Nam is the homeland of many nationalities. In the lowland and mid-land regions people grow wet rice. In the mountain areas, people grow wet rice in the valleys and corn or dry crops on terraced fields.

HISTORY AND SOCIO-ECONOMICS OF FOREST DWELLERS

There are 54 ethnic groups living in Viet Nam. People of various nationalities have found out different patterns to cope with nature, appropriate to specific regions. In the northern uplands and the central highland, people clear and burn jungle patches as a method of farming. With a sub-tropical climate, cultivation is chiefly carried out in summer and autumn. For acclimatization and raising of land utility rate, people, from time immemorial, have developed multi-cropping to generate further income and prevent soil erosion. Some cultivated patterns of some ethnic groups are listed below:

The Bo Y group: the Bo Y lives mainly on slash-and-burn agriculture. They rear plenty of cattle and poultry and are experienced in fish raising. Every year, when the rainy season comes, they go to the rivers to collect spawn and put them in their ponds and submerged fields.

The Bru-Van Kieu group: they live mainly on rice cultivation of burnt over land and in submerged fields. Hunting, gathering and fishing supplement thiei main source of food. They rear cattle and poultry. Basketry and palm mat making are their secondary occupations.

The Cham group: the Cham live in the plain, have a tradition of farming in submerged fields. They are experienced in intensive farming with irrigation, sowing seeds and applying fertilizers. The Cham are involved in business. Pottery making and cotton cloth weaving are two well-known secondary occupations.

The Chu Ru group: the Chu Ru adopted farming very early. Nowadays, they also develop sericulture and life is fairly stable. Apart from cultivation, they raise cattle, pigs, goats and poultry. They make bamboo and rattan articles and produce tools such as sickles, picks, and knives. Some villages are well-known for pottery. Hunting, gathering and fishing are secondary occupations in every family.

The Co-Ho group: the Co-Ho group cultivates rice on burnt-over land and submerged fields. They use farm tools such as axes, beams and sticks to dig holes to grow plants. The Co-Ho are good at horticulture. In the gardens, they grow jack-fruit, rice-fruit, banana, bobo and papaya. Many Co-Ho villages lead a static life and cultivate coffee, grow mulberry and rear silkworm.

The E De: the E De mainly practise cultivation on burnt-over land. Besides cultivation, the E De also practise animal husbandry, hunting, gathering, fishing, basketry and weaving.

The Gia Rai: they mainly live by cultivation on burnt-over land and terraced field. Ordinary rice is the staple food. Farm implements are simple, including machete, cleaver, picks and hoes. They also breed elephants. Men are skillful in basketry and women in cloth weaving. Hunting, gathering and fishing are secondary occupations.

The Ha Nhi: they live on rice cultivation on burnt-over land or terraced fields. They are one of the groups who have traditional experience in reclaiming terraced fields on mountain slopes, digging canals and building small dams. They use ploughs and harrows pulled by oxens and buffaloes in the fields. The gardens are often close to their houses. Animal husbandry, weaving of cloth, and basketry supplement then incomes.

The Kho Mu: the Kho Mu live on slash and burn cultivation. They mainly grow maize, sweet potato and cassava. Hunting and gathering are needed to meet daily needs, especially during the slump. The Kho Mu do not practise cloth weaving, so have to buy cloth and garments from other groups. Up to now, many Kho Mu families still lead a nomadic life. Their villages and hamlets are generally distant from one another and quite small. The houses are temporary and rudimentary with few pieces of furniture.

The Mong: the Mong live mainly as nomadic cultivator of burnt-over land. They also grow rice and corn on terraced fields. The principal food is corn and rice grown on burnt over land, and rye. Apart from these, they grow linen plants to supply fibres for cloth weaving and also medicinal plants.

The Muong: the Muong lead a sedentary life in moutain areas where arable land is available. The Muong practised farming from time immemorial. Wet rice is their main staple food. In the past they prefered sticky rice. Extra-occupation of the family is to exploit forest products including mushroom, amomum, sticklac, cinnamon, honey, timber, bamboo and rattan. Handicrafts are popular such as weaving, basketry and silk spinning. Muong women are very skillful in weaving.

The Thai: the Thai are experienced in consolidating edges, digging canals and building frames to fix gutters to take water to the fields. Wet rice is their staple food, especially sticky rice. The Thai also cultivate rice, subsidiary crops and other trees on burnt-over land.

MANAGEMENT OF THE FOREST

In Viet Nam, some kind of forest management exists in both governmental and private sectors.

State forest management divides forests into three classes:

- special use forest such as protected areas, national parks, biosphere reserves, landscape forest, etc.
- protection forest such as watershed forest and shelter belts; and
- production forest.

State forest management bodies are state-run enterprises (mainly for production forest) and management board (for special use and protection forest). People plant trees on their farm land which is already allocated to them. The government decided to facilitate and encourage private companies to invest in forest plantations. Government shares responsibility with the communities for protection and management of natural forests. Forestlands are allocated under contracts for protection. A fixed allowance per ha per year has been allocated when households or communities signed a contract with the government (represented by the enterprises or management boards).

In Viet Nam mountainous area accounts for three fourth of the total area of the country. The people in this area face many difficulties such as poor infrastructure and communication networks. Income per capita is low compared to the country's average. During the last decade, the government initiated many policies and programmes in order to boost conditions in this mountainous region. These are creating an environment for communities to involve in forest management. Below are some of these programmes and projects:

Forest land allocation programme – Forest land has been allocated to households and organizations to invest in reforestation and management.

Five million ha reforestation programme (661 programme) – This programme has three objectives: to increase forest cover, to establish a raw material supply for wood industry, and to generate income for forest dwellers.

Bio-diversity action plan – This plan aims to increase protected areas including the establishment of new national parks, and to conserve important wildlife and flora (Decree 18/CP).

135 programme (development of remote and difficult communes) – The programme has three objectives: to improve infrastructure, to enhance human resource competencies of local government, and to generate income for poverty alleviation.

Fixed agriculture and sedentarisation programme – This programme promotes fixed agriculture practices to shifting cultivators and groups in the upland, and support upland communities in the development of resettlement areas.

Below are some international agency supported programmes:

- World Bank: Focus on mangrove areas
- Multilateral donors: UNDP, FAO
- Bilateral donors: Netherlands (biodiversity conservation and poverty alleviation, SDC (extention and training), SIDA (6 northern provinces), CIDA (central highland, Mekong delta, etc.), GTZ (REFAS, forest land allocation), JICA (reforestation).
- Several NGOs also work in the development of participatory forestry: CARE International (buffer zone development), WWF (biodiversity conservation)

Many other programmes and projects also contributed to improving the living condition and poverty alleviation in rural and mountainous areas (Table. 5). There were great achievements gained through these programmes together with policies on land, finance and credit, investment, health and education and with strong efforts made by the farmers themselves. Agriculture production has rapidly increased, forest degradation has been gradually reduced and rural conditions have been positively changed. Monthly income per capita has also increased (Table 6).

Table 5. Infrastructure in rural area, 1997–1999

Items	1997	1998	1999
Total number of commune	8845	8883	8917
Share of commune using electricity (percent)	79.9	82.9	85.9
Share of commune has car road to the commune (percent)	90.3	91.6	92.9
Share of commune has the car road to the village (percent)	77.2	78.4	79.8
Share of commune with health centre (percent)	96.4	97.7	98.8
Share of commune has primary school (percent)	97.9	98.9	98.8

Source: Statistical Year Book GoV (2000a)

Table 6. Monthly per capita income (1000 VND)

Items	1994	1995	1996	1999
Income (whole country)	168.1	206.1	226.7	295.0
Income in Urban areas	359.7	452.8	509.4	832.5
Income in Rural areas	141.1	172.5	187.9	225.0

*Source: Statistical Year Book GoV (2000a)

RESEARCH AND EDUCATION NEEDED

The following issues, related to research and education, need to be considered:

- Economic benefit sharing to encourage forest development and protection;
- Training for researchers, planners, policy makers and analysts;
- Decentralization in natural resource management;
- Role of local community and gender issues in resource management;
- Training to enhance management capacity for people and officials at different levels; and
- Improving ways of teaching, applying participatory approach in curriculum development and research in natural resource management.

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26 Forestry for poverty reduction in Viet Nam

Trieu Van Hung*

ABSTRACT

Forest cover in Viet Nam over the last 50 years had reduced by almost half. The trend of natural forest degradation is still continuing as there are over 24 million people living close to forest, of whom 8.5 million are the ethnic minorities. Slash and burn, shifting cultivation and free migration are still practiced in these areas. In addition, forests are continuing to be converted for agriculture, including for the planting of commercial tree crops such as coffee, rubber and cashew nut. The demand for wood and forest products is high, coupled with increasing population, and increasing hunger and poor conditions in remote and ethnic minority areas, have led to further degradation of the forest resources. Vietnamese government has prioritized forest protection and forestry development, which are linked to poverty reduction through the deployment of guidelines under the "three stabilities": forest capital, production force, and livelihood for labor that includes matter and spirit; and "Socialization for forestry". Several hundred thousand farmer households have participated in plantation establishment. A few million have been re-settled in forestry production zones, such as the over 20 000 ha plantation in the Thanh Hoa province, and over 10 000 ha Cinamomum plantation in the Yen Bai province, they have assisted over 132 000 households with more than 800 000 people.

INTRODUCTION

According to forest inventory up to the year 2000, the forest area in Viet Nam is 10 915 592 ha. Forest cover is 33.2 percent, of which natural forest area occupies 86.5 percent and plantation forest area occupies 13.48 percent. Total growing stock in the year 2000 was 751.5 million m^3 and 8.4 billion bamboo culms; of which plantation wood is 30.6 million m^3 and bamboo plantation is 96 million culms.

During the past sixty years, forest resources have become degraded seriously in Viet Nam. From the year 1943 to 1985, natural forest decreased especially from 1980 to 1985 at the rate of 235 000 ha annually. Increase in plantation forest did not compensate for the natural forest area lost. In the years from 1985 to 1995 both natural and plantation forest were increasing rapidly, therefore total forest area increased. In recent years, forests are well protected in Viet Nam due to efforts of the state. From the 1995 to 2000, forest area increased by 1.6 million ha, of which natural forest cover contributed 1.2 million ha and plantation forest 0.4 million ha. The forest has been rehabilitated by forest tending, protection and plantation. However, forest quality and productivity are still low, as forest products do not meet the requirements of the state. The number of high economic value trees such as *Erythrophloeum fordii* and *Chukrasia tabularis* are low. Non-timber forest products are reducing at a fast rate. Currently, the forest situation in some regions such as western high plateau, southeastern and Mekong river delta has deteriorated. The consequences are scarcity of fuelwood and forest products, land and environmental degradation, increase in floods and natural calamities.

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Forest has been lost due to the following causes:

- Viet Nam experienced over 30 years of war that degraded the forest resources immensely.
- Rapid population increase: in the first decade of the 20th century, population of Viet Nam was around 15 million. From the year 1960 onwards, the population has doubled every 25 years. The forests are overexploited to meet the growing demands of the growing population.
- Economic development needs: forest is also sacrificed to meet demands for coffee, rubber, cashew nut and shrimp and fish rearing.
- Shifting cultivation: The population in the mountainous areas practise uncontrolled slash-and-burn shifting cultivation.
- High demand for forest products: Fuelwood is an important energy source for the 60 to 70 million farmers. Annually, Viet Nam needs more than 30 million tonnes of fuelwood.
- Policy mechanism: the forest management policy and system were not effective in protecting and developing the forests. For example, there is no effective mechanism to regulate the conversion of forest land for non forestry purposes. Planning methods and procedures are not appropriate for forestlands. The motivation for forest protection and development is still not adequate.

CURRENT SITUATION OF FORESTRY PRODUCTION

Viet Nam forestry sector is developing to serve the dual purpose of meeting the domestic requirements, as well as exporting of surplus wood (Table 1).

