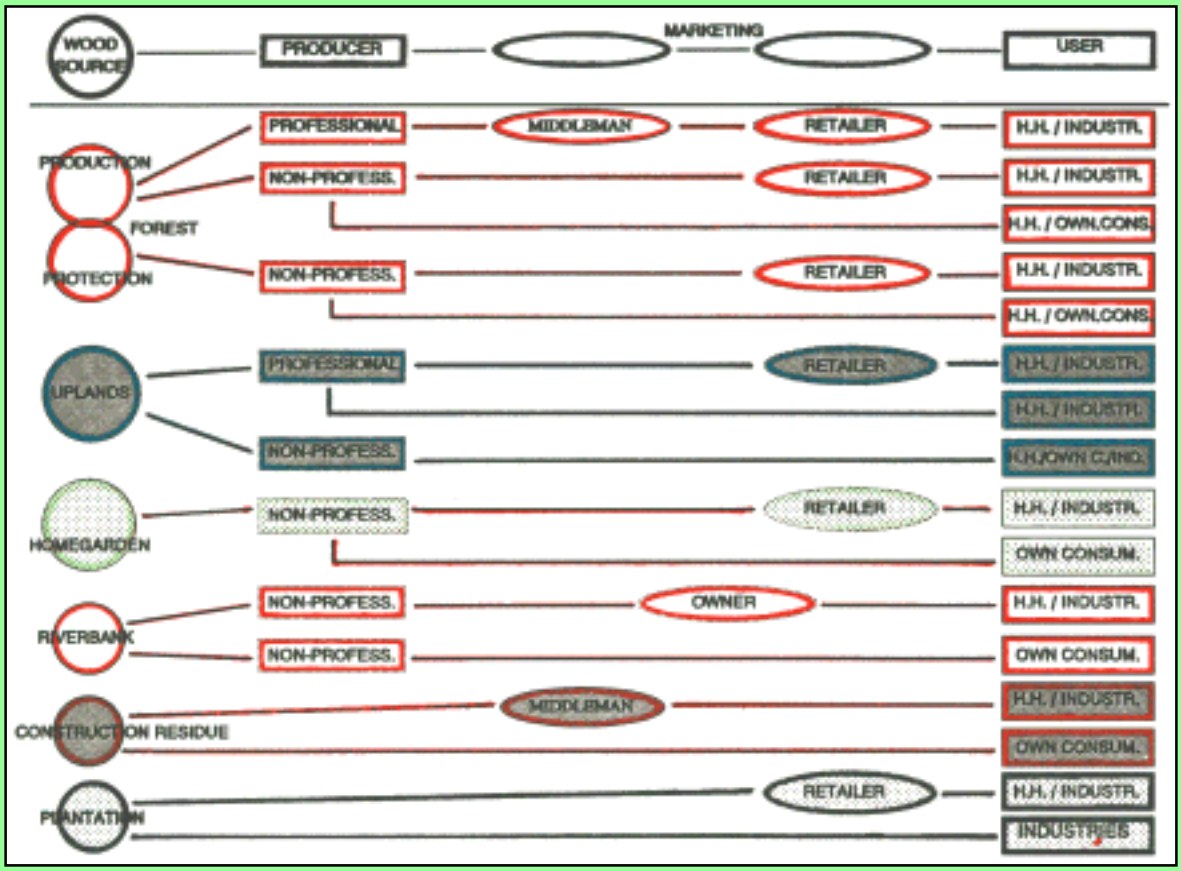
Field Document No.37a

REGIONAL WOOD ENERGY DEVELOPMENT PROGRAMME IN ASIA
GCP/RAS/154/NET

# WOOD ENERGY DEVELOPMENT:

# PLANNING, POLICIES AND STRATEGIES

**VOLUME I**
**Report on the RWEDP Regional Meetings on Wood Energy Planning and Policies**




**FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS**
**Bangkok, May 1993**

This publication is printed by
the FAO Regional Wood Energy Development Programme in Asia,
Bangkok, Thailand



*These proceedings consist of three volumes:*

*Volume I: Report on the RWEDP Regional Meetings on Wood Energy Planning and Policies*
*Volume II: Papers Presented at the "Expert Consultation on Data Assessment and Analysis for Wood Energy Planning*
*Volume III: Papers Presented at the "Seminar on Policy Instruments for Implementation of Wood Energy Development Programmes"*

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## FOREWORD

Development of appropriate wood energy strategies and improvement of the capabilities of member countries in planning wood energy development programmes are two important objectives of the Regional Wood Energy Development Programme in Asia (RWEDP). Since its inception in 1985 RWEDP has supported a large number of case studies, workshops and training courses on various specific subjects related to these two objectives. The list of RWEDP publications on the back of this document reflect the project's past activities in this field. Other national and international institutions and organizations have also contributed to an improved information base on wood energy.

The actors in wood energy systems, from the supply and demand sides, are clearly identified and their roles are now better defined than in the past. In addition forest resources are beginning to be assessed and evaluated in a more systematic way.

For example, while earlier the use of fuelwood by poor people was seen as the cause of deforestation it is now recognized that other factors such as conversion to farmlands, industrial use of forests and forest fires - for which not always the poor people are responsible - are also important causes.

It has also become clear that wood energy provides opportunities for income generation and rural development and deserve attention of policy makers from a broad range of sectors.

While considerable progress has been achieved in improving national capabilities in research, training, education and wood fuel surveying additional efforts are required to create multidisciplinary teams capable of mastering the subject and involving relevant groups (local governments, villagers, NGOs, university research and extension programmes, and others) in the planning and implementation of wood energy projects.

Unfortunately, the quality of wood energy data available is still inadequate for conducting detailed sectoral reviews and wood energy planning activities. In many countries, this lack of accurate information leads to controversial interpretation of the energy situation and hampers the correct identification of solutions to be undertaken.

The end of the second phase of RWEDP was considered to be an opportune time to reflect on the progress made in our understanding of wood energy issues in RWEDP's 11 member countries and on possible issues to be addressed in a follow-up project.

Thus, from 22 February to 3 March 1993, two consecutive regional meetings were conducted in Chiang Mai, Thailand. The first one, aimed at planners from RWEDP member countries, was an *"expert consultation on data analysis and assessment for wood energy planning" while* the second one, aimed at policy makers, was a *"seminar on policy instruments for the implementation o wood energy development programmes".* 36 participants came from the member countries to the two meetings, and a total of 29 papers by 23 resource persons were presented.

A wealth of information became available during these meetings and RWEDP is grateful to all the participants and resource persons who contributed to lively discussions and/or acted as rapporteurs of the various sessions and workshops. Particular thanks go to C. Heruela, who as a consultant to the project was primarily responsible, from the initial conceptual framework to the final editing of the three volumes of this report. I also wish to thank Aroon Chomcharn and Cor Veer for their valuable inputs in preparing the agenda's and Tina Sriratana, Pimpa Molkul, Panpicha Issawasopon and Navaporn Liangcheevasoontorn for their assistance in the organization of the meeting and Panpicha for the typing and design of the documents.

It is hoped that the two meetings and this report will generate appropriate attention to wood energy from planners and policy makers in the field of energy, natural resources and rural development. Hundreds of millions of poor people in our member countries, depending on this important source of energy and income, deserve it.

Egbert Pelinck
Chief Technical Adviser

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# Chapter 1

## INTRODUCTION

*Rural women bunding fuelwood for sale in **Myanmar** - Trading of wood fuels provide additional source of income to farmers and other rural dwellers.*

*Wood as cooking fuel in a commercial kitchen in Indonesia - Wood fuels provide energy for process heating in many types of enterprises and industries*

*Upland agroforestry farming in Pakistan - Tree planting and sustainable management of multipurpose trees that complement agricultural production systems*

# Chapter 1

# INTRODUCTION

## 1.1 DEVELOPMENT BACKGROUND

**The FAO Regional Wood Energy Development Programme (RWEDP) in Asia** has been operational since March 1985 in 11 countries of the region. RVv'EDP has been one of several regional and international cooperation programmes which have been assisting countries in Asia in studies and other activities to improve the wood energy situation in them. The results of these studies and activities have considerably changed the understanding on the role of and prospects for wood fuels.

In the mid-eighties, the ideas about fuelwood were dominated by the perception of widespread and rapidly growing fuelwood crisis. This was thought to be associated with rural hardships in the form of long time spent on fuelwood gathering that would affect agricultural labor and productivity, in the worst case even the diet of the people. Also fuelwood gathering was at the time perceived as a major cause of deforestation.

These issues were much debated in the forestry sector and strategies to tackle the perceived wood fuel problem emphasized the reduction of fuelwood consumption through more efficient charcoal production systems and cooking devices and the substitution by other fuels. Also, increased production of fuelwood was advocated through planting of fuelwood species, and the cultivation of energy plantations.

At the same time, the energy sector centered their activities on exploring innovative energy applications for wood fuels, focusing on the development of more efficient conversion and utilization technologies that can use wood fuels as feedstock for producing fuels for internal combustion engines and for power generation. R&D activities on the gasification, fermentation and densification of wood fuels were undertaken. However, in most countries, these new technologies went as far only as village demonstration projects creating no significant impacts on the greater number of wood energy users - the domestic sector.

Nevertheless, in many cases, the people on their own, adapted to the changing wood energy situation. They adapted differently depending on the nature and speed of change of the situation in trying to satisfy their fuel needs for energy using-activities traditionally supplied by wood fuels cooking in households and process heating in rural-based industries and enterprises. There were those who moved to the use of electricity and fossil fuels when they were given the options to do so, while many had no choice but to shift to lower forms of fuels such as agri-residues and animal wastes.

