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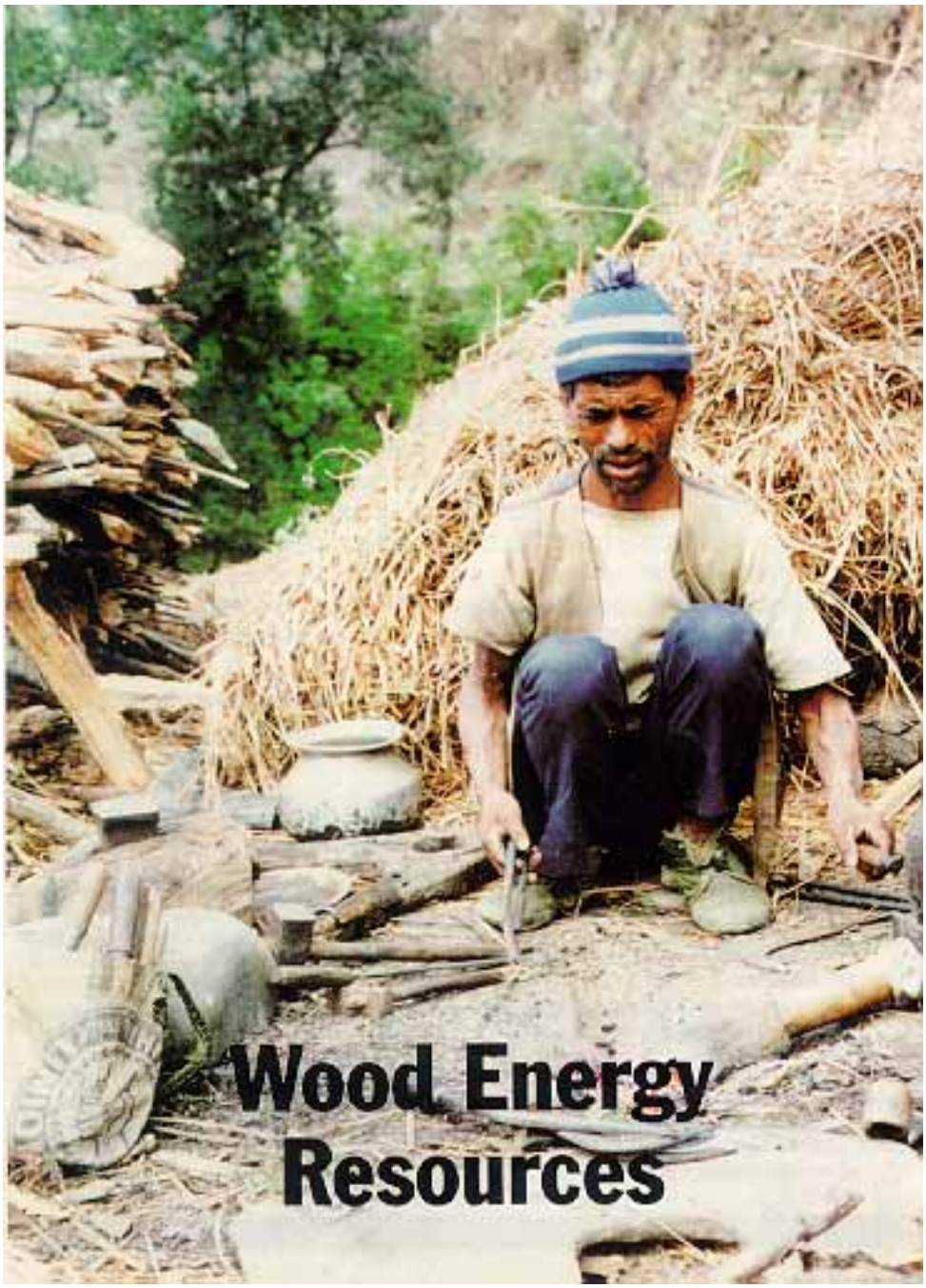

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Colophon

Project information:

The Regional Wood Energy Development Programme in Asia (RWEDP) aims to assist 15 developing countries in establishing and strengthening their capabilities to assess wood energy situations, plan wood energy development strategies and implement wood energy supply and utilisation programmes. The programme promotes the integration of wood energy in the planning and implementation of national energy and forestry programmes.

Wood Energy News:

The programme's newsletter Wood Energy News, which is published on a regular basis, addresses a wide variety of wood energy issues, such as woodfuel resources, woodfuel flows, wood energy planning and policies, wood energy technologies, etc. Its purpose is to share information on wood energy with its subscribers. Suggestions, reactions or contributions are more than welcome, and don't forget to share your own experiences.

Those wishing to obtain Wood Energy News can write to the RWEDP secretariat.

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Editorial

Even though woodfuels meet about half of the energy demand in the region, very few people grow trees for the sole purpose of burning them. Fuel is just one of the many products trees provide. Therefore, the availability of wood energy intrinsically depends on a large number of conditions and factors which are beyond the range of wood energy itself. Amongst them are local land-use patterns, production systems and markets for timber and agricultural produce, availability and value of labour, gender roles, forestry and environmental policies, etc. As about two times more woodfuels originate from farm land than from forest land, intricate linkages with local socio-economic and agricultural systems prevail. Furthermore, substantial amounts of fuels are derived from wood waste, including used construction wood.

Recent data show that the overall consumption of wood energy is still growing in all RWEDP member countries, notwithstanding economic transitions and processes of commercialisation. This raises serious questions about the future sustainability of the supply. In fact, in many areas scarcities of woodfuel are already pressing. Leaving options for demand side management apart, the short answer would be: grow more trees! Obviously, enhancement of supply is not at all an easy matter as long as woodfuels remain a largely undervalued 'by-product'. In order to address shortages we have to understand the varied resource base and the distribution patterns whereby woodfuels reach the users, all within the context of local socio-economic and environmental conditions. Many different strategies have been developed with regard to resource management and techniques for tree production systems, so as to optimise woodfuel supplies amongst other products. Some strategies have proved disappointing and others have failed miserably when they lacked popular participation; some have proved more successful under local site-specific conditions. Rarely are distributional and equity aspects adequately addressed simultaneously.

In the old days of the 'supply gap' theory the problem looked straightforward. At that time, it was simply argued that woodfuel consumption surpasses sustainable yields from natural forests and plantations under government ownership. Though the theory has served to alert foresters and environmentalists, we now know that it is wrong because of the false presumption that all woodfuels are derived from forests. We have learned that trying to protect forests against people or installing bans on woodfuel use, may be ineffective or may even have the opposite effect to that which is desired. Another rather naive approach is the one advocating the 'enormous potential' of wood and biomass energy by simply applying some multiplication factors to a hypothetical national resource base or stock level. The real future of wood energy in the region is linked to the development potential of the land and the people involved.

Front page: Eleven million tonnes of fuelwood are annually consumed in Nepal.

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Woodfuel Sources and the Poor in India

Dr. N. C. Saxena

Background

In most of the rural areas in the Third World, woodfuel is the primary source of fuel for domestic cooking. In India, between 80 and 90 per cent of the total domestic fuel consumed in rural areas is made up of fuelwood (65 per cent), agricultural wastes and animal dung (Natrajan 1985). The use of dung and agricultural waste as fuel is widespread in agriculturally prosperous regions with fertile soils and controlled irrigation. However, wood continues to be the main domestic fuel in less endowed and poorer regions. In addition to cooking, woodfuels are used for heating water, for cremations, in hotels and small eating places, and in industries such as brick-kilns and tile making. Woodfuels come from various sources, as shown in table.

Source	Details	Total fuelwood contribution in mln MT/year
Forest	Felling of Trees	19
	Lopping of twigs and branches	42
	Logging wastes	9.5
	Shrubs on degraded lands and roadsides	46
Tree planting on 17m ha during 1975–90 through social and farm forestry programmes	Tops, twigs, small branches and poles	40
Homestead gardens	Twigs and branches	16
Total		172.5

Sources of woodfuels in India, 1991 (Ravindranath and Hall, 1995).

In the past, biomass resources were virtually the only energy forms used in rural areas of India. This situation has changed significantly during the last 50 years, mainly due to three trends. The first trend involves the increasing use of modern forms of energy for productive and household activities, including irrigation pumping and lighting. The second trend is that in some areas rural people are, instead of using modern fuels, stepping down the energy ladder to make use of straw, leaves and twigs. The use of inferior fuels for cooking by rural people may have implications for their quality of life. The third trend is that the share of crop residues in the household energy consumption has declined because new agricultural crop varieties yield less husk and straw (UNDP, 1986). Moreover, only rich farmers produce sufficient crop residues. Being a private resource, the poor have little access to it, especially in the context of monetisation.

The net result of these trends is that the per capita bio-energy use has remained almost constant for the last twenty years. The poor lack the cash resources to purchase the minimum amount of kerosene or LPG, or the appliances for these fuels. They may also lack the security to keep such fuels or appliances while absent from their living quarters, so that they are forced to depend on gathering, or even purchasing more expensive small quantities of fuelwood regularly, perhaps daily, and using cheaper and less efficient cooking appliances.

Despite the fact that fuelwood shortages have both a regional and class dimension, and the degradation of forest lands has continued in many regions (although at a slower rate since 1988), fuelwood prices in India have not generally gone up after 1985 for two reasons (Saxena 1995). Firstly, farmers in the commercialised and surplus regions of India have produced a great deal of *Eucalyptus* wood, which has had to be sold as fuelwood, being surplus to the needs for poles and pulpwood. Secondly, the greatest potential for supply of fuelwood at little opportunity cost is through shrubs, such as Prosopis (*Prosopis juliflora*) and Lantana (*Lantana camara*) on degraded lands. In many semi-arid regions the natural spread of *Prosopis* shrubs provides excellent fuelwood for both consumption and sale at almost zero opportunity costs to the poor. According to a field study in five villages of Anantpur (Andhra Pradesh) 86 per cent of households met more than 75 per cent of their cooking needs from *Prosopis* alone. However, *Prosopis* and *Lantana* are not favoured species due to the presence of thorns in the case of *Prosopis* and low density in the case of *Lantana*. Yet the absence of commercial interest in these species help the poor in their access to such shrubs. These positive developments, though unconnected with government policies, still leave out a large

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proportion of the rural population for whom fuelwood is scarce. We discuss below what needs to be done to augment woodfuel supplies from the three most important sources: degraded public lands, farm lands, and forest lands.

Policy Prescriptions for Woodfuel Resources

Social Forestry

Although social forestry projects were designed to produce fuelwood, in actual practice market-oriented trees were planted which did nothing to improve the consumption of fuelwood by the poor. The main product of community and farm forestry was *Eucalyptus* poles, which could never reach the rural poor.