Table 1. Export of surplus wood

Year	1986	1990	1995	2000
Export value (million US $)	71.6	126.5	153.9	200.0

Inspite of increase in export, the contribution of forestry to the overall economy has decreased (Table 2).

Table 2. Contribution of forestry to overall economy

Year	1986	1990	1995	1999
Value rate (percent)	11.8	7.6	5.1	4.6

Compared to the total economic value in 1995, forestry production value has declined from 1.2 percent to 0.87 percent in 2001. In forestry, production value is concentrated in logging and forest products processing. From 1985 to 1999, production values were represented by 72.7 to 79.6 percent, 13.05 to 17.88 percent and 3.85 to 12.96 percent for forest plantation, forest tending and other activities respectively.

The government policy on natural extraction has reduced the authorized logging over time as shown in Table 3.

Table 3. Decreasing logging productivity, 1990–2003

Year	1990	1995	2000	2003
Authorized logging productivity (1000 m^3)	1081	617	300	250

Viet Nam forestry has transformed into social forestry in many ways such as farms, households and community forestry. In the late 1980s forestry production activities were governed more by marketing needs, including economic forest plantation, non-timber forest products utilization, etc. Although forestry sector only contributes a very small portion to the national economy in Viet Nam, it however plays an important role for the livelihood of the people living in forests.

FORESTRY AND POVERTY REDUCTION

The role of forestry for poverty reduction

Up to the year 2002, out of 82 million people in Viet Nam, 24 million were living in or around forests. There are over 8.5 million people belonging to various ethnic minorities in the high mountain areas close to forests. In the upland areas, harvesting and hunting in the forest are important minor activities. Although there is

a rapid change in economy and society, wood, fuelwood and non-timber forest products still play an important role in the livelihood of these ethnic minorities.

Administratively, Viet Nam has 61 provinces and cities, and approximately 10 500 communes that represent 57.1 percent of mountainous, upland remote areas. The life in 1175 communes is very difficult. These are the poorest people and their living depends solely on the forests. On the other hand this group has adverse impact on forest resource leading to degradation. The importance of NTFPs to rural households in Viet Nam cannot be overlooked, especially its role for rural households and upland areas. For example, a study with Dzao and Tay communities living in the mountainous areas around Ba Be National Park, fuelwood, bamboo, fodders, forest vegetables, basic medicines and a variety of the life-enhancing products continue to provide essential and supplementary materials for livelihoods (Morris 2002).

NTFPs can create important economic opportunities for communities in remote mountainous areas, with often simple technologies for collecting, planting and pre-processing. For example, households in Bac Ha district in Lao Cai have begun to grow *Amomun aromaticum*, harvesting on average 200–300 kg of fruit per year and, in some cases, as much as 500–1000 kg, equivalent to 20–30 million VND, which is 10 to 20 times higher than rice cultivated on the same area (Nguyen 2001).

Viet Nam is one of top 10 countries in the world with high biodiversity and potential for non-timber forest products. However, NTFPs were not utilized fully and sustainable management of NTFPs is still limited.

Some results of the combination between forestry and poverty reduction in Viet Nam

Vietnamese government has initiated poverty reduction improvement of people especially those living close to forests. By the end of 1980's, the state laid down "Three stabilities' policy: forest capital, production force, matter life and spirit for labour". Forestry socialization was initiated to attract the participation of people to forestry activities. Several hundred thousand farmer households received rights to do their business on allocated land. Many successful national programmes are as follows:

- Programme 327: For regreening denuded land and bare hills (1993 to 1998), 1.6 million ha forest land was distributed to the farmer households, new plantation of 638 500 ha, forest tending and protection and regeneration of 748 100 ha, fruit trees and industrial trees planting of 119 940 ha. The main theme of the programme was to attract labour force to participate in forestry activities.
- Programme 661: Continuing the Programme 327 from the year 1998–2010s, its objective is to establish 5 million ha of new forest plantation. This is a comprehensive programme for uplifting the poor people in rural and mountainous areas. After four years of implementation about 200 000 ha of forest has been planted annually with the support of the people beside forest tending, protection and regeneration. Because of this programme the forest cover has increased by 2 percent.
- PAM programme: A hundred thousand households planted forest under a world food programme (PAM) aid.
- Fixed cultivation and sedentarization programme: it contributed actively to stable living condition for high mountain people. After 20 years, 1185 communes belonging to 26 provinces with 1.9 million people participated in the whole country. In many fixed cultivation and sedentarization areas, production development created many concentrated forestry production zones such as the Luong plantation in Thanh Hoa (20 000 ha), and in Yen Bai province (10 000 ha of Cinnamomum). This assisted over 132 000 households with more than 800 000 people, and established many forest farms at new inhabitant areas.
- National programme of poverty reduction and 135 programme on socio-economic development located in 2235 difficult communes. Every year it reduced 1.5 to 2 percent of poor households (28 000 to 30 000 households/year), and created jobs for 1.4 million labourers.

Some questions that need to be solved regarding forestry and poverty reduction:

- Enhance the awareness on relationship between forest protection and economic development: the livelihoods of people, who live in and around forest are still difficult and need attention for improvement. In these areas, the qualification of labourers is lower than elsewhere. For example, according to a World Bank study, it is realized that in some mangrove forest areas, about 20 percent of illiterate people were in school and a large number of people did not know the harm caused by forest destruction and benefits accruing from forests. Therefore, enhancement of the awareness on the role of forest for local people is very important. They should not degrade forest for short-term benefits.
- Long-term and stable land-use planning: in practice, the feasibility and effectiveness of land-use planning are not attractive enough. Forestry planning for each region categorizes forests into: production, protection and special-use forest.

- Reasonable resource utilization through appropriate technologies: production models are: agriculture – forestry and agriculture–forestry–fishery, in which micro land use planning and production models have been laid out on appropriate scale. The application of appropriate and recent technologies is very important. Selection of crop structure, animals and farming techniques suited to physical condition of each region (for example: cultivation on slopping land) and linkage to marketing. In addition, it should combine new techniques and traditional indigenous knowledge of each community to extract maximum potential.
- Socio-economic policy: forest and land allocation policy has helped many farmers to produce and establish many effective models. In general, there is a lack of a synchronous forestry policy system to encourage participation in forest protection and development.

FOREST SCIENCE INSTITUTE OF VIET NAM

The Forest Science Institute of Viet Nam was established in 1961 by merging three institutes, The Forest Research Institute, the Forest Industry Institute and the Forest Economics Institute. The Forest Science Institute of Viet Nam is the main research organization on forestry and is under direct control of the Ministry of Agriculture and Rural Development.

The Forest Science Institute supports scientific and technological research, technology transfer, post-graduate training, and consultant services in various fields of forest science.

Regular staff of the Forest Science Institute of Viet Nam is 480, of which 26 are Ph.D and 20 Master degree holders. The Forest Science Institute of Viet Nam has seven research divisions, three specialized research centres, nine regional centres, three centres for technology transfer and technical service, eight functional divisions, etc. There are five laboratories, 4500 ha forest for research and many sites for joint research with various production units and National Parks. The Institute carries out a number of programmes at state and sectoral levels as well as socio-economic development projects. The Institute has contributed enormously to forestry development in Viet Nam.

Some of the issues on science and technology to strengthen the role of forestry in poverty reduction and forest resource sustainable utilization would include:

- Basic investigations on physical, economic, social conditions for scientific planning for development of different regions:
- Selection of suitable tree species.
- Evaluation of forest resource potential, identification of promising species including non-timber forest products.
- Investigation and evaluation of the traditional indigenous knowledge of communities.
- Investigation and evaluation of the market for main forest products including NTFPs.
- Research on seed improvement, propagation, farming technique, product processing, preservation technique, aimed at increasing productivity.
- Research to develop models on high productivity and sustainability (combined with ecotourism): models on agroforestry system in various zones such as ethnic minority area, coastal zone and mangrove and shrimp rearing areas.
- Study on management mechanism for the three types of forest: protection, production and special-use forests. Development of policies on attracting the farmers to forestry activities, benefit to forest owners, tax, investment and credit.
- Strengthen forestry extension services.

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27 Participatory seed source management in Cambodia

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ABSTRACT

Cambodia has lost nearly 15 percent of its forest cover within the last three decades due to illegal logging and rapid agricultural expansion. Up to 6 million ha of the forests are considered as degraded and need rehabilitation. The forests are both dry-land (evergreen, deciduous, mixed forests, coniferous, etc.) and edaphic (flooded and mangrove) types. Forest plantations play an important role in improving soil and environmental degradation. At present, most planting efforts use seeds of poor quality from unidentified sources. Source of seed supply is a critical factor that determines the raising of successful plantations. Seed sources or seed production area is important for tree improvement programmes as it is the primary source of planting material. The Cambodia Tree Seed Project has established 11 seed sources in natural forests, with 17 species of indigenous tree species. Besides, seed production area of exotic species (Acacia and Eucalyptus) has also been raised. People have been involved in raising and management of seed production areas that may eventually help in large-scale forest rehabilitation programmes.

BACKGROUND

Cambodia has a land area of 181 035 km^2 and shares its border with Thailand, Lao PDR and Viet Nam. Population is about 12 million with a growth rate of 2.49 percent (National Census 1998). Eighty-five percent of the people are rural farmers, whose livelihoods depend mainly on subsistence agriculture, forest products and other natural resources.

Before 1973, 73 percent of Cambodia's geographical area was under forests. But during the last three decades these resources have rapidly declined and the forest cover in 1997 was estimated at 58 percent. Two major forest types exist, dry-land forest comprising evergreen, deciduous, mixed and coniferous forests; and edaphic forests, which include flooded and mangrove forests. However, the existence of these forests is under threat from over exploitation due to concessions, illegal logging, and rapid agriculture expansion after decades of civil war. Up to 6 million ha of the remaining forest is considered as degraded and needs rehabilitation.

FOREST PLANTATION

Forest plantation plays an important role in improving soil and rehabilitation of degraded forests. Forest plantations have high yields compared with natural forests and create many jobs for farmers and labourers and thereby contribute to rural development (Prasad and Kandaya 1992).

The Royal Government of Cambodia pays high attention to the forest rehabilitation through plantations. At present, for most planting programmes, seeds collected from locally grown trees are being used. The genetic quality of these seeds is not known. Seeds of indigenous species such as *Hopea odorata, Anisoptera costata,*

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Dipterocarpus alatus, Afzelia xylocarpa, etc., are usually collected from natural forests or temples near the nurseries.

The quality of tree seedlings for fast volume increment with seed of good quality from known seed sources, is a critical factor in achieving successful plantations. Therefore, the issue of tree seed selection for planting programmes must be carefully considered. The government encourages planting both indigenous and exotic species in the forest rehabilitation and reforestation programmes in the over-logged areas and degraded land. The indigenous species are preferred for conservation, timber production, and non timber forest products, whereas the exotic species preference is for the immediate forest products such as firewood, poles and shade.

ESTABLISHMENT OF SEED PRODUCTION AREAS IN NATURAL FOREST

Seed production is important in tree improvement programmes, since they provide the first source for planting material. They are not directly linked to the establishment of seed orchards, which are the defused sources of improved planting material, but they often form an interim source until progeny tested seeds can be obtained from the seed orchards (Schmidt 1993).

The Cambodia Tree Seed Project, which is part of Forest Research Institute, has so far established 11 seed production areas in natural forests with 17 species of indigenous tree species (Table 1). These 17 species were classified as rare and endangered and need to be conserved either *in-situ* or *ex-situ*.

Besides the indigenous species, the seed production areas of exotic species have also been established in various provinces. With support from CSIRO, seeds of *Acacia auriculiformis, A. mangium, A. crassicarpa* and *Eucalyptus camaldulensis* were brought from Australia.

