WOOD ENERGY NEWS

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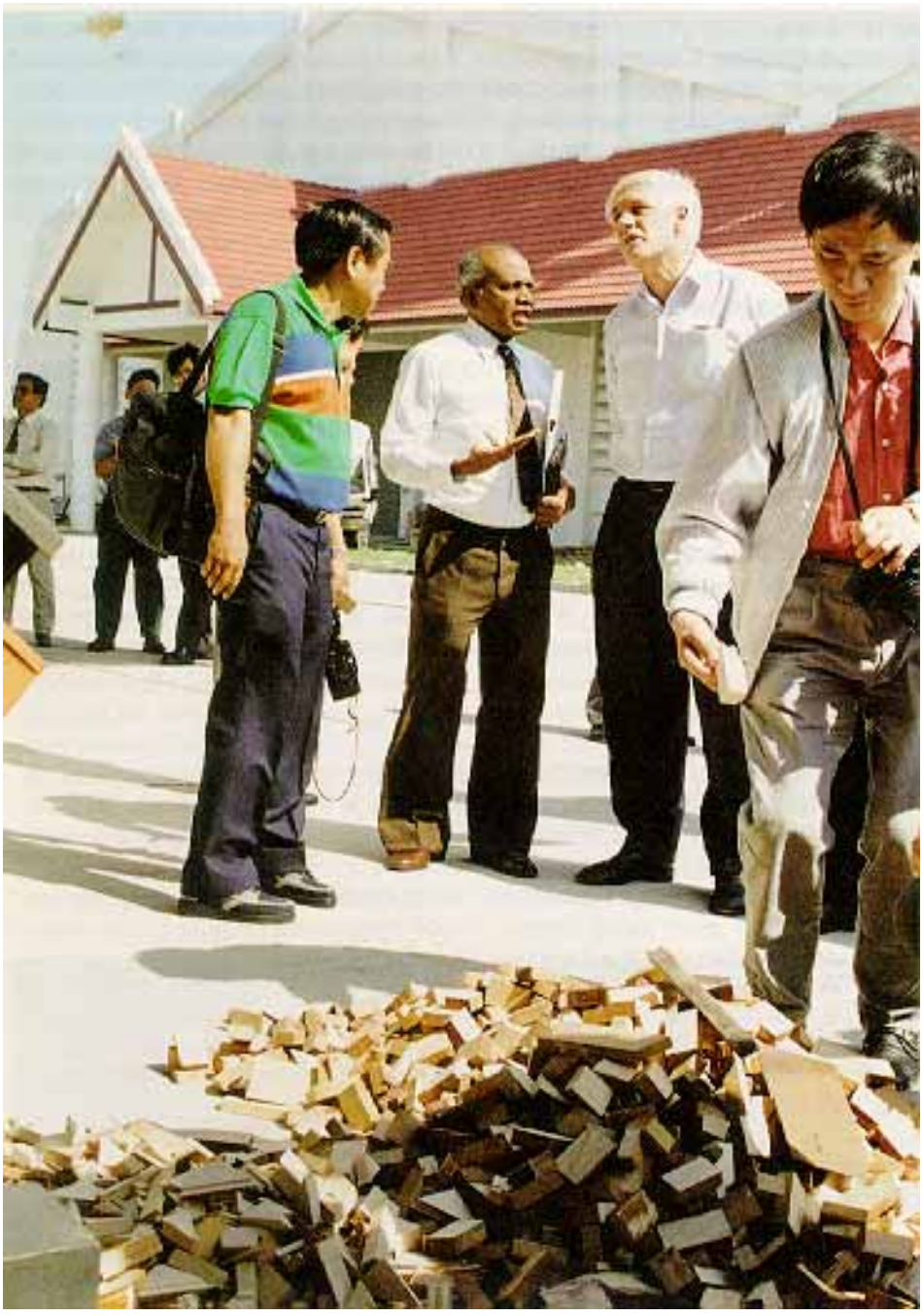

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Editorial

The utilization of woodfuels in Asia is still increasing in absolute terms, whereas their supply is becoming more and more problematic in many areas. The implications are not surprising: severe problems for households in meeting their daily fuel needs; a survival crisis for woodfuel-based industries; incomes of millions of rural people in the fuelwood business at stake; land degradation where other types of biomass are substituted for wood; rural-urban migration or unbalanced growth; and ever increasing fossil fuel bills.

These problems will worsen in the years to come, and therefore must be taken seriously by governments and policy makers. In most RWEDP member countries, woodfuels meet more than half the national energy needs. Wood energy is a form of energy, whether modern or traditional. Consequently, its supply and demand should be part of national energy policies. However, few countries have yet integrated wood energy into their national energy planning. Too often the countries' activities in wood energy are confined to micro-projects or haphazard interventions.

Sustainable supply and proper use of woodfuels is linked to several sectors under the responsibilities of different ministries. The obvious ones are the ministries of energy and forestry which should cooperate closely in this matter. Other relevant ministries include those of agriculture, environment, rural development, transport, industry, employment and health etc. It is not an easy task to integrate the analyses of woodfuel-related problems into the work of the various sectors, and coordinate the responsibilities of the respective ministries. Policy development with regard to wood energy requires proper institutions which can take up that role.

The first step a government can take to develop a wood energy policy is to firmly decide that wood energy must be integrated into energy planning and policy making. Next, to develop the required institutions for planning and policy a National Committee on Wood Energy Development should be established and should consist of representatives of relevant sectors, including the energy and forestry sectors. The National Committee can guide the tasks of National Wood Energy Working Groups.

The Regional Advisory Committee on Wood Energy Development, which met in Bangkok last February, strongly recommended that National Committees will be put in place by the governments. RWEDP is keen to cooperate with the National Committees in order to implement the new regional programme, as was endorsed by the meeting.

Front page: Discussion during the RAC field trip

Wood Energy Policy Development

W.S. Hulscher

In most RWEDP member countries woodfuels meet more than half of the energy needs. Wood and charcoal serve as the main fuels not only in many households, but also in numerous small-scale industries and commercial activities. However, in many regions the supply of woodfuels has become more and more problematic for diverse reasons. The implications are severe: households (particularly women) experience the burden of shortages in meeting their daily fuel needs; incomes of up to 100 million rural people in the woodfuel business are threatened; land is degrading where other types of biomass are used as substitutes for wood; prices increase; rural industries may not survive when they cannot switch to other energy sources; rural-urban terms of trade deteriorate with related migration and unbalanced economic growth; and the country's bills for importing fossil fuels increase.

Many people look at woodfuels as 'just a traditional commodity' and perhaps that is why effective policies for addressing wood energy problems tend to lag behind policy formulation in other sub-sectors. A complication is that a coherent wood energy policy implies linkages to many different sectors, which are difficult to achieve. Obviously, relevant policy areas include the supply and demand of energy at large, and any policies on forestry and land use. But they also include agricultural policy, as agricultural practices not only demand fuels but also produce fuels in the form of wood and agri-residues. Furthermore, industrial policies are relevant for wood energy, particularly any interventions which aim to support small-scale productive enterprises, many of which are based on woodfuels. Further relevant policy areas are labour and employment, rural development, gender issues, ethnic minorities in remote parts of the country, public health care where the risks of improper woodfuel combustion are at stake, and technology transfer, international cooperation and trade. Last but not least, environmental policies can have major implications for woodfuel supplies.

It is not an easy task to harmonise the various policy areas for the sake of wood energy. Examples of conflicting policies might include the following scenarios. The ministry responsible for environment and natural resources bans the charcoal trade whereas government policies on rural development aim to slow down rural-urban migration. Or, the ministry responsible for energy assumes the continued supply and use of woodfuel, whereas the ministry responsible for forestry gives priority to protecting teakwood plantations. Or, the ministry responsible for industry aims to promote small-scale industrial activities, but the ministry responsible for science and technology fails to develop cheap fuel-saving technologies. Some policy conflicts can even exist within different departments of one ministry. If the department responsible for power spends large amounts of money for rural electrification whereas another department of the ministry responsible for energy fails to address the major energy needs of the majority of the rural population, I would call this a policy conflict.

Institutional Development

Policies for wood energy development, like other policies, must be made coherent, effective and feasible. To enhance this, the overall policy instrument is institutional development. Related policy instruments are the development of legal frameworks; price controls; taxation and duties; incentives; education, training and extension; infrastructure; and coordination. Here, I will elaborate on institutional development and coordination.

A country's institutions for wood energy development encompass the whole range from norms, values and attitudes of the population, via legal frameworks, government structures and organizations, down to institutes, infrastructure and competence which are able to deal with wood energy in a proper way. Institutional development constitutes a major challenge to governments of developing countries as well as other countries in dynamic socio-economic conditions.