However, in most of the region, people continued their use of wood fuels. And in many of these areas, the total use of wood fuels has increased. Today, wood remains to be the dominant domestic energy source for most people in the developing countries of Asia. In some cases, over 90% of domestic energy is still supplied by wood. In addition to satisfying the primary rural household energy requirements, wood is also used in supplying energy for many rural-based enterprises; brick kilns, lime kilns, drying tea and tobacco, smithies, potteries and various cottage industries and household-based enterprises.

Furthermore, inspite of the increasing availability of electricity and fossil fuels in all countries of the region, wood continues to be significantly used for cooking in the households in urbanizing areas in Asia and as an energy source for process heat production in a number of urban-based industries and enterprises. In these areas, wood fuels are traded goods - a "cash crop" which provides an alternative source of income for its suppliers, mostly farmers and other rural dwellers.

Wood will remain to be a significant indigenous energy resource for the foreseeable future in most countries of the region. Higher household incomes to the majority of the population coupled with affordable, accessible and steady supply of alternative "modern" fuels - the conditions that led to people to shift from wood fuels - are not likely to occur in majority of the countries in the region soon.

On the other hand, even if such conditions occur, wood energy can also be viewed as a "modern, sustainable and indigenous" fuel option. Although it may appear that there are several areas where use of wood fuels has may have contributed to the cutting of trees from the forests and probably unto land degradation, apparently, this is not prevalent through out the region as was previously generally regarded.

Recent studies have indicated that there are many situations which show that significant portions of wood fuels being used are coming from non-forest areas and are therefore not contributing to forest denudation as was previously thought of. Wood fuels are also significantly coming from trees growing on places like farms and homesteads, and along roads, river banks and irrigation canals. Trees are not wholly cut for fuelwood, as many believed before, but their branches lopped off instead allowing for regeneration. And tree-growing technologies, through agroforestry, have been introduced in some areas which encourage the planting and sustainable management of multi-purpose trees that complement agricultural production systems.

These studies show that if the right policies, support structures and market environment are present in localities where favorable agro-ecological conditions occur - wood fuel use, rather than causing indiscriminate tree cutting, on the contrary, can lead to economic and sustainable production of wood fuels and other produce from trees and other woody biomass resources. This may not only result in the continued supply of an indigenous energy resource, but can help, in particular, farmers and other rural dwellers address the more pressing need of generating additional income. From an environmental aspect, this can even result to the upgrading of waste lands.

In these situations, many benefit and in various forms; the rural users have a source of locally-available, accessible and affordable fuel, the wood fuel producers and traders have a source of income, and the urban and industrial users have an additional cheap energy supply option. It will not be difficult to see that such developments can contribute to the larger goals of energy, forestry, environment and national economic programmes in most of the countries.

In furthering wood energy development in countries of the region, there are two factors that influence the supply and use of wood fuels which must be considered:

- The first is the country's national programme for the development of energy supply to fuel economic growth and development. Most countries of the region are experiencing rapid growth. The rest, which are still lagging behind, have to increase also their production given the need to improve the quality of life of their burgeoning population. A more productive agricultural sector, increasing industrial activities, and urbanization are the characteristics of developments in these countries. All of these need large energy inputs.

Inspite of relatively low level world oil prices, the still large deposits of coal available in the region and the recent discoveries of additional fossil fuel reserves, particularly natural gas, knowledgeable policy makers and planners in Asia are fully aware of the difficulties that lay ahead in terms of providing all the energy needs of the developing economies of the region require. Many of these policy makers and planners realize that not one particular energy resource can provide all the energy needs of their economies. There is an awareness that a country's energy plan should include a multi-resource energy supply development programme combined with energy demand management strategies towards more rational and efficient use of energy.

The energy supply development programme should consider all available energy sources. However, in practice, the decision to include a particular type of energy resource is based actually on country-defined criteria. Such criteria can be based on financial, economic, environmental or social factors but the final choice of which factors to consider, and thus, which energy resources to develop, is essentially a political act.

Nevertheless, no matter which criteria are chosen, wood energy is *"in the picture".* Cost and logistical constraints of what are termed as "modern fuels", i.e., petroleum products and electricity, channel most of the "modem fuels" to upper income rural households, urban households, industries and commercial establishments - leaving the majority of the rural households, many poor urban households and also a number of industries and enterprises to the use of wood fuels. Wood energy has always been a significant component of the energy supply mix of most of the countries in this region and will continue to do so in the foreseeable future. Thus, there is a need to reassess how appropriate energy policies and programmes are in furthering wood energy development and the need to redefine them.

- The second factor is the success of current strategies to arrest the continuing deterioration of forest and other tree resources. The wood energy supply situation in many areas in the region continues to degenerate. The rapid depletion of tree cover and forests, as a result of increasing population, expansion of agriculture, overgrazing by livestock and over exploitation of forest resources for commercial gains, including fuelwood and charcoal supplies to urban markets and industries, prevails in many parts of the region and has seriously affected wood energy supplies in those areas. The shift to the use of other biomass, such as dried dung, straw, rice husks and even plant roots continues in many places.

  However, as mentioned earlier, there have already been positive experiences which point out that the worsening situations in many areas can be reversed. Effective wood production strategies include the use of innovative techniques in agro-forestry, social and community forestry approaches whenever appropriate, and the implementation of suitable incentives whether production is either from forests or agricultural areas, in public or private lands.

  Since the situations where these positive experiences occurred are characterized by their non-homogeneity, what is needed is to draw the lessons which can help determine which specific methods worked in which specific situations and thus, be able to define specific appropriate strategies for wood production for energy in particular situations.

Incorporating wood energy development strategies in energy supply development and wood production (forest or non-forest based) programmes however, needs to addresses the following issues:

- ❖ Wood fuels at present satisfy mainly subsistence and basic energy needs. In many countries, these are the needs of the majority of the population - the large percentage of which are rural-based, marginalized poor people. In this regard, wood fuels are not just an energy or a forestry problem (or opportunity), but are also (or should also be) a concern in development efforts to uplift the general conditions of the rural population as they are the producers and suppliers of wood fuels and its major users. Thus, there is a need for a multisectoral but integrated approach to wood energy development efforts.

- ❖ The commercialization of wood energy in which, as previously discussed, wood fuels are increasingly being traded - sold mostly to upper income rural households, urban households, industries and enterprises - is another development in wood energy systems which needs to be further understood. Case studies have indicated that commercial wood fuel production can be a positive development. And as mentioned earlier, it presents opportunities to producers, traders and users of wood fuels, particularly, in applications in industries and enterprises. It is important to define appropriate policies and to exploit such opportunities.

  However, like any resource extraction activity that produces raw commodities for external markets, it is easy to see that unhampered wood fuels production for exchange can lead to excessive extraction of tree resources towards depletion. Since it is also a good which is widely used and greatly needed in rural areas, its impacts on rural supply should also be understood so that appropriate measures are put in place to check whatever adverse impacts are created.

- ❖ Recent experiences also indicated the very site-specific character of wood energy systems - thus, the nature of problems in, solutions to and opportunities arising from the use of wood fuels are greatly determined by the specific local conditions. Macro-level generalizations of wood energy situations, as have been often done, have obscured the site-specific character of wood energy systems. Recent local-based studies have provided a clearer picture of the real situations. Such site-specificity requires local-based decentralized interventions, and the participation of intended beneficiaries in the planning and formulation of strategies to solve problems or tap opportunities in wood energy development.
- ❖ Whether wood fuels will remain to be an energy source for the future is not anymore a question, rather, the challenge to policy makers and planners is:
  - to identify the situations (i.e., socioeconomic and agro-ecological conditions, specific areas, types of applications, favorable impacts, etc.) where wood fuels can be a suitable and sustainable energy supply option;
  - to define the inputs and strategies needed (i.e., policies, programmes, technical assistance, support structures, etc.) to make wood fuels a viable and sustainable energy source; and
  - to create the conditions (i.e., institutional linkages, extension activities, local participation, decentralized approach, etc.) whereby the majority of poor users and producers of wood fuels can maximize their benefits from wood energy development programmes.

Initial attempts by countries in the region, some through RWEDP assistance, to incorporate wood in energy planning activities have however been met by the problem of lack of or inadequate data. In many cases, initial efforts were first spent on defining acceptable methodologies for data collection. In some, there was a need to develop techniques for data assessment and analysis for wood energy planning.

Efforts were also undertaken by some countries to include wood energy in sectoral policy studies and debates in the energy and forestry sectors. The most notable among these are the more recent *UNDPIWB-Energy Sector Management Assistance Programme* country studies conducted in the region. In fact, some of the new insights on the dynamics of wood energy systems came from these studies (e.g., Household Energy Strategy Studies in Pakistan and the Philippines). In some countries, wood fuel considerations were incorporated in the development of either their *Forestry Master Plan or Tropical Forestry Action Plan.* Therefore, the region has already some degree of experience in integrating wood energy in national planning exercises and in incorporating wood in policy studies and debates in sectors where it is a major components. Nevertheless, these are just the initial steps and they need to be broadened, strengthened and institutionalized.

## 1.2 RWEDP REGIONAL MEETINGS ON WOOD ENERGY PLANNING AND POLICIES

Generating new information and sharing information on new developments in the wood energy sector with institutions in all its 11 member countries is one of the major tasks of the Regional Wood Energy Development Programme in Asia (RWEDP). The developments described in the preceding paragraphs warranted a comprehensive review with relevant experts and policy makers from the region.

RWEDP, in the last few months of its current phase, organized therefore, between 23 February to 3 March 1993 two regional meetings for policy makers and planners in the region dealing with the sectors where wood energy is a major component; energy and forestry.

### 1.2.1 "EXPERT CONSULTATION ON DATA ASSESSMENT AND ANALYSIS FOR WOOD ENERGY PLANNING"

The general objective of this consultation was to determine methodologies for data assessment and analysis for wood energy planning, to formulate strategies for implementation of wood energy development programmes well-integrated into national programmes.