Table 1. Seed production area in natural forests

Species	Area (ha)	Province
Dalbergia bariensis	12.5	Preah Vihear
Pterocarpus macrocarpus	20	Siem Reap
Azardirachta indica	50	Banteay MeanChey
Hopea ferrea	30	Ratanakirir
Dalbergia cochinchinensis	50	Siem Reap
Dipterocarpus alatus	7	Siem Reap
Pinus merkusii *Fagraea fragrans*	104	Kampong Thom
Dalbergia bariensis *Pterocarpus macrocarpus* *Xylia dolabriformis*	21	Ratanakiri
Afzelia xylocarpa *Dalbergia bariensis* *Pterocarpus macrocarpus*	18	Ratanakiri
Afzelia xylocarpa *Dalbergia bariensis* *Shorea cochinchinensis*	20	Ratanakiri
Sindora cochinchinensis *Tarrietia javanica* *Shorea farinosa* *Shorea vulgaris* *Dipterocarpus costatus* *Anisoptera costata*	117	Kampong Thom
17 species	**449.2**	

Survey of forest seed demand conducted earlier this year has revealed that the tree species listed in Table 2 are preferred for planting programmes.

Table 2. Popular plant species used in various planting programmes

Indigenous Species	Exotic species
Cassia siamea	*Acacia* spp.
Dalbergia bariensis	*Eucalyptus* spp.
Dalbergia cochinchinansis	*Melaleuca cajeputi*
Dipterocarpus alatus	*Leuceana leucocephala*
Dipterocarpus turbinatus	*Tectona grandis*
Eugenia jambolina	
Hopea odorata	
Peltophorum dasyrrhachis	
Shorea farinosa	
Tarrietia javanica	

Seed supply for planting programmes is important and mostly the seed sources are in remote areas, so successful management and maintenance need support and participation of local communities. The conservation of plant species also relies on good relations between forestry staff and local people (Pedersen 2002). Two pilot sites have been started and local communities are willing to participate in forest conservation. Local people are allowed access for non-timber forest products such as forest seeds, fruits, honey, mushrooms, and ants' eggs, for use and sales. The local forest staff help farmers in selling seeds to planters and other users.

BOUNDARY DEMARCATION AND SILVICULTURE TREATMENT

The boundary lines of seed production areas were made by clearing the undesired species and shrubs. The lines are made 1.5 to 3 m wide and concrete poles have been planted along the line with distance of 50 m from one another. The poles and some trees along the lines have been painted with red colour rings. As the number of mother trees per ha is fairly low, silviculture treatment such as removal of undesired trees have not been done.

EX-SITU CONSERVATION

Seeds collected from managed seed sources have been raised and used for establishment of seed production area and seedling seed orchard for *ex-situ* conservation in the potential area for reforestation in future. The seed orchards established in 2003 are as listed in Table 3.

Table 3. Seed orchards established in 2003

Species	Area (ha)
Afzelia xylocarpa	0.70
Aquilaria craasna	0.50
Dipterocarpus turbinatus	0.50
Hopea odorata	1.00
Shorea vulgaris	0.81
Tarrietia javanica	0.81

CONCLUSION

The participatory approach of forest management will help in taking up large forest rehabilitation programmes through reforestation in future. Such reforestation programmes will use quality seeds from natural forests and seed orchards.

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28 Forest and poverty alleviation in Thailand

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ABSTRACT

During the last decade, the percentage of Thailand's population living below the poverty line has declined by half to 11.4 percent in 1996. However, the proportion in rural areas has increased to 12.9 percent. In the ninth national economic and social development plan Thailand has targeted poverty reduction and set four main objectives, which include attacking poverty and inequality, increasing the potential of the poor, strengthening the poor-dependent economic sector and strengthening the participation process. To alleviate poverty, the present government has set up a series of activities, including debt suspension for farmers, improved capacity in sustainable agriculture, one sub-district one product programme, village and community fund, bank of the poor and the "30 Baht Health Care Programme". People in Thailand maintain a close relationship with forest and trees and a very large number of the rural poor derive some part of their livelihood incomes from forest resources. Forests still remain the main source of medicinal plants, construction wood, fuelwood and charcoal, and about 240 plant species are identified as edible. Their impact, however, has frequently been limited by failure of the government to transfer full or effective rights and by regulations and actions that restrict access by small producers to markets for forest products. Thailand has however, developed strategies for sustainable management of the forestry sector.

INTRODUCTION

Poverty is a massive problem which means having insufficient food, income and other inputs to maintain an adequate standard of living. Poverty may mean vulnerability to shocks to the livelihood systems and inability to cope with and recover from them. Poverty also means weaknesses in the position of the poor which prevent them from exercising options that a resource endowment could make available. Therefore, in order to address poverty, one has to look at empowerment, security and opportunity.

The office of the National Economic and Social Development Board has conducted research on the incidence of poverty in Thailand. Thailand's major industries are agriculture, tourism, mining, tin and light manufacturing. Thailand has been a country with significant economic growth in the past. GNP per capita in 1990 was US$ 2740 but as the country faced the economic crisis since 1997, it dropped to US$ 1970 in 2002.

Over the past few decades, the percentage of Thailand's population living below the poverty line reduced by half, i.e., from 27.2 percent in 1990 to 11.4 percent in 1996, but rose to 12.9 percent in rural areas. It may be mentioned that the poor in Thailand can be classified into two groups, the ultra poor and the marginal poor. The ultra poor (very poor) are defined as those with annual income of less than 80 percent of the poverty line; they constitute 9.34 percent of the total population of 5.8 million people; 3.4 million of which are in the farming sector.

Urban poverty in Thailand was also studied and there are about 2000 slum communities with 2 million people. They are daily wage earners and small traders. They are faced with the problem of land and housing,

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insecurity, property, rights in the city, access to basic infrastructure, health and education. Community network helps them in sharing problems and set up communal decision making to find possible ways to upgrade their way of living.

Poverty relies much on several indicators, such as level of income and consumption, socio-economic indicators, vulnerability to risks and socio-political access. In Thailand, the poverty line is set to its four dimensions, including income, health and education, vulnerability, voicelessness and powerlessness. The 1997 Human Development Report presented the Gender-related Development Index and Human Poverty Index measuring achievements of 146 countries in life expectancy, education and income, and Thailand was ranked 39 in the list.

In its ninth national economic and social development plan, Thailand has targeted poverty and set four main objectives, which include attacking poverty and inequality, increasing the potential of the poor, strengthening the poor-dependent economic sector and strengthening the participation process. Moreover, rural development policies in general and agriculture policies in particular, have traditionally been implemented in a top down and prescriptive manner and are generally unresponsive to actual development needs of local communities. Modern production technologies introduced to poor farmers have a high risk factor attached to them and often lead to severe levels of debt in rural areas. This results in loss of farm-lands for many marginalized farmers who are not able to repay their debts.

So, to alleviate poverty, the present government has set up a series of activities, including debt suspension for farmers, improved capacity in sustainable agriculture, one-district-one-product programme, village and community fund, bank of the poor and the 30-Baht Health Care Programme.

CLOSE RELATIONSHIP OF FOREST, TREES AND PEOPLE

Traditionally, agriculture is the backbone of the Thai society. The country still remains one of the six countries in the world that produce sufficient food and export it to the world market.

All natural forestlands and natural forest resources in Thailand are considered property of the State. The Forest Policy therefore, aims at preservation and utilization of forest resources. However, people in Thailand maintain a close relationship with forest and trees and a very large number of the rural poor derive some part of their livelihood inputs from forest resources. Forests form an integral part of the social and cultural framework for forest dwellers. Furthermore, about 240 plant species are identified as edible plants by the Thais.

Forests still remain the main source of medicinal plants, construction wood, fuelwood and charcoal. However, their impact has frequently been limited by failure of the government to transfer full or effective rights and by regulations and actions that restrict access by small producers to markets for forest products. Thailand has however, developed strategies for sustainable management of the forestry sector as mentioned in the eighth national economic and social development plan (1997–2001). The strategies include:

- preservation and enrichment of forestry resources;
- maintenance of ecological balance;
- protect the environment to maintain the quality of life and provide a solid foundation for development;
- establishment of forestry management systems for efficient utilization and protection of forest resources and forest ecosystems for the benefit of society and local communities;
- protection against and relief from natural disasters.

To conserve forests and protect biological diversity, Thailand has established a comprehensive protected areas system covering an area of 10.6 million ha or 20.6 percent of total land area, including 124 national parks, 53 forest parks, 57 wildlife sanctuaries, 44 non-hunting areas, 15 botanical gardens, 22 protected mangrove forests and 49 arboreta.

FARMERS IN THE FOREST

Only 21 percent of Thais live in urban areas. With large number of people living in rural areas, the population growth in Thailand has led to increased land encroachment. Forest encroachment has disturbed the existing ecosystems and when forest areas were converted for settlement and farm practices, severe environment degradation was observed. Certainly, the most effective way to slow down population growth and poverty would be to increase the economic strength of the country. Approximately, 60 percent of the population is employed in the agricultural sector. However, agriculture accounts for only about 9 percent of the GDP.

In 1971, Thailand adopted a national policy to stabilize the population by promoting a creative government-supported programme. The growth rate of 3.2 percent in 1971 dropped to 1.6 percent in 1986 and 1.1 percent in 1998. At present, the population of Thailand is 62.3 million with a growth rate of 0.8 percent. Life expectancy in Thailand has increased from 60 years in 1960 to 69 years in 2002.

There are about one million families or about ten million people living illegally in the forest, including one million members of hill tribes. It has been observed that about 1 out of 6 Thais depend for livelihood on the natural forests. It is expected that with the proposed Community Forestry Bill, the legislative recognition of the customary rights of the local communities to use, manage and protect their forests will be possible. This means that people will be able to participate in decision making concerning the use and sustainable management of forests.

LOGGING BAN

The Royal Forest Department (RFD) was established over a hundred years ago to regulate teak logging operations in the north of Thailand. A management plan was prepared by the British (Mr. H. Slade) and successively developed further. It was recommended to send four Thai scholars to study forestry in England, 11 to Dehradun and 32 to Burma Forestry School. Most foresters were trained to understand forest management, control logging operations and transportation, marking logs as well as collect tax for the government.

The establishment of Phrae Forestry School, 68 years ago, was aimed to train Thais to understand logging practices, manages forests and planting more trees. After 20 years of establishment, Phrae Forestry College and three other colleges were merged to form Kasetsart University. Faculty of Forestry was formed for greater emphasis on forest management, forest biology, silviculture, wood technology and forest engineering. The curriculum was revised several times and higher degree (M. Sc. and Ph. D.) programmes are now offered.

By the early 1960s, development theory and practices strongly focused on industry-led approaches, where rural poor can provides manual labour. Like other underdeveloped countries, forest products in Thailand enter extensively into economy and face vigorous demand. Logging areas for teak, besides other hardwood and softwood species, were expanded throughout the country. Poor management practices and the uncontrolled encroachment led the government to declare total logging ban in 1989. To achieve this goal, the government has set up the following action plans:

- Support for alternative agriculture;
- Support for watershed management;
- Support for community forestry;
- Support for community networking;
- Improved management through harmonizing *in-situ* human settlements and forest conservation; and
- Xommunity and civil society perticipation in natural resources management..

LAND-USE PROBLEMS

As there are a large number of people living in the forest areas, the government authorities have been active in establishing settlements for landless families. The Forest Village System was introduced by the Forest Industry Organization (FIO) in the plantation units and further implemented in other areas.

Forest Village System will provide the land of 1 Rai (40x40m) for settlement and 14 Rai for farm practices. Rural poor will be hired for forest plantation activities and at least two members in each family will have better chance to earn some incomes. They are allowed to plant crops in between tree rows and will receive the award if the trees in the area of their responsibility, survive well and show good growth.