For instance, when woodfuels are an under-priced commodity, largely ignored by policy makers, people tend to use woodfuels in a wasteful way without even knowing they do so. The sector will suffer from under-investment as is actually the case in many countries. Moreover, the technologies and infrastructure for efficient conversion devices will not be available, and little competence will exist in the country to anticipate depletion of woodfuels in particular regions. Obviously, it would not be sufficient to hire one or two consultants (not even through FAO) for a few months to redress the situation. Once the government has decided that woodfuel, indeed, is a precious commodity, it will take the country a long time to build up the proper institutions for change. What will be required is developing relevant expertise via education and training, establishing responsibilities within the government bureaucracy for analysis and policy development, addressing the public, developing legal frameworks, infrastructures, and extension networks, and then preparing adequate interventions, including new pricing systems, the introduction of new technologies, etc. Such a programme may take several years to become effective.

Popular norms, values and attitudes are part of institutional development, as stated above. Also within the government sector itself, attitudes of civil servants often represent an undervaluation of wood energy. Sometimes, officers in the ministry of energy perceive rural energy as rural electricity only. It is up to the policy makers to increase the overall appreciation and status of the so-called traditional energies.

Wood energy development builds upon at least three areas of expertise, i.e.

wood energy resources assessment, conversions, and planning. Here, I will focus on institutional development for only one of the three areas, i.e. wood energy planning, which is probably the least developed area of expertise in many RWEDP member countries. If wood energy planning is to be taken up at all, it requires appropriate institutional development. Such a task would need to include the following:

1. The central government acknowledges that wood energy is an important policy area which is to be addressed. (Rationales for this have been mentioned above).

2. The government identifies or establishes a unit responsible for wood energy planning within the government. Related to this are the political questions of which ministry will be responsible for wood energy planning, what will be the relation with the national planning commission, and what the decision making procedures will be.

3. The unit develops relevant planning expertise by training or other means, and analyses the wood energy problems to be addressed. The linkages with relevant policy areas are identified, and the respective policies are documented.

4. The unit identifies which type of information will be required for wood energy planning. The information needs refer to both the demand side and the supply side in a very disaggregated way, corresponding to different regions within the country and other relevant parameters.

5. The unit considers which levels of local government should be involved in the process of wood energy planning, and how. Decision makers are advised accordingly. Next, priorities are set, and suitable methodologies for data collection, interpretation, appraisal and planning are selected.

6. The unit identifies which relevant centres of expertise exist in the country (on economic development, wood resources, socio-economic surveys, gender issues, technologies, etc). Amongst the centres may be academic institutes, specialised units within other ministries, non-government organisations, consultancies and other private sector companies, international agencies and institutes, etc.

7. Working relations are established with the planning commission, decentralised government authorities, and relevant centres of expertise including statistical offices. At the same time, the responsible unit identifies which relevant types of information, competence and infrastructure are lacking in the country, and decides how to deal with these gaps. For instance, statistical officers and enumerators may need additional training to deal with various aspects of wood energy.

So far, all the steps are part of institutional development which is a pre-requisite for wood energy planning. Only when this task is complete can affective wood energy planning begin.

Some elements in the steps listed above have a wider implication than wood energy planning, for instance the procedures for inter-ministerial coordination, and the roles to be played by decentralised government levels. Finding solutions for inter-sectoral or inter-ministerial coordination is a major challenge and probably one of the most crucial phases of institutional development for wood energy development. Furthermore, it depends on the country's general political and administrative culture, e.g. how much authority in planning, decision-making and implementation can be decentralised. Common experience in wood energy planning and related issues shows that state/province, regional/district, and even village levels have important roles to play.

Another general issue is the role of the private and non-government sector. Wood energy policies can hardly be implemented without contributions from the private sector. It may be effective for policy makers to interact with the private sector already in the stage of planning and policy formulation. This would reduce the chances that plans are being made and policies are being formulated which, in practice, could never be implemented. Similarly, non-government organisations have an essential role to play. These organisations are usually strong in expressing people's needs and can give valuable advice to the government on the relevance of its policies. Also, NGOs have proven to be instrumental in the implementation of improved wood energy practices.

RWEDP

The FAO Regional Wood Energy Development Programme in Asia has been active and successful in many countries in this region for the last 10 years. The present Programme builds on the achievements of the past whereas, at the same time, it has a new thrust. A great deal of emphasis in the new RWEDP will be on transfer and dissemination of knowledge and skills. In the past 10 years a wealth of experience has been accumulated while many changes have taken place in this most dynamic region of the world. It is now time to share the many results from studies, pilot projects and other efforts, discuss their applicability in today's environment, and reach a wider audience by training and education.

Recognising the important roles played by women in wood energy, RWEDP will make provisions to ensure full participation of women and women's groups in planning and implementation of project activities, including the design of training programmes and annual and regional workplans.

New in the present RWEDP is its strong interest in all aspects of planning for wood energy. Wood energy planning, being part and parcel of policy making on wood energy, is necessary to consolidate the achievements of various activities in wood energy development in the member countries. It is well understood that wood energy planning and policy making are to link with energy planning at large. That is why linkages with the energy sectors are being established, in addition to the existing good links with the forestry sectors in the member countries. In fact, a new phase of institutional development with respect to wood energy is about to take-off for RWEDP. Multi-sectoral National

Committees on wood energy development in the member countries will be the main allies of RWEDP to successfully achieve its objectives.

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Wood Energy Conservation

Auke Koopmans

Overall, energy use in developing countries is much lower than in the developed world and a considerable amount consists of traditional sources of energy such as fuelwood, charcoal, agricultural residues, dung, etc. Table 1 provides some basic information with regard to energy consumption, population size and per capita energy consumption.

Studies have shed some light on the importance as well as the amounts of traditional sources of energy used. Unfortunately, this provides little insight into differences between rural and urban areas, or into the origin of these sources of energy. The available information indicates that, even though the needs are basically the same, people in rural areas use, on a per capita basis, more energy as well as more biomass energy than those living in urban areas. With regard to the origin of woodfuels: again little is known. The sparse information which is available on the source indicates that in many countries the amount of fuelwood obtained form forests is often less than 50% of the total amount used, the remainder being derived from non-forests such as homesteads, agricultural land, village and common lands, scrap and drift wood, etc.

It may be expected that in the near future the reliance on biomass as a source of energy will remain strong and in most countries will increase due to, inter alia, the increase in population.

In many countries energy policies appear to be biased against traditional sources of energy even though these often account for more than 50% of the total amount of energy used. The reasons for the bias in favour of commercial sources of energy are manyfold. The lack of information on the supply and demand of traditional sources of energy, difficulties encountered in obtaining data, being considered as non-progressive, bad for the environment, causing soil erosion, loss of habitat for wildlife, loss of bio-diversity and loss of soil fertility, etc. are just a few of them.

	Share of world population	Share of world energy consumption	Per capita energy consumption in TOE
Industrialized countries	28%	66%	4.10
Developing countries	72%	34%	0.75
RWEDP member countries	51%	13%	0.43

Although, undoubtedly, there is a causal relationship between the use of traditional sources of energy and the environment, this does not always have to be negative. In fact, traditional sources of energy may offer several benefits over commercial sources of energy. Fuelwood and residues, when burned, release as much carbon dioxide as burning the equivalent amount of commercial sources of energy. However, being renewable and, assuming that the same amount is replanted as was harvested, much if not all of this carbon dioxide is re-absorbed by the replanted material. Besides, traditional sources of energy have other benefits. Traditional sources of energy can be used in many ways: the collection and trade is labour intensive and provides income for many poor people, they are cheap and locally available, the technologies to use them already exist and are often part and parcel of the local society, e.g. combustion equipment is locally made using local materials and can be locally repaired.

Even though traditional sources of energy have several advantages over the commercial sources of energy, this should not be taken as a sign that in all cases promotion of their use has only

positive effects. Many of the traditional sources of energy such as wood and agro-residues can be used for more purposes than only fuel and this may result in competition between different end-users and may drive up the prices or deprive other sectors of much needed raw materials.

Considering the pros and cons of the use of traditional sources of energy as described earlier, answers to the following questions should be sought: "What role will traditional sources of energy play in the near future?" and "What role should they play?". With regard to the first question, it is a foregone conclusion that traditional energy will remain an extremely important source of energy for millions if not billions of people who can not afford or have no access to a guaranteed supply of commercial energy. With regard to the second question, one should consider carefully the implications of promoting the use of a particular source of energy over others, in particular the effect this may have on the environment. Although no definite conclusion can be given, it is clear that there are upper limits to the use of both commercial and traditional sources of energy. The implications are therefore clear in sofar that action has to be taken at both ends. With regard to the traditional energy sector, actions can basically be sub-divided into three major areas: The planning and policies aspects, the resource base, and conservation.