The participants were heads or senior staff of energy, forestry and natural resources planning agencies and state planning bodies of the member countries. All 11 member countries were represented. Six countries were represented by both their forestry and energy departments. Ten resource persons came from within and outside the region. The expert consultation lasted from 23 to 27 February 1993. The participants went on a field visit on 28 February, 1993.

### 1.2.2 "SEMINAR ON POLICY INSTRUMENTS FOR THE IMPLEMENTATION OF WOOD ENERGY DEVELOPMENT PROGRAMMES"

Planners can only identify and assess various strategies, scenarios and programme options. It is still the policy maskers who have the responsibility to choose or recommend to government officials the suitable scenario, strategy or program. The policy maker has a broader understanding of the economic, social and probably, most importantly, political agenda of the state than the planners for making such strategic decisions.

RWEDP has organized this seminar to discuss policy issues relating to wood energy development. The general objective of the seminar was to determine how policies and institutional structures can be modified to be used as effective instruments to develop and strengthen the planning and implementation of wood energy development programmes and the participants be made critically aware of this.

# Chapter 2

## ORGANIZATION OF THE REGIONAL MEETINGS

*Participants to the **Policy Seminar** visiting a wood-fueled brick making factory In Chiang Mai, **Thailand**.*

*Thirty papers were presented in the two meetings. Discussions followed these paper presentations. In the **Data Consultation**, there were also workshop*

*Representatives of the Royal Thai Government, the Dutch Embassy, FAO Rome and Chiang Mai Province attended the Opening Ceremonies of the **Policy Seminar**.*

# Chapter 2

# ORGANIZATION OF THE REGIONAL MEETINGS[1]

## 2.1 "EXPERT CONSULTATION ON DATA ASSESSMENT AND ANALYSIS FOR WOOD ENERGY PLANNING

The expert consultation was held from 23 to 27 February 1993 at the Chiang Mai Orchid Hotel in Chiang Mai, Thailand.

The participants were heads or senior staff of energy, forestry and natural resources planning agencies and state planning bodies of the member countries. The expert consultation lasted from 23 to 27 February 1993. The participants went on a field visit on 28 February, 1993.

### 2.1.1 OPENING SESSION

The consultation meeting was inaugurated with speakers representing Chiang Mai Province, the Royal Thai Government, FAO Headquarters and RWEDP.

### 2.1.2 TECHNICAL SESSIONS

Mr. Egbert Pelinck opened the technical sessions with a presentation *"Why a Wood Energy Planning Workshop?"* - an explanation of the rationale and objectives of the expert consultation.

The consultation was divided into ***six technical sessions*** as follows:

- ***Session 1: 'Wood Energy Developments in Asia"*** - The participants discussed the current degree of understanding of the present importance and further potential of wood energy, the options for solving the present fuelwood problems and the barriers to and potentials for wood energy development in the region. There were ***four paper presentations*** as follows:
  - *"Wood Energy Development in Asia: Assessment of Chtical Issues, Constraints and Prospects"* by Mr. Auke Koopmans
  - *"Woodfuel Use in the Household Sector in Pakistan"* by Dr. Azedine Ouerghi
  - *"Charcoal in Northeast Thailand"* by Mr. Opart Panya
  - *"Wood Energy as a Commercial and Industrial Fuel in Cebu City, Philippines"* by Mr. Terrence Bensel.

  An **audio-visual** *presentation* prepared by Ms. Elizabeth Remedio and Mr. Terrence Bensel entitled *"Wood Fuels Supply and Use Systems in Cebu"* followed the paper presentations.

- ***Session 2: "Wood* Energy in *National* Planning Exercises" -** The participants reviewed the experiences in the region in defining, developing and implementing wood energy planning activities and efforts to integrate wood energy into national planning exercises, and to determine the crucial elements that can make wood energy planning a successful exercise. There were ***two* paper *presentations*** as follows:

[1] The proceedings of the two meetings are respectively presented in Chapters 4 and 5.

- *"Wood Energy Data Assessment and Planning Activities in Asia"* by Mr. Conrado S. Heruela
- *"AnApproach to EnergAssessment and Planningfor Sustainable Development -Status of Implementation in Asia"* - a paper prepared by Dr. Gustavo Best and presented by Dr. Miguel Trossero.

❖ ***Session 3: "Methodologies for Data Collection and Assessment for Wood Energy Planning"*** -Presentations were made on techniques for the collection and analysis of data on the supply and utilization of wood energy. There were ***four paper presentations*** as follows:

- *"The Use of SecondaryData Cum Field Observations as a Preliminary Method for Wood Energy Analysis"* by Mr. Auke Koopmans
- *"The Use of Formal Structured Surveys in Wood Energy Consumption and Woodfuel Flow Studies"* by Ms. Aida C. Pujanes
- *"Methodologies for Wood Energy Supply and Utilization Studies In Pakistan",* a paper prepared by Mr. Gary Archer and presented by Dr. Azedine Ouerghi
- *"Methodologies for the Study of the Wood Energy Situation in a Rapidly Urbanizing Area: A Case Study of Cebu City, Philippines"* by Ms. Elizabeth Remedio.

❖ ***Session* 4: *"Methodologies* for Data Analysis for Wood Energy Planning - Energy *Modeling"*** - Presentations were made on attempts to use modeling in data analysis for wood energy planning and to identify the criteria for determining suitable energy models. There were ***two paper presentations*** as follows:

- *"Considerations in Energy Planning Models for Wood Energy Planning",* a paper prepared by Dr. Charles Heaps, Dr. Michael Lazarus, Dr. Paul Raskin and Dr. David Von Hippel and presented by Dr. Heaps
- *"Energy Modeling Studies on Wood and Biomass Energy in the ASEAN Region"* by Dr. Jean-Yves Garnier.

❖ ***Session* 5: "Methodologies *for Data* Analysis *for* Wood *Energy Planning* - Project *Appraisal"*** There was a presentation on alternative methodologies for evaluating and assessing wood energy strategies and projects in comparison with other energy supply options. There was only ***one paper presentation*** in the session - *"Expanding the Use of Financial, Economic and Environmental Criteria in the Formulation of Developmental Plans for Wood Energy",* a paper prepared by Mr. Matthew Mendis, Mr. Jeffrey Mullaney and Ms. Marcia Gowen and presented by Mr. Mendis.

❖ ***Session 6: "Wood Fuels* in *Energy Planning: Policy* and *Institutional Issues"*** - The objective of this session was to identify policy and institutional issues to be addressed to achieve effective integration of wood fuels into national energy planning exercises. There was only ***one paper presentation*** in this session - *"Data Assessment and Analysis for Wood Energy Planning: Policy and Institutional Issues"* by Dr. Veena Joshi.

### 2.1.3 GROUP WORKSHOPS

The participants in the workshops were divided into ***three working groups.*** Members of each group came from both the forestry and energy sectors. The working groups were given at least one-and-half hours to meet each day to work on their assignment. The three working groups and the topic assigned to them were as follows:

- ***Working Group 1 – "Energy" Group -*** This group discussed issues relating to *wood energy utilization* (i.e., rural and urban, commercial and non-commercial, domestic and other sectors), including the implications on the energy-economy interactions and the linkages between the energy and forestry sectors, particularly in the area of planning, policy formulation and programme implementation.

- ***Working Group 2 – "Forestry" Group -*** This group discussed issues relating to *wood energy supply* (i.e., production from forest and non-forest sources, wood fuels flow, wood fuels markets) and its effect on the linkages among energy, forestry, and other relevant sectors particularly in the area of planning, policy formulation and programme implementation.

- ***Working Group 3 - "Wood Energy Planning" Group -*** This group discussed the issues relating *to wood energy planning* (i.e., data base development, supply analysis, demand analysis, integration with national energy planning) and its implications for the corresponding responsibilities of the energy and forestry sectors.

### 2.1.4 PLENARY SESSION

The outputs of the three working groups were presented and discussed. A summary of conclusions and recommendations was approved by the plenary session.

### 2.1.5 CLOSING SESSION

Statement of thanks were read by representatives of resource persons, country participants, FAO Headquarters and RWEDP.

### 2.1.6 FIELD VISIT

The participants visited a ***brick making factory*** using wood fuels, a ***briquetted sawdust charcoal factory,*** **a** ***tobacco flue-curing barn*** which has shifted partly to lignite and the ***Ban Pae Community Forest.***

## 2.2 "SEMINAR ON POLICY INSTRUMENTS FOR IMPLEMENTATION OF WOOD ENERGY DEVELOPMENT PROGRAMMES"

The meeting was held from 1 to 3 March, 1993 at the Chiang Mai Orchid Hotel, Chiang Mai, Thailand. The participants to this seminar were key senior staff of national energy and forestry agencies.

### 2.2.1 OPENING SESSION

The meeting was opened with statements by the representatives of Chiang Mai Province, the Royal Thai Government, the Netherlands Embassy, FAO Headquarters and RWEDP.