Should Prosopis be classified a 'low' value tree?

Another area of confusion has been as to what constitutes fuelwood species. There are two divergent perspectives. According to foresters fuelwood is obtained by felling trees having a high calorific value or as a by-product from lops and tops of timber trees. *Casuarina* and *Eucalyptus* therefore seem perfectly justified on public lands. But the poor obtain fuelwood from twigs and branches of living trees, and not by felling trees, and often get little from the felling of so-called fuelwood trees. *Casuarina* and *Eucalyptus* may be justified on farm lands, if they improve farm incomes on a sustainable basis. But these hardly serve the poor when raised on public lands.

Thus there would be a world of difference between planting *Eucalyptus* and *Prosopis Juliflora* on roadsides. *Eucalyptus* benefits urban markets and industry, whereas *Prosopis* not only solves the fuelwood problem of poor families, but also generates self employment for the poor. *Prosopis* produces double the biomass on similar soils as compared to *Eucalyptus*, and yet is considered by the Forest Department to be a 'low' value tree. It has often been described as a weed. One may recall that until the first two decades of this century bamboo was also described as a weed, till its use in the paper industry was discovered, which led to its plantation on a large scale. What is significant about *Prosopis* and other similar shrubs and low value trees is that they do not require decisions about market shares between rich and the poor. Their usufruct is not of much interest to the rich, or is only available to them through gathering by the poor, so that by default the benefits are available to the poor.

Farm and Agro-Forestry

Half of all social forestry projects have been carried out on private lands. As fuelwood was not seen as income generating, farmers preferred to plant income generating trees, and continued to collect fuelwood, mainly or exclusively twigs and branches, from public lands as before. Why would farmers be interested in using their scarce resources of land and capital to generate a product they could collect? It was unfair to load social concerns on farmers if they saw no economic returns. Actually, in the states of Punjab, Haryana, Gujarat and U.P., *Eucalyptus* glut has forced the farmers to sell their trees at fuelwood prices. As fuelwood prices are hardly remunerative, farmers have been unwilling to produce trees as a commercial product, and have stopped growing trees in the above states. Furthermore, there are restrictions on harvesting, transport and marketing of wood, while the state subsidises supplies of *Eucalyptus* to industry, thus causing market distortions. It would be ironic if *Eucalyptus* production on farm lands was discouraged due to production of more expensive *Eucalyptus* on government lands.

Whereas farm forestry in agriculturally developed regions would produce woodfuel only as a by-product, in subsistence and backward regions complementary agroforestry could not only produce fuelwood at little opportunity cost, it could also enhance agricultural production through nutrient recycling and mulch. Thus, farmers should have a range of other short-rotation, high-value species beside *Eucalyptus* and *Acacia* not only to meet their various needs, but also for spreading the risk of collapsing markets. Diversification in species will also be better from an environmental respective.

Forest Lands

Peoples' participation should be promoted on forest lands by enabling the people to have usufruct of an intermediate and definite share (say 50%) in final production. A forest patch in many cases does not have a well-defined and recognised user-group, therefore admitting rights to the entire population of that region or to the entire forest area. This kind of 'right-regime', making forests open-access lands, is not conducive to successful protection as rights of contiguous villages protecting forests may come in conflict with those of distant villages, who are not protecting the forests but still have rights to enjoy usu-

fruct. Thus, settlement and usufruct rights should be reviewed in Joint Forest Management areas (JFM) in order to put them in harmony with the 'care and share philosophy' of JFM. For low income rural families to participate, it is important that benefits start flowing as early as possible. Therefore, the objective should be to encourage such species where benefits by way of fuelwood, fruit, or twigs are available as soon as possible. Multiple objectives to maximise outputs from many products will require innovative and experimental silviculture, which must focus on the management of shrub and herb layers, and on forest floor management to enrich the soil and encourage natural regeneration. For instance, the Forest Department's present management of *Sal* (*Shorea robusta*) seems to be for timber, and hence only one shoot is allowed to grow. Since *Sal* is an excellent coppicer, degraded forests and hills close to a village should be managed under a coppice or a coppice with standard system for fuelwood and *Sal* leaves.

Summary

What policy prescriptions follow from the above analysis? Firstly, a distinction must be made between fuelwood from logs and fuelwood from twigs and branches. The former, when produced on public lands is out of the reach of the rural poor as it gets marketed, and at best helps the urban poor. The rural poor have access to twigs and branches only, which requires a labour intensive process of collection and does not attract contractors' greed. Secondly, twigs and branches are best made available to the poor through shrubs and bushes, or from lopping of large trees. Thirdly, the concept of social forestry must be extended to reserve forest lands, where usufruct based trees should be planted along with short gestation grasses, shrubs and bushes. Fourthly, traditional silvicultural practices should be modified on forest lands to yield more gatherable biomass for satisfying local needs. And fifthly, the two main components of afforestation, farm forestry and afforestation of forests and public lands, should have different objectives and approaches. Farm forestry and agroforestry should aim at maximising sustained economic returns from land, whereas public forestry should aim at maximising welfare through production of commodities such as fuelwood, fodder, and non-timber forest products needed by the poor people. Finally, the main barriers to afforestation in India are institutional, those concerning empowerment of local communities, proper land and product tenure to them, and involvement in decision making (Saxena 1995). These issues deserve urgent attention.

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Preference for Markets Over Planning[1]: The Case of Woodfuel Production, Trade and Use in Cebu Province

Ms. Elizabeth M. Remedio

In classical economics, the role of government emphasized simply the maintenance of law and order in society, collecting taxes from constituents and providing minimum social services. The economic role of governments greatly expanded with the Keynesian revolution. Governments were now tasked with the prime responsibility of maintaining full employment within the market economy using countercyclical monetary, as well as, fiscal policies. While this Western Keynesian revolution was taking place, the Soviet Union was demonstrating to the world the power of central planning to mobilize resources and accelerate industrial growth.

At the same time, colonial governments in the Third World were gradually replaced by indigenous leadership faced with these two models to guide them through the transition period. Inspired by a free-enterprise structure and philosophy from the colonial period, yet also influenced by the Soviet planning performance, most less developed countries (LDCs) adopted a system of mixed market combined with central planning. In most cases however, as we have seen, there is a relatively heavier emphasis on central coordination in all aspects of economic activity. Experience shows that there is a general agreement today that many public institutions are inefficient, too centralized, and too urban-oriented in both outlook and staffing. Some critics would even say that there is too much corruption and too little entrepreneurship and initiative. The truth is, conditions are just too huge to control, resources are just too much to manage and problems are just too complex to be hinged upon one single, centralised source of decision making.

Government interventions, particularly in the form of policies, are more often than not, ad hoc responses to unexpected crisis and recurring problems.

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Rather than a means towards the achievement of a long-term grand design of development or growth, all too often regulations and laws are too generalised and inflexible. Take the case of woodfuel production and trade in the city and province of Cebu, Philippines. As in many other developing countries, biomass energy in the form of fuelwood, charcoal and agricultural residues continue to be a primary source of cooking fuel, especially in the rural areas.

Even in the city of Cebu alone, a 1993 study (Bensel and Remedio 1993) estimated total woodfuel consumption to be 82,120 tons[2] per year with 61 per cent used by households and 39 per cent consumed by industries and institutions. It is precisely due to these large consumption figures, that misconceptions regarding the woodfuel situation prevails, especially among government offices, non-government offices and even in the academic circles of the province. They believe that deforestation in Cebu is caused by woodfuel cutting. Hence, it is feared that Cebu will soon experience severe woodfuel shortages.

The province of Cebu is generally considered to represent one of the worst cases of extreme environmental degradation in the Southeast Asian region. It has virtually no forest cover, predominantly steep terrain with a very high population density of 520 persons/km^2. Collins (1990) described the island as being on the brink of ecological collapse, a 'desert island' and an 'ecological disaster'. Thus, this widespread dependence on woodfuel and the substantial trade in woodfuel are often identified as the major cause of Cebu's environmental problems. This seeming 'crisis' situation prompted government and NGO officials to propose tighter restrictions, particularly on the commercial woodfuel trade in the province. As a result, without looking more closely into the overall woodfuel production situation and woodfuel networking/trading history, regulations in woodfuel harvest and transport are overly restrictive.

While it should be clear that there are cases of indiscriminate cutting of woodfuel resources, it is not the general pattern. Rather than the prevailing situation, irresponsible cutting is an exception and many factors (i.e. land use types, land tenure patterns, culture, socio-economic etc.) interplay to result in such abuse.

A brief description of the prevailing harvest and transport permit system will illustrate this interpretation. The current harvest and transport permit system suffers from a number of deficiencies that tend to discourage tree-planting and at the same time reduces the competitiveness of the woodfuel trade. For instance, the current regulatory system is based on the issuance of 'certificates of origin': transport permits for shipments of woodfuels which originate from planted trees and shrubs grown on titled lands (instead of those grown naturally). Because the issuance of permits is largely based on evidence of land title, it excludes immediately untitled or tenant farmers from obtaining them. Many farmers are also discouraged from entering into the woodfuel production and trade due to the time and money needed in processing and securing these permits. Finally, the current permit-securing practice oftentimes dampens part-time traders or smallholders who wish to transport their own wares since it is much easier for full-time operators to acquire permits under the current system.

The commercial woodfuel trade in Cebu, on the other hand, is not inefficient or uncompetitive. It is mostly an informal sector economic activity. Existing practices and arrangements between traders, woodcutters, charcoal-makers, landowners, vehicle owners and consumers represent decades of market development, intelligence and competition. As early as the 1920's Wiersum (1982) reported that a thriving commercial trade in woodfuels had already begun in the urban areas of the province. Today, it is estimated that around 35,000 rural households derive some cash income from the sale of fuelwood and charcoal. Another 5,000 earn income as rural and urban traders, transporters and helpers in the trade. After accounting for the share of the trade accruing to traders, transporters and landowners, the fuelwood-cutters and charcoal makers still receive around US$ 4.8 million/year, with the average family earning between US$ 120-160 per year (Bensel 1994).

A recently completed study entitled 'Patterns of Commercial Wood Fuel Supply, Distribution and Use in the City and Province of Cebu, Philippines' by Bensel and Remedio (1993) gives a more comprehensive elaboration and explanation of the overall woodfuel production, harvest and trade situation in Cebu. The point to stress here is that official regulation of woodfuel harvest and transport in Cebu is overly restrictive resulting in disincentives for landowners and smallholders to undertake more widespread tree-planting and tree farm management. Moreover, most policy makers have failed to recognise the important link between woodfuel and woodfuel markets and the impact it has on tree planting and management decisions. Some rethinking is thus necessary to improve the current policies with regard to woodfuel production, harvest, transport and trade. Only then will wood energy production be attractive.