The traditional energy sector can in general be characterized as an energy-intensive and energy-inefficient sector. In other words, a lot of energy is used and goes unnecessarily to waste. However, the word "waste" should be used carefully as in practice some energy is always "lost" as it is inherent to the energy conversion systems used (friction, surface heat losses, hot exhaust gases needed to provide draught, etc.).

The efficiency of a process, expressed as the amount of output energy in relation to the amount of input energy, can therefore never be 100% and will always be less. Although several technical measures can be taken to increase this ratio e.g. increase the efficiency, this in practice poses several problems or may even be impractical. Therefore, before contemplating energy conservation, several issues should be considered critically and all the pros and cons weighed. Some of the issues to be considered are: technical, financial, economical, institutional and social. Although each of these issues can be seen as an entity in itself, most have a direct bearing on or are influenced by the other issues. When contemplating energy conservation activities, one should therefore consider all the issues in an integrated manner in order to arrive at the most appropriate solution.

…energy conversion…

As they depend on local conditions such solutions may vary. What works perfectly well in one country may not be appropriate in other countries (consider for instance the energy efficient Bull trench brick kiln widely used on the Indian sub-continent but which is not found in other countries).

It is therefore probably better not to talk about the most efficient equipment in absolute terms for a given task, but rather about the "most efficient or those that provide the most appropriate benefits under local circumstances". With regard to the benefits of such energy conservation programmes, again a few distinctions can be made: benefits accruing to the user, to the owner, and to the nation.

However, in order for energy conservation activities to be taken up it is important that policy makers acknowledge that the supply of and demand for energy is posing problems. This acknowledgement is normally no problem for commercial energy as it either involves import (and the use of foreign exchange), or large investments in refineries, hydro electric dams, transmission systems, etc., or both import and investments. However, in the case of the traditional energy sector acknowledging such problems is often more difficult. This is basically caused by the lack of information and possibly a poor understanding of what is going on in the traditional energy sector.

However, acknowledgement by policy makers that the demand for and supply of the traditional energy sources is posing problems, is not enough. The users of traditional energy are the people who are facing the problems and it is they who should acquire energy conservation devices. If they do not consider energy as problematic or if they have other more pressing problems, it is difficult to get them to switch. Hence, before contemplating energy conservation activities a thorough assessment should be made and knowledge acquired about the area where activities are to be undertaken including its people, the role of women, the power structure (within families but also within communities), etc. preferably with the direct involvement of the target group of energy conservation activities. Conventional data is often available but unfortunately this is rarely adequate. In-depth studies and surveys may have to be undertaken to be able to analyse the data and to come up with workable and acceptable solutions. Again, what is found to be common in one area may not be valid in other areas.

Wood Energy Resources

Tara N. Bhattarai

In addition to the need for sustainable management of forests for enhancing the production and supply of numerous forest products, new roles for forests have been recognised and endorsed by the Rio Earth Summit, UNCED 1992. Moreover, besides Agenda 21 and the Rio Declaration two important global conventions (on Biodiversity and World Climate Change) add a new dimension to future forestry management, primarily from the point of view of environmental protection.

Energy Use Pattern

In 1991, the World Bank assessed biomass energy resources and revealed a 14% share of biomass in the world's primary energy consumption. Biomass provided 35% of all energy to 75% of the world's population, and the bulk is consumed by the domestic sector. Further studies by the RWEDP in seven member countries show that commercial and industrial sector activities also rely heavily on traditional sources to meet their energy requirements. Although WRI (1994) shows a declining percentage share of traditional energy in most countries, in absolute terms there may not be any reduction in biomass use, because of the growing population. Over one half of the RWEDP member countries still meet 50% or more of their energy requirement from traditional energy sources.

In 1981, the FAO Fuelwood Situation Map of Developing Countries revealed that 2 billion people depended on wood for energy. Out of this, 96 million were reported to be unable to satisfy their minimum needs, and another 1052 million were in a deficit situation (734 million in Asia). Another study (FAO, 1988) cites the problem of non-availability of data for estimating the energy consumption by different types of rural industries and processing activities. The conclusion of this study is that even industries of one type vary significantly in their energy requirement-mix in different locations. The role played by industrial residues as an additional energy source was recognized by Montalembert and Clement in 1983, now brings a new element into the discussion on supply sources.

The 1988 study by FAO categorically states that "Rural industries not only process and use local raw materials, they also tend to rely on local sources for the heat energy they need." The case studies by RWEDP during its two preceding phases (1985-93) in selected member countries endorse the statement further. These case studies, besides contemplating the energy need and the important role of the domestic sector in the rural socio-economy, also identify other important industrial and commercial activities by specific type, sector, and wood energy requirements. The energy requirement of such activities is substantial, and most of it is currently invariably met by traditional energy sources that are available: primarily woodfuels from the forest and private trees in farms.

Management of Wood Energy Resources

WRI (1994) estimates global deforestation at 3.8 million ha (or 0.4%), and average reforestation at less than 1.4 million ha per annum for the period 1981-90. FAO's second global assessment in 1991 showed a 50% increase in tropical forest deforestation since the first assessment in 1980. The increase is very severe in Asian countries with a 1.2 per cent loss per year. The Global Assessment of Soil Degradation (GLASOD, a three-year study on land degradation) presents three equally responsible causes: unsustainable livestock grazing, agriculture, and forestry practices. Over-exploitation of forests and indiscriminate disposal of waste is also contributing to soil degradation, which has affected land productivity as well as traditional management systems. Such a practice of natural resources management does not, and can not, maintain the renewability potential of forests and must be replaced by the adoption of proper and adequate management practices. These will also help to support traditional farming systems which integrate agriculture, forestry and livestock. Deforestation due to land use changes (e.g. conversion of forest into agricultural land under planned schemes as well as due to illegal encroachment) has been most prominent in Asia. As a consequence, the rate of soil degradation is accelerating in many areas, which contributes to decreasing land productivity. If such a situation continues, long term sustainability of the resource base must be questioned and the quality of life of rural people may further degrade from the present level. Many of these people are already poor or marginalized. In many countries no alternative source of employment is readily available for the rural poor. The complexity and intricacy of traditional farming systems and their over-dependency on forests, adds to the problem of resource management. The long-term sustainability of livelihoods is threatened even after paying a heavy toll out of the already deteriorating environmental resources.

The conditions of natural high forests in most high-energy demand areas (with no or limited prospect for energy substitution), have been continuously degrading. Where commercial energy sources are accessible, reliable and affordable, which is mostly in urban centres, fossil fuel use has been growing at a rapid rate. However, a transition away from woodfuel is likely to take place only with simultaneous improvement in the living standards of people. In 1981, the Panel on Fuelwood and Charcoal could not identify any reliable substitutes for fuelwood for the next 25 years or so and thus had to fall back on recommending the production of more fuelwood to resolve the problem of shortages.

Indeed, the peri-urban and rural population as well as a large number of rural industries and commercial activities will still be using woodfuels for many years to come. But the principal sources for the perennial supply of traditional energy are further decreasing. These sources to a large extent incorporate the managed natural high and secondary growth forests, the unmanaged natural forests, and the degraded forests, including the shrubby and bushy-scrub lands mostly under state ownership. The primary cause of degradation has been improper management. With ever increasing population, the problem of forest management has been further exacerbated and in most cases, the popular theory of the "Tragedy of Commons" prevails.

Supply Enhancement Strategies

To enhance the supply of wood energy in RWEDP member countries, many chronic problems must be overcome. The problems frequently raised include: inadequate institutional and funding arrangements; limited or no participation of stakeholders or beneficiaries (including traditional forest users, women, and minority groups); inadequately trained manpower; and weak political commitment. Solutions can be supported by the application of adequate scientific measures and practices in the management of forests, watersheds, community lands, and degraded lands. Furthermore, all issues related to national policy and legislation, land tenure and tree ownership, as well as present management practices must be reviewed, revised or redrawn in order to make them more pragmatic and acceptable to a majority of the stakeholders. Such measures will be essential for developing a country's long term strategies and plans for forestry development, and also to create a new environment which favours the participation of local forest users, business communities and the private sector in forest management.