### 2.2.2 TECHNICAL SESSIONS

Mr. Egbert Pelinck opened the technical sessions with an explanation of the rationale and objectives of the seminar. He also briefly discussed the results and relevance of the *expert consultation on data assessment and analysis for wood energy planning* conducted a week before

this seminar. Mr. Conrado S. Heruela of the RWEDP presented the *"Summary of Results of the Expert Consultation on Data Assessment and Analysis for Wood Energy Planning".*

The seminar was divided into ***five technical sessions*** as follows:

- *Keynote Session* - There was *one paper presentation* in this session - *"Advancing Our Understanding of Wood Energy Towards Appropriate Policies and Strategies"* by Dr. John Soussan. This was followed by an *audio-visual presentation* prepared by Ms. Elizabeth Remedio and Mr. Terrence Bensel entitled *"Wood Fuels Supply and Use Systems in Cebu".*

- *Session 1: 'Policy Issues on Wood energy Supply and Use'* - The objective of this session was to identify policies in the energy, forestry, macro-economy and other sectors beneficial to or constraining wood energy production and utilization, and present policy options which may be adapted that may promote wood energy development and also support the strategic objectives of the related sectors. There were ***three paper presentations*** as follows:

  - *"Energy Policies and the Utilization of Wood Fuels"* by Mr. Conrado S. Heruela
  - *"Impacts of Forestry Policies on the Production and Use of Wood Fuels"* by Dr. N. Saxena
  - *"Relating Macro-Economic and Sectoral Policies with Wood Energy Supply and Use" by* Dr. John Soussan
  - *"Wood Energy Health Effects in Developing Countries"* a paper prepared by Mr. Kirk Smith and presented by Mr. Cor Veer

- ***Session 2: "Policy Optionsfor Wood Energy Development"*** - The objective of this session was to identify policy initiatives needed to develop and strengthen national and sub-national planning and program implementation capabilities in wood energy development.
  Session 2 was divided into two parts. There were ***two paper presentations*** in the first part as follows:
  - *"Policy Initiatives for Developing Capabilities in Wood Energy Data Assessment and Integrated Planning"* by Dr. P. P. S. Gusain
  - *"Policy Options for Wood Energy Resource Management Strategies"* by Mr. Chun Lai

  In lieu of paper of Mr. Kirk Smith titled *"Opportunities and Policy Options in The Use of Wood Fuels in the Household Sector: Learning Lessons from Improved Cookstoves Programs", a* ***panel discussion*** was organized where Dr. Aroon Chomcharn and Mr. Nguyen Duy Thong were asked to speak. Copies of the joint ESMAP/UNDP report titled *""What Makes People Cook With Improved Woodstoves? A Comparative Review",* written by Mr. Douglas Barnes, Mr. Keith Openshaw, Mr. Kirk Smith and Mr. Robert van der Plas were distributed to the participants.

  There were *three paper presentations* in the second part as follows:
  - *"Opportunities and Policy Options for Traditional Woodfuel Using Industries and Enterprises"* by Dr. Aroon Chomcham
  - *"Opportunities and Policy Initiatives for Wood-Fueled Industrial Heat and Power Systems"* by Mr. Ludovic Lacrosse
  - *"Opportunities and Policy Options for Private Investments and Entrepreneurial Activities in Wood Energy"* prepared by Mr. Matthew Mendis and Mr. Jeffrey Mullaney and presented by Mr. Mendis.

❖ ***Session 3: "Institutional Policy Issues in Wood Energy Planning and Development" -*** The objective of this session was to identify institutions and other bodies and- their respective roles in the planning and implementation of wood energy development programs and the policies needed to institutionalize these roles. There were ***four paper presentations*** as follows:

- *"Participatory Land Use Planning in Social Forestry",* a paper prepared by Ms. Uraivan Tan-Kim-Yong and presented by Mr. Cor Veer
- *"Intermediating Between Government Institutions and Program Beneficiaries in the Implementation of Wood Energy Programs"* by Dr. Malee Suwana-adht
- *"Decentralization of Institutional Responsibilities for Wood Energy Development"* by Mr. Socrates Apollo P. Botictic
- *"Inter-Sectoral Linkages Towards Integrated Planning and Program Implementation" by* Mr. Binayak Bhadra

❖ ***Session 4: "Future Agenda for Wood Energy Development in the Region"*** - This session had only ***one paper presentation -*** *"Thrust and Priorities for Regional Cooperation Program"* by Mr. Egbert Pelinck.

### 2.2.3 CLOSING SESSION

Statement of thanks were given by representatives of resource persons, the country delegates, observers, FAO Headquarters, and RWEDP.

### 2.2.5 FIELD VISIT

A field trip was organized for the participants before the start of the seminar. They visited the same sites visited by the participants of the expert consultation.

# Chapter 3

## WOOD ENERGY DEVELOPMENT: PLANNING, POLICIES AND STRATEGIES

***"Analysis & and Highlights of Paper Presentations and Discussions"***

*Government-supported nurseries in Bhutan - Providing effective external support to ensure the availability of material and technical inputs is one way to strengthen local-level solutions.*

*Lowland agroforestry farming system in India - Trees shelter crops from dessicating winds, improve soil nutrients and generate substaintial income to farmers when sold.*

*Traditional silk making process in Thailand - Fuelwood have been the conventional energy source for many traditional and rural-based industries in the region.*

# Chapter 3

## WOOD ENERGY DEVELOPMENT: PLANNING, POLICIES AND STRATEGIES

***"Analysis & and Highlights of Paper Presentations and Discussions"***

This chapter is a consolidation of the deliberations in the two meetings. The key points raised in the paper presentations and the resulting discussions are summed up here.

The *expert consultation* may be divided into three parts: (1) a re-assessment of the wood energy situation in Asia; (2) presentations on and discussions of the various aspects of programme planning - focusing on integrating wood energy, particularly, in energy and forestry planning; and (3) workshops to formulate recommendations for the integration of wood energy in national planning exercises - the methodological, institutional and policy aspects of it.

The *policy seminar* started with a presentation of the results of *expert consultation* where the re-assessment of the wood energy situation O83 Asia and the recommendations of its participants were highlighted. The policy discussions centered on the following: (a) positive and negative impacts of sectoral policies in forestry, energy, macro-economic and environment on wood energy supply and use; (b) policies needed for developing wood energy planning capabilities, enhancing wood production strategies to increase wood fuels supplies, improving implementation of household wood energy programmes, and exploiting the potentials of productive wood energy uses in industries and enterprises; (c) policy initiatives to strengthen institutional structures essential for the implementation of wood energy programmes; and (d) the possibilities for regional cooperation and support to assist countries develop and adopt appropriate policies, plans and strategies for wood energy development.

### 3.1 A FRAMEWORK FOR UNDERSTANDING WOOD ENERGY SUPPLY AND USE

The presentation of ***John Soussan -*** "Wood Energy: Towards Appropriate Policies and *Strategies",* as keynote speaker for the *policy seminar* summed up the common goal of the two meetings: he defined the need to fully understand wood energy problems and how the formulation and the implementation of the solutions to these problems must proceed.

***Soussan*** pointed out that the key to understanding wood energy is to analyze the direction and speed of change in fuelwood production and use, and that the relationship of these patterns to the development of the local production system should be seen as the starting point of analysis. He explained that in rural areas, fuelwood stress reflects changes in economy-environment relationships which affect local biomass resource supply/demand patterns. Whether gradual or rapid, these processes of change lie at the heart of the fuelwood problems. They set clear limits on the opportunities open to effectively confront them. Fuelwood problems must be approached from a dynamic perspective, and must be related to trends in the development of localities in question.(24)

He analyzed the production and use of wood and other biomass in which he underscored that fuelwood problems and potential solutions to these problems are specific to people and places. He pointed out that, as such, policies (and strategies) in this area must capture and build on the ways in which the users of wood (and other biomass) fuels respond to the problems they face and the opportunities they perceive.

His analysis of the nature and origins of fuelwood problems pointed out that access to biomass fuels can be constrained by location, land tenure and land management practices He emphasized that the fuelwood problems do not affect whole communities uniformly, and it is usually the poor who are his first and the hardest. But as fuelwood problems emerge, people respond according to the opportunities open to them. These responses are variable, indirect and locality-specific. Some of these responses are desirable and sustainable and form the basis for effective interventions. Others produce negative impacts, with steps taken as necessary response to immediate problems resulting in the longer-term undermining of the local production system.

At the end of his presentation, he showed the importance of seeking the perceptions and priorities of the people on the ground; a process which is in itself desirable and which can form the starting point of their wider participation in the creation of solutions to the problems the reveal. He made clear that the adoption of such an approach is not in itself a complete answer to the problems surrounding the creation of effective fuelwood projects on the ground but it will produce an orientation which is the first step to building such solutions.

## 3.2 RE-ASSESSING THE WOOD ENERGY SITUATION IN ASIA

*Session 1 - "Wood Energy Developments in Asia"* - of the *expert consultation* provided a forum for the presentation of recent studies conducted in the region and for participants to share information about the wood energy situation in their countries.

***Auke Koopmans*** opened this session with a regional overview of the wood energy situation based on data available from the countries and various international agencies. He presented new information which provided a clearer understanding of the supply and use of wood fuels in the region.(12)

The energy consumption in the region has increased tremendously from 1979 to 1989. Per capita energy consumption increased by 26% compared to the world average of 2%. However, the average regional per capita energy consumption of 28 gigajoules (GJ) is still low compared to the world average of 67 GJ. The regional average further decreases to 12 GJ if only the energy use in the RWEDP countries is accounted for.

Sources of energy included in these figures include both “commercial” and “traditional” sources of energy. Traditional sources of energy had been defined to include both wood fuels and other forms of biomass fuels.

**REGIONAL OVERVIEW**

- Covers RWEDP countries Bangladesh, Bhutan, India, Indonesia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand & Vietnam, & includes non-RWEDP countries Cambodia, Laos & Malaysia
- Large variations in terms of size, population, population density, forest cover, per capita GDP
- Rural-based population will change dramatically in the next 20-25 years from an average of 73% today to about 67% in the year 2000, falling to 60% in 2010
- The agricultural sector, including forestry, fisheries and hunting-important not only in providing employment
- Low contribution of the agricultural sector to GDP on a per capita basis – an indication of under-employment within the sector
- Large population sizes occupy relatively small land areas, land availability is an increasing constraint to agriculture
- Increasing pressure on forests & woodlands not only as source of fuelwood and timber but also as source of lands to grow food (12)

Table 3.1 and 3.2 provide an overview of the importance of traditional energy sources within the overall energy consumption of different countries. however, comparison of the figures available from world Resources 1992-1993 (based on UN data) with data from recent *WB/UNDP ESMAP, TFAP* and *Forest Master Plan Reports* from the region showed that actual traditional energy consumption in most of the countries is considerably higher than what has been previously estimated (see Table 3.3).