The experiences of developing countries in promoting and dealing with government interventions raises a number of issues. Firstly, government planning tend to be more rigid and inflexible than private decision making due to the existence of complex governmental decision-making machinery. Secondly, organisations and individuals require incentives to work, innovate, control costs and allocate efficiently, and the rewards of the market cannot easily be replicated within public enterprises and organisations. Public enterprises tend to be more inefficient and wasteful. More importantly, individuals may know more about their own preferences and circumstances than the government.

For the decades to come, whether we like it or not, governments in developing countries must continue to play an active role and assume heavy responsibility for the future well-being of their countries. Governments should play an active role in institutional and structural reforms and should assume the major responsibility for forging the direction and for the management of these econo-

mies. These countries will have to struggle for greater economic growth and development as they face intense global competition with the rest of the global community. They must also continue to deal with the problems of poverty, debt, inequality, population, environment and industrialisation. Such is the extremely challenging task of public intervention.

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Notes:

[1] The term planning here refers to extensive government intervention.

[2] This estimate excludes other metropolitan areas and cities of Cebu. Likewise, this total consumption figure of 82,120 tonnes may be translated into an imputed cost or local savings per year of approximately 500,000 BOE or using P1992 FX rate, an amount of US$ 9 million.

An Overview of Woodfuels Supply and Management Status in Nepal

Dr. G.R. Bhatta & Mr. D.L. Shrestha

Background

Since time immemorial, woodfuels have been the main source of energy for a variety of applications, specifically in the domestic sector. Traditional fuels such as woodfuels (branches, twigs, bark, split wood, logs, etc.), agricultural residue and animal waste are the only easily available and relatively cheap indigenous energy resource for almost all rural people in Nepal. Other energy resources are less available due to lack of a commercial fuel distribution network, absence of fossil fuels and socio-economic constraints. Approximately 11 million tonnes of fuelwood are annually consumed for different applications in Nepal, while more than 70% of the total energy demand is supplied by fuelwood. This situation will remain the same for many years to come. The share of biomass fuels (fuelwood, agri-residue, animal waste) in overall national energy consumption (271 million GJ) was estimated to be 91% in 1992/93. The share of woodfuels and other biomass accounted for 67.9% and 22.3% respectively. The residential sector is the major biomass energy consumption sector (97.6%) where fuelwood, agricultural residue, and animal waste account for 72.4%, 16.2% and 8.9% respectively. Besides the domestic sector, many agro-based and forest based rural industries are also heavily dependent upon woodfuel energy systems. The current overwhelming demand for woodfuels is met through over exploitation of existing natural forests. However, most of the accessible forests are being progressively converted into degraded forests and in some districts they have already been depleted.

Physiographic Region	Cultivated Land	Non-Cultivated Inclusion	Grass Land	Forested Land	Shrub Land	Other Land	Total	Estimated Forested + Shrub Land in 94/95
High Himal	7.8	1.9	884.2	155.2	66.6	2233.9	3349.6	182.4
High mountain	244.4	147.2	509.9	1631.5	181.3	244.7	2959	1398.8
Mid mountain	1222.5	665.4	292.6	1794.1	409.3	60.6	4444.5	1748.2
Siwaliks	258.8	55.3	20.7	1444.7	31.3	74.3	1885.1	1109.4
Terai	1234.6	117.1	49.7	591.3	1.4	116.1	2110.2	442.7
Total	2968.1	986.9	1757.1	5616.8	689.9	2729.6	14748.4	4881.5
Per cent	20.1	6.7	11.9	38.1	4.7	18.5	100	33.1

Land use in Nepal by Physiographic Region (1978-79). (in 1000 ha)

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Source of Woodfuels

The major source of fuelwood in Nepal is the country's forests. This extremely dependable resource is deteriorating at

a very alarming rate due to the overwhelming energy demand of households and other applications coupled with a growing population. It has been estimated that Nepal had about 6.7 million hectares of forests and shrub land coverage in 1964, which has declined to 5.9 million hectares in 1993/94, or 36.8% of its land surface. Over exploitation of forests is resulting in crown coverage losses of 2% per annum. In addition, forest land is also depleting at the rate of 0.4% due to illegal encroachment, resettlement, and expansion of agricultural land. In conclusion, deforestation is not only caused by woodfuels supply; resettlement programmes, extension of farm land, timber extraction and many industrial uses have also made a significant contribution to this phenomenon.

Again, these resources are not homogeneously distributed to the consumption centres. Districts situated in the middle mountain region have enough resources in comparison to the Terai districts and the Siwaliks area. Due to the diverse topography and the inaccessibility of resources to many settlements, available resources can not be fully utilised. In hills and mountain regions, only forests, non-cultivated inclusions, and shrub and grass land situated at a horizontal distance of 4 km from farms, are assumed to be accessible for fuelwood supply. But in reality, rural people are compelled to collect fuelwood from the existing forests situated at a horizontal distance of more than 6 km from the farms.

Woodfuel Supply Status

Fuelwood supply in Nepal is mainly based upon accessible government forests comprising shrub and grass lands and non-cultivated inclusions that are either forested shrub, or grass land situated in the vicinity of farm lands. A considerable amount of woodfuels come also from agricultural fields, private trees and wood lots, community forests and forest based industries as industrial waste. The supply situation of fuelwood is characterised by a widening gap between sustainable supply and demand over the past decades. The National Energy Balance has indicated that about 4.3 million tonnes of fuelwood are supplied by over exploitation of natural forests to meet the current total energy demand. The estimated area of forest and shrub land is currently 3 million hectares. For the country as a whole, 18% of total fuelwood requirement is supplied from the farms, while the remaining 82% comes from somewhere else. Two years ago, sustainable fuelwood supply from accessible forests, shrub and grass land was estimated to be around 5.0 million tonnes, 0.35 million tonnes from farm land, and 2.1 million tonnes from non-cultivated inclusions. These supply figures indicate that around 65% of Nepal's total woodfuel requirement is sustainable.

Wood and other biomass fuels come from various places.

Recently, the fuelwood requirements of the urban areas have been supplied from forests situated at a distance of more than 400 km (e.g. fuelwood supplied to Kathmandu Valley from the far west of Nepal). Transportation of fuelwood requires imported commercial fuels. Such transported fuelwood has more than 60% moisture content on an oven dry weight base, which indicates that in the energy content scenario a lot of foreign currency has been unnecessarily drained. However, in most rural hills fuelwood supply has been non-monetised and readily available in apparently unrestricted quantities in close proximity to the consumption point. It is perceived by most of the rural population as a free good with no direct cost except for the time and effort to collect it.

Management of Woodfuels Supply

Prior to 1957, vast tracts of forests growing in private land were protected and managed by the people to meet their fuelwood, fodder and timber needs. However, the nationalisation of forests in 1957 resulted in the immediate and indescriminate felling of trees in private lands as owners sought to secure benefits before losing land ownership. Thus, instead of protecting and utilising the resource in a proper way, large forest areas were depleted due to the negative impact of the nationalisation policy. During the mid 1970s, the government realised the need for people's participation in the protection and management of forests. A new National Forestry Plan recommending the involvement of local communities in forest management was implemented in 1977 to conserve and properly utilise Nepal's resources. In 1980, under the Panchayat Forest and Protected Forest Rules, which were formulated in 1978, a limited area of government forests adjacent to the users, was handed over to local communities for management and protection for sustainable use. In 1988, a long-term Forestry Master Plan was also implemented to develop forest resources in addition to fuelwood supply management.

Traditionally, fuelwood marketing has been carried out in many urban areas by

head loaders with wood from illicitly felled trees. In addition to this, a number of private depots and dealers have been involved in fuelwood marketing. In the past, the Fuelwood Corporation was involved in fuelwood marketing with a number of depots in different urban centres. The Fuelwood Corporation, which used to be under the Ministry of Forests, was placed under the responsibility of the Ministry of Supply in 1987 and amalgamated with the Timber Corporation of Nepal in 1989. The Department of Forests had no incentive to allocate permits for felling trees to the Timber Corporation. So, by indirect administrative fiat, the urban fuelwood marketing and supply system was de facto almost completely privatised.

Despite government organisations such as District Forest Offices, the Forest Development Board and the Community Forestry Division, fuelwood supply in rural areas with fuelwood scarcity is also managed by users' groups through community forest areas and leasehold forests. Under the Community Forest Programme, one of a number of programmes for ensuring sustainable wood fuel supply, scattered patches of natural forest are being handed over to local communities for overall management by users' groups with nominal technical support from District Forest Offices.

Development Constraints

The proper management and development of Wood energy in Nepal faces a number of constraints. The main identified constraints are socioeconomic, institutional and technical. Other problems include the limited funds available to the forestry sector, inefficient use of wood residues, lack of planning capabilities and ineffective policies to stimulate proper forest management practices.

Recommendations

Based on the constraints identified above, the following measures seem appropriate to stimulate woodfuel development in Nepal.

- Supplies of woodfuels should be increased by intensive management of all accessible natural forests and by planting trees on open grass land and uncultivated land adjacent to farms. In addition to this, existing natural forest should be fully supported with adequate scientific measures and management practices;

- There is a need for strong political commitment to forest based energy programme and careful evaluation of energy policies;

- Cooperation between relevant institutions involved in wood based energy development should be strengthened;

- Community forestry and agro-forestry programmes should be intensively enhanced by strict supervision by the District Forest Officel;

- More attention should be given to conservation programmes to slow down forest depletion possibly through establishment of rural community and farm wood lots, and the introduction of efficient-combustion technology. Use of other viable energy resources should be promoted specifically for urban households through energy pricing mechanisms;

- Adequate funds should be injected into wood based energy development programmes;

- Finally, the awareness of people regarding the need to conserve forest resources should be increased by means of mass media.

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Wood Energy Supply

Mr. Tara N. Bhattarai

Introduction

Biomass of different kinds, both woody and non-woody, derived from plants and animals, is the most commonly used and the most reliable source of energy among a majority of the rural population in the developing countries. Firewood derived from tree stems, branches and stumps is the commonly preferred traditional fuel among the different types of biomass that can be used for fuel. Most better-off households and those who have access to production sources prefer woodfuel for domestic uses such as cooking and space heating. It is estimated that 30-80% of all energy needs in Asia is met through woodfuels. Studies conducted

so far indicate that only a limited segment of the users purchase woodfuel in the market, others may either hire paid labour for free collection or harvest at the source, therefore contributing significantly to rural incomes. These sources are mostly natural forests, and/or trees grown in public, community or private lands. Many poor people in large urban centres also collect woodfuel from free collection sources for their own use. For these people biomass residues of different kinds (mostly crop and animals residues), or the commonly perceived inferior fuels are the main sources of energy. Of particular importance as additional supply sources, both for household use as well as for industrial commercial activities in rural areas are: (a) fallen leaves/needles, twigs, and branches of standing trees; (b) left over wood and branches after the commercial harvesting of forests; (c) crop residue of different kinds, including stalks, straw, husk, shell and cobs; (d) grasses; (e) animal dung; (f) industrial residues in the form of saw dust, offcuts, bagasse, coconut fonds; and (g) discarded waste wood from different sources (e.g. old furniture, recovered wood from old construction, drift wood, etc.). Some rural agro-processing industries meet their fuel requirement by using the residue they generate themselves (e.g. sugar mills, rice mills, palm and coconut oil mills), others may use the firewood derived during the process of replacing fruit orchards, and non-industrial plantations (rubber, coconut, etc.).