Commonly recommended strategies for tackling the woodfuel crisis include: increasing the productivity of existing resources; creating additional fuelwood resources; improving distribution of woodfuels and conversion technologies; and developing alternatives to woodfuels. A mix of different strategies may have to be applied depending upon the specific situation of an area. The Tropical Forestry Action Plan (TFAP) presents a framework to national governments and donor agencies to guide their future actions in tropical forestry management. The areas of action are clearly specified, e.g. forestry in land use; forest based industrial development; fuelwood and energy; conservation of tropical forest ecosystems; and institutions. FAO, which is the coordinating agency for TFAP has assisted countries in the preparation and adoption of a National Forestry Action Plan (NFAP)- a plan mandated by UNCED 1992 for all UN member countries. NFAP could be considered synonymous with the TFAP, since it has a global endorsement.

The generally accepted priority of forest management, which is primarily production of wood for industries and export, has to change. Now, greater emphasis should be given to ensuring the long-term sustainability of the natural resource base, including ecosystems and habitats. The production functions of forests should also continue on a sustained yield basis as they provide numerous types of products required by people. This new and challenging priority calls for the integration of wood energy into different sectoral development schemes for the management of natural resources. Important considerations from the point of view of wood energy resources development include:

- Reorganization, reformulation and adoption of forestry institutions, policy and legislation, to make them more conducive to the changed context of contemporary forestry.

- Application of sustainable land-use practices, including clearly defined ownership rights to trees on the part of land owners and tenant farmers.

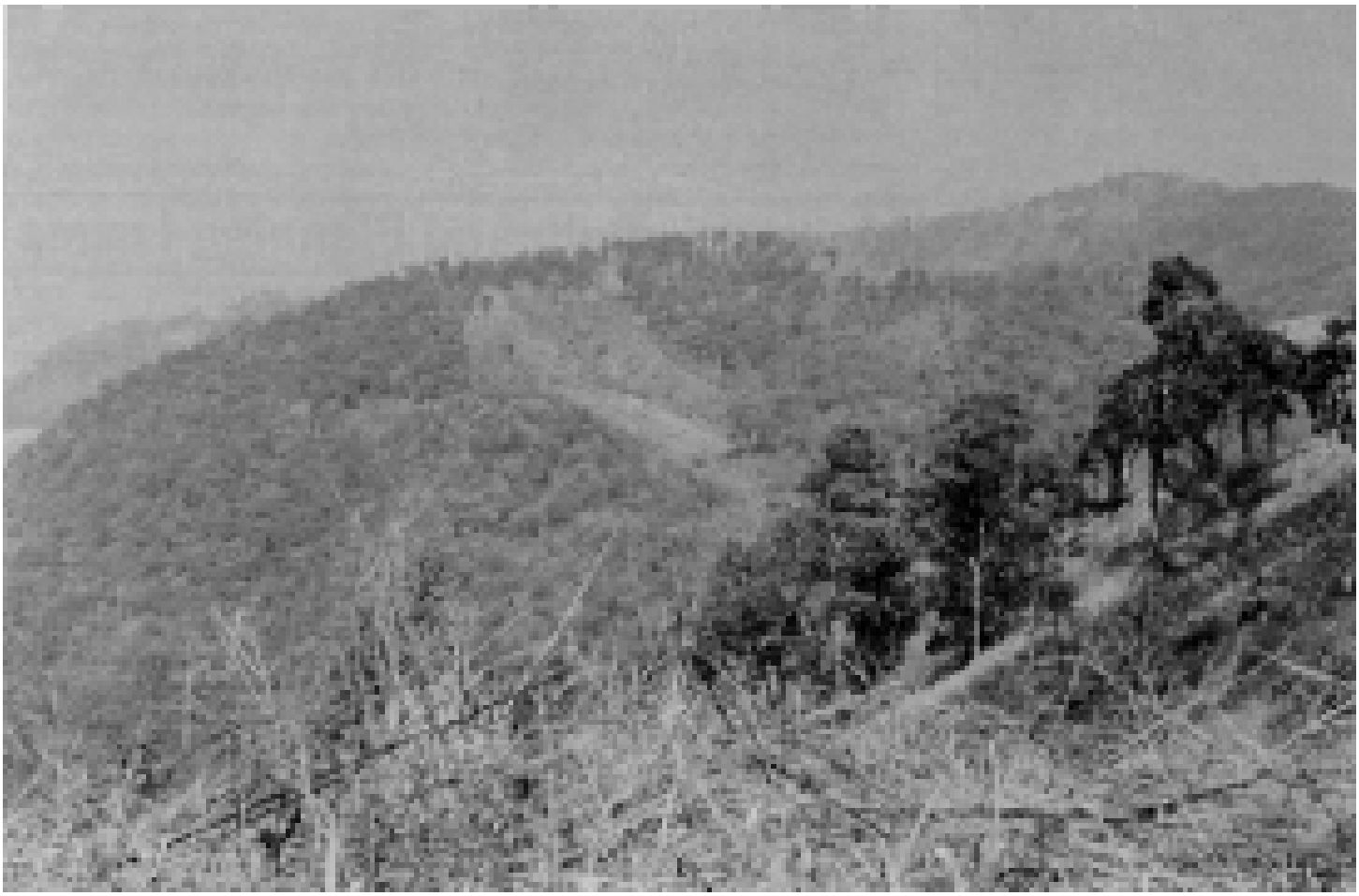
- Change in the attitudes and behaviour of forestry officials to respond to the need of contemporary forestry. This will involve a change from a traditional policing role to the role of a facilitator or supporter.

- Integration of conservation needs and the wood energy needs into all forest management plans in order to promote long-term sustainable economic development.

- Re-alignment of forestry research policy, strategy and plans, including the application of social science theory and practices in addition to the traditional bio-physical aspects of forestry management.

Recent studies on wood energy and related small forest and tree-based enterprises reveal that woodfuels contribute considerably to the income of rural people where only limited opportunities exist for alternative means of employment. A large number of rural households earn cash income from the production, collection, processing and trade of woodfuels. Furthermore, forests products serve as an alternative source of income at the time of crop failure or after natural catastrophes.

The heavy dependence of countries with low -income economies (per capita GDP less than US$ 675) in Asia on wood energy calls for the adoption of multiple approaches to bridge the current gap in energy supply and demand. The immediate options that may be available without much difficulty to enhance the production, include: (a) effective protection and intensive management of existing resources, and (b) massive expansion in plantation of fast growing multi-purpose tree species on land currently lying outside the legal forest boundaries. Moreover, application of efficient combustion technology and better organization of distribution and marketing mechanisms will help to reduce woodfuel consumption and promote resource conservation. Additional actions for promoting the development and use of alternative energy sources where woodfuels can no longer be made available, must be pursued simultaneously with other activities of environmental protection. Alternative energy sources provided to the people must be acceptable, affordable and reliable. In forest rich areas, where a high potential for generating commercial energy from woodfuel exists (e.g. dendrothermal), the potential should be optimally utilized. Participatory forestry programmes



…wood energy resources…

under different labels (Community or Social Forestry, Agro- , Farm or Village Forestry, Forest for the People, etc.) have been pursued over the last two decades, primarily to enhance the production of fuelwood and construction timber for local traditional forest users, communities and other minority groups. New human and financial resources, both from local communities and the private sector, have been, and should continue to be invested in the management of different types of forests. Programmes which promote private and leasehold forestry development should be promoted.

Experience to-date in protected area management indicates that past efforts towards conservation have been only partially successful, since most projects in the past did not integrate the needs of the people residing in and around the vicinity of protected areas. Recent advancement in protected area management, recognizes the necessity of zoning the protected areas by dividing them into a core "Protection Zone " and a "Buffer Zone" or "Conservation Area" within its outer perimeter. The division is from the point of view of the needs of the people living in the surroundings, with their active participation in planning, sustainable management and utilization of such areas.

Recently, the need for incorporating people's requirements into the protected area has become a matter of paramount concern, also from a global perspective. This new consideration requires greater coordination (particularly in terms of policies, strategies, plans and programmes) between the agencies responsible for different sectors of national development. The activity of one sector should not conflict or hinder the development of another. Such an arrangement is essential for the development of wood energy resources, and also from the point of view of the national energy economy.

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Wood Energy Development: Data and Planning Issues

C.S. Heruela

The key issue in defining an effective strategy for wood energy development is how to manage and utilize the resources on a sustainable basis. This requires a better understanding of wood energy flows - the production, processing, marketing, conversion and utilization of wood energy; the integration of wood energy into sectoral planning and policy analysis, particularly in the energy sector; and affirmative policy actions towards wood energy development.