STK (right to form) Certification was modified from Forest Village System and the programme expanded very fast, while the basic requirements had not been managed properly. However, STK did not improve the security of ownership or provide incentives for reforestation. STK cannot be used as collateral for loans, while the land improvement cannot be liquidated through sale. Later, land reform system was introduced and Land Usufructory System was adopted but the restriction of transferability is well intended aiming to prevent the sale of land and the continuation of forest encroachment. Rural poor still demand more land for settlement, farming practices and aquaculture practices. The existing problems remain to be solved particularly in the protected areas. To counter these problems Thailand has to establish community forests.

EXISTING FORESTS AND DEFORESTATION

Like most developing countries, the forest resources have been disturbed and rural poor were blamed for disturbing the forest. In fact, people from urban areas have been active in demanding land and worked in closed collaboration with rural poor so as to claim more occupied land. In 1900, forests covered about 70 percent of the total land area. This dropped to 53 percent in 1960, 29.4 percent in 1985, 27.95 percent in 1989 and 26.3 percent in 2001. With the new satellite imagery programme, it has been possible to include small marginal forests and left-over forests in the farm. The total existing forest area is now at around 30.6 percent.

There are many factors leading to forest destruction in Thailand. Shifting cultivation, encroachment for settlement, farm practices, tourist resorts and shrimp farms have been reported in various parts of the country. Illegal logging practices have diminished the existing forests and commercial tree species have been logged out. Tree cutting for fuelwood and charcoal has been done by rural poor. Poor management practices result in forest area becoming deforested. The disturbance of the existing forests as caused by uncontrolled encroachers and hunters also cause forest fires. Deforestation has also caused floods, erosion and siltation in the main rivers. The government has managed to complete watershed classification work in 24 major watershed areas.

NATURAL REHABLITATION

Natural forest rehabilitation has succeeded in reducing biotic influences. However, more forest rehabilitation work has been promoted in Thai society during the last five years. About 5 million Rai was allocated for this work and the private sector, companies and organization can provide their financial support and set up their management techniques to protect the planting sites and generate tree growth. Petroleum Authority of Thailand (PTT) has completed the rehabilitation tasks in about one million Rai and presented to HM the King. The management practices were applied into action work and with the financial support from the company, rural poor who live near the forests have better opportunity to help in planting and protecting the forests. More forest rehabilitation work will be developed.

REFORESTATION

Tree planting has been taken up as industrial plantations, tree farming, road side tree planting, farm woodlots, shelterbelts etc. Thailand grows teak as the main economic species. Other important tree species are *Acacia auriculaeformis*, *Acacia mangium*, *Afzelia xylocarpa*, *Azadirachta excelsa*, *Azadirachta indica siamensis*, *Casuarina junghuniana*, *Dipterocarpus alatus*, *Eucalyptus camaldulensis*, *E. deglupta*, *E. urophylla*, *Leucaena leucocephala*, *Pinus kesiya*, and *Pterocarpus macrocarpus*.

It is hoped that the private sector will plant more trees in the future and this will provide more jobs for the rural poor. However, the impact of the fast growing demand for raw material will promote people to grow more eucalypts on the farmlands in the near future.

The concept of agroforestry has been used so as to make efficient use of land. Poor farmers will have better income from the practices. It is also possible to promote community reforestation with agroforestry systems in the degraded forest area and this may lead to the establishment of local industry centers.

COMMUNITY FORESTS IN THAILAND

Community forestry will provide opportunities for communities to build and strengthen their governance skills and capacity to influence policy. Local people improve their management skill for managing local natural resources. Community forest is also honouring diversity through ethics of reciprocity. Since the early 1990, Community Forest Bill has come under intense negotiation and debate among policy makers, government officials, foresters, villagers, non-government organizations and academics. Four versions of the act were drafted for debate and negotiations in 1997. Community Forest Act has not yet been approved by the parliament.

FUTURE TREND

For more than four decades, His Majesty the King of Thailand has been demonstrating sustainable development techniques through his 240 royal projects on the grounds throughout Thailand. Sustaining farming has been supported by the government. Certainly, the better way of farming should be permaculture which leads to a sustainable way of farming where people and nature support one another.

It is also necessary to establish a balance between poverty alleviation and conservation through good participatory management plans. More programmes on the participatory management of natural forests and woodland and by the extension of agroforestry will be developed, which will allow the farmers to cooperate with each other, invest their labour and soil fertility through the planting of a variety of crops.

Water is one of the main indicators promoted by the government. In Thailand about 89 percent of the total population has access to safe water. The Year of Water was declared in June 2003 and this will help to bring more participatory management practices to certain ecosystems.

With support to the poor people to participate in decision making, the Thai government has declared war on poverty. The Prime Minister Thaksin Shinawatra has declared that poverty shall be gone in six years. He also promoted one-district-one-product policy so as to bring the local communities throughout the country to produce goods for cash. He has also declared that 25 river basins throughout the country will be rehabilitated.

The government has also restructured the organizations responsible for forestry resources. Royal Forest Department was restructured into several organizations and some subdivisions will be recombined with other departments. It is hoped that the resources will be better managed.

It is noticeable that the poor continue to remain poor while the rich are becoming richer. Previously, the poor would collect minor forest products to sell, while the rich would transport, process and package the products to meet the market demands. It is difficult to solve this universal problem but self-reliance systems can serve the purpose. Self reliance system was suggested by HM the King of Thailand, with the aim that one can adapt to what he has and efficient practices can be developed through proper land classification and utilization.

29 Poverty alleviation and forest conservation in Bangladesh: role of research

Sheikh Sirajul Islam*

ABSTRACT

Forest resources are being depleted rapidly due to increasing population pressure in Bangladesh. The existing laws have not proved efficient in protecting forest resources. Forest department which has to look after large areas of forest with insufficient staff, ignores local needs. A change is felt essential and a participatory forestry programme has been introduced. The Betagi–Pomra Community Forestry Project has changed the socio-economic status of the settled families. The North Bengal Community Forestry Project contributed significantly towards land use efficiency, employment generation, environmental stability and social equity. The participants with the share benefit system emerged as a dynamic social group. It helped forest department to recover encroached land and established legal rights. The Farming system research and development programme (FSRDP) has improved the socio-economic conditions of the poor hill farmers by developing and practicing sustainable land use system on hill farming.

INTRODUCTION

Forest resources

Bangladesh is mostly composed of flood plains (80 percent) with some hilly areas (12 percent). Bangladesh has a total land area of 14.39 million ha of which 9.12 million ha are under cultivation, 2.14 million ha public forest, 0.27 million ha village groves, 1.64 million ha permanently under water, with other land areas (1.22 million ha) occupied by tea gardens, uncultivable areas, rural and urban houses and ponds (Kibria *et al.* 2000). The country has limited forest area in comparison to its total land and population. The areas under government and village forests are about 16 percent of total land. However, only 0.93 million ha (6.5 percent) is under tree cover which is about 40 percent of the government controlled forests (Anonymous 1989). The remaining 60 percent includes denuded grasslands, scrub and encroached lands. At least 73 000 ha forest land has been lost due to encroachment for aquaculture and agriculture. Moreover, 24 000 ha is lost every year to homesteads, urbanization and deforestation (FMP 1992).

The contribution of forestry towards Gross Domestic Product (GDP) at current price has been estimated at 3.28 percent (BBS 1994). The supply of various forest products such as timber, poles, fuelwood and bamboos do not meet the present demand. Village forest area being one-tenth of the national forest area supplies 70 percent of saw logs, 90 percent of fuelwood and 90 percent of bamboos used in the country (Douglas 1982). The per capita consumption of timber and fuelwood has been estimated to be 0.01 million m^3 and 0.08 million m^3 respectively (Byron 1984). The figure will be less if the present forest production and population are considered. The gap between the demand and the supply will increase as the population grows. The gap can be narrowed through plantation of fast growing trees in the presently denuded forest and waste lands as well as homestead areas.

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FOREST POLICY, STRATEGY AND MANAGEMENT

Forest policy and strategy

The national forest policy of Bangladesh prepared in 1979 is summarized below:

- forests shall be carefully preserved and scientifically managed;
- government forest shall not be used for non forestry purposes;
- timber wealth shall be increased by large scale plantations;
- optimum extraction and utilization of forest produce using modern technologies;
- measures to set up new forest-based industries and to meet raw material requirements shall be adopted;
- research, education and training in forestry shall be organized to meet scientific, technological and administrative needs;
- a cadre of officers shall be constituted for manning the forest sector;
- forest sector shall be organized as separate administrative unit of the government and relevant laws updated for implementing forest policy;
- steps shall be taken for conservation of forests, wildlife and for utilizing recreational potential of forests;
- mass motivation shall be initiated and technical assistance extended to those interested in forestry.

The country's forest management has the following goals and strategies:

- reduction of forest products shortages
- improvement of forest management
- reduction of deforestation and encroachment
- development of people's participation
- minimization of environment hazards
- creation of employment opportunities and poverty alleviation

Forest management

The main forest management system has been clear felling of the natural forest followed by artificial regeneration in hill forests. Sal forests are managed by the three working circles, namely; conversion with artificial regeneration working circle, coppice working circle and afforestation working circle. There is a problem of large scale encroachment in the sal forests. So afforestation has been practiced with the active participation of local people on a benefit-sharing basis. Existing stocks are gradually loosing coppicing power rendering extended areas blank. The early management in the Sundarbans confined itself to realization of revenue. Sundarbans forests are now under the Selection-cum-Improvement management system with a 20-year cycle. Yield is controlled by fixation of exploitable diameter.

RATIONALE OF PARTICIPATORY FOREST MANAGEMENT

Bangladesh is one of the densely populated countries of the world. It has very limited resources in comparison to the population and the existing resources, especially the forest resources are not equally distributed all over the country. On the other hand, the existing forest resources are also in a serious state of degradation due to over exploitation, and the demand and supply gap is increasing. The degradation of forest resources has already started to take revenge in the form of floods, cyclones, land-slides, etc., causing threats to ecosystem, and as a consequence, poverty is increasing in rural Bangladesh at an alarming rate.

After the independence of Bangladesh the government initiated many programmes to alleviate poverty but most were unsatisfactory. As a consequence government has been undertaking programmes to promote much wider diversification of activities that may help to alleviate poverty of the rural mass. At present, along with many other programmes for poverty alleviation, forestry in the form of afforestation, reforestation, social forestry, community forestry, forest based small scale entrepreneurship development etc. has also been taken as an approach to alleviate rural poverty.

The overall result of past management of the natural forests do not support healthy forestry development. The position has worsened in recent years. Over the 20-year period ending in the early 1980, natural forests declined by 2.1 percent annually on an average. From 1984–90, the annual rate of decline was 2.7 percent and is likely to be more than 3 percent in the coming years. On the other hand, a large area of khas and protected forest land has remained unproductive and contributes very little to the national economy.

In the part, forestry remained the exclusive domain of the Forest Department. Generally it ignored the local needs, and helped divert forestry benefits to the wealthy people. A change is felt essential, and forest management and protection should become the function of the entire population.

To increase the tree cover on private lands and involve the masses in it, government and non government organization (NGOs) have made several attempts towards participatory forestry programmes. A number of participatory projects have been undertaken. These efforts have three directions – protecting the existing forests, expanding the forest area through utilization of khas and protected forest lands, and regenerating the denuded hills. Bangladesh Forest Research Institute (BFRI) has generated many technologies which are directly related to poverty alleviation and forest conservation. BFRI has done extensive studies on the participatory projects, *viz*., the Betagi–Pomra Community Forestry Project, the Farming System Research and Development Programme, the North Bengal Community Forestry Project and the Thana Afforestation and Nursery Development Project. The primary objectives of these participatory projects were to rehabilitate the landless poor people and to augment the supply of fuelwood, timber, edible fruits, fodder and other tree products which will ultimately help the country in poverty alleviation as well as forest conservation.