Users' preferences among various biomass fuels, including woody and non-woody types, depend largely on the economic status of the user's household as well as on the availability of, and accessibility to the supply sources. Given a choice, woodfuel (firewood and charcoal) seems to dominate over other non-woody biomass, as woodfuel is placed higher up in the 'energy-economy ladder' compared to other biomass substitutes. Therefore, most households would not like to use other biomass for fuel as long as woodfuel is easily available and affordable. Affordability may be defined in terms of time required for self-collection of firewood or for collection through hired labour.

Many recent studies designed to learn more about the household level energy use and mix patterns in member countries, have revealed important information on different aspects of woodfuel production, flow and utilisation, and wood energy systems. Some of these studies covered only the rural areas, while others covered important urban centres as well. Still, very little is known at the micro level, except for a few countries where detailed 'Household Energy Strategy Studies (HESS)', 'Rural and Household Energy Issues and Options' studies or 'Urban Household Energy Strategy Studies' have been carried out by the World Bank through the 'Energy Sector Management Assistance Programme (ESMAP)' and the United Nations Development Programme (UNDP). In some countries, RWEDP has supported some area specific studies to understand the mechanics of their woodfuel systems. Most of these studies were carried out during the early 1990s. But for many other countries, no information is yet available to explain the wood energy systems. Information on the role of women in wood energy systems is still limited or unknown for most countries. Similarly, the potential impact of woodfuel production enhancement programmes on gender, which invariably require additional workforce for natural forest management/reforestation, and enhanced woodfuel supply may also initiate new economic activities in addition to the traditional gender specific responsibility in rural areas demanding additional time and labour in unequal proportion from different sex/age groups. This aspect of development has not been adequately assessed in energy/forestry sector planning in the past.

For the countries where this basic information is available from previous studies, no mechanism is in place to systematically update the data, which is essential for the periodic revision of policy and resource allocation. Despite the fact that the share of traditional fuels in energy consumption is declining in most developing countries over the years, in absolute terms the amount of woodfuel used is not and will not be decreasing in rural areas due to population growth and lack of alternatives. The high share of woodfuel in total roundwood production in Asia is a clear manifestation of the high consumption of wood for energy. Among the seven South Asian member countries, the share of woodfuel is between 83% in Bhutan and 97% in Bangladesh. Among the Southeast Asian members, the share lies between 17% in Malaysia and 93% in Laos.

Furthermore, the declining share of traditional sources in total energy consumption needs to be interpreted carefully. It is primarily due to a rapid growth in energy use associated with the import of commercial energy intensive

A considerable amount of fuelwood comes from trees on road sides.

modern technologies, and partly due to the improvement in living conditions of the urban population associated with the continuing upliftment of the national economy in most countries. Whatever may be the reason, total energy consumption in virtually all countries is increasing and is met mostly through commercial fuels. But this process will not replace the use of traditional energy completely within the foreseeable future. Population growth, limited income opportunity, underemployment, and non-availability of cash to purchase commercial substitutes, which are typical constraints of the subsistence economy, compel the rural majority to use biomass for fuel. None of the recently conducted studies indicate any reduction in traditional energy consumption in absolute terms. Inadequate infrastructure, limited transportation, and discouragement of imported fuel use by national policy, force people to continue using traditional fuels, even to maintain their present type of socio-economic activities a minimum subsistence requirement. Thus woodfuel will remain important, even if most energy planners of today do not contemplate the long-term use of traditional energy. Most of them disqualify wood energy from the list of so called 'modern' commercial energy sources which they opt to develop. If the energy production potential of biomass, which is also a renewable source under proper management, is properly utilized, it can be converted into commercial forms (through gasification, thermal-power generation, etc.). In the future woodfuel is therefore likely to play a much greater role in the production of 'clean' and 'environmentally friendly' energy. This process has already been initiated in some rich countries of the developed world where woody-biomass is being purposely grown to produce commercial energy with new investment channelled for its development.

Wood Energy Supply Sources

Public forests of different kinds have traditionally been the main source of woodfuel supply. With the rapid growth in population, lands under public forests have been, and still are, illegally encroached or purposely cleared under government sponsored agricultural expansion schemes. Many existing natural forests have been over exploited without adequate consideration of their sustained yield potential, not to mention sustainable utilisation and management of the ecosystem. This common scenario of an 'open access' management regime of public forests in the name of allowing free collection of basic needs to the people, without allowing their active participation in planning, management and benefit sharing in the past, has virtually depleted the forests within the accessible distance of major population centres. As a result, shortages in fuelwood supply are increasingly felt. People are forced to create and/or use alternative supply sources through reforestation/afforestation in degraded government owned forests or grass lands, through incorporating trees into the production system in privately owned lands, or through substituting woodfuel with other inferior biomass (e.g. animal and crop residues) and other commercial fuels (e.g. coal, kerosine, LPG, electricity, etc.), depending largely on their availability, accessibility, and affordability. In the process of energy transformation, the economy of a country as well as the socio-economic status of its population, both play a critical role in dictating which alternative will be the most feasible option for the short-, medium-, or long-term supply enhancement. No single and easy solution being applicable to all situations can be found.

In localities where woodfuel is a traded item, where people are willing to pay the price by grade/quality of woodfuel, where market price is always higher than the cost of its production, new supply sources can be developed over and above the traditional supply sources. Private sector participation in woodfuel production could then compliment the supply from the government sector. The success of agro- and farm-forestry in private lands, and the block plantations in community/government lands under different labels of social or community forestry schemes in the region is a clear manifestation of this new possibility. Of course, the principal users of additional wood produced under these schemes so far have been the woodbased/construction industries. The reason is quite simple. The price they offered to procure the needed raw materials has been the best and most competitive in the market in most cases. What remains available for the people is mostly the leftover wood. And out of this leftover wood too, some portion is sold in the market as woodfuel for the better-offs and industries who are willing to pay for woodfuel. Only that which can not be sold in the market (mostly the leaves, twigs and roots of a tree) will be available as fuel to the poor for free collection.

To the poor and marginal farmers it is the non-woody biomass which is becoming a more important source of fuel to overcome the problem of woodfuel supply shortages due to forest depletion, and deforestation. But to others who can still afford it, woodfuel is the preferred fuel for domestic use. They can obtain it from government owned natural forests and/or plantations, community forests, degraded government forest managed jointly with the local forest user groups, private forests, trees grown in private or leased lands, or from trees along roads, canals or railway lines. In most cases, the rich people living in medium sized towns seem to be the ones paying higher prices for woodfuels in terms of money spent for household energy compared to their counterparts in big cities and large urban centres where other commercial fuels are easily available. In contrast, most people in rural areas seem to collect woodfuel at the source, mostly for free. But where woodfuel is already scarce, they seem to be the ones most affected and satisfy their fuel requirement by using whatever substitutes are easily available, quality to them is immaterial. When this is the case, it will not be easy to clearly identify the supply sources for household level woodfuel supply.

Many studies in the past tried to look into the demand aspects of the wood energy systems, rather than the supply aspects. Methods used for projecting firewood demand/supply relied mostly on the 'gap theory'. It looked into the total sustainable supply or yield from all existing resource bases (primarily natural forests under government ownership). The important variables taken

into account to present a demand/supply scenario at a certain point in time included the total population, average woodfuel requirement of population at certain pre-determined per capita consumption level, total area of the resources, average allowable cut/ harvestable yield of wood per unit of area per year, share of woodfuel in total wood production/harvest, and the rate of population growth. This method tends to ignore the development potential of the land and the changes over time in the behaviour and attitude of the people who invariably try to maximise their benefits from any new opportunities which arise. The existence of trees on private lands, mixed with the seasonal agricultural crops, sometimes but not always in separate blocks, is a prime example of the type of need/market induced development strategies people have traditionally adopted in relation to the farming system. With the new thrust of market oriented production, the integration of trees into the farming system (in pure blocks or as agroforestry plantations) has become a fast developing economic strategy of private land management. Such strategies along with successful joint forest and plantation management programs undertaken by local forest users' groups, explain the dynamics of changes and the new potentials which can be capitalized on for woodfuel production enhancement.

Currently, the supply of woodfuel from non-forest sources ranges from 90% in Pakistan to 87%, 85%, 75%, 75%, 50%, 44-74%, and 34% in Bangladesh, Philippines, Sri Lanka, Vietnam, Thailand, India and Nepal, respectively, (data for other member countries are not available. However, the average for all RWEDP member countries will not be less than 40%). This important source of woodfuel production is often completely ignored or underestimated by most foresters. Foresters' ignorance may even cause them to exaggerate the magnitude of the pressure of woodfuel collection on government forests, which they could use as a shield. At the other extreme, they probably have no knowledge of the role and contribution of non-forest lands in woodfuel production, which is under the control of the private sector and where most activities

Allelopathy[1]: Farmers may know more about it than the experts!

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No matter who is advocating the adoption of one new technology or another, farmers have followed their own traditional beliefs and experiences related to species selection for planting in private lands, whether for subsistence or for the market. The traditional cropping systems, developed mostly through 'trial and error' methods to match the socio-economic requirements of the people at different times, have led to the development and adoption of specific sets of crop-mix patterns suitable for a particular agro-ecological zone. Various models of crop-mix patterns can be observed globally to match specific situations, but without much variation under similar agro-ecological conditions.

One reason why farmers do not easily adopt a new technology into the farming systems until they become confident of the benefits of the new intervention (e.g. enhanced crop yields and/or added contribution to satisfying basic needs) is the uncertainty and risk associated with it. The same can be said of farmers' general reluctance to integrate trees with paddy and other cash crops raised in high valued irrigated fields, despite the fact that the integration of trees into the farming system may increase farmers' income, enhance production, supply multiple products, increase frequency of benefit flows, and reduce the risk of crop failure.