Constraints to Wood Energy Development

Weaknesses in the planning process that prevent the integration of wood into energy planning, are mostly brought about by an inadequate wood energy information base. This not only results in an inadequate understanding of wood energy systems but also in a lack of or weaknesses in wood energy development policies, leading to ineffective wood energy strategies. Weaknesses in energy planning are also brought about by limitations of planning methodologies which are generally biased towards renewables and are therefore inadequate for integrating wood into energy planning - an "unbalanced playing field" - resulting in uncompetitive renewable energy projects. In the end, this undermines any commitment made to wood and renewable energy development at broad policy levels.

Early attempts to incorporate wood energy in modelling studies were based on simplistic assumptions of a rapidly growing "fuelwood gap" resulting from a growing population and declining wood resources. This led to a belief that reducing wood fuel use will result in a decrease in deforestation, and to policies and strategies that limited the attempts by the poorer people to improve their livelihood and prevented wood fuels from contributing to major energy, forestry, environmental and other national development objectives.

The adoption of an integrated energy planning (IEP) process was a step towards effective integration of wood in energy planning and policy analysis by providing a framework for accounting the complexity of wood energy sys-

tems. However, the IEP process needs to be decentralized to be able to conduct micro-level analyses for project identification and design. At the same time, it needs aggregation to conduct macro-level studies for national policy and strategy formulation. These require innovative data collection and management methods and improved energy assessment and planning tools that allow decentralization and aggregation of the planning process, and levelling the "playing field" in the evaluation of energy projects.

Institutional factors can further weaken the planning process. Energy ministries are responsible for coordinating and integrating national energy programs but often have little authority over the energy policy decisions made by other agencies. Furthermore, shortages of skilled personnel have reduced their effectiveness in many countries. Often, skilled people can obtain highly-paid employment outside the government resulting in high rates of staff turnover. It is difficult to reach a "critical mass" of talent, so that in-house knowledge can be passed-on and built-upon by newly arriving staff. Involving foreign consultants in planning studies can also lead to problems because they may be unfamiliar with local conditions and institutions. Finally, vested interests and the inevitably short-term perspective of periodically-elected officials may constrain rational energy planning and policy analysis.

Integration of Wood into Energy Planning

RWEDP aims to help develop national capabilities that will allow a better understanding of wood energy systems and enlightened debates on wood energy issues, leading to the integration of wood into energy planning and resulting in appropriate wood energy policies and effective strategies. In integrating wood into energy planning, there are two aspects of the energy planning process which RWEDP considers necessary to be developed or strengthened; the data and methodological aspects, and the organizational and institutional aspects.

Data and Methodological Aspects

Enhance Capabilities for Data Collection, Processing and Organization:

RWEDP together with relevant institutions will organize regional and national training activities on wood energy planning. This will include topics such as: questionnaire design; training of enumerators; conduct and supervision of surveys; encoding, cleaning and processing of data; and the generation of summary tables and cross tabulations. Trainees will come from related units of energy, forestry and other relevant agencies, including national statistics offices. RWEDP will also support case studies to fine-tune wood energy data collection and organization techniques as well as hands-on training activities.

Improve Wood Energy Information: RWEDP will aim to develop a comprehensive, up-to-date quantitative wood energy data base both at country and regional-levels. The case studies and hands-on training activities will also aim to help improve information at the macro and micro-levels.

Upgrade Energy Modelling Techniques: RWEDP will include training in the use of LEAP (Long-Range Energy Alternatives Planning) and GIS (Geographical Information System) in the training activities and case studies. The LEAP is one model that considers the complexity of wood energy systems. Its other advantages include: it is adaptable to any level of data availability; it is applicable whether planning at the decentralized or aggregated level; and it makes use of a scenario-approach in evaluating the physical, economic and environmental impacts of energy strategies. RWEDP has supported the development of a simplified GIS to make use of available relevant geographical information in site-specific planning and in project identification, evaluation and monitoring.

Policy and Institutional Aspects

RWEDP will support the following activities to develop a more conducive policy and institutional environment for wood energy development:

Establish Institutional Mechanisms: RWEDP will require member countries to organize National Advisory Committees (NACs) and National Wood Energy Working Groups (NWEWGs) to facilitate institutional linkages with countries at the highest possible levels. The main task of NWEWGs and NACs is the formulation, implementation and monitoring of a "national work plan" that will run parallel with the regional-level activities of RWEDP.

Define National Work Plans: The national work plans include activities for strengthening wood energy policies, planning, and strategies as well as proposed policy actions to pave the way for the adoption and implementation of a national wood energy development programme. RWEDP can provide technical and financial assistance in the conduct of multi-sectoral workshops on wood energy policies, plans and strategies wherein one of the objectives is definition and adoption of a national work plan.

The formulation of a work plan that will develop or strengthen wood energy planning capabilities, involves first an assessment of planning activities. The assessment aims to determine what wood energy-related planning activities are currently being carried out, and to what extent they are incorporated into the country's energy planning process, and to identify gaps which preclude the integration of wood into the energy planning process. Assessment also involves conducting an inventory of wood energy-related planning activities, and identification of the country's training needs. The results will help to define the national work plans which include the following types of activities:

- capability building activities: regional and national training activities intended to develop expertise in such areas as: data collection and management; energy demand analysis; wood energy supply assessment; energy projections and scenario studies; and energy policy analysis.

- information base strengthening activities: case studies which will help to build up a wood energy data base

and provide hands-on exercises in the following areas: rapid rural assessment studies; formal structured surveys; aerial photogrammetry; energy modelling; decentralized area-based planning studies; project identification and evaluation; and integrated energy planning.

- policy actions: policy decisions that clear the way for the implementation of the work plan such as: defining new mandates, tasks or responsibilities of agencies concerned; creation of new organizational structures; commitment of resources or other inputs for implementation; etc.

Expected Results

The activities defined under the national work plans are building blocks towards defining national wood energy policies, plans and strategies. The expected results at the end of the five-year duration of RWEDP are countries having the organizational and institutional capabilities to:

- analyze and define wood energy-related policies;
- integrate wood into energy planning, and conduct integrated energy planning exercises that incorporate wood energy; and
- formulate and evaluate wood energy supply and utilization strategies, and implement, monitor, evaluate and improve wood energy strategies.

The ultimate objective of these exercises is the implementation in the countries of an effective national development strategy for a techno-economically efficient, environmentally-safe and sustainable supply and use of wood energy well-integrated within the national energy programme.

The State of Wood Energy Development

Harry Oosterveen

Based on the country papers, submitted for the Regional Advisory Committee Meeting, and the presentations given at that meeting, this paper gives an overview of the state of wood energy development in the member countries of RWEDP. The full country papers will be published in the proceedings of the RAC meeting (forthcoming). The delegates, who presented their country papers, were specifically requested to highlight the institutional aspects, experiences and problems encountered in their countries, and suggestions for assistance by RWEDP, as well as suggestions to other countries. Most countries sent one delegate from the forestry sector and one from the energy sector. Three of the four new member countries, China, Lao PDR and the Maldives, were represented by the forestry sector only, whereas Malaysia was represented by both sectors.

Institutional Aspects

The general picture in most countries is that there are several institutions dealing with the various aspects of wood energy development. Forestry departments/ministries are active in the field of forestry planning, plantations (although often not specifically for wood energy, or with the purpose of supplying fuelwood as a by-product), and in some cases with improved stove development and dissemination. Energy departments deal with energy planning and implementation, and in several countries there is a department specifically dealing with renewable sources of energy. Still, there is little focus on wood energy, and also the renewable energy departments are involved in many more forms of renewable energy, such as solar, wind and hydro. Although there may be activities in wood energy development, this does not mean that it is incorporated into mainstream energy planning.

In most countries, there is no institute dealing specifically with wood energy. Instead, activities in this field are scattered around various institutes, and there is no institutionalised coordination for wood energy. Coordination between the relevant ministries often takes place at the level of National Planning Committees, but there is no indication that this involves wood energy development.

In most countries focal points for RWEDP have been identified already, as these often remain the same as in the previous phase of the programme. The focal points are usually at the forestry ministry and at the energy ministry. Additional members of the National Advisory Committees (NATCOMs), namely representatives of other key institutions and relevant organizations, have been appointed in some countries; in others they still have to be identified. National Wood Energy Working Groups (NATWEGs) still have to be formed (with the exception of the Philippines), and the situation as described above shows that there is a need for improved coordination between all organizations dealing with wood energy. This need was also acknowledged by several country representatives.