This is not surprising as traditional sources of energy do not appear in any statistical information. They are usually not recorded and are often collected for own use. ***Koopmans*** noted that for those countries for which recent data are available, the share of traditional sources of energy is about 10-30 percentage points higher than what official data showed.

**Table 3.1: Energy Consumption in RWEDP Countries** (12)

| Country/Region | Commercial energy consumption | | Total energy requirements | | Imports as % of consumption 1) | | Traditional energy as % of total consumption | |
|---|---|---|---|---|---|---|---|---|
| | Petajoules 1989 | % of Change since 1979 | Petajoules 1989 | % Change since 1979 | 1979 | 1989 | 1979 | 1989 |
| RWEDP countries | | | | | | | | |
| Bangladesh | 227 | 125 | 502 | 38 | 59 | 30 | 71 | 54 |
| Bhutan | 1 | 155 | 30 | 9 | 91 | -189 | 99 | 95 |
| India | 7,528 | 94 | 10,693 | 70 | 13 | 8 | 33 | 25 |
| Indonesia | 1,453 | 44 | 2,852 | 32 | -276 | -180 | 53 | 47 |
| Myanmar | 74 | 36 | 268 | 27 | -35 | -15 | 71 | 69 |
| Nepal | 13 | 80 | 226 | 67 | 91 | 85 | 94 | 92 |
| Pakistan | 930 | 119 | 1,330 | 102 | 35 | 36 | 26 | 21 |
| Philippines | 527 | 9 | 983 | 21 | 87 | 85 | 38 | 38 |
| Sri Lanka | 55 | 17 | 153 | 21 | 89 | 83 | 54 | 52 |
| Thailand | 1,026 | 117 | 1,631 | 90 | 94 | 59 | 41 | 34 |
| Vietnam | 210 | 13 | 465 | 22 | 12 | 12 | 49 | 51 |
| NON-RWEDP Countries | | | | | | | | |
| Cambodia | 6 | 1,353 | 58 | 41 | 100 | 98 | 99 | 89 |
| Laos | 5 | 12 | 43 | 25 | 7 | 15 | 82 | 83 |
| Malaysia | 705 | 128 | 834 | 117 | -89 | -151 | 17 | 10 |
| RWEDP Countries | 12,044 | 81 | 18243 | 58 | --- | --- | 42 | 34 |
| Non-RWEDP Countries | 716 | 127 | 935 | 103 | --- | --- | 29 | 18 |
| ASIA | 70,787 | 54 | 84,136 | 52 | -72 | -194 | 14 | 10 |

Source: World Resources 1992 – 1993 (WRI, 1992)
Note: 1) Negative numbers indicate net exporters.

This information, as mentioned earlier, have provided a clearer picture of the wood fuel situation in the region:

- ❖ Use of wood fuels is most widespread in rural areas of Asia where, generally, wood is gathered for own use. With increasing rural population (inspite of urbanization), and the low probability of a large number of them drastically shifting to other fuels, the volume of fuelwood consumption will even increase in the foreseeable future.
- ❖ In many places in the region, particularly in urban areas where wood fuels are still used even if so-called *modern* fuels are available, wood fuels are traded goods. Many higher income rural families and urban households are purchasing wood fuels. A number of industries and enterprises are buying wood to provide fuel for their heating needs.

**Table3.2: Traditional Energy Use in RWEDP Countries (12)**

| Country/Region | Traditional energy use 1) | Traditional energy use in million tons 2) | | | | | |
|---|---|---|---|---|---|---|---|
| | Million tons in 1989 | Total 3) | Fuelwood/ Charcoal | Residues | Bagasse | Dung | Year/Source |
| RWEDP Countries | | | | | | | |
| Bangladesh | 17.98 | 31.95 | 5.86 | 23.88 | 1.53 | 6.70 | 1981/BEPP, 1987 |
| Bhutan | 1.92 | 0.94 | 0.92 | 0.02 | --- | --- | 1988/FAO, 1991a 4) |
| India | 176.27 | 321.83 | 162.06 | 51.17 | --- | 119.4 | 1990 6) |
| Indonesia | 89.05 | 73.13 | --- | --- | --- | --- | 1997/WB 1980 5) |
| Myanmar | 12.31 | 28.46 | 26.33 | 2.46 | 7) | --- | 1990/WB 1990a |
| Nepal | 13.92 | 11.33 | --- | --- | --- | --- | 1985/TFAP 1988 |
| Pakistan | 18.51 | 60.82 | --- | --- | --- | --- | 1991/Ouerghi' 92 |
| Philippines | 24.67 | 35.18 | 29.15 | 6.96 | --- | --- | 1989/WB 1992b |
| Sri Lanka | 5.29 | 13.08 | 12.61 | --- | 0.74 | --- | 1990/CEB 1990 |
| Thailand | 37.42 | 30.37 | 23.86 | 3.38 | 6.32 | --- | 1988/NEA |
| Vietnam | 15.91 | 46.80 | 33.18 | 13.62 | 7) | --- | 1988/FAO 1992a |
| NON-RWEDP Countries | | | | | | | |
| Cambodia | 3.41 | --- | --- | --- | --- | --- | |
| Laos | 2.38 | 2.40 | 2.40 | --- | --- | --- | 1989/GOL 1990a |
| Malaysia | 5.63 | --- | --- | --- | --- | --- | |
| RWEDP countries | 413.27 | 653.89 | --- | --- | --- | --- | |

Note: 1) Based on World Resources 1992-1993 (WRI, 1992)
2) Conversion factors used as mentioned in the original documents
3) Converted to fuelwood equivalent by using average conversion factors
4) A direct comparison can not be made as a different population size (700,000 in the FAO study instead of 1.4 million as used in WRI 1992
5) Traditional fuel use based on Soesastro et al (Soesastro, 1983)
6) Unpublished and unofficial estimates by ESMAP
7) Included under residues
-- No data available.

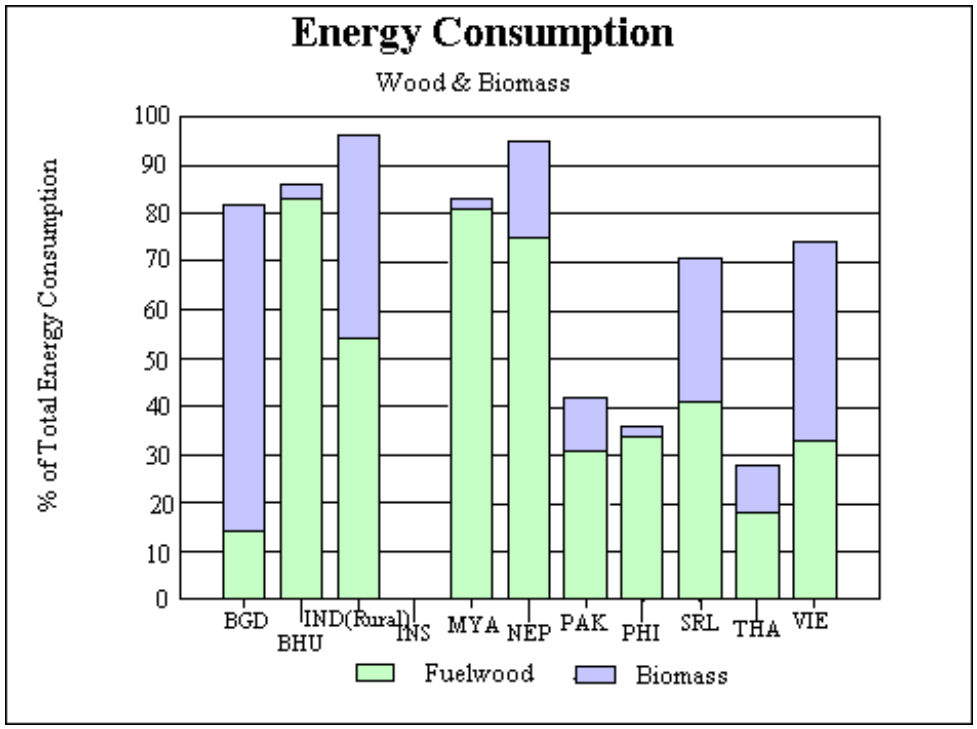
**Table 3.3: Sectoral Energy Consumption in RWEDP Countries** (12)

| Country | Commercial energy | | Fuelwood and/or charcoal | | Residues, Dung, etc. | | Total traditional energy sources | | | Year and Source |
|---|---|---|---|---|---|---|---|---|---|---|
| | Domestic | Others | Domestic | Others | Domestic | Others | Dom | Oth. | Tot. | |
| Bangladesh | 3.8 | 9.8 | 11.7 | 3.4 | 57.6 | 13.7 | 69.3 | 17.1 | 86.4 | 1981/BEPP, 1987 |
| Bhutan | 1.5 | 11.3 | 75.1 | 11.8 | 0.6 | 0.0 | 75.7 | 11.8 | 87.2 | 1988/FAO, 1991a |
| India | --- | --- | --- | --- | --- | --- | --- | --- | 39.1 | 89/90 Est. 5) |
| Indonesia | 12.6 | 33.1 | 50.9 | 3.5 | --- | --- | --- | --- | 54.3 | 1979/WB 1980 3) |
| Myanmar | 0.6 | 12.0 | 84.1 | --- | 2.5 | 0.8 | 86.6 | 0.8 | 87.4 | 1990/WB 1990a |
| Nepal | 1.2 | 4.4 | 92.8 | 1.5 | 0.0 | --- | 92.8 | 1.5 | 94.4 | 1982/WB 1983a |
| Pakistan | 7.1 | 40.1 | 41.2 | 11.6 | 1) | 1) | 41.2 | 11.6 | 52.8 | 1991/Ouerghi' 92 |
| Philippines | 10.1 | 44.8 | 32.6 | 5.3 | 3.5 | 3.6 | 36.1 | 8.9 | 45.1 | 1989/WB 1992b |
| Sri Lanka | 6.6 | 21.6 | 59.0 | 10.3 | 2) | 2.3 | 59.0 | 12.6 | 71.8 | 1990/CEB 1990 |
| Thailand | 8.8 | 60.9 | 18.9 | 2.4 | 1.2 | 7.6 | 20.1 | 10.0 | 30.3 | 1988/NEA 4) |
| Vietnam | 2.0 | 24.0 | 29.6 | 4.4 | 34.7 | 5.2 | 64.3 | 9.6 | 73.9 | 1988/FAO 1992a |

Note: "Others" includes Industry, Transport, Agriculture, Commerce, Government as well as Other uses. Conversion losses have not been accounted for. – denotes "No data available" while 0.0 denotes "Neglible amount"

1) Residues are included under fuelwood
2) Domestic fuelwood consumption apparently includes residues also
3) The Domestic sector includes Government use as well as use by Commerce
4) The Domestic use include use by Commerce as well
5) Estimate by the author, based on WRI/UN data for commercial energy and unofficial World Bank data for traditional sources of energy.