Most farmers in the developing parts of the world are resisting efforts to persuade them to replace their on-going traditional low yielding farming practices, considering them safe and non-risky. In their perception, integration of multipurpose trees in irrigated fields suitable for high value crops like paddy, wheat, etc. is not acceptable since it has a shading effect on the main crops, reduces yield, and provides shelter for birds and pests which destroys crops. With the identification of suitable fast growing commercial tree species shedding leaves during the peak agricultural crop growing season, it has now become possible to introduce new agroforestry practices and gain economic returns per unit of land. This has also contributed to woodfuel production. However, the issue of 'shade effect' of trees on agricultural crops is still a main stumbling block as many farmers still do not accept agroforestry as a superior system of irrigated land management. Their conviction may have scientific bearing too, as allelochemicals are reported to be present in all plant tissues, including leaves, flowers, fruits, stems, roots, rhizomes, and seeds.

Information on the nature of active chemicals and their mode of action is still lacking. More studies are needed on these aspects of agroforestry. According to P.K.R. Nair of the University of Florida, the priority should be on screening the commonly used plants in agroforestry systems for their allelopathic interaction for it may not be feasible to explore the details of the mechanisms involved in each case.

Perhaps, the farmers knew about this type of interaction well before anybody else!

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[1] *Allelopathy is the growth inhibition of one plant due to chemical compounds that are released into the soil from neighbouring plants. Farmers commonly refer to this principle as the 'shade effect'.*

take place at the level of individual households. Part of the reason for this ignorance is that there is no established system of monitoring woodfuel production and trade. If such ignorance did not prevail it would have been unnecessary to adopt the restrictive measures which are universally applied in RWEDP member countries and which either totally ban the ownership/private use of certain tree species and/or restrict the harvest, transportation/movement, and trade in wood and related products, even if such products are raised in private lands.

The energy sector, on the other hand, may not consider it worth while to integrate wood energy into its planning system. In reality, however, most countries in Asia meet more than 50 per cent of their household energy requirement through wood energy. They must therefore recognise woodfuel as an important source for meeting their country's energy demand and development needs, and not simply as a marginal source in the total supply.

Issue of Supply Enhancement

The new development programmes in the forestry sector, e.g. Forestry Sector Master Plans (MPs), Tropical Forestry Action Plans (TFAPs), and the more recent National Forestry Action Plans (NFAPs) after the Rio Earth Summit of 1992, all recognize the depleting condition of natural forests due to deforestation and over use. They all call for the initiation of sustainable management of the remaining natural forests and man-made plantations. To protect the fragile ecosystems and to meet the basic needs of the local people, they recommend an enormous expansion in the rate of tree plantation, in which participation of the local forest users' group or community or the private sector is considered a prerequisite.

To overcome the woodfuel shortages, most plans recommend a three pronged approach: (a) demand management through the introduction of technology to increase woodfuel use efficiency (e.g. improved cook stove); (b) supply enhancement through improved distribution systems and increased production (e.g. management of natural forest, new reforestation/afforestation, private planting, etc.); (c) development of alternatives (e.g. commercial utilisation of wood-waste for energy by densification or cogeneration, development and promotion of non-conventional/renewable energy use, etc.). But cost consideration appear not to have been adequately addressed. Will it be economic to raise large-scale fast growing plantations purely from the point of view of woodfuel production? If feasible, under what condition(s)? These are the basic issues one has to consider and carefully analyse while identifying the potential sources for woodfuel production, and for the woodfuel supply enhancement strategy. All these issues could be influenced by various factors: (a) land ownership and tree tenure; (b) legislation, rules and regulations governing the movement, transportation and trade of woodfuel (produced by local communities or the private sector); (c) rules and regulations governing land use and land-holding ceiling; (d) credit and support services for wood energy development and tree planting; (e) marketing and market related information; and (f) incentives, subsidies and cross subsidies. These factors have implications for the existing policies, legislation, rules and regulations of many interrelated sectors besides the forestry sector.

From these points of view and from the extent and development potential of existing resource bases, the supply potential of woodfuel could vary greatly from one place to another. If one tries to distinguish woodfuel into high, medium, and low grade/value products, which applies not only between the woodfuel produced from different tree species but also within a single tree species according to the distinct preferences of users, one largely depends upon considerations of the density, calorific value, moisture content in the wood, etc. Furthermore, from whose demand point of view is one trying to identify the supply sources and at what cost? These are also important issues one has to consider while planning for woodfuel production enhancement and identifying potential sites for woodfuel production between competitive land use/production systems.

In some places in Indonesia having high population figures and an acute shortage of land, trees are grown along field boundaries and irrigation channels and not on paddy lands (photo: APAN).

Strategy for Supply Enhancement

In today's competitive world, whatever cannot be sold cannot be raised and whatever has a potential of attracting a high price will be raised/grown/produced mostly by farmers and investors from the private sector, even if there is a risk of over supply.

As long as energy planners and policy makers favour commercial energy development, guided by their misperception about woodfuel as a 'dirty energy', commercial production of woodfuel in large scale plantations will remain underdeveloped, despite the fact that woodfuel can be converted into commercial forms of energy or the so called 'modern energy' through gasification or electricity generation. Enhancement of supply in rural areas, where woodfuel is not a traded item yet, will be more difficult without integrating it with other land based production systems (e.g. high value tree-based cash crops, fruit orchards, etc.) in which wood fuel becomes only a by-product of the multipurpose production objectives of the particular farming system. In areas where the commercial trade of woodfuel is possible, private sector investment in woodfuel production should be promoted by clearing obstacles created by policy, legislation, institutions, cross sectoral implications, etc. and by supporting the 'free flow' or uninterrupted movement and trade of woodfuel from the producers to the users. The government's priority should lie not so much with imposing controls or restrictive measures, but with promoting the identification of new support services, incentives, etc. Indeed, the government should initiate large scale farms, blocks, strips or agroforestry development schemes under a separate programme package outside the influence of social forestry programmes, and provide the needed support for its further development.

Where woodfuel is mostly collected for subsistence purposes and no prospect exists for commercialisation yet, collaborative approaches in the form of social/community forestry and joint forest management should be the strategy. In this way local participants can satisfy their basic needs while the government can ensure the protection of the forest and ecosystem.

Conclusion

A thorough understanding of the issues discussed above plus the elimination of misconceptions about wood energy among energy planners is a must for a comprehensive and integrated development of the energy sector, without which the energy needs of the household (both rural and urban households), rural industrial and commercial sectors in member countries will be difficult to meet. Such an integrated strategy may also partly reduce the imbalance in foreign trade and payments due to a reduced reliance on imported commercial fuels. The other benefits of renewable woodfuel use would be to help preserve the environment and reduce gaseous emission into the atmosphere and to generate income and employment to the poor and landless. This latter benefit may also contribute to reducing gender inequality in rural areas.

The issue of reliable estimation of the ratio of traditional versus commercial fuel in total energy consumption still remains, in virtually all member countries. Though most studies show a declining share of traditional energy due to rapid expansion in commercial energy demand form the transport and industry sectors, no standard system exists yet for the collection, storage, retrieval, and analysis of wood energy related data. The estimate presented so far in terms of demand/supply of wood energy at the national level for most countries is a gross estimate only. In no case can these data represent the true picture of any local situation, either in terms of demand or in terms of supply sources because these factors vary significantly from one area to another for a variety of reasons. Without any provision for periodic collection and updating of data, related to both supply and demand aspects of wood energy, it will be difficult, if not impossible, to show changing patterns in energy consumption and mix or to design the type of supply enhancement strategy and programme that may have to be pursued to meet the rural energy supply gap - a key element of energy sector planning.

The Non-Forest Woodfuel Resources of Sri Lanka

Dr. Anoja Wickramasinghe

Introduction

Woodfuel is primarily used for ensuring human survival. Since time immemorial it has been obtained freely from natural vegetation systems. The common sources have been freely shared by users without obligations. With the growth of population and the acquisition of forest lands for other uses people have had to rely on non-forest woodfuel sources. This is due to the fast depletion of natural supply sources, the expansion of agriculture and other land-based activities and strict legislation introduced with the objective of inhibiting free use of natural forests. The increasing demand for domestic consumption as well as wood energy based industries has contributed to this situation as well.

In Sri Lanka, the area under forests has been reduced to 24% in 1992, confined mostly in isolated islands. The crucial problem in Sri Lanka is not the extent of land area under trees/woody perennials, but the imbalance between the supply and demand, as well as disparities in the distribution of 'hot-spots' in produc-

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tion and 'sinks' in consumption. The scarcity has been felt by some end users more crucially than others due to pressure and competition on supply sources, as well as due to their lack of resources.

The whole scenario of fuelwood production and consumption is complex. The link between the growth of population and the national consumption has been postulated on the basis of per capita consumption and biomass fuel production figures. A similar connection has been made between deforestation and population growth. Increasing population, particularly in the agrarian economic context of the country has meant the acquisition of more land to produce crops and increased pressure on land for subsistence. The two interrelated factors affecting the wood energy scenario of the country include the heavy dependence of people on agriculture, in which nearly 48% of the people are engaged, and the concentration of about 76% of the population in the rural areas. A crucial question is to what extent the rural concentrated population is able to cater for the country's woodfuel needs out of the lands that they use for agriculture and settlements.

Woodfuel Sources

The share of energy consumption includes 66% of bio-energy. The household sector is the biggest consumer absorbing nearly 61% of the total energy in 1992. Woodfuel practically encompasses woody and non-woody biomass such as barks, twigs, roots, crop residues, shells etc. that are derived from vegetation and converted into energy. The end users' consumption of these depends on availability and access to supply sources; enduses; competition or pressure on supply sources; socio-economic considerations, etc.

The sources of bio-energy supply have been categorised (see table). Comparing the share derived from these sources has led to the conclusion that non-forest sources play a dominant role. The share of woodfuel derived from homegardens, coconut and rubber plantations, and croplands alone come to about 71% of the total supply. These supply sources

Source	Percentage share
Homegarden	26
Cropland	19
Coconut	19
Rubber	7
Processing residues	3
Natural forest	7
Forest plantation	4
Others	14

The sources of bio-energy supply (FSMP, 1995).

are highly area specific and closely linked with the non-forest landuse patterns. The overall picture discloses that 71% of the country's energy requirements and over 94% of domestic energy are obtained from non-forest sources, so forests are primarily the commercial sources. Nearly 75% of the requirements (or about 5.6 million tonnes) were obtained from non-forest sources in 1986. Among non-forest sources, homegardens play a major role.