Experiences and Problems

Wood fuels supply a significant part of the total energy consumption, although the shares vary among countries, ranging from 20–90%. In most countries there are shortages of fuelwood, although often only in certain areas of the countries, and to a varying degree in different areas. Relatively little manpower and funds are set aside to deal with the situation. Due to these limited resources, and often a lack of coordination and cooperation between relevant organizations, the situation can not be dealt with adequately: there is a lack of data and the wood energy sector is not represented at higher decision making levels.

Other problems mentioned, particularly in the implementation phase, are lack of experience in carrying out dissemination projects, lack of support and participation at the local level, reluctance and

financial constraints to adopt new technologies. Gender issues were not particularly addressed in the country presentations. Some countries mentioned that the cooperation between government organizations and NGOs is improving.

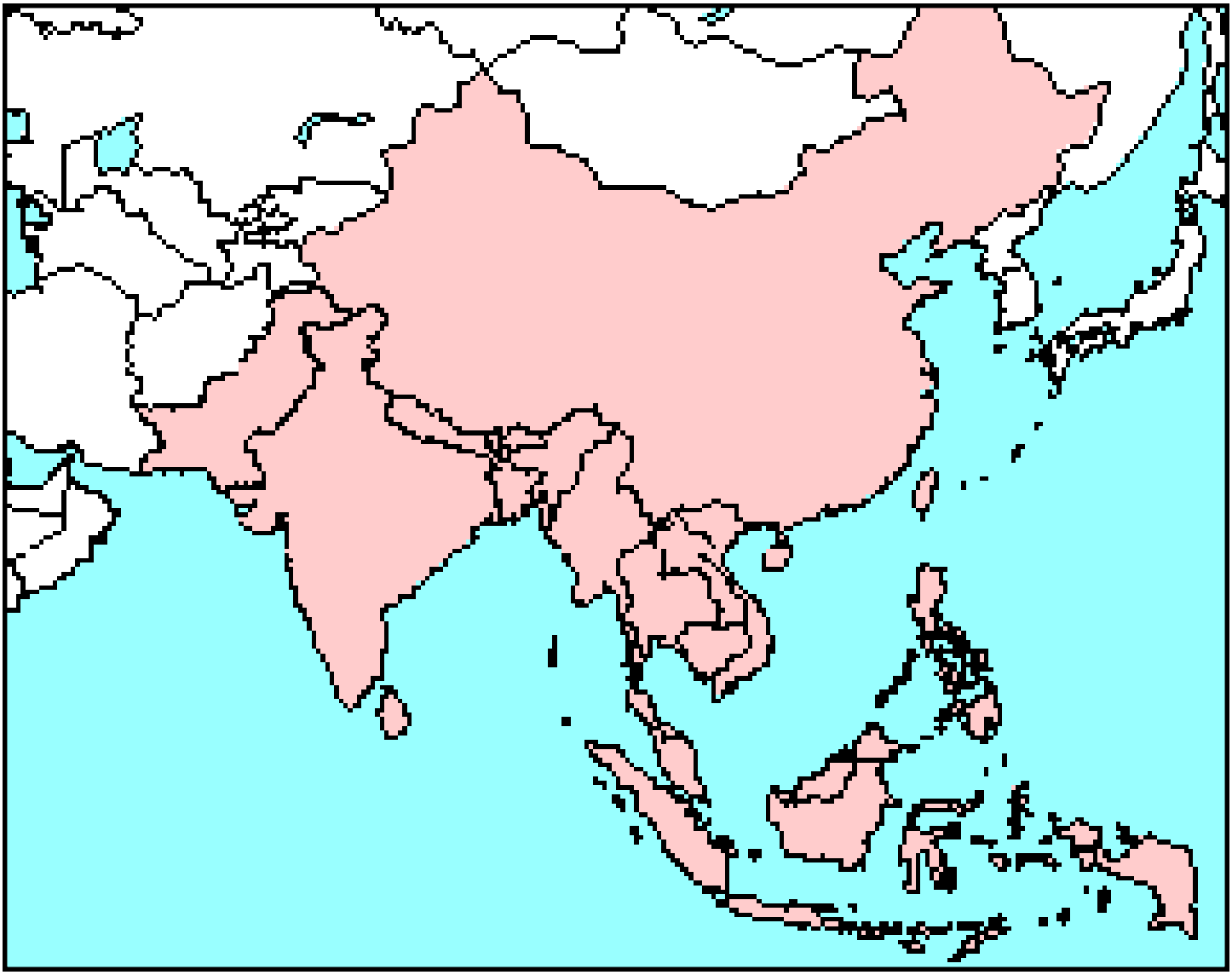
During the past years, the knowledge and understanding of wood energy has greatly improved, and a wide experience has been gained in the implementation of various projects and programmes. Still, much information is lacking and the increased knowledge has not been translated into sound wood energy policies or incorporated into national forestry and energy planning yet.

From the fact that almost all member countries of the previous phase of the programme were represented at the RAC meeting by both the energy and forestry sectors, while the new countries were mainly represented by the forestry sector only, it can be concluded that one of the achievements of the programme has been to bring wood energy to the attention of the energy sector.

Suggestions for RWEDP

There are two groups of countries: one group that has gained experience and built up expertise, where the major constraints are the lack of data and cooperation, particularly between GOs and NGOs, and the other group where the lack of experience and expertise is hampering the further development of wood energy. Therefore, there is considerable scope for exchange of expertise between countries, which can be facilitated by RWEDP.

Priority areas for RWEDP assistance, cooperation and training are different from country to country. However, in the field of data collection and processing and data base development, most countries feel that there is a need for assistance and training. Other priority areas mentioned are: resources conservation, dissemination of improved wood conversion technology, support for case studies, information exchange, and, as noted particularly in the paper from Vietnam, elaboration of national policies, strategies and programmes on wood energy and how to integrate these into energy planning and rural development.



RWEDP member countries

RAC Meeting: Conclusions and Recommendations

Regional Advisory Committee Meeting, Bangkok, 31 January – 4 February 1995

The meeting of the Regional Advisory Committee (RAC) provided a venue for interactions between the forestry and energy sectors, leading to substantial discussions on wood energy issues. As most of the participants are at senior levels, there was assurance of follow-up by country-level activities. The RAC endorsed the analyses and work plans presented by RWEDP. Some major conclusions and recommendations of the meeting are summarised here.

Conclusions

1. Wood will continue to be a major source of energy in the foreseeable future in rural as well as in urbanizing areas of the developing countries of Asia. However, woodfuel use in both the domestic and industrial sectors is still largely inefficient. Gender issues are important at all levels of wood energy development.

2. The relationship between wood energy use and the environment does not always have to be negative. Wood energy is proving its potential not only as a techno-economically competitive energy source, but also as an environmentally-safe and sustainably-produced fuel. Furthermore, supplying woodfuels (i.e. firewood and charcoal) contributes considerably to rural incomes as a large number of households obtains cash earnings from the production, collection, processing and trading of woodfuels.

3. In many countries information is insufficient for a comprehensive understanding of wood energy systems, and inadequate for integrating wood into energy planning. This results in policies and strategies that constrain attempts by the poorer people to improve their livelihood, and prevents woodfuels from contributing to major energy, forestry, environmental and other national development objectives.

Delegates during the RAC

4. A multi-pronged approach to enhance wood energy supply includes: effective and intensive management of existing resources, massive expansion of tree plantations, and better organization of the distribution and marketing of woodfuels. Wood resource management should aim for sustainable management of existing forests for the conservation of the resource base, ecosystems and habitat, perhaps by local level control. The priority should be the fulfilment of basic needs and not only the production of wood for industries and exports.

5. Where market opportunities for wood exist, development can be promoted through private investment in forests, leasehold forests or joint venture companies. Communities, user-groups and forest dwellers can be motivated to participate in commercial wood production, including wood fuels. If there are no prospects for commercial trade, participatory forestry can be developed to incorporate woodfuels for subsistence users. Multi-purpose fast-growing trees and their potential to contibute non-woody forest products should enhance the economic and social value of wood production systems.

6. Improved wood energy conversion technologies are to be promoted, aiming at reducing losses in the intermediate steps between the resource collection and the end-use. Energy conservation measures for end-use equipment, such as the introduction of more efficient combustion and conversion equipment for stoves, furnaces and kilns, are urgently needed.

7. Energy conservation strategies face technical, financial, economical, institutional and social barriers which in most cases are related to each other. This complicates the implementation of effective conservation strategies.

8. A coherent wood energy policy requires linkages between different sectors, particularly energy, forestry, land use, and agriculture. Other relevant areas include industry, labour and employment, rural development, gender, ethnic minorities, public health care, technology transfer, international cooperation and trade, and environment.