- There are large variations in agro-climatic conditions across the region. Socio-economic situations also differ among the countries, and even among the districts and villages of the countries. Macro-level data on traditional fuels cannot give accurate pictures of the local situations pointing to a need for locally-based data desegregated as far as possible.
- National averages of amounts of wood fuels consumed which are coming directly from forests range from 25 - 50%. A large part of these are in the form of twigs, leaves and dead wood which, although from the forests, do not result in the cutting of trees. Deforestation is a result of many complex, often inter-related factors, of which, the extraction of wood as a source of energy is only one.
- About 50-75% of wood fuels come from non-forest areas like fallow lands, shrubs and grass lands, agricultural lands, trees on homesteads and along roads, rivers and irrigation canals.
- Sustainable wood production for energy can be viable and the wood fuels demand/supply imbalances in many areas are considerably less serious if wood coming from non-forest sources are properly accounted for.




**Consumption of Wood and Other Biomass Fuels** - RWEDP (1992)

*Crop residues as fuel in Red River Delta, Vietnam - Real hardships in obtaining Needed wood fuels push poor households to use lower quality fuels*

Many of the points raised above were discussed further in the presentations of studies using primary data. These studies also postulated new thoughts and initiated a re-assessment by participants of their thinking about wood energy. These have lead to a more realistic view of the wood fuel sector.

Four papers were presented in the *expert consultation* discussing these subjects. Several papers in the *policy seminar* touched also upon these topics. The workshops formulated conclusions and presented recommendations so that countries can obtain more accurate pictures of the wood energy situations in them. The issues discussed can be grouped into: (a) the dynamics of wood fuel supply and use for wood-gathering rural households in subsistence conditions; (b) the commercial uses of wood fuels and its economic, social and environmental impacts; and (c) the sources and sustainability of wood fuel supplies.

**ECONOMIC IMPORTANCE OF FUELWOOD**

- In Indonesia, fuelwood accounted in 1988 for about 0.2% of the country's GDP (= 59 M cubic meters)
- In Bangladesh, fuelwood – with bamboo, honey golpata, sungrass and fish (from mangroves) – are included in GDP – at 650,000 tons, this is only what is officially derived from forests
- The 9 M tons of wood fuels used in Pakistan is approximately equal to 1.5 M tons of kerosene, this requires 240 M US$ - about 6% of export earnings
- Not included in the above is the cost for uninterrupted distribution of kerosene even in the smallest and remotest villages plus possible subsidies to make kerosene affordable to all
- An estimated 536,000 households are involved in commercial wood fuels gathering and production in the Philippines, about 158,000 more are making and selling charcoal and a further 140,000 are into wood fuels trading (12)

### 3.2.1 SUPPLY AND USE OF NON-TRADED WOOD FUELS

The majority of wood fuels users are low-income households. Most of these families are living in rural areas, and many of them gather the fuelwood that they use.

**Fuelwood Gathering Patterns -** *N. Saxena* reported that in rural India, only 15% of total fuelwood consumed is purchased, the rest being collected directly from public or own land. He pointed out that there is a need to make a distinction between use of fuelwood by rural people who gather mostly twigs and branches for their daily fuel needs (which can be sustainable) with those users who purchase their wood fuels such as in urban areas. Village supplies of fuelwood can be obtained more often from pruning or pollarding branches of trees or even bushes in a limited area.(23)

***Azedine Ouerghi*** described that in Pakistan, over 69% of the total fuelwood consumption was collected mostly by women and children. Fuelwood was considered financially free which explains why fuel transition from fuelwood is not happening.(18)

Almost half of fuelwood users reported higher consumption levels than four years before due to larger family size. However, although households spend considerable time and effort collecting fuelwood, most of them (91.1 %) reported that they did not experience any problem of shortage. This is inspite of the survey result which shows that supply is not sustainable.

He pointed out that if there was really widespread scarcity, the divergence between what households perceived and what was the reality can be explained by the fact that depletion was a slow process that takes place over several years in a very localized areas and therefore was not immediately noticeable by households.

Another plausible explanation he said, was that, labor for gathering and collecting fuelwood was readily available and thus cheap even if woodfuel - collecting trips were long or getting longer, it was not a concern. If labor was very scarce, even the collection of abundant woodfuel supplies would be perceived as a serious problem.

Fuelwood collection was estimated to take around 699 person-hour/year/household. If collection by households gathering fuel for their own use was valued, it would cost a household almost Rs. 2,800 and the economy almost Rs. 19 billion, whereas the market value of the collected fuelwood does not exceed Rs. 14 billion[2]. The difference is the amount of annual loss in household income due to fuelwood collection. This loss could have been avoided if household members were engaged in an income generating activity and were able to purchase their fuelwood. However, job opportunities are not easily available in rural areas, particularly for women and children.

***Ouerghi*** expects fuelwood collection to continue to play a major role in rural households. Fuelwood will remain cheaper than fossil fuels so long as women's labor is valued. If there would be real hardships in obtaining the needed quantities, households would use lower quality fuels such as shrubs, dung cake and crop residues. This explains why fuelwood transition is not affected by income levels and is not happening in rural areas.

**PAKISTAN – HOUSEHOLD ENERGY USE**

- 79% of all households use fuelwood and consume about 29 M tons per year. Intrural areas 91% of the households use this fuel and consume an average of 6.7 kg/day; whereas in urban areas 52% of households use fuelwood and burn an average of 5 kg/day.
- This level of consumption contradicts the most frequently cited and used figure in Pakistan (0.2 m3 per person per year).
- Baluchistan has the highest level of consumption at 561 kg/yr/capita, followed by Sindh at 486 kg/yr/capita. Rural households in NWFP and Punjab use 403 kg/yr/capita and 340 kg respectively.
- The high consumption in Baluchistan, which is located in a semi-arid and desert area, is explained by the non-availablility of alternative fuels, especially crop residues and dung cake, for medium and low income households. Rural Baluchistan has the lowest proportions of households using crop residues (4.3%) and dung cakes (48.5%), whereas the national levels are 40.4% and 69.4% respectively.
- Although Sindh and Punjab are dominated by the same type of agro-ecological zone (irrigated type), households in Sindh consume considerable quantities of fuelwood which can largely be attributed to the presence of the riverain forests. In Punjab the availablilty of alternative fuels such as cotton sticks and dung cake has probably contributed to a lower demand on fuelwood. Punjab province grows about 80% of the cotton and raises over 60% of the cattle.
- NWFP has the largest forest cover in the country, and its relatively high consumption is directly related to its rigorous winter and better availability of woody biomass resources (18)

He also presented that fuelwood collection occurs in urban areas. In Pakistan, less than 15% of the urban population collect their needs and over 70% of these belong to medium-low and low income households with an average expenditure less than Rs 2,000 per month.

***Terrence Bensel*** presented similar findings in Cebu City, Philippines where households in built-up districts scoured scrap wood for fuel. The most common sources were construction sites, garbage dumps, warehouses, piers, furniture shops, woodcraft factories and lumberyards which also supplied sawdusts. They noted the drift towards commoditization of scrap wood and even sawdust.(3)

They estimated that about 50% of the fuelwood-using households in the city were "gathering" their own fuel. At least 28% of the total households in the city were using fuelwood, many of them are poor families.



[2] 1US$ = 25 PRs.

**Table 3.4: Fuelwood Consumption by Household Size By Area for Fuelwood Users *Pakistan Household Energy Strategy Study* (18)**

| Size Class | URBAN Yearly Consumption (in kg) | | Average size | RURAL Yearly Consumption (in kg) | | Average Size |
|---|---|---|---|---|---|---|
| | Per H'Hold | Per Capita | | Per H' Hold | Per Capita | |
| 1 – 4 | 1,394 | 456 | 3.06 | 1,893 | 559 | 3.16 |
| 5 – 7 | 1,673 | 276 | 6.07 | 2,284 | 375 | 6.09 |
| 8 – 10 | 2,031 | 231 | 8.79 | 2,648 | 299 | 8.86 |
| 11 – 15 | 2,289 | 194 | 12.43 | 3,208 | 257 | 12.46 |
| + 16 | 3,282 | 170 | 19.29 | 3,986 | 204 | 19.56 |
| Total | 1,820 | 252 | 7.22 | 2,455 | 334 | 7.36 |

**Consumption Patterns - *Ouerghi's*** study showed that about 84% of wood fuels was used in rural areas of Pakistan where almost all households are gathering fuelwood for own use. Consumption patterns however varied significantly from one province to another denoting differences in agro-ecological conditions, household sizes and availability of other fuels.(18)

Most of the fuelwood was consumed for cooking purposes (81.1%). Water heating and space heating end-uses represented only 9.8% and 8.3% of the total consumption respectively. But these values are only indicative. He noted the multiple use of wood energy devices by households. While cooking, households usually benefited from the emitted heat to warm the space and, in some cases, the water.