Production and Consumption of Woodfuel

The depletion of sources of supply, increasing pressure on the remaining sources, land fragmentation, and problems of getting access to sources indicate that their are serious difficulties in meeting the need for fuelwood in some areas, and a number of experts have predicted a serious fuelwood crisis in the not too distant future. The real situation of the country cannot be generalized by masking the serious problems faced in some areas by some groups, primarily the poor. So, restoring the balance between production and consumption, is in fact a prerequisite to introduce strategies to relieve the woodfuel situation of the poor. The most important results of fuelwood scarcities are the increased cost of resources, increased time used for collection, increased amount of energy expended for collection and changes in production work. What is important to examine is how surplus production and deficits occur in real terms, due to the unequal distribution of non-forest supply sources. Forest depletion has caused villagers to seek to satisfy their need for fuel from homegardens, hedges and fences, farmlands and also common and reserve lands located within villages. Even in rural areas it is the better off communities owning large plots of homegardens and farmlands that have the least problems. So the problem is not the insufficiency of bio-energy itself, but the insufficiency of production and supply sources that are within the reach of the end users.

For the majority living below the poverty line or having irregular and unreliable earnings, adoption of costly fuel substitutes is not possible. Often the cost of energy for cooking is not a part of the household budget. So, every effort is made to procure it from non-forest sources and the deficit is met with residues (e.g. coconut leaves, fronds, husks, shells). It is important to note that inferior quality woodfuel is increasingly being used in rural industries and the domestic sector (i.e. Gliricidia sticks, coconut husks, industrial waste wood). Where most of the woodfuel derived from tree stems is absorbed by rural industries, the quality of woodfuel available for domestic uses becomes poorer. This also implies that in such situations, the market share of non-forest produced woodfuel increases to meet the fuel requirement of rural industries besides having a prominent role in satisfying domestic requirements.

Multipurpose Land Management Systems

The multipurpose land management systems outside the jurisdiction of forestry departments and primarily meant and managed for non-wood products, are the main source of woodfuel in the country. These include cash crop tree plantations; homegarden hedges and vegetative fences; scattered trees on small-sized croplands, narrow strips of reserve lands with trees and shrubs, etc. Forest plantations cover about 66,500 hectares, but comprise primarily exotic fast growing tree species. The use of plantation raised fuelwood is negligible. The bulk of the plantations consists of *Pinus, Tectona grandis, Eucalyptus, Acacia spp.*, etc. being commercial species which do not contribute to woodfuel production as such. The natural forests on the other hand are only a rare source as far as woodfuel production is concerned.

So far, all four elements of the social forestry programme introduced in the early 1980s to cater to the woodfuel needs of the villagers (the farmers' woodlots, the community woodlots, the demonstration woodlots, and the block fuelwood plantations), have not been harvested, neither have they contributed to the target beneficiaries. This means that the production systems managed for non-wood products are the major sources that cater to the woodfuel needs of the majority. The product of the final harvest of these trees is invariably turned into timber. These non-forest production systems have been exclusively promoted and managed by people. This includes the agricultural systems dominated by coconut, rubber and tea plantations and the multipurpose land management systems of agroforestry type, homegardens, trees used for boundary demarcation, around irrigation tanks, drainage channels, paddy terraces, and hedges, fences, etc. All these systems consist of a wide variety of species which are of immense importance to villagers for fuelwood and as an additional income source to meet contingency needs. Within the context of woodfuel, the way resources have been promoted for non-wood outputs have become a major issue. How tree species not intended for woodfuel production have become the 'important' producers is worth examining too.

Under these circumstances, the 'multipurpose tree species' of non-forest areas play a dominant role in catering to the country's wood energy demand. Woodfuel is one of the preferred by-products, secondary to food, derived from many woody perennials. The physiological characteristics, the species' suitability to be managed for fuelwood, the species' composition and their multiple production functions are interrelated. The trees in the landuse systems are not extracted for fuelwood, but either the dead or seasonally harvestable parts are obtained as wood for fuel. The commonly grown species in homegardens include: Coconut (*Cococ nucifera*), Jack fruit (*Artocarpus heterophyllous*), Mango (*Mangifera indica*), Avocado pears (*Persea gratissima*), Guava (*Psidium guajava*), Mango (*Mangifera indica*), Rambutan (*Nephelium lappaceum*), Tamarind (*Tamarindus indicus*) etc.

A field survey in Bambarabedda village shows the coconut tree as a consistent producer of woodfuel, and the Jack fruit tree as another important contributor. In Madugalla village located in the neighbourhood of Bambarabedda, the coconut tree is considered as a prominent woodfuel producing homegarden species, although all other species with woody branches contribute as well. The branch prunings of nonfood producing species such as Kududawla (*Neolitsea involucrata*), Kenda (*Macaranga peltata*), Havarinuga (*Alstonia macrophylla*), Sapu (*Michelia champaca*), and *Albizzia spp.* also contribute, especially in terms of meeting household needs.

Fuelwood is a by-product of market oriented species. Either the branchwood or the sticks obtained at prunings/ coppicing are piled up for domestic fuel purposes. When an excess is harvested, producers tend to sell the surplus in the market (in cubic meters). The empirical data points to the fact that most trees grown, maintained and protected by villagers are meant to provide multiple products. Villagers' priority for tree species is determined by their ability to produce the most essential products. These include food/fruits or nuts, fuelwood, timber, fencing materials and agricultural poles etc. All priority species produce fuelwood. The objectives of promoting biodiversity in homegardens are related to all multiple needs among which fuelwood has been noted.

Studies focused on farmers' tree use practices and homegardens demonstrate that woodfuel for domestic uses consists of a variety of materials which vary significantly in form, shape, size and calorific value. The situation concerning the fuelwood scenario of individual households in the rural sector shows a few major features which could be used in promoting fuelwood production systems. These include:

In Sri Lanka at least 75% of woodfuel is derived from non-forest areas.

- Fuelwood is only a by-product, obtained throughout the life span of woody perennials primarily grown on farmers' lands;

- Branchwood is preferred, so a species' suitability for pruning without reducing the production of fruits/food etc. is an advantage. Another associated feature is the ability to obtain deadwood regularly;

- Fuelwood is part of the multiple land management systems, so the systems primarily meant for non-wood products are the systems producing fuelwood;

- For the resource poor it may not be a regular income, but it is certainly a source of contingency to meet adhoc expenses;

- Better quality woody parts are mixed with many other forms of bio-energy harvests, so it consists of a mix of woody and non-woody materials;

- Fuelwood production is one aspect of multiple tree and land management. The integration of this aspect into development projects is more favourable than developing specific areas for fuelwood production and substituting other purchased types of fuel for fuelwood.

Issues Related to Woodfuel Production

Issues related to woodfuel production are broadly associated with the country's development policies for it is a integral part of resource management and development. The country scenario revealed that at least 75% of the woodfuel derives from non-forest areas, especially from the lands under agriculture. It also shows that within the agriculture sector, the tree crop-based systems, particularly coconut and rubber, exclusive of homegardens with mixed composition, provides 26% of the bio-energy. This is equivalent to the amount derived from homegardens. Homegarden products are not only of great importance in terms of their convenience, but are also an indicator of the self-sustainability of the whole tree crop-based system. The state efforts to diversify plantations, particularly rubber and coconut, indicate that there is an increasing tendency for plantations to contribute to woodfuel production. This, however, is a rather limited solution due to the fact that the high cost of transport for portaging plantation wood to consuming areas will be increased in the years to come with increasing fuel prices.

In addressing the problems through locally appropriate measures the role of state policies related to overall land management is important. State policies on agriculture broadly contain the programmes executed for promoting rice production: incentives delivered to expand crop monoculture in the country, and conversion of natural forests for forest plantations, for tree monoculture contributing little to woodfuel needs, and also the land fragmentation for housing development, primarily the coconut lands in the periphery which are threatened by urban expansion. Highly compartmentalised state sectoral intervention is a constraint to self sufficiency in woodfuel production and also to the promotion of tree growing among farmers. For instance, the random integration of trees into farming systems has prevented farmers from getting state subsidies for export crops. For instance, to obtain subsidies for tea, small-scale

Training Curricula of the PFI for Woodfuel Production Flow and Utilization

Dr. K.M. Siddiqui

Pakistan has had a very small forest area since its creation in 1947. Its forestry situation can be characterised by a limited forest area (4.8% of the total area) and a high demand for timber and fuelwood by its large population (120 million). The demand for timber and fuelwood has increased over the years due to an increasing population with rising living standards and the general development of the country. Almost 98% of the total fuelwood demand is met through trees grown on farmlands. Since the trading of fuelwood by the informal sector up to the mid 1980s, little attention has been paid to developing fuelwood resources to meet the above requirements. The training curricula of the country's forestry professional and technical persons have generally failed to recognise the importance of fuelwood in the national economy or the need to develop fuelwood sources thus causing the depletion of wood resources, the degradation of watersheds and the deterioration of the eco-system over the years.

The Pakistan Forest Institute, which started as a forestry training institution, has carried out a number of changes in its training curricula over the years. It started offering courses leading to B.Sc. and M.Sc. degrees in 1958. In the 1980s it introduced specialisations in wood products and engineering, watershed management and farm and energy forestry management in its M.Sc. programme. Farm and energy forestry management specialisation was introduced in 1987 through substitution of three existing subjects: farm and energy forestry, agro-forestry systems and energy as a forest product. Most students currently enrolled are opting for this specialisation.

A large number of social/farm forestry programmes are being implemented in Pakistan in order to increase wood production in the country through people's participation. This programme of forestry development is expected to further expand in the coming years for which trained manpower is needed. It is expected that graduate students of the Pakistan Forest Institute with a specialisation in farm and energy forestry management will be responsible for the planning and execution of these programmes.

Dr. K.M. Siddiqui is Director General of PFI in Pakistan.

tea growers are encouraged to clear their lands. Although subsidy schemes have been introduced to promote woody perennials among farmers, particularly rubber, coconut and many other species such as cloves, cocoa, coffee etc., woodfuel production has been excluded from the development packages.

With the absorption of rubber wood into the industrial sector and also as a result of deforestation in the dry zone areas, the state sector, primarily the tea sector, has allocated its marginal lands for woodfuel production. As the goal has been to become self-sufficient in producing wood for own consumption, competition in the market has not been created. The wood obtained from forest plantations is often confined to branch wood and immature segments of the harvested timber. One of the constraints faced by the non-forest woodfuel producers is the high cost of transport. Another constraint is the limited market potential in the areas of production. Woodfuel has not been a primary source of income for the producers. In situations where excess harvest is obtained from pruning of trees in hedges, homegardens and farmlands, producers sell their excess harvest to meet contingency needs. In addition, the lack of state interventions to stimulate private tree growers by way of organizing woodfuel markets means that producers often fetch a low price at the farm gate thus the economic returns are low. This is a result of the lack of proper institutional arrangements.