9. RWEDP has an important role as a facilitator for: exchange of information and expertise; regional and national training activities; provision of short-term fellowships and internships; encouraging case studies and providing pilot projects; and support to special activities, etc.

10. Political support from top-decision makers is essential for effective planning and programme implementation.

Recommendations to RWEDP

1. Procedures for screening of participants in training workshops are necessary to ensure optimal effect of the training. Amongst the criteria are (i) the availability of the participant for the conduct of follow-up activities, and (ii) clearly defined obligations and responsibilities of the member countries with regard to proper utilization of trained personnel.

2. RWEDP should continue collaborating with other regional networks, organizations and experts in developing and implementing human resource development activities, particularly for regional and national level training. In all training activities gender aspects will play a role. Special training modules on gender and wood energy can be developed and disseminated by RWEDP.

3. RWEDP should identify parameters and core-data which countries should collect. In order to reach a "common language" for wood energy data systems, such data are to be standardised, in conjunction with survey methods and units of measurements.

4. RWEDP should therefore organize a technical meeting to determine and recommend appropriate standardization methods for data collection and organization (like classification of traded and non-traded wood fuels, wood energy production techniques, cultivation and harvesting of particular species, wood energy processing techniques, charcoal making and wood gasification, heating values, units of conversion, etc), and identify relevant sources of expertise from previous and ongoing projects).

5. Wood energy databases should include other biomass energy.

6. The sustainability of databases for the period after the completion of the RWEDP should be addressed. The databases need to be linked with FAO information or statistics programmes.

7. Case studies on the following subjects are suggested:

- economics of production, handling, marketing and utilization of fuelwood and charcoal;
- economics of different end-uses of woodfuels, including aspects of gender;
- strategies and technologies for upgrading wood energy resource management;
- economics of wood energy conservation for households and small-scale industries;
- successful (and unsuccessful) cases of coordination between forestry, energy and agriculture sectors as regards supply and management of woodfuel.

8. RWEDP, whenever necessary, should assist countries in assessing wood energy policies with a view to promoting a more favourable environment for wood energy development. Existing policy instruments would have to be reviewed.

9. RWEDP can organize study tours or visits for high- and medium-level government decision makers in an effort to raise awareness and increase understanding of wood energy issues. In order to generate political support, RWEDP can further develop media presentations on the linkages between wood energy and development, that will appeal directly to the interests of politicians and decision makers.

10. Information on the success/failure factors of wood energy resource man-

agement and conservation strategies as applied by countries, should be compiled and disseminated. RWEDP can support surveys of the strengths of member countries with a view to identifying which models can serve other countries. On the basis of this, RWEDP should work with countries to identify appropriate interventions in resource management and conservation.

11. RWEDP should organize specific training on wood energy planning methods. New roles of planning in the national context, and the economic aspects of fuelwood need the constant attention of RWEDP and member countries.

Recommendations to member countries

1. Priority should be given by member countries to the establishment of the National Advisory Committee (NAT COM) on Wood Energy. This institutional set-up must be in place to ensure the smooth implementation of the programme.

2. The Regional Advisory Committee endorsed the Terms of Reference of the National Advisory Committees (NAT COMs) on Wood Energy, and the National Wood Energy Working Groups (NATWEGs). However, the NATCOM could be an existing committee which takes up a mandate for RWEDP.

3. The NATCOMs should be chaired by a senior government official.

4. Members of NATCOMs should be selected such that the Committee has the authority to coordinate work amongst various sectors, make facilities accessible to the NATWEGs, and convince the government regarding the importance of wood energy. The NATCOMs should strive for continuity in their membership.

5. Governments of member countries should provide adequate facilities for the NATCOMs, like secretarial support and operational budget.

6. There should be good and frequent interactions between NATCOMs and the RWEDP-office to monitor the implementation of country programmes.

7. Mass media should be addressed to promote RWEDP objectives and activities, explaining the advantages to member countries for participating in the regional wood energy programme. Promotional efforts should be directed to top-officials to encourage support for programme activities in their own countries.

8. Member countries should establish a coordination mechanism at the national level for different sectors to exchange information and data. For instance, the National Wood Energy Working Groups under the guidance of the National Advisory Committees, and with representatives of national planning offices, should link scattered databases relevant for wood energy planning.

9. Well established NGOs and private sector companies should also be involved in wood energy development. Decentralised levels of government should be given a proper role in wood energy planning and implementation. Gender issues are to be integrated into national and sub-national efforts for wood energy development.

10. Member countries should make a timely effort to institutionalise training programmes in wood energy development, preferably with the help of RWEDP.

Publications Review

Bioenergy for Development - Technical and Environmental Dimensions

Bioenergy for Development is written by J. Woods and D.O. Hall, and published by FAO as no. 13 in its Environment and Energy Paper series. It deals with the potential for biomass energy, bioenergy conversion technologies, environmental interactions, as well as policy, socio-economics and institutions. The following is a brief summary of some of the main points made by the authors.

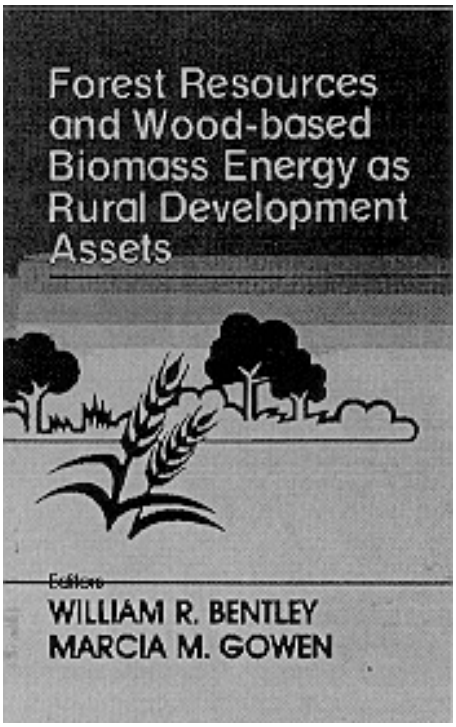
Energy from biomass can play a significant role in the future supply of energy. It does so already with respect to small-scale applications, such as domestic cooking, but in the next century it also has the potential to supply a large share of modern energy. Many of the technologies are already mature and, depending on the circumstances, can compete with more conventional sources, such as large-scale hydropower and fossil fuels. However, a major constraint is that often these more conventional sources are subsidised, the so-called "uneven playing field". To make bioenergy competitive, subsidies to fossil fuels should be removed or mitigated, and external costs (externalities) should be taken into account. These costs include environmental damages, such as acid rain, greenhouse gases, etc. An example of this is the so-called carbon taxes that are levied in some European countries. If sustainably grown, biomass energy has many environmental benefits over conventional fuels.

There are considerable areas of land available for the production of biomass, for example on wastelands. In some countries in Asia little land seems to be available for biomass energy programmes. However, agroforestry and the use of agricultural residues and wastes still leaves a large potential for biomass energy. Besides, the increased availability of energy for agriculture may lead to higher yields, thus reducing the need for more agricultural land.

Although the technology for large-scale biomass energy plants is available, the necessity to be near the resource (due to high transport costs of the raw material) makes small to medium scale plants often a more feasible solution. This has several advantages: not only does it reduce the cost for long distance electricity distribution with the attendent obvious losses in power and drops in voltage, but it also allows for more flexible energy planning, by adding small modules instead of large plants.

Governments have to play a role in the further spread of modern biomass energy use, by means of policies that remove constraints, such as the above mentioned unlevel playing field, and by promoting communication and cooperation between the different institutions and government sectors involved, ie. agriculture, forestry, land planning and energy.

This publication is available from FAO, Rome. Write to Mr. Gustavo Best, FAO/AGR, Via delle Terme di Caracalla, 00100 Rome, Italy.



Forest Resources and Wood-based Biomass Energy as Rural Development Assets

This book is a result of a February 1992 workshop on Forest Resources and Wood-based Biomass Energy as Rural Development Assets, held in Old Saybrook, Connecticut, and contains a number of the papers presented there with some additional ones. The papers, edited by William R. Bentley and Marcia M. Gowen, are on various topics related to the title, so the book is divided into various parts: experiences with wood-based biomass energy, tropical forest management, and forest economies.