There was a strong link between household size and the level of fuelwood consumption. As expected, the per capita consumption of large households is much lower than small households (see Table 3.4). Larger household size provides households with a substantial economy of scale for fuelwood consumption. Urge households consume more fuelwood than smaller households, however, they provide themselves with more labor for fuelwood collection.

The Pakistan household energy survey found very few families switching to *modem fuels. If* at all, these are mostly high-income families located in areas where supply of natural gas and kerosene were made available. Because in rural areas almost all households were gathering the fuelwood they use and fuelwood was considered financially-free, consumption patterns were not affected by income levels. They are affected by the availability of alternative fuels, other woody biomass resources and of free labor to collect fuelwood.

***Koopmans*** pointed out in his regional review that for many poor rural households, residues, such agriwastes and dung, are important alternatives to wood fuels. Rural users would use the residues even of lower grade than fuelwood for additional income.(12)

Rural users, usually used less efficient stoves than their urban counterparts. In Pakistan, for instance, the stoves were self-made mostly by women, and do not require financial expenditure. This was probably one reason why the regional overview also showed that, in general, rural consumers, use more energy for cooking that their urban counterparts. (See Tables 3.4 and 3.5, and Figures 1.1, 1.2 and 1.3)

**Table 3.5**: Most Important Reasons Cited for Using Fuelwood
Cebu Fuelwood Study (3)

| Reason | % of Respondents |
|---|---|
| - Food tasted better when cooked with fuelwood | 30.4 |
| - Fuelwood is inexpensive | 15.9 |
| - Able to obtain fuelwood for free | 13.4 |
| - Fuelwood is available nearby/easy to purchase | 10.9 |
| - Others | 10.9 |
| - Gives off high heat/cooks food fast | 9.1 |
| - For specific cooking end-uses (long cooking of stews, beans, etc.) | 4.0 |
| - Fuelwood is always available | 2.9 |
| - Fuelwood stoves are inexpensive | 2.5 |
| Total | 100.0 |

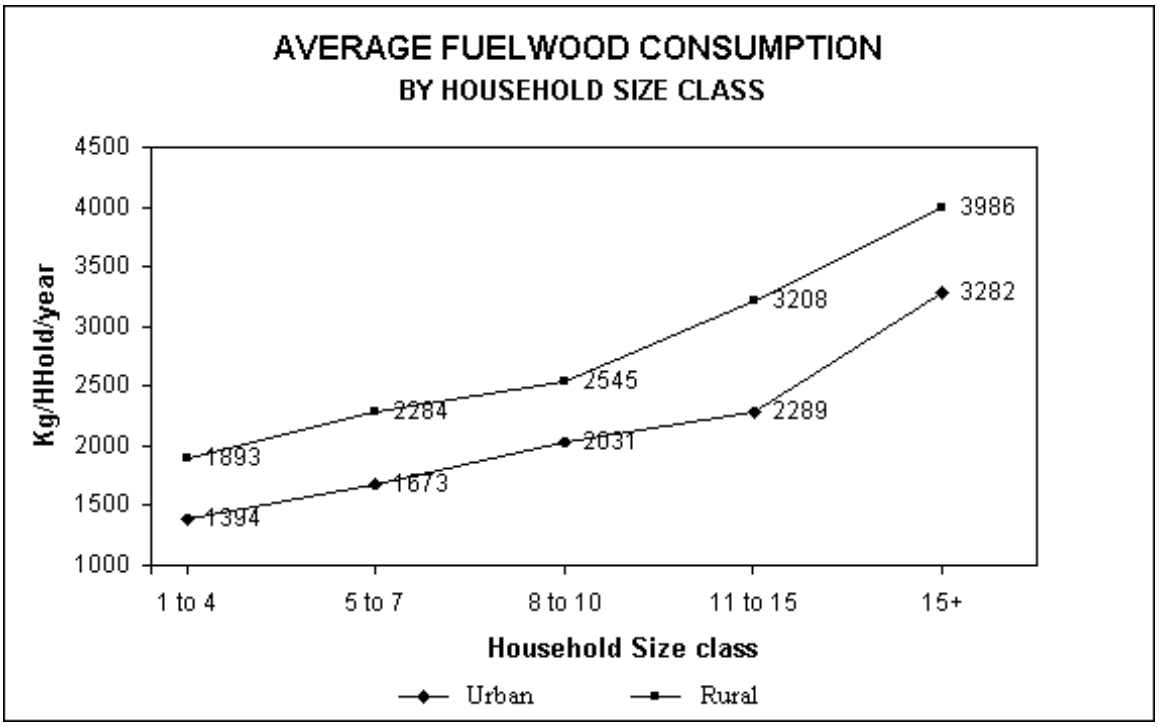



**Figure 3.1: Consumption Per Household**
***Pakistan Household Energy Strategy Study (18)***

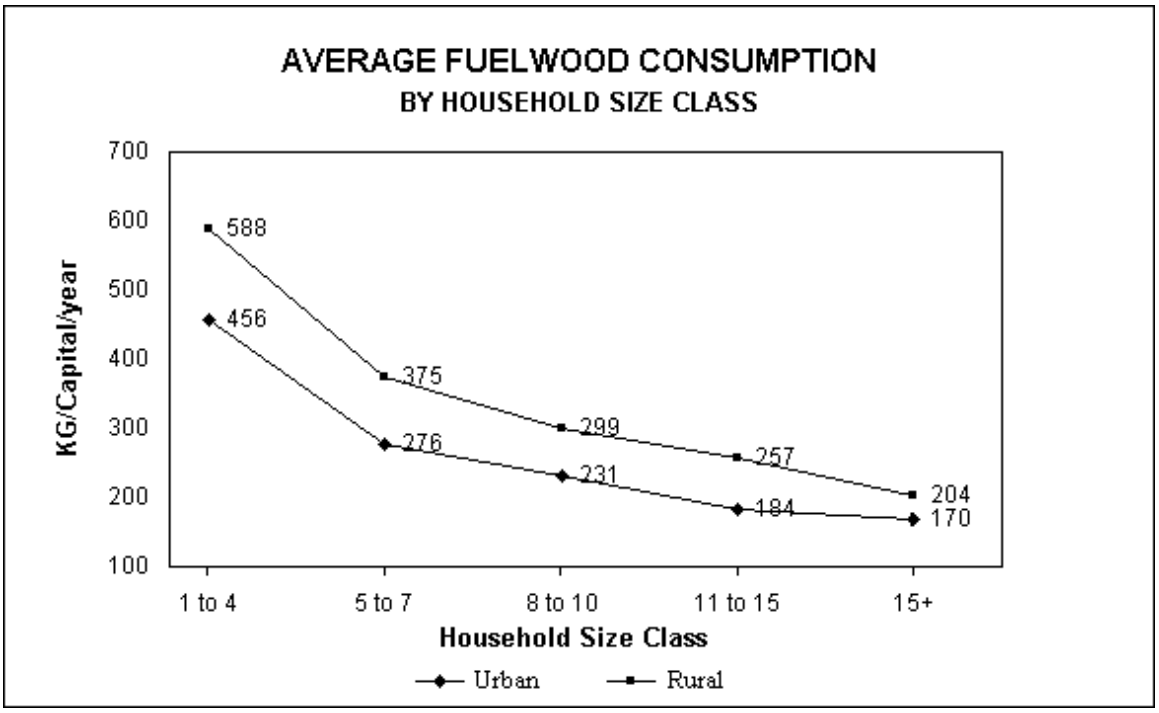



**Figure 3.2: Consumption Per Capita**
***Pakistan Household Energy Strategy Study (18)***

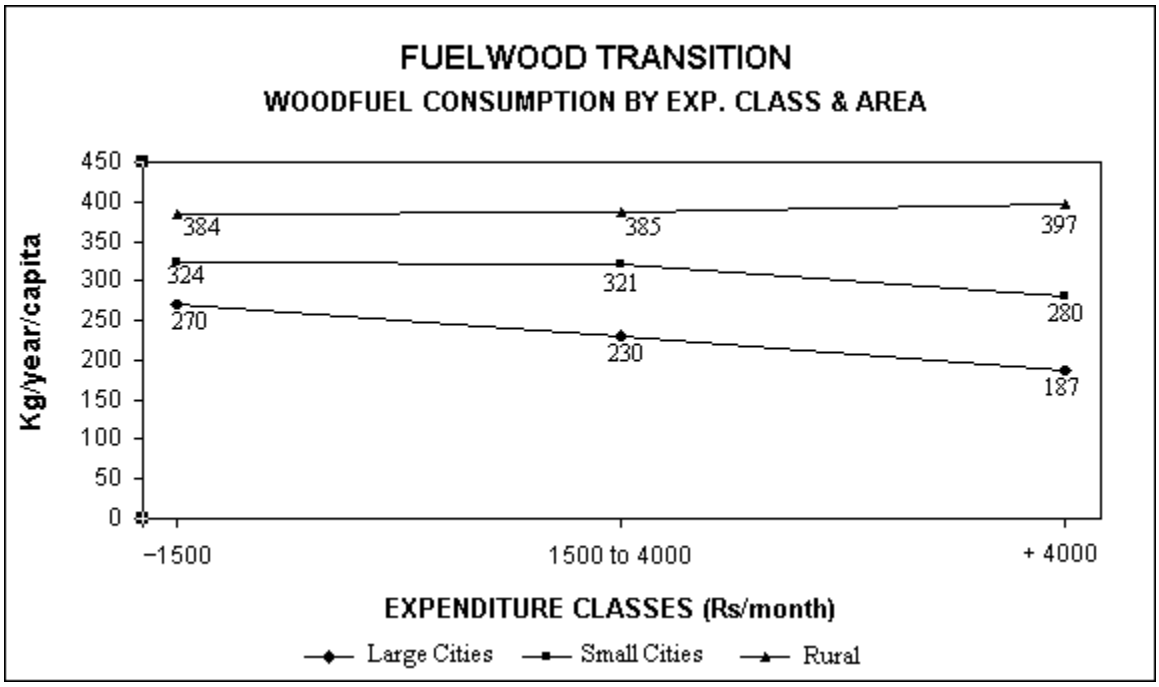



**Figure 3.3 Patterns of Fuelwood Transition**
***Pakistan Household Energy Strategy Study (18)***

### 3.2.2 COMMERCIAL WOOD ENERGY SYSTEMS

Although, the volume of wood fuels being traded now is still small compared to the volume of wood fuels gathered for own use, the increasing awareness on commercial uses of wood fuels not only in the urban and peri-urban areas of the region but also in many of the rural villages has made

the understanding of wood energy systems more complex. This has made also the design of interventions in the sector also more complex.