POVERTY ALLEVIATION AND FOREST CONSERVATION

BFRI technology related to poverty alleviation

Bangladesh Forest Research Institute (BFRI) was established in 1955. It has a total area of 1100 ha including 28 ha at headquarters in Chittagong. It has two research branches with 17 research divisions, besides, the Administration and Service Engineering Division. There are 22 field research stations all over the country. There are 830 officers (including 150 scientists) and staff in this institute. Research studies are conducted under 12 programme areas, and a total of 40 technologies has been generated. Some of the technologies help to increase forest resources in both public and private forest land. Some technologies help wood based industries for product development through scientific utilization of forest resources. Such increase in forest resources and their proper utilization ultimately reduce poverty solving unemployment problems in the country. Out of 40 technologies, eight are directly related to poverty alleviation for the poor and marginal farmers and listed:

- Simple technique for propagation of bamboo
- Technique for enhancement of service life of rural housing materials
- Nursery and plantation techniques for indigenous tree species
- Nursery and plantation techniques for cane and pati-pata
- Propagation and conservation of medicinal plants
- Production of improved quality forest seeds and seedlings
- Appropriate technology for hill farming
- Techniques for pest and disease management in nursery and plantation

The Betagi–Pomra Community Forestry Project

BFRI undertook a study to investigate the socio-economic impact of the Betagi–Pomra Community Forestry Project in 1985 (Islam 1998). The project was undertaken in two villages of Betagi and Pomra under Chittagong district in Bangladesh. The two villages are hilly and close to government reserve forest. Betagi is khas land under the jurisdiction of the Ministry of Land Resources while Pomra is protected forest land under Forest Department. The objectives of the project were (a) to regenerate denuded hill through plantation of trees, (b) to rehabilitate landless farmers, (c) to protect the forest from the illegal felling with the help of the settlers and (d) finally to suggest how this experience can be effectively extended to other hilly areas in the country.

A socioeconomic sample survey was conducted in both areas in 1985. Information on family size, labour contribution, growing stock per hectare, annual farm income, etc. were collected. Similarly another follow up sample survey was conducted in both the areas in 1994. The same information was collected again. The survey results are presented and compared in Tables 1 and 2.

Table 1. The comparative results of family size, labour hour per day and annual farm income at Betagi and Pomra

Project area	Year	Family size (Average)	Labour hour per day	Annual farm income (Tk.)
Betagi	1985	5.6	14.00	14,000
	1994	7.4	11.47	29,343
Pomra	1985	5.7	12.00	9,023
	1994	6.0	7.53	22,593

Table 2. Estimated change in average growing stock at Betagi and Pomra

Project area	Year	No. of forest trees	No. of fruit trees	No. of banana trees	No. of bamboo clumps
Betagi	1985	650	870	35	2.5
	1994	746	1,557	38	3.0
Pomra	1985	225	530	25	2.0
	1994	514	1,083	35	2.3

In Table 1, it is observed that the family members have not increased significantly over a long period of 9 years at both Betagi and Pomra. The annual farm income has, however, increased two to three times more than the same in 1985 with decrease in trend of labour hour contribution per day. In Table 2, it is also noticed that the growing stock of forest trees, fruit trees and bamboo groves have increased largely at both areas over the same period. It indicates that the landless people have developed their allotted plots with agroforestry farming. Previously, they used to live on day labour, rickshaw pulling and fuelwood collection.

The inpu–output situation in Betagi and Pomra is given in Table 3. The internal rate of return (IRR) was estimated to be 104 percent for Betagi and 90 percent for Pomra.

Table 3. Input–output situation under Betagi and Pomra Community Forestry Project (1985)

Input		Average cost per plot (Tk.)	
		Betagi	Pomra
a) Seeds and seedlings		700	783
b) Fertilizers, insecticides, etc.		650	711
c) Depreciation and overheads		50	150
d) Labour contribution		3,500	3,000
	Total	**4,900**	**4,644**
Output		**Average income per plot (Tk.)**	
		Betagi	**Pomra**
a) Income from vegetables		–	3,942
b) Income from fruits		–	2,786
c) Income from sungrass and fuelwood		–	2,033
d) Income from livestock		10,000	263
	Total	**10,000**	**9,024**

US $ 1 = Tk. 40

The socio-economic impacts of the project are as follows:

- The employment opportunities were created for the landless. Their income and quality of living have improved significantly.
- The denuded hills have turned into green crops. The farmers are producing fruits, vegetables, sungrass, fuelwood and timber. The encroachers are now protectors.
- The farmers have become capable of contributing a large range of activities.
- Significant impact on social equity has been achieved. This is the ultimate goals of rural development.
- The two areas have become self-sufficient in fuelwood and sungrass which are essential commodities for rural living. The settled families now supply vegetables and fruits to local areas and Chittagong city.
- Social crimes have decreased. The farmers are now hope for a better life.
- Economically viable hill farming technology has been developed with sufficient generated information.
- A community forestry model has been established. It may be used in formulating forest management policy and for replicating elsewhere.

The North Bengal Community Forestry Project

BFRI conducted the study of the financial viability of agroforestry under participatory approach at Modhyapara of Dinajpur district in Bangladesh (Rahman and Islam 1997). Forest Department (FD) established this agroforestry plantation of 6.05 ha in 1985. FD made an agreement with five local participants allotting 1.21 ha land to each allottee with certain terms and conditions. BFRI contributed to select agro and forest crops and their plantation techniques after discussion with the participants and FD.

A socio-economic survey (for five participants) was conducted in 1996. Financial viability was found out in terms of benefit-cost ratio (B/C ratio) and internal rate of return (IRR). Financial analysis was done from first year to ninth year considering the investment and benefit over the period. The financial returns received by the FD were Tk. 1500 in the third year (pineapple auction) and Tk. 138 090 (sale proceeds of trees) in the ninth year. The participants incurred input costs in addition to FD assistance for growing intercrops in the first year. They had to bear all the costs for growing agricultural crops from second year. Labour contributed by themselves was Tk. 30 per day. Participants' benefits came from agricultural crops (100 percent), cyclone damaged trees (100 percent), wages paid by FD in the first and second year and sale proceeds of trees in the ninth year (50 percent). Year-wise break-up of costs and benefits is presented in Table 4. The estimated B/C ratio and IRR have also been shown under each situation.

Table 4. Financial analysis of Dinajpur (Modhyapara) Community Forestry Projects

Year	FD only (Tk.)		Participants only (Tk.)		Whole agroforestry system (Tk.)	
	Benefit	Cost	Benefit	Cost	Benefit	Cost
1		23000	16150	14400	16150	37400
2		5000	12750	13890	12750	22890
3	1500		28100	23800	29600	23800
4			24500	6610	24500	6610
5			8400	690	8400	690
6			2225	360	2225	360
7						
8						
9	138090	5000	144690	11950	291960	16950
Present work at 15 percent rate of interest	42850	28227	102437	46348	145286	74575
B/C ratio	1.43		2.21		1.95	
IRR (%)	22		250		42	

US $ 1 = Tk. 43

The total costs pertaining to the whole agroforestry system were obtained by adding the costs incurred by both the participants and FD. The total benefits generated by the system were also estimated similarly. The results shown in the table are on the basis of 15 percent rate of interest. The B/C ratio under only FD situation, participants situation and whole agroforestry system situation stand at 1.43, 2.21 and 1.95 respectively. All the three B/C ratios are greater than 1. It implies that the agroforestry system applied is viable not only for FD and the participants but also for the whole participatory module. The IRR under the above three situations are 21 percent, 250 percent and 42 percent respectively.

The socio-economic impacts of the project are given below:

- FD recovered the encroached forest lands and established its legal rights
- FD emerged as development partner.
- The management costs of FD reduced substantially.
- FD established well stocked plantation in the area where it could not be successful under conventional approach.
- FD did not require to employ its limited resource for protecting the plantation as the participants protected the plantation.
- The participatory approach appeared to be easier and successful.
- The income of the participants increased substantially with the receipt of 50 percent share of timber sale proceeds.
- The participants emerged as a dynamic social group.
- Employment opportunities were generated.

- There is population pressure on scarce land. The participatory approach rehabilitated both man and land together. It accelerated landuse efficiency so that land could be intensively utilized for sustaining national development.
- The system contributed towards environmental stability.
- The system enhanced the supply situation in the local market contributing towards price stability.
- The system contributed towards social equity.
- Successful resource management system was introduced which ultimately helped both poverty alleviation and forest conservation.

Farming system research and development programme

BFRI started Farming System Research and Development Programme (FSRDP) at Saulok and Faitong sites of Bandarban hill district in Bangladesh in 1996 (Paul *et al.* 2002). The main objective of the programme was to improve socio-economic conditions of the farmers by developing and practicing sustainable land use system on hill farming. FSRDP had five research programmes and seven development programmes through transfer of mainly BFRI generated technologies.

Research Programmes

- Studies on differential slope agroforestry (DSA) method
- Developing techniques of soil conservation and soil management practices in the slope land cultivation system
- Devising multi-storied home garden
- Studies on socio-economic impact of agroforestry interventions
- Assessment and improvement of women's role in respect to agroforestry activities

Development Programmes

- Demonstration of sloping agriculture/agroforestry land technology (SALT).
- Introduction of improved agroforestry management practices under Rabi and Kharif seasons.
- Use of pre-rooted and pre-rhizomed branch cutting technique for cultivation of bamboo.
- Popularization of preservative treatment of indigenous rural housing materials, viz. bamboo, sungrass, wood, etc., and their service life.
- Beef fattening programme by using urea-molasses-straw (UMS) technique.
- Introduction of improved chicken/broiler/duck rearing practices.
- Introduction of improved fish culture technique using small water reservoirs/seasonal ditches/ponds as means of cash generation activities.

The site working group consisting of researchers, farmers and related extension workers implemented the field activities. The household assets of the 50 target farmers have been categorized into upper, middle and lower groups through the base line survey. The studies on socio-economic impacts of agroforestry showed 70 percent and 112 percent economic rate of return (ERR) for group-1 (farmers with more than two technologies) and group-2 (farmers with less than two technologies) respectively. The base line survey indicates that the women farmers are closely involved in household activities, cropland, home garden management and marketing. The women have positive attitude in adopting improved technologies.

Demonstrations have been conducted on SALT as well as on management of tree and bamboo propagation nurseries under farmers' management conditions. The growth of trees and crop yield were satisfactory. The survival of tree seedlings was good (90 percent). The hedge trees yielded 9 ton/ha/year as biomass. Under improved agroforestry management practices, the yield of different forest and High Yield Variety (HYV) agro-crops was satisfactory. In nursery management technique, the farmers raised about 60 000 seedlings and 30 000 bamboo branch cuttings. Of these seedlings about 30 percent were utilized by the farmers themselves and the remaining 70 percent were marketed to the local people. The farmers' reaction on preservative treated durable bamboo and sungrass-made house has been found positive. Thirty out of 150 cattle have been brought under beef fattening programme. The average benefit-cost ratio (BCR) in beef fattening was 1.69. Rearing of improved broiler and layer chicken and duck has been enthusiastically accepted by the farmers. The improved fish culture technique has been found to be an effective cash generating activity. The cash generation from each decimal of water body under improved fish culture was increased to Tk. 250, which is 150 percent higher than traditional practice.

Apiculture has been introduced to 20 farm families in the site and upto June 2001 about 40 kg honey has been collected. The FSRD programme has been initiated through training of about 300 farmers on seven technologies. Similarly field days have also been organized on agroforestry demonstration/practices through participation of about 450 farmers. The results of the programme are compiled in Table 5.