Two results from the workshop are mentioned in particular. Firstly, the wood energy utilization issue is a complicated matter as the use of wood for energy, even if only residues are used, could have both positive and negative consequences, and it requires addressing the issue of social causal relationships, not simply the technology as such. The other result is the recommendation that more applied research is needed, in contrast to disciplinary research. This is particularly the case for policy in terms of political and institutional relationships,

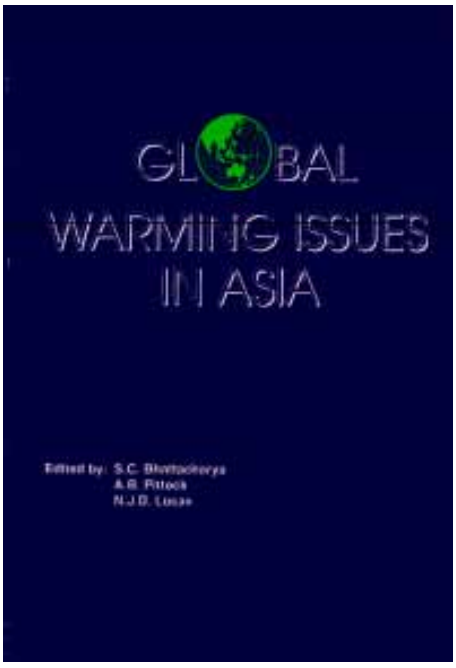
ownership or property and tenure rights, inventories, not only stocks but also flows of all resources, and resource management systems.

It is concluded that the questions raised can not be answered by a particular discipline or research method, but instead requires integrative thinking between the related disciplines. It also argues for case studies that go beyond an evaluation of a project in mere financial or economic terms. Attention should be paid to identifying the sources of risk, uncertainty and ambiguity. What can be done to reduce these? Who pays and who benefits, and why? Do the technologies and institutions mesh in concert to increase productivity, to improve the environment, and to benefit poor people? Some examples of this type of case study can be found in the book.

The book is published by Oxford & IBH Publishing Co. Pvt. Ltd, 66 Janpath, New Delhi 110001, India.

Global Warming Issues in Asia

Proceedings of the Workshop on Global Warming Issues in Asia, 8-10 September 1993, Bangkok, Thailand, edited by S.C. Bhattacharia, A.B. Pittock and N.J.D. Lucas. The proceedings consist of 36 papers which are divided into 6 major sub-headings namely 1) Modelling, Climate Change and Impacts, 2) Emissions and Energy, 3) Policy Considerations, 4) Agriculture and Forestry, 5) Water Resources and 6) Global Warming and the Developing Countries. In addition to the papers, reports of the working groups are also presented.



The proceedings provide a comprehensive overview of issues related to the emission of greenhouse gases and their impact on the climate likely to be faced by different geographical regions or groups of countries of the world. Scientists generally agree that the continued and increased emission of greenhouse gases such as carbon dioxide, (an increase in CO_2 of about 11% over the last 30 years has been measured versus an increase of about 25% over the last 200 years). Besides CO_2 which is mainly derived from the burning of fossil fuels, other greenhouse gases are emitted such as methane (mainly due to agro based activities), CFCs, nitrous oxides, etc. (increasing at a combined rate of about 1% per year). It is expected that this increase will lead to climate changes in terms of increasing the average global temperature. However, the actual global rate, sometimes estimated at an increase of 0.3ºC per decade over the next 40–60 years, remains the subject of scientific debate. The same is true for the extent of such variations from place to place and its impact on socio-economic conditions. The extent to which countries contribute to the global emissions of CO_2 varies, but two main trends are clear. Heavily industrialized and populous countries have contributed most to the problem to date but, if recent trends are any indication, the other countries are likely to become the dominant source in the next century. However, on a per capita basis, CO_2 emissions are much higher in the industrialized world and are likely to remain so into the future. With regard to Asia the climatic effects
are even less clear due to various reasons. Still little is known about specific emission characteristics (burning of biomass fuels, residues, etc. large scale rice growing, etc.) while on the impact side the monsoons, cyclones and ENSO (El Nino and the Southern Oscillation) may cause specific effects.

Participants were unanimous in recommending further research in various fields. These consist of but are not limited to areas such as: How to assess and quantify the effects of changes in land use (forest degradation, standing biomass, productivity, soil carbon and nitrogen content, etc.); impact of climate change on growth rates in agriculture and forests); socio-economic (regional and international) effects and identification of alternative industrial and land use development strategies; policy instruments (possible effects of subsidies and carbon taxes on energy production/use, social effects, environmental effects, resource transfer, technology transfer, etc. However, participants were also unanimous in that anticipatory action should be taken even though uncertainties exist as possible outcomes will be unacceptable and have to be avoided. The key at present appeared to be to continue to work to reduce the uncertainties so that actions are based less on assessments of the risks involved and more on scientific knowledge.

Available from: Regional Energy Resources Information Centre (RERIC), Asian Institute of Technology, P.O. Box 2754, Bangkok 10501, Thailand (Price US$ 50 for Asia and US$ 65 for other countries airmailing included).

Events

Event, Description (Info)	Date, Venue
Community Forestry, certificate course Planning and implementation of community forestry activities, advice to villagers in forest management, training of facilitators (RECOFTC)	5 Jun–6 Oct 1995 Bangkok, Thailand
Geographic Information Systems & Environmental Modelling, short course Principles and potential of GIS's as a tool in resource management, hands-on skills in development and use of GIS for complex sets of resource and environmental data (ANUTECH)	3–14 July 1995 Canberra, Australia
Rural Energy and Development, specialization within MSc course Analysis of potentials and constraints in rural energy, with a focus on surveys, information, planning and decision making, within the MSc degree course "Forest Survey" or "Socio-economic Information for Natural Resource Information" (ITC)	Aug 1995–Feb 1997 Enschede, The Netherlands
Energy Technology, conference Energy conservation and management, renewable energy, energy policy and planning, environmental issues related to energy utilization (ASEAN)	28-29 Aug 1995 Bangkok, Thailand
Environmental Assessment for Development Projects, short course Environmental screening of projects, identification and scoping of environmental impacts, and environmental appraisal in project design, monitoring and evaluation (ANUTECH)	4–29 Sep 1995 Canberra, Australia
Energy Management in Small and Medium Scale Industries, training programme Enhanced management capabilities for small and medium scale industries in developing countries in general, and with respect to the role of energy, energy supply, choice of fuels and machinery, energy efficiency/conservation and relevant policy options and strategies (UT/MSM)	9 Oct–10 Nov 1995 Enschede/Maastricht, The Netherlands
Forestry Planning & Management Course, 8-week course Modern concepts of environmentally sustainable development: plantation development and the management of indigenous forests, project planning and management (ANUTECH)	16 Oct–8 Dec 1995 Canberra & Gympie, Australia
Environmental Assessment for Sustainable Land Use, international course Analysis, Explanation and design of solutions for environmental problems by the use of the 'Problem-in-Context' framework (IAC)	22 Oct–4 Nov 1995 Wageningen, The Netherlands
Gender in Policy Development for Sustainable Land Use, international course Information, wider viewpoints and tools required to conceptualize, plan and formulate policies from a gender perspective in the field of sustainable development (IAC)	5–18 Nov 1995 Wageningen, The Netherlands
Environmental Management: A Gender-balanced Approach, short course This course aims to foster the development of plans, practices and policies which encourage gender-balanced environmental management within a framework of sustainable development principles (ANUTECH)	6 Nov–8 Dec. 1995 Canberra, Australia
Energy, Environment and Economics, international symposium Exchange of knowledge, ideas and plans for the future in policy, efficiency, economics and environmental effects of energy production, utilisation and conversion (MELBOURNE)	20–24 Nov 1995 Melbourne, Australia

ANUTECH: ANUTECH/Australian National University, GPO Box 4, Canberra, ACT, 2601, Australia. ☎ (61-6) 249 5671, 249 0617, 🖹 249 5875, 257 1433

ASEAN: ASEAN Conference on Energy Technology, School of Energy and Materials, King Mongkut's Institute of Technology Thonburi, Bangmod, Rasburana, Bangkok 10140, Thailand. ☎ (66-2) 427 8094, 🖹 427 9062

IAC: International Agricultural Centre, P.O. Box 88, 6700 AB Wageningen. ☎ (31-8370) 90111, 🖹 18552

ITC: International Centre for Aerospace Survey and Earth Sciences, P.O. Box 6, 7500 AA Enschede, The Netherlands. 🖹 (31-53) 874 238, 💻 scheggetman@itc.nl

MELBOURNE: Symposium on EEE, Faculty of Engineering, University of Melbourne, Parkville, Australia, 3052.

RECOFTC: Regional Community Forestry Training Center, Kasetsart University, P.O. Box 1111, Bangkok 10903, Thailand. ☎ (66-2) 579-0108, 561-4881, 🖹 561-4880

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Opening sessions of the RAC

Group portrait during the RAC field trip