The promotion of woodfuel production entails the improvement of local initiatives, rather than directing local people with external incentives. The integration of priority species, primarily the multipurpose tree species into local production systems is more appropriate in the sense that it could strengthen the supply systems. Problems are not experienced equally due to the unequal distribution of production sources, unequal access to forests, gender specific implication of scarcities and stress, and also unequal affordability either in terms of purchasing wood or substituting with modern fuel types. The dilemma under most circumstances is between the 'free energy' and 'costly energy substitutes'. The question to be answered is who could afford substitutes even if users are prepared to turn them. All possible substitutes such as kerosene, electricity, LPG and furnace oil are costly and unaffordable for the majority of users.

The tradition of procuring woodfuel freely points to the fact that it has remained as a by-product of non-forest production systems. The competition for fuelwood from external and industrial sectors will have a negative effect on households. Woodfuel should be integrated into all land-based development systems as transportation from outside areas is costly and there are potentials for reformulating farming systems to promote woodfuel production. The process should begin with the existing traditional examples like homegardens, without allocating lands or selecting 'fuelwood species'. Integration has a better prospect than considering fuelwood entirely apart from non-wood systems and other products.

Publication Reviews

Forest Resources Assessment 1990: Tropical Forest Plantation Resources

The last assessment of tropical forest plantation resources was carried out about a decade ago, by the FAO/UNEP Tropical Forest Resources Assessment Project. Significant changes have taken place since then as awareness of the need for planting trees worldwide has grown, many additional millions of hectares have been planted and financial support to plantation projects in developing countries has increased. The present study by Mr. Devendra Pandey of the Indian Forest Service carried out at the Royal College of Forestry, Umea, Sweden, improves and updates the earlier assessment, to the reference year 1990. Besides the estimates of 88 tropical countries, the report also contains information about the plantation resources of 6 nontropical developing countries and 6 developed countries.

After describing the basic concepts and methodology, the study presents a global overview of plantation resources, consisting of cumulative total reported area, average annual rate of increase,

areas under industrial/nonindustrial and non-forestry plantations and under main species, estimated net areas to the end of 1990 and a discussion on community forestry tree planting. The actual yield of the main species established in large scale plantations is also presented. The next section contains a detailed presentation of the above topics at regional, subregional and country levels. Time series data provides basic information on plantation development in 88 tropical countries. Additional information for selected tropical, nontropical developing and developed countries is given for comparison. The evaluation of plantations, which is discussed in the fourth section, deals with three aspects: (a) review and analysis of the available plantation inventory results and estimation of net plantation areas at both global and regional levels, (b) review of growth and yield data of large scale plantations and their comparison with permanent sample plot yield data and

potential yields of the natural forests and (c) case studies on other issues related to the planning and management of plantations. The report ends with the findings of the study and a set of recommendations.

For more information on the document, please contact FAO, Viale delle Terme di Caracalla, 00100 Rome, Italy.

Formulation, Execution and Revision of National Forestry Programmes: Basic Principles and Operational Guidelines

This document is a 1996 publication of the Food and Agriculture Organization (FAO) of the United Nations, Rome. It is divided into two parts. The first part outlines the basic principles upon which the National Forestry Programmes rely upon, while the second part relates to the main phases recommended for the implementation of preparatory, executing, and updating processes of the National Forestry Programmes.

These basic principles and operational guidelines have been prepared to: (a) assist in the formulation of sector strategies for sustainable forestry use and conservation; (b) guide foresters and forestry planners in the task of harmonising the forestry sector strategy with these of other sectors; (c) integrate forestry sector programmes within the broader context of sustainable development strategies; and (d) help all stakeholder to play a more effective and efficient role in planning and implementing activities for sustainable forest development.

In the post-UNCED era , trees, forests and forestry in general are becoming increasingly important. The need for balancing environmental concerns with the socio-economic development of countries has been universally agreed upon. In this context , the rational, equitable and non-destructive use of natural resources is a must. This calls for the application of sustainable development strategies in the management and utilisation of all types of forests. The way these resources are used depends on each country's specific conditions. This document therefore recognises the specific peculiarities of each country and suggests the Basic Principles and Guidelines to be used as a guide while developing country specific National Forestry Programmes. This document is also expected to be useful for enhancing the effectiveness and efficiency of the forestry development plans or programmes, which many countries have already pursued in line with the recommendations of the United Nations Conference on Environment and Development.

The Basic Principles under which forests, forestry and the forestry sector have been defined, recognises the National Forestry Programme as a global framework to address forestry issues within the context of sustainable development. It also suggests the goal and main objectives of forestry programmes, lists the basic principles to be used as a guide in the preparation of national programmes; highlights the importance of sustainability and suggests issues to be considered in policies and programmes together with other concerns like national sovereignty, country leadership, partnership, participation, capacity building, policy and institutional reforms, consistency with global initiatives, awareness raising, national commitment, etc.

Part 2, Operational Guidelines, includes five figures to illustrate the process which needs to be followed to implement the basic guidelines. The process can be broken down into four phases, namely: (a) organisation of the process; (b) strategic sector planning; (c) programme implementation; and (d) revision of the national forestry programme. Identification of partners, national coordination mechanisms and development of a communication strategy are the three main activities under the first phase. Similarly, preliminary analysis, in-depth sector analysis, strategic analysis, formulation of the national forestry programme and national forestry programme documents are the activities included under Strategic Sector Planning. The third phase deals with implementation and includes activities such as implementation coordination and monitoring, capacity building programme, policy, legal and institutional reform programme, and investment programme. The last phase is Revision/Updating, which includes evaluation of national forestry programme implementation, reassessment of the national and international context, and updating the national forestry programme. The document includes two tables to explain the Basic Principles.

For more information, please contact FAO, Viale delle Terme di Caracalla, 00100 Rome, Italy.

Rural Energy Planning: a Government-Enabled Market-Based Approach

The central focus of this volume is on rural energy development in liberalised rural energy markets enabled by appropriate governmental policies and indicative planning. The volume is divided into eighteen chapters under three broad groupings, namely: issues and approaches; planning methods and techniques; and implementation strategies. The introductory chapter highlights the core philosophy of the proposed new approach, that is, developing rural energy systems with a close and direct consideration of human needs. The stand taken is that rural energy systems at present lack a clear developmental focus and are in a state of crisis due to the protracted neglect of important socio-economic needs of rural populations in the energy planning process. The chapter traces recent trends in development outlook in general arising from the con-

vergence of market and welfare economic philosophies. It highlights the opportunity provided by these trends to resolve rural energy problems and outlines the central notion of a government-enabled market based approach (GEMBASED). Chapter 2 is intended to set rural energy issues in their proper development context, chapter 3 is mainly based on the findings of the regional rural energy survey, while the GEMBASED approach to rural energy planning is described in chapter 4. Rural electrification consistent with the GEMBASED approach, the development of an enabling policy framework and the central role of technology in modernising rural energy systems are the focus of attention in the chapters 5, 6 and 7. The second group, planning methods and techniques, covers (a) the development and management of a rural energy data base, (b) the analysis and forecasting of rural energy demand, (c) decentralised energy technologies, and (d) economic and environmental impact analysis of rural energy policies and programmes. The third group, implementation strategies, is directed at rural energy market potential assessments and market penetration strategies. It provides an initial framework for organising market potential assessment activities, setting out the role of the government in a national context and the roles of other actors at various levels. The methodology of carrying out such an assessment is elaborated in the remaining chapters with an accompanying discussion on the main considerations in developing marketing strategies.

This document is published by the Asian and Pacific Development Centre, Pesiaran Duta, P.O. Box 12224, 50770 Kuala Lumpur, Malaysia, ISBN 967-9928-40-3, 1995.

Regional Perspectives on UNCED Follow-up in Forestry: Three Years After Rio

This document, a joint publication of the United Nations Environment Programme (UNEP) and the Food and Agriculture Organisation (FAO), presents a regional perspective on UNCED follow-up activities within the forestry field. It reports on three specific regional workshops which were held at FAO Regional Offices to assess the progress in the implementation of Agenda 21 and the Forest Principles agreed upon by the member countries at the UNCED in Rio de Janeiro, Brazil, 1992. These workshops were held in Santiago, Chile (5-7 December 1994) for Latin America and the Caribbean; in Bangkok, Thailand (16-19 January 1995) for Asia and the Pacific, and in Ghana (23-26 January 1995) for Africa. The three workshops were organised to offer greater opportunity for the perspectives of various parts of the world to be highlighted while the United Nations Commission on Sustainable Development (CSD) met in April 1995 to review the progress in the implementation of UNCED forestry agreements.

The document outlines the progress achieved and experiences encountered, and mentions TFAP (Tropical Forestry Action Plan) as an instrument for implementing UNCED agreements. While evaluating the progress and identifying the constraints, the document categorically states that much of the progress achieved since UNCED has involved continuation or acceleration of earlier programmes. In all three regions, practical pre-UNCED actions in sustainable forest management have continued but, more importantly, the focus has been on creating the conditions that would enable faster progress in the near future. The document further states that many countries are still grappling with the question of how to incorporate environmental concerns into forestry in a manner which would ensure balance with the economic and production functions of forests. It appears that in all three regions the post-UNCED years have witnessed an increasing awareness of environmental issues and of the role of forests and trees. Some pre-UNCED policies, plans and strategies are being adapted to bring them into harmony with the proposals of the Rio conference, while some countries have developed national Agenda 21 programmes. Institutions have been set up in some countries to oversee Agenda 21 implementation and a few deliberate efforts have been made to revise National Forestry Action Plans (NFAPs). Reforms in the forestry policies of the main regional development banks have taken place in all three regions.

Despite the fact that many countries have encouraged the use of alternative energy sources and EIAs (Environmental Impact Assessments) in forestry sector planning, and have started recycling fibre in papermaking, there are still some major constraints/issues to be tackled: (a) inadequate funding; (b) lack of institutional capacity; (c) necessity of appropriate forestry technology and techniques for sustainable forest management; (d) unresolved land tenure issues; (e) absence of mechanisms to resolve conflicts; (f) short-term economic interests versus sustainable management; (g) incoherent landuse; (h)

lack of coordination among donor agencies; (i) inadequate technology and knowledge; and (j) donor driven choice of priorities. In general, the participation of NGOs in awareness raising, is regarded positively. The document further underlines that the prominence of the TFAP as a framework for national strategies for forestry development was recognised in all regions, while the Master Plan for Forestry Development was found important in the Asia-Pacific region only. Three years after UNCED more than 90 countries are reported to have developed National Forestry Action Plans or Master Plans for Forestry Development.

The document concludes with a list of the reports that have been prepared by UNEP/FAO jointly. Contact addresses to order copies are also included. The main recommendations of the three regional workshops are provided in an annex under separate headings.