Table 5. Component wise progress of FSRD at Bandarban (1998–99/2000–2001)

Component	Participant (Nos.)	Input	Investment (Tk.)	Output (Tk.)	IRR (percent)	B/C ratio
1. Research Programme						
Differentiated slope agroforestry method	7	Seedlings, fertilizer	130000	175500	35	1.23
Soil conservation and management practice	5	Seedlings, fertilizer	120000	159850	33	1.21
Multistoried home garden approach	65	Seedlings, fertilizer	70000	94250	35	1.22
Assessment and improvement of women's role in agroforestry	30	Seeds of mushroom	55000	67500	23	1.12
2. Development Programme						
Sloping agroforestry land technology	8	Seeds, seedlings, fertilizer	140000	220400	57	1.43
Improved agroforestry management practice	150	Seeds, fertilizer	130000	532000	309	3.72
Bamboo branch cutting technique	16	Equipments	165000	319200	93	1.76
Beef fattening programme	25	Medicine, molasses	110000	238500	117	1.97
Poultry bird rearing	80	Chicks, medicine	125000	494000	295	3.59
Policulture of fish	45	Fishing	95000	222000	134	2.12
Treated bamboo house	6	Chemicals, equipments	60000	102400	71	1.55

US $ 1 = Tk. 56

The socio-economic impacts of FSRDP are as follows :

- SALT has been demonstrated as a sustainable slope land cultivation practice.
- The nursery techniques for tree and bamboo have facilitated local availability of desired seedlings for the people interested in tree planting activities.
- Trees of improved sources and HYVs of crops have been cultivated under agroforestry practices.
- The average soil erosion loss has been drastically reduced in the FSRD site.
- Bee culture has been accepted as attractive cash generating activity and became a popular production technology.
- Farmers' reaction to preservative treated bamboo-sungrass made house is positive.
- Farmers showed their keen interest in UMS technique for beef fattening.
- Increased production of meat and eggs has enhanced cash generation to the farmers and local people through rearing both broiler and layer chicken and duck.
- Increased fish production through poly culture of fish has contributed to generate cash money for the farmers.
- The women have positive attribute in improved technologies for household and home garden activities.
- Significant socio-economic impacts have been achieved in terms of higher economic rate of return due to FSRD interventions.

Thana Afforestation and Nursery Development Project

Thana Afforestation and Nursery Development Project (TANDP) was executed during the period from 1987 to 1994 by Forest Department adopting BFRI technologies on nursery techniques and strip and agroforestry plantation techniques (Huq and Alim 1995). The primary objective of the project was to arrest depletion of the tree resources and improve the land-use practices for increasing production of fuelwood and timber in unproductive forest land in the country. TANDP raised community awareness for forestry development creating a permanent institutional capacity for forestry extension.The project had the following participatory components:

- Enrichment plantation
- Agroforestry plantation
- Strip plantation
- Establishment of thana nurseries

Local people were involved as participants in establishment of enrichment plantation. They were involved with share benefit mechanism. The participants got 40 percent of total forest produces including intermediate output. Encroached forest land was brought under a multiple used agroforestry component by participating local members. They received 50 percent of final forest products including agriculture and intermediate forest produces. The participating members of public were involved in strip plantation on government land. A total of 345 thana nurseries was established for distribution of 25 700 000 seedlings to all agencies including members of public as well as to disseminate BFRI technologies for nursery and plantation. However, the targets and achievement of the participatory components are given in Table 6.

Table 6. Target and achievement of participatory components of TANDP

Component	Unit	Target	Achievement
Enrichment plantation	ha	20225	16875
Agroforestry plantation	ha	4200	3052
Strip plantation	km	17372	15747
Establishment of thana nurseries	nos	345	345
Raising seedlings for distribution	100 000	347	257

CONCLUSION

Bangladesh Forest Research Institute (BFRI) along with different forestry research and development programmes, has a mandate to undertake poverty alleviation programmes. With this view, the institute has undertaken research and development programmes within its capacity.

Equipped with the BFRI generated technologies, many marginal and poor farmers have developed nurseries, collected and produced quality seedlings of bamboos, trees, canes, pati-patas and medicinal plants. Through this, they are earning a lot of money from sale proceeds of seeds and seedlings. The farmers are using preservative treated rural housing materials like bamboos, wood and sungrass for enhancement of service life. As a result, the poor farmers do not have to collect the housing materials for a long time. This will also reduce pressure on forest resources. The farmers are also using the techniques for pest and disease management in their nurseries and plantations. The poor hill farmers are also benefited through use of appropriate technologies for hill farming such as home garden, agroforestry, bamboo propagation, apiculture, fish culture, poultry farming, livestock, low cost housing with bamboo and sungrass, etc. The poor hill farmers are now better of through selling their products. Their hills are now protected from soil erosion and are covered with fruit and forest trees.

The Betagi–Pomra project depicts a way of utilizing denuded hills simultaneously by rehabilitating the landless people. The socio-economic status of the settled families has improved considerably. If this type of project is initiated in the denuded unclassed state forests and unproductive hilly khas lands, it will help rural development solving unemployment problems for the landless people and increase the production of food, fuel, timber and other forest products.

The participatory approach in forest management contributes significantly towards land use efficiency, employment generation, environmental stability and social equity. The approach has been inspiring both the participants and the Forest Department. The Forest Department has legal right to encroached land and emerged as a development partner. The participants have been benefited with their share, while the Forest Department also has earned handsome revenue from a small patch of plantation without involving itself in the tedious job of its protection. The system is a unique example for poverty alleviation of the poor farmers and conservation of forest without much involvement for management and protection.

In TANDP, the poor people were involved in its components and received financial benefit as per share-benefit agreement. They developed nurseries with the help of the project and received income selling quality seedlings. Thus, the project has contributed to poverty alleviation through implementation of the participatory components.

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30 FORDA: Forestry research and community development in Indonesia

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ABSTRACT

Indonesian forests are facing a serious threat for its existence due to illegal logging, forest fires, forest encroachment and mismanagement. Most of the destructive factors could be linked to poverty. Therefore, the Ministry of Forestry (MoF) has launched a social forestry programme as an umbrella of its five priority policies. Forest Research and Development Agency (FORDA) is an Indonesian government institution under the MoF, which has a mandate to conduct research and development in forestry. Therefore, FORDA has to support and back up the MoF for the successful implementation of its policies by providing reliable, relevant and accurate information based on scientific findings. In order to improve its institutional capacity and to address poverty reduction, FORDA had taken many actions such as the establishment of new research stations, improvement of research design, assessment of institutional performance, and formulation of strategies for maintaining its existence.

INTRODUCTION

Indonesia has the second largest tropical forest area in the world after Brazil. Its forest area is 113 million ha and accounts for 60 percent of total land area of Indonesia and 14 percent of total forest area in the Asia-Pacific region. The forest is rich in biodiversity and is home to 16 percent of the world's bird species, 11 percent of plants and 10 percent of mammals.

The forests have been threatened by serious problems of illegal cutting, forest fires, forest encroachment, unmatched wood demand, land tenure problem and ineffective supervision. Recent decentralization of production forest management has increased the complexity of problems; however, this decentralization is a political decision that needs to be implemented gradually and consistent with other existing laws. All these have caused, in the last ten years, deforestation at an estimated rate of 1.8 million ha per year (Departemen Kehutanan 2002)

Forests have important functions for life supporting systems and other social and economical functions. Indonesian forestry aims to achieve sustainable forest management for sustainable development. The unwritten goal is to have forests as an inter-generational heritage because of its uniqueness, social and economical values, and other uses.

The pressure on natural forest is due to: (i) lack of understanding of government on community's needs, (ii) limited access of the local people to participate in forest management, (iii) unbalanced benefit distribution, and (iv) poor institutional capacity. As a result, the local people living in surrounding areas of forest are still poor and remain good observers rather than active actors or economic movers.

In order to reduce the pressure on natural forest, and to alleviate the poverty of local community, social forestry is a good alternative solution. Social forestry programme has been supported through the Ministry of Forestry Decree Number: 31 (2001) for empowering local people in forest management by maintaining forest function and living environment in the context of their prosperity improvement.

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At present, the Ministry of Forestry (MoF) has set the social forestry programme to be the umbrella programme for implementing five priority policies. The five policies are: (i) combating illegal logging activities, (ii) controlling and suppressing forest fires, (iii) restructuring forestry sector, (iv) establishing plantation forest and reforestation, and (v) decentralizing the forestry sector.

Forest Research and Development Agency (FORDA) is an Indonesian Government institution under the MoF, which has a mandate for doing forestry research and development. Therefore, FORDA has to support and back up the MoF for the successful implementation of its policies by providing reliable, relevant and accurate information based on scientific findings.

This paper tries to explain (i) the current situation of FORDA in connection to the improvement of its institutional capacity, (ii) the establishment of its new research stations, (ii) the improvement of its research design, (iii) the assessment of its institutional performance, and (iv) the formulation of strategies for FORDA's future.

PRESENT SITUATION IN FORDA

FORDA was originally established in 1913 as an institute called "Proefstation voor het Boswezen" located in Bogor, West Java. Currently, FORDA has four centres, ten institutes and three stations. The centers are: (i) Centre for Research and Development of Forest Product Technology, (ii) Centre for Research and Development of Forest and Natural Conservation, (iii) Centre for Research and Development of Biotechnology and Forest Tree Improvement, and (iv) Centre for Social, Culture and Economic Research on Forestry. The institutes are: Forest Research and Development Institute (FRDI) of Manokwari, FRDI of Makasar, FRDI of Samarinda, FRDI of Kupang, Institute of Reforestation Technology (IRT) of Banjarbaru, IRT of Palembang, Institute of Watershed Management Technology (IWMT) of Surakarta, IWMT of Ujung Pandang, and Seed Technology Research and Development Institute (STRDI). The stations are: (i) Research and Development Station (RDS) of Monsoon Forest, Ciamis, West Java; (ii) RDS of Non-Wood Forest Product, Kuok, Riau; and (iii) RDS of Primate, Samboja, East Kalimantan.

The vision of FORDA is to be the centre of excellence for forestry science and technology, capable to provide knowledge as a basis of strategy for sustainable forest development and provide options for solution of both current and future forestry problems. The missions of FORDA are: (i) to provide science and technology that support sustainable and optimal use of forest resources for the people welfare, (ii) to coordinate, supervise and evaluate forestry R&D activities, supported by professional human resources and competence R&D institutions, and (iii) to disseminate forestry science and technology for the improvement of value added and competitiveness of forest products.

In line with its missions, FORDA's research activities are directed to provide scientific background in supporting the policies of MoF as well as managing forest resources toward sustainable forest management (SFM). The research focused on activities that may provide the best options on handling both the national issues and global concerns on forest resources in Indonesia.

FORDA has a total staff of 1380, of which 605 are administration staff, 410 researchers and 365 research technicians. Its annual budget from the government is Rp. 40 billion (US$ 700 000).

There are many criticisms from the stakeholders, such as: (i) FORDA is not user-oriented in its research activities especially for improving prosperity of local communities, (ii) FORDA produces many spatial and non-integrated research activities, (iii) Parts of the research are not "one step ahead" orientation, (iv) FORDA is not the centre of excellent but the centre of silent, (v) No guarantee for doing multi-year R&D, and (vi) most of research managers has low professionalism. Therefore, FORDA has to improve its performance to win the competition among research institutions in gaining financial support.

ESTABLISHMENT OF NEW RESEARCH STATIONS

Due to multi-dimensional crisis, social conflicts in forest management have emerged in all regions. These social conflicts escalate in the implementation of regional autonomy through Law No: 22-1999 due to the unprepared framework of its implementation. On the one hand the central government is not ready to shift its power to local government. On the other hand, the local government has limitations in human resource quality and in making local regulations due to the unavailability of the guidelines.

Actually, many social conflicts in forestry management were mainly caused by the poor social and economic conditions of local people leading to illegal logging and forest encroachment.

In anticipation, in 1999 FORDA established a new centre called the Centre of Social and Economic Research in Forestry (CSERF) in Bogor, West Java. The emergence of the centre is in response to increasing demand for research on the social and economic aspects of forestry.

The research topics related to poverty reduction addressed by CSERF are presented in Table 1.