***Saxena*** pointed out that the demand created by traded wood fuels can have a much wider effect on wood fuel supplies than village fuelwood demand since the need to increase production for the urban markets and other wood fuels buyers can lead to greater use of logs and larger branches. This means that reasonably-sized trees will be sought for and cut, possibly in large patches, thus having more degrading effect on forests.(23)

However, very significant were the findings presented in the *expert consultation (by* Koopmans, Ouerghi, Bensel & Remedio, Panya and Pujanes) which showed that non-forest areas are the major source for wood fuels, accounting for 50-75% of the total supplies. As important were the findings that in the region, wood fuels production can be sustainable and even contribute to upgrading of waste lands. There are indications that such cases can be duplicated in many parts of Asia. **Thus, the notion that the demand for wood fuels is a major reason for the diminishing forest should at least be put into question.**

Commercialization of wood fuels means that, these can provide opportunities for rural development through the generation of rural employment and income through the production, harvesting, processing and transporting of wood fuels for the markets. But wood fuels would continue to be needed in rural areas, and there had been many previous negative experiences created when commercial and urban demand for goods produced and used in rural areas significantly increased. This further heightens the need to understand the emerging patterns of wood energy systems to be able to identify needed interventions and formulate appropriate strategies.

#### 3.2.2.1 WOOD FUEL FLOWS

**Description of Systems -** The distribution of wood fuels from the source to the final users can be complicated. Even though some information is now available on how the system works, there are still many unknown factors in the fuelwood and charcoal distribution process. Wood fuel trade is generally an informal sector activity.

***Aida Pujanes*** reported a very recent study done in the Philippines on wood fuel flow systems. The study identified the various players in the woodfuel distribution systems. The urban traders include the wholesaler-assemblers, wholesaler-assembler-retailers, wholesaler-retailers, and retailers. A wholesaler sells in large volume most of the time. The assemblers gather or bring together fuelwood and charcoal from different sources for stock. A retailer sells in small quantity directly to consumers. The rural traders transport fuelwood and charcoal from rural areas. Rural traders procure fuelwood and charcoal directly from fuelwood gatherers, charcoal makers, sawmill operators, or from rural-based assemblers. The study found that farmers are generally involved in fuelwood gathering and charcoal production. Some are also acting as rural traders and even local assemblers.(21)

For most of the traders, sale of wood fuels was the most important source of household income, but very rarely was it the only source. There were other income-generating activities they were engaged in such as the retail of basic household items (cooking oil, grains, soap, etc.), food vending, liquor sales, trading driftwood (for orchids), fruits and other products sourced from rural areas. Other working household members also provided income.

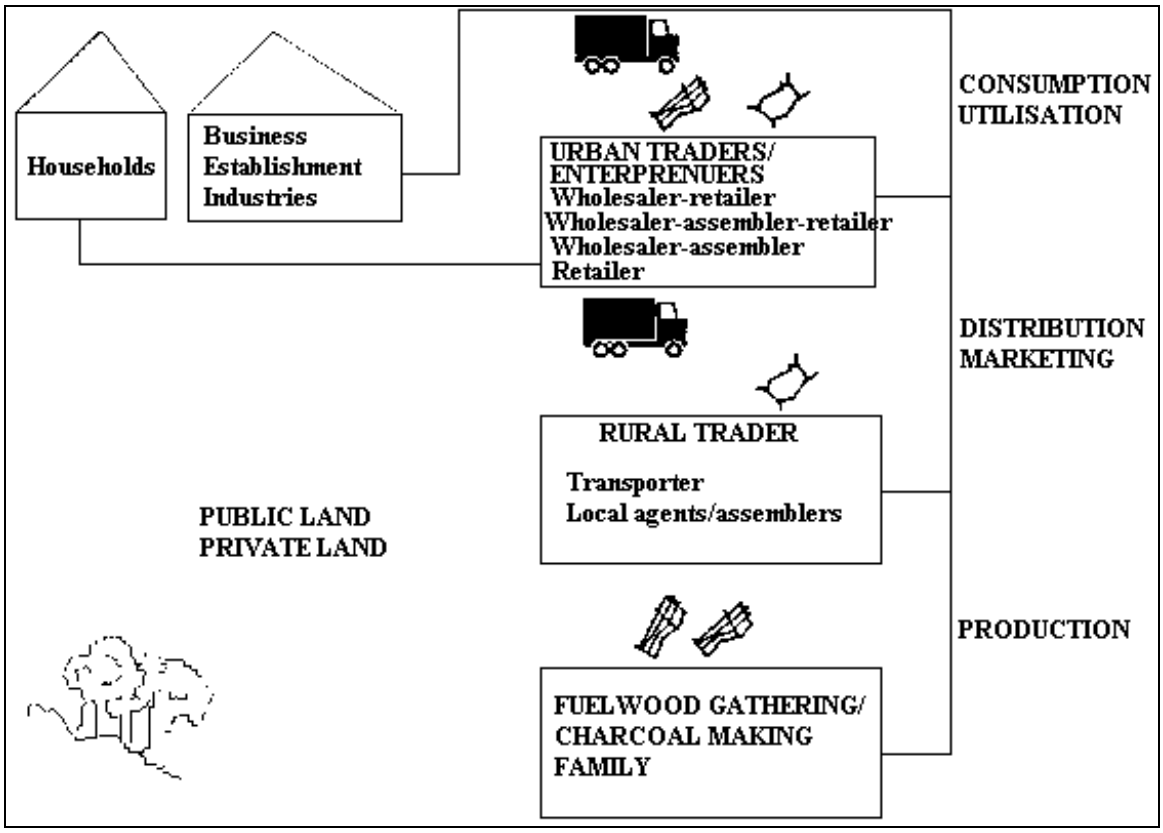



**Figure 3.5 Conceptual Framework Used in the Analysis of the Fuelwood and Charcoal Supply Systems**
***Philippines Household Energy Strategy Study***

The Philippine study covered Manila and five more urban areas. Each area was different in terms of proximity to forest areas, extent of cover of these forest areas, types of agricultural crops raised in the surrounding villages, population, source of incomes other than agriculture, extent of built-up areas in the cities, and supply and availability of *modern fuels* (LPG, kerosene and electricity). The study showed both common and site-specific findings for all six areas.

A more detailed study was later done in Cebu City, one of the cities covered by the above study as presented by *Bensel.* This was significant in highlighting the need for local-based studies to generate dis-aggregated data which can be used to focus strategies and interventions and attune them to local conditions. Transport of wood fuel, a key aspect of the flow is described below.(3)

The largest percentage of wood fuels enter the city in six-wheeler trucks carrying up to six tons of wood coming from the farther northern and southern municipalities. Wood fuels sourced from the mountain villages within the city and nearer municipalities are transported in jeepneys which can hold around 1 ton. Even smaller amounts of wood fuels enter the city on the roofs of buses, on pushcarts coming from close-by mountain villages.

Once in the city, fuelwood and charcoal is re-transported on a whole range of transport modes. For example, many urban traders either own or have access to a bicycle with sidecar or push cart used to deliver to larger buyers. In some cases the trader will assume responsibility for delivery, in some cases the buyer, but either way appropriate transportation can usually be hired if neither party owns some. Besides the manual forms of intra-urban transport, use is also made of jeepneys, motorcycles with sidecar and horse- drawn wagons.

In many ways the woodfuel market supplying the household sector is often distinct from that supplying the commercial sector. This is the case for the types of wood fuels being sold, the forms they come in, and the way in which these fuels are marketed and delivered.

According to ***Koopmans,*** fuelwood trade in Sri Lanka commonly involves specialized contractors who harvest fuelwood either from the forests but more often, from plantations. They sell the wood either in short log form or as split wood to urban fuelwood depots. These depots in turn sell direct to consumers (households, bakeries, restaurants, etc.) or to retail outlets. Large users, like brick and tile factories, buy directly from the plantations or usually, through fuelwood contractors for which often, tenders are put out. The fuelwood contractors are registered and therefore the wood fuel trade is legal and there appears to be little put in their way. Although the formal trade channels account for the majority of the fuelwood traded, there are also many informal channels. People collect wood from their own land, village land and forests for own use and for sale either directly along the road or to shop keepers.(12)

**Pricing -** The study in the Philippines showed that fuelwood retail prices varied only vary slightly across regions (P930-P1,100 per ton[3] ). However, "farmgate" prices for fuelwood varied significantly (P140-P630 per ton) with the higher prices found near Manila. On the other hand, both retail and "producer" prices for charcoal were fairly uniform across regions. Retail prices for charcoal ranged from P3,350-4,000 per ton while "producers" prices ranged from P1,430-1,800 per ton. The differences between the retail prices and the "farmgate" and "producers" prices for fuelwood and charcoal respectively indicate mark up by traders and transporters.(12)

Data showed that woodfuel prices have been increasing steadily over the years and have taken sharp fluctuations in response to certain events such as oil crises or natural disasters.(3)

Traders typically employ a simple mark-up scheme but the actual selling price often depends on the