For more information, please contact FAO, Viale delle Terme di Caracalla, 00100 Rome, Italy.

News and Notes

National Training Workshop, China

RWEDP collaborated with the International Farm Forestry Training Centre (INFORTRACE) of the Research Institute of Tropical Forestry (RITF), Chinese Academy of Forestry, Longdong, Guangzhou to organize a 'National Training Workshop on Identification of Tools for Degraded Land Management in Rural Areas with Emphasis on Wood Energy Problems', from 11-16 December 1995. This workshop was a follow-up to the subregional 'Training Workshop on Integrating Woodfuel Production in Agroforestry Extension Programmes in Southeast Asia' which was organized by RWEDP in Indonesia, in April 1995.

The training workshop was organized by RITF as an integral part of its new project 'Alternative Socioeconomic Approaches to Reclaiming Degraded Lands (ASARDL)' with the International Development Research Centre (IDRC) of the Government of Canada. RWEDP used this unique opportunity to collaborate with other partners pursuing the common interest of participatory management of rural community-based natural resources for satisfying their basic needs by integrating issues such as woodfuel, gender, and environmental sustainability.

All together, there were 19 participants (2 from CAF, Yunnan Province; 4 from Hunan Province, 3 from Central-South Forestry College and 1 from Huihua Forestry Bureau; 3 from Zhejiang Forestry College, Zhejiang Province; 1 from Changwu Forestry Bureau, Guangxi Region; and 9 from Guangdong Province, 8 from RITF and 1 from Zhongshan University) and 2 resource persons. RWEDP's paper highlighted the issues of production, consumption and development of wood energy in rural areas, particularly in the context of prevailing rural energy systems in China.

Selection Criteria and Priority Rating for Assistance to Rural Biomass Energy Using Industries

A regional expert consultation on Selection Criteria and Priority Rating for Assistance to Rural Biomass Energy Using Industries was held in Penang/ Kuala Lumpur, Malaysia from 15-18 January 1996. This RWEDP sponsored workshop was hosted by the Forest Research Institute of Malaysia (FRIM). It was the first activity (within the framework of a series of activities) to be organised by FAO-RWEDP with regard to rural based biomass energy using industries. The objective of the expert consultation was to draw up a set of selection and prioritisation criteria to be used for (a) the identification and selection of 5 traditional biomass energy using industries and (b) the subsequent priority rating for RWEDP support.

During the first part of the expert consultation resource persons and country representatives presented papers and statements, describing various activities undertaken in their countries with regard to biomass energy using industries as well as those related to industries in general. An overview of industries and the various aspects to be taken into consideration while setting criteria to select industries, such as R&D perspectives, commercialisation aspects, financing aspects, etc. was presented, all in relation to biomass energy using industries. The latter part of the expert consultation was devoted to group discussions in order to draw up a list of selection criteria and potential industries which need to be assisted. During the often lively discussions, the participants in the expert consultation selected the most relevant criteria as well as industries. The following selection criteria were considered as being most important (not necessarily in order of importance):

- Contribution to the satisfaction of basic needs;
- Socio-economic contribution of the industry (related to the biomass energy system with their upstream and downstream linkages);
- Those criteria related to fuel quantity e.g. total amount used, specific energy consumption, the effect of biomass energy use on its resource base (degree of concentration) and the contribution of the price of biomass energy in relation to the production costs;
- The sustainability of the industry;
- The capital intensity of the industry;
- The level of intervention required to support the industry;
- Environmental considerations.

Based on these selection criteria, the participants decided that the following 5

industries were considered as being important within the region and for that reason warranted support by external organisations:

- Sugar/Gur/Jaggery making;
- Brick and roof tile making;
- Lime burning.
- Timber drying;
- Tobacco curing;

Besides naming five industries, it was also recommended that attention should be given to some processing technologies. These technologies consist of charcoal making and briquetting of sawdust and/or other residues. It was recommended that FAO-RWEDP should provide assistance in various forms to these industries where feasible. For instance, in the form of providing information, training, training materials, manuals, apprenticeships, etc. The proceedings of the expert consultation are being prepared and will in due course be available from the RWEDP secretariat.

Stoves for Space Heating and Cooking

A Regional Workshop on 'Stoves for Space Heating and Cooking at Different Altitudes and by Different Ethnic Groups' was organised by RWEDP in cooperation with ICIMOD (International Centre for Integrated Mountain Development). The workshop was conducted between 12-16 February at Pokhara, Nepal. The 23 participants and observers came from GOs, NGOs and the private sector in 9 different countries. Resource persons came from specialised institutions in Nepal, India, and Indonesia, as well as from the organisers and GTZ. The general objectives of the workshop were to determine methodologies and formulate specific recommendations on the introduction of improved stoves which can be used for cooking and heating or for space heating alone. In addition, a number of specific issues were addressed. In fact, at present there is still little systematic information on heating stoves available, and few development efforts have been undertaken regarding space heating problems in the region. Experiences from designers and practitioners of heating stoves had not been exchanged or discussed before.

Papers from experts and participants were presented and discussed during the workshop. Some papers reported results from special studies in pilot projects by NGOs commissioned by RWEDP. A special aspect of the space heating function is, of course, the aim to prevent heat loss which often leads to poor ventilation of the space. In many cases this has adverse impacts on the health of users and family members, as was studied and documented in medical studies. An important contribution to the workshop was also made by producers of hardware, who displayed space heating devices during the workshop. Most of the devices came from Nepal, but some were even carried all the way from China. During a two-day field visit to the Anapurna Conservation Area many interesting observations were made and these were later discussed by the workshop participants.

The output of the workshop contributes to:

- State-of-art reviews on the technical, economic and social aspects of stoves used for space heating and cooking in the context of mountain populations.
- Better understanding and realization of space heating requirements that form an integral part of the domestic energy services of mountain people.
- Better understanding of the health aspects of space heating/cooking devices and practices of mountain populations.
- Formulation of policy framework for the adoption and popularization of suitable space heating and cooking devices for mountain population.
- Identification of strategies for technology transfer within and among the countries of the region.
- Formulation of action plans for follow-up activities and programme implementation.

The cooperation with ICIMOD, Kaski District, and the Anapurna Conservation Area Project is gratefully acknowledged by RWEDP. The workshop was the third in a series of five regional RWEDP workshops on stove problems in the region. The first workshop focussed on stoves for institutional and commercial use (Yogyakarta 1995), while the second workshop focussed on stoves for loose biomass residues as fuels (Hanoi 1995). Full reports on the workshops will be available from RWEDP.

Readers' Contributions

Readers may have noticed that recent issues of Wood Energy News focussed on special themes. So far the themes have been: (1) gender and wood energy; (2) modern wood energy; (3) wood energy planning; and (4) wood energy resources. The next issue will focus on regional wood energy data. We welcome suggestions, contributions and reactions from our readers, which may or may not be linked to the current theme.

Events

Event, Description (Info)	Date, Venue
Forest Production Research Techniques The course covers the basic analysis of concepts and principles of research management; design and analysis of experiments in the various fields of forestry; and demonstration of research techniques in managing and solving problems in wood energy development, social forestry, forest production, and conservation (Los Banos).	23 July- 19 Aug 1996 Los Banos, The Philippines
Urban Forestry The course deals with nursery production; culture of planting materials; species selection; care and maintenance; protection of trees in urban communities; woodfuel production and flow; urban forest planning; organization; and administration (Los Banos).	23 July - 9 Sept 1996 Los Banos, The Philippines
Integrated Forest Resource Management Planning for Sustainable Development The course covers the basic methodologies, concepts, principles, techniques and tools in planning the management of forest resources and wood energy for sustainable development; the biophysical and socio-economic aspects relevant to the preparation and analysis of a forest resource and wood energy management plan (Los Banos).	23 July - 2 Sep 1996 Los Banos, The Philippines
Geographic Information System and its Application in Natural Resources Management The course covers the basic concepts, principles, and techniques geographic informations system (GIS) for the analysis of spatial data; introduction to geographic data processing and the applications of resources management with emphasis on forestry, wood energy and the environment (Los Banos).	23 July - 2 Sep 1996 Los Banos, The Philippines
Certificate Course in Community Forestry This course provides an introduction to participatory management and community-based forestry. The four month course is divided into five major modules: introduction to community forestry; relevant forestry principles and practices; community based forest management systems; social and institutional issues; and community forestry assessment and planning process. The course includes extensive field visits (RECOFTC).	12 Aug-13 Dec 1996 Bangkok, Thailand
Forest Community Development Course The course covers five modules designed to build up the capability of the participants to formulate and manage a forest community development program or project. It focuses heavily on the community development process as the major intervention and the role of woodfuel resources management in community development (Los Banos).	3 Sept - 14 Oct 1996 Los Banos, The Philippines
Third International Course on Gender in Policy Development for Sustainable Land Use The aim of the course is to strengthen the ability of the participants to develop policies that warrant an appropriate balance between sustainable land use and gender issues. The course provides the participants with information, viewpoints and tools that will help them to conceptualise, plan and formulate policies on sustainable land use from the perspective of gender (IAC).	6 - 19 Oct 1996 Wageningen, The Netherlands
The International Conference on Forest Products The course focuses on the following areas: wood and forest property; forest products chemistry; wood industry; wood protection; non-wood forest products; and wood energy (RFD).	18 - 22 Dec 1996 Bangkok, Thailand

Los Banos: the Director, Institute of Forest Conservation, College of Forestry, U.P. Los Banos, P.O. Box 434, 4031 College, Laguna Philippines, ☎ +63-94-2268/3340/2736, 🖹 +63-94-3340/3206, 💻 trv@mudspring.uplb.edu.ph

RECOFTC: Dr. Sukwong Somsak, Regional Community Forestry Training Center, Kasetsart University, PO Box 1111, Bangkok 10903, Thailand, ☎ +66-2-561-4881/579-0108, 🖹 +66-2-561-4880, 💻 ftcsss@nontri.ku.ac.th

IAC: International Agricultural Centre, P.O. Box 88, 6700 AB Wageningen, The Netherlands, ☎ +31-317-490111, 🖹 +31-317-418552, 💻 iac@iac.agro.nl

RFD: The Secretariat, International Conference on Forest Products, Forest Products Research Division, Royal Forest Department, Paholyothin Road, Bangkok 10900, Thailand, ☎ +66-2-5795412, 🖹+66-2-5795412

Leaf litter from Casuarina *trees planted for coastal protection, is collected for fuelwood. This collection of leaf litter from soil surface partly defeats the purpose of coastal protection. The biomass energy situation in this particular area is however so serious that people have to revert to digging out roots of grass just to fulfil their basic fuel needs (Vietnam).*