Table 1. Research topics on poverty reduction conducted by CSERF in 2001–2002

Research topics in 2001–2002	Research output
Study on private forest and poverty alleviation.	Private forest contributes significant revenues from primary to secondary wood industries.
Study on land tenure system in forestry.	Land tenure is obtained by communities converting forests into their farm areas and demarcated by certain tree species. The needs of land are increasing due to autonomy implementation.
Policy analysis on export tax of round wood and processed wood.	Policy on log export ban is not effective to combating illegal logging. Log export tax has an effect on sawn timber and moulding but not for plywood.
The impact of fuel subsidy reduction on wood production and consumption and SFM.	It has no effect on them because they are determined by other factors such as log prices and level of exchange rates.
Analysis on variability of private forest management.	There are three types of private forest: (i) self reliant, (ii) partnership, and (iii) government's subsidy. A wide range of revenues among districts range from Rp. 1.5–10.0 million/ha/year.
The potential of rubberwood as a raw material alternative for wood-based industries.	Rubberwood from the regeneration of rubber tree plantations is only used for firewood. It can be used for wood industries such as plywood mill, woodworking and furniture.
Market and price stabilization on raw rattan for downstream rattan industry.	The opening of raw rattan export policy depresses the domestic price of raw rattan and resulted a loss to rattan farmers.
Review of forest community management in production forest.	There is a big variation in forest community management. Some of them have their own regulations for achieving the sustainability of their forests.
Economic performance of common agroforestry system in Southern Sumatera, Indonesia: Implications for Carbon sequestration services.	Four agroforestry systems (rubber agroforestry, cinnamon multi-cropping, oil palm monoculture, and dammar agroforest) are financially and economically attractive.
Study on utilization of indigenous knowledge to improve forest resource productivity.	Dayak Bentian ethnics have their own forest management system that is divided into implementation stages (1–100 years).
Study on utilization of ex-forest fire areas.	No correlation between reforestation activity and rehabilitation of ex-forest fire area. Ex-forest fire area should be handled by forest management units.
Opportunities and constrains of ecotourism on enhancing community welfare and district domestic revenues.	Ecotourism has several constraints such as (i) difficult access to the location, (ii) no attractive landscapes in the location, (iii) non professional management of ecotourism and (iv) unprofessional ecotourism guides. It contributes to community revenues from Rp. 25 000–Rp. 500 000 per day and clean water for drinking and other purposes.

IMPROVEMENT OF RESEARCH DESIGN

FORDA has made many improvements on research design especially in the formulating of research need, submission of research proposals to international donors and collaboration with other parties.

At present, FORDA has several research coordinators (42 persons) to coordinate and group similar research topics into research grand proposals. Every coordinator is responsible for designing, implementing, monitoring, and evaluation of research topics related to the grand proposal.

In 2002 FORDA collaborated with CSIRO (Commonwealth Scientific and Industrial Research Organization), Australia, in conducting a workshop on research priority and management. This workshop aimed to enhance the capacity and capability of prospective researchers and managers from all FRDI and RDS to become professional researchers and managers. In 2002 FORDA, in collaboration with CIFOR and GTZ, also conducted training in preparing research proposal to donors. Training participants (20 persons) were from the four centres. It is expected that the participants can impart the training to other researchers in their working places.

ASSESSMENT OF INSTITUTIONAL PERFORMANCE

There was a big difference between the importance and performance values for all research aspects as revealed by an internal survey in FORDA (Table 2).

Table 2. Importance and performance values of various research aspects

No.	Research aspects	Importance value	Performance value	Difference (I-P)
1.	Quality of science	3.45	2.79	0.66
2.	Value for money	3.03	2.21	0.82
3.	Understanding customer needs and constrains	3.82	2.76	1.06
4.	Accessibility of research staff	3.57	3.21	0.36
5.	Intellectual property protection	2.82	2.36	0.46
6.	Quality of documentation	3.57	2.91	0.66
7.	Availability of unique and/or quality facilities	3.57	2.48	1.09
8.	Responsiveness to customer needs and constrains	3.61	2.33	1.28
9.	Deliver on time and budget	3.12	2.85	0.27
10.	Usability of the information, tools and material provided	3.57	2.73	0.84

The big differences are for research aspects 8, 7, 3 and 10, in descending order. Therefore, these gaps should be further investigated and clarified for improvement of research aspects. This can be put as priority for FORDA to improve its working performance in the eyes of its own staff. FORDA has an activity in 2003 to assess the existing institutions in relation to the spirit of regional autonomy (Law No: 22–1999) and the issuing of a national policy to change the structures of all research institutions in every department.

FORMULATION OF FORDA'S STRATEGIES

FORDA's future should be in line with the future scenarios of Indonesian as well as global, especially the Asia Pacific and global, forestry sectors. The future scenarios of Indonesian forestry sector are: (i) forest conservation and rehabilitation will dominate forestry action plan, (ii) the sustainable natural forest management will be achievable, (iii) plantation forest will fulfill the growing demand of wood products, (iv) local community will participate in the forest management system, and (v) forest services will meet people's need (Haryatno *et al.* 2002).

FAO (1998) has projected the future scenarios of forestry in the Asia Pacific as follows:

- Demand for goods and services presently provided by forests will continue to increase;
- Physical and regulatory constrains on forest resource use will continue to increase;
- Pressure for sustainable management (and other environmentally oriented policies) will continue to gather force;
- Increased attention will be paid to the multiple roles performed by forest and efforts for forest ecosystem management;
- Forest product trade will continue to be an important element in the forestry sector;
- Globalization and rationalization will affect forestry sector significantly;
- Demand for social equity will continue and increase; and
- New roles and opportunities will emerge for all forest sector stakeholders.

FORDA should also follow up the SWOT analysis for improving its research management. This can be done by optimizing its strength and opportunities and by eliminating its weakness and threats for its research priority. Mulyadhi (2001) has proposed some strategies for the improvement of FORDA's performance. They include:

- Strategic plan of FORDA should be revised by using different approaches (one step ahead, multi-stakeholders, suitability of legal aspects, current and future forestry issues).
- Professionalism of researcher and research manager should be improved.
- Criteria and procedures are clear and detailed to facilitate preparation of project proposals.
- Project proposal and research activities should be integrated and holistic.
- Clear criteria and indicators for monitoring and evaluation of research activities.
- An independent evaluation team (professional and fair) for evaluating research proposals should be formed.

- Soliciting of financial sources is based on research topics (users will finance their research and the government will give money for public R&D).
- Researchers and research managers should be deployed in accordance with their capability and the number related to the amount of the tasks.
- Networking is a must.

CONCLUSION

Forest Research and Development Agency (FORDA) is a government institution under the Ministry of Forestry (MoF) which has a mandate for doing research and development on forestry. FORDA management has not seriously implemented its vision and mission. FORDA has anticipated the needs of social and economic research on forestry by establishing three new research institutions/stations, CSERF, RDSMF and RDSNWFP. Many research topics conducted by CSERF are in line with the community development and poverty reduction programmes. An evaluation showed that FORDA has a low level of performance. This is indicated by a big difference in total scoring between importance and performance values. FORDA has taken many steps to continuously improving its institutional capacity, such as the establishment of new research stations, the improvement of research design, the assessment of institutional performance, and the formulation of strategies.

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31 Forestry for community development in Myanmar: research issues

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ABSTRACT

Myanmar possesses an ecological spectrum ranging from the snow-capped mountains to tropical rain forest as well as costal and marine ecosystems. Such a wide variety of environmental conditions allows for the existence of diverse flora and fauna. Keeping in line with the forest principles of UNCED 1992, the Government of Myanmar has issued the new Myanmar Forestry Policy in 1995. The new National Forest Policy introduces, and focuses on the modern concept of biodiversity conservation and upgrades the people's participation in forestry. People's welfare and participation are emphasized in the legislation by allowing the village communities to establish the community plantations on public forestlands and even in the reserves. The Forest Department of Myanmar has also decentralized its management role to release socio-economic pressure and to reduce rural poverty. Rural development programmes have been launched across the country, especially in the environmentally critical areas such as the Ayeyardady Mangrove Delta, Southern Shan State, and the Dry Zone. Research in areas such as community forestry, agroforestry, non-timber forest product and small scale forest enterprises have been conducted as an integral part of rural development programme.

INTRODUCTION

Myanmar, possesses a wide range of ecological spectra ranging from the snow-capped mountains to tropical rain forest as well as coastal and marine ecosystems. Such a wide variety environmental conditions allows for the existence of diverse flora and fauna. There are 285 families of flora comprising around 10 000 species of trees, shrubs, herbs, bamboo, climbers, etc. Likewise, the country also has diverse species of fauna containing over 1000 species of birds, more than 300 species of mammals, about 400 species of reptiles and amphibians, and 68 species of swallow-tailed butterflies.

In Myanmar, certain categories of land, whether public or private, are kept under permanent forest cover to secure their optimal contribution to national development. Myanmar has a forest area of 343 767 km^2 (50.8 percent of the total area). At present, 20.66 percent of the total area has been identified as reserved forests and public protected forests. The land-use categories of Myanmar are as shown in Table 1.

Table 1. Forest cover in Myanmar

Category	Area (km^2)	% of total area
Closed forest	293 262	43.34
Degraded forest	50 968	7.53
Forest affected by shifting cultivation	154 389	22.82
Water bodies	13 327	2.01
Non-forest	164 624	24.30
Total	**676 577**	**100**

Source: Forest resources of Myanmar (1991).

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The distribution of the forests in the country is highly variable. The forest types of Myanmar are classified as shown in Table 2.

Table 2. Forest types in Myanmar

Types of Forests	Area (ha)	% of total area
Tidal, beach and dune, and swamp forests	1 376 900	4
Tropical evergreen forests	5 507 800	16
1. Tropical wet evergreen		
2. Tropical semi-evergreen		
Mixed deciduous forests	13 425 300	39
Dry forests	3 442 400	10
Deciduous dipterocarp (Indaing)	1 721 200	5
Hill and temperate evergreen forest	8 950 100	26
1. Hill evergreen		
2. Dry hill forests		
3. Alpine forests		
Total	34 423 700	100

Source: Forestry in Myanmar, Forest Department (1999).

The forests of Myanmar are of significant economic value. These forest resources are of vital importance since about 67 percent of total population who live in rural area depend extensively on forests for many products for posts, poles, fuelwood, fodder and food.

MYANMAR FOREST RESEARCH INSTITUTE

Myanmar Forest Research Institute (FRI) is located in Yezin, Pyinmana Township, and a number of other universities and research centers are also located in the vicinity. The main objective of the FRI is to provide technical information on all aspects of forestry and forest-based activities to increase the contributions of the forest and forest lands to the well-being of the nation.

Forestry research in Myanmar started in 1914 and a research division was formed in 1922 as a part of the Forest Department. In 1952 a Forest Research and Training Circle was set up, which is the forerunner to the present research institute. The Forest Research Institute was established in 1978 with the accomplishment of Food and Agriculture Organization of the United Nations and the Government of Myanmar. The project covered two four-year phases. Nowadays, FRI is the only institution responsible for forestry research.

The forestry research at the FRI has been conducted under the supervision of Forest Research Advisory Committee. There are 59 researchers in the eight sections (sub-divisions) under three divisions. Each division has its own structure and major research functions.

Forest Development Division

- Forest Management and Silviculture Section
- Forest Botany and Tree Improvement Section
- Natural Resources Section
- Forest Protection Section

Wood Utilization Division

- Wood Properties and Utilization Section
- Forest Industry Section

Administration and Finance Division

- Research Planning, Administration and Extension Section
- Finance and Technical Section

Research activities of the FRI

Research activities in the FRI have been mainly conducted by the Forest Development Division and the Wood Utilization Division. The FRI has prioritized the following research programmes, based primarily on the anticipated development in the forestry sector:

- Sustainable forest management in natural teak forests
- Development of economic plantations
- Reforestation in the central Dry Zone
- Efficient utilization of timber
- Development of the non-timber forest products
- Fuelwood resources development and wood energy conservation measures

Research projects of the Forest Development Division

Forest Development Division takes responsibility for technological development in sustainable forest management including soil and water conservation, *in-situ* and *ex-situ* genetic conservation and forest protection. Of course, rehabilitation of degraded forests is also of crucial importance in sustainable forest management. Therefore, the following research projects are being implemented:

- Enrichment planting techniques for rehabilitation of degraded forests
- Structural analysis of different forest types in Myanmar
- Study on effective planting techniques for teak plantations
- Application of GIS and Remote Sensing in forest management
- Tree improvement and genetic conservation of teak and other commercial timber species
- Watershed management and soil conservation
- Community forestry assessment, monitoring and evaluation in different agro-ecological zones

Research projects of the Wood Utilization Division

Wood Utilization Division mainly concentrates on investigation of physical and mechanical properties of Myanmar timber species and the utilization potential of these species. In addition, properties and sustainable utilization prospects of non-timber forest products (NTFPs), with special emphasis on bamboo, rattan and medicinal plants, are examined as priority to enhance household economy and national economy, as well as providing technical information.

At present, the FRI is conducting two bamboo projects in collaboration with International Tropical Timber Organization (ITTO) and International Plant Genetic Resources Institute (IPGRI). These projects are targeted to promote the establishment of plantation, management and utilization potential of bamboo species through community participation and to conserve some important commercial bamboo species.

Administration and Finance Division

Under this Division, Research Planning, Administration and Extension Section is conducting community forestry and agroforestry research. Furthermore, rural development research such as an in-depth analysis of livelihood of the shifting cultivators and their farming system are being conducted. The dissemination of the research finding is the major tasks of the Extension Section.

PRESENT SCENARIO IN FORESTRY SECTOR

Forest legislation

In Myanmar, forests have always been state owned ever since the country became an independent state in 1948. The new Forest Law of Myanmar was enacted in 1992, which replaced the old Forest Act of 1902. The new law introduces and focuses on the modern concept of biodiversity conservation and upgrades people's participation in the forestry sector. People's welfare and participation are emphasized in the legislation allowing the village communities to establish the community plantations on public forestlands and even in the reserves on usufruct basis. In addition to the forest legislation there is a separate legislation for wildlife protection. Certain sections of the Forest Act in conjunction with the Protection of Wildlife and Protected Areas Law and the Rules form a set of comprehensive legislation for the wildlife protection countrywide.

National Forest Policy

In 1995, new Myanmar Forest Policy has been adopted to replace the old policy, which was issued in 1894. The statements in the new forest policy are keeping in line with the forest principles adopted at UNCED 1992 and in compliance with the main stream of international forestry obligations. It has identified six imperatives that the government needs to accord the highest priority in order to achieve broader national goals and objectives:

- Protection of soil, water, wild life, biodiversity and environment;
- Sustainability of forest resources to ensure perpetual supply of both tangible and intangible benefits accrued from the forests for the present and future generation;
- Basic needs of the people for fuel, shelter, food and recreation;
- Efficiency to harness, in the socio-environmentally friendly manner, the full economic potential of the forest resources;
- Participation of the people in the conservation and utilization of the forests;
- Public awareness on the vital role of the forests for the well-being and socio-economic development of the nation.

To support the sustainable forest management, the Forest Department has issued the Community Forestry Instruction (CFI) in 1995. The CFI raises awareness and interest of people in the forestry sector and offers opportunities for active participation in tree planting on barren lands and degraded areas. It also provides legal support for developing the community forestry especially in the areas with severe forest degradation. Agroforestry practices are allowed in the context of community forestry to provide both short-term and long-term benefits for the local people.

Forest Management

In the forestry sector of Myanmar, two governmental institutions, namely the Forest Department and the Dry Zone Greening Department, have been undertaking the protection, conservation, and restoration of degraded forest and sustainable forest management of forest resources. Systematic forest management started in 1956 when Dr. Dietrich Brandis, a German forester, was appointed to take charge of the Bago Yoma teak forests.

Dr. Brandis started to formulate the working plans for management of teak forests of Bago Yoma. These management plans were written based on growing stock and growth rate obtained from valuation surveys. He also developed a silvicultural system that forms the basis for the present management system known as Myanmar Selection System (MSS).

All of the natural and planted forests are managed under working plans and are divided into two categories, permanent forest estate (PFE) and public forest. Under the PFE, reserved forest, protected public forest and protected area are included. On the basis of accessibility and also on the nature and form of the forest produce available, forests are organized into the following working circles (WC):

- *Production Forest Working Circle*
  This WC was formulated for commercial purposes.

- *Plantation Working Circle*
  The rationale of the formation of this WC is to supplement the production from the natural forests in meeting the ever increasing demands for timber.

- *Watershed Forests Working Circle*
  This type of WC was formed to meet the needs of protecting and conserving the watersheds across the country.

- *Local Supply Working Circle/Community Forests Working Circle*
  This WC is the mainstay of the rural people for their basic needs of post, pole, small timber, bamboo, thatch, food, fuel, fodder, etc. In line with the Community Forestry Instruction (CFI) issued in 1995, the Community Forest Working Circles are formed along with the Local Supply Working Circle. Plantations are also being established for the supply of fuelwood, posts and poles, etc. to the local people.

Sustainable Forest Management

Sustainable Forest Management (SFM) was initiated for sustainable development in forestry sector. Myanmar has been a member country of ITTO since 1993, so Myanmar abides by the decisions of ITTO Guidelines on matters related to sustainable forest management (SFM), and keeping in line with the ITTO Guidelines, a National Forest Policy was formulated incorporating all the important principles of ITTO regarding SFM. Myanmar has identified its own criteria and indicators for sustainable development of natural forests and also has established model forests in conformity with the criteria given by ITTO. Forest Plantations are being established to ensure sustainable supply of timber and to reduce pressure on natural forests. Moreover, Myanmar has already established a Protected Areas System (PAS) covering 4.7 percent of the total area of the country.

Rehabilitation of the central Dry Zone

In Myanmar, although 50.8 percent of the total area is covered by forests, the distribution pattern is uneven. Severe environmental degradation can be found in the Dry Zone of central Myanmar and it has an area of about 10 percent of the total area of country. Therefore, Myanmar has been recognized as a country affected by desertification and drought. The Ministry of Forestry has tried, over successive periods, national conservation approaches to prevent desertification and forest degradation. Moreover, in order to focus entirely and accelerate environmental restoration processes, the Dry Zone Greening Department (DZGD) was created in 1997, in addition to the Forest Department which was originally responsible for all forestry activities in the country. The major tasks of the DZGD have been set as follows:

- Establishment of forest plantations;
- Protection and rehabilitation of existing degraded natural forests;
- Development of woodfuel substitutes; and
- Development of water resources.

To fulfil the demand of wood and other forest products for the rural community in the Dry Zone, 85 498 ha of plantations have already been established. In addition, about 0.37 million ha of degraded forests and about 1.31 million ha of forests affected by shifting cultivation have been identified for conservation by the year ending 2001 (DZGD 2002-2003 Working Plan).

Forestry for local community development

Myanmar's economy is largely dependent on agriculture and forestry. In addition, forest resources also play a significant role in rural livelihoods of a large number of people. Although wood and wood products have become important international commodities during the recent years, the importance of non-timber forest products (NTFPs) has not diminished for communities dependent on them. Nowadays, forest resources have been degraded as a result of population pressure, agricultural expansion, overexploitation, environmentally harmful mismanagement and socio-economic mix factors. The assessment of the change of forest conducted in 1990 revealed that the actual forest area had decreased at an annual rate of 220 000 ha or 0.64 percent of the actual forested area during a period of 14 years from 1975 to 1989.

Due to deforestation and soil degradation, the productivity of agricultural lands declined rapidly. Therefore, the development activities in the Ayeyarwady Mangrove Delta, Southern Shan States and the Dry Zone have been initiated as Human Development Initiative projects, funded by UNDP, in collaboration with a number of related departments including Forest Department. The specific objectives are:

- To assist the poorer households in selected communities to establish productive and environmentally sustainable income earning opportunities;
- To develop efficient technology transfer programmes; and
- To provide critical agricultural inputs, and strengthening the capacities for local self reliance

These projects consist of three clusters:

- human development and humanitarian needs;
- environmental and food security; and
- income generation and micro credit.

These projects also share a common anti-poverty, people-centred and participatory orientation. The forestry sector activities are mainly concerned with restoration in the degraded dryzone ecosystems through reforestation and agroforestry. The activities aim to increase the availability of forest products, enhance short-term and long-term income opportunities and generate the natural resource capital necessary to ensure sustainable development.

FORESTRY RESEARCH IN POVERTY REDUCTION

Forest resources are increasingly being recognized as having a significant role for rural communities with a variety of products not only for subsistence but also for earning incomes. Although agriculture is the major income earning activity for the rural communities, rural households have to rely on forests in order to fulfil their social and economic needs by collecting seasonal and non-seasonal NTFPs. Thus, exploitation, storage, processing and marketing have been recognized as important means for enhancing rural employment and income generation.

However, because of overexploitation and lack of specific management strategies for NTFPs, the availability of these products are dwindling. This present situation calls for sustainability of income earning opportunities from the forest and forest-based enterprises. Keeping in line with international mainstream and National Forest Policy, the Forest Department of Myanmar has given much attention to poverty reduction by implementing participatory forest management. The Forest Department has also been trying to decentralize its management role to release these socio-economic problems of rural people and to reduce rural poverty along with environmental rehabilitation. Hence, rural development programme has been launched across the country especially in the environmentally critical areas such as the central Dry Zone, Southern Shan States and the Mangrove Delta. Most of these projects are being implemented in collaboration with UNDP, FAO and other international organizations. Meanwhile, research in areas such as community forestry, agroforestry, NTFPs and forest-based small-scale enterprises, have been conducted as an integral part of rural development programme.

Participatory forest management as a strategy for sustainable rural and forestry development has emerged, and it would have the mutual benefit for the Forest Department and the rural community. At present, 36 567 acres of community forests have been successfully established by the people's participation. Community forestry research projects are designated to address the interrelated problems of the environmental degradation and rural economy, promoting local communities as the agents and beneficiaries of the forest activities.

Research related to agroforestry practices have also been conducted within the context of Community Forestry Instruction. These agroforestry systems are strongly related to women's group activities. The research projects are targeted at small farmers and interested housewives for farmer-to-farmer extension and awareness raising of new agroforestry systems, making modifications to system design, monitoring tree planting activities.

Income generation from forest-based industry, bamboo and rattan reforestation, management techniques, efficient and sustainable utilization and extension research are being carried out in cooperation with ITTO and IPGRI. These research projects will improve the living standard of the rural poor as well as the area's devastated ecosystems and conservation of bamboo genetic resources.

In addition, research based on indigenous knowledge, utilization potential and market surveys of medicinal plants are also being widely explored to create income earning and employment opportunities for the rural communities. Collection, cultivation, and dissemination of medicinal plants related information, are also the major fields of study for rural development.

CONCLUSION

The forestry sector of Myanmar has been included as an integral part in the overall development of the nation. Population pressure, increasing rural poverty, and economically and forest resource degradation have been assessed and every endeavour is being made to solve these problems. The Ministry of Forestry has adopted appropriate policies, plans and strategies for the socio-economic benefit of the people. The challenge at present is not merely to find better ways and means for growing trees, conserving resources and harvesting them more efficiently, but also to harness our natural resources in a conservative and sustainable manner so as to provide increasing benefits for the people without causing adverse environmental and ecological impacts for the present and future generations. In such a situation, people-oriented forest activities like participatory resource management are needed. Rural development and poverty reduction can be achieved by shifting from a top-down approach to a bottom-up approach in forest management at the national and regional level. It is hoped that further cooperation and collaboration among the local institutions and relevant organizations abroad would contribute more towards further development of rural community and reduction of rural poverty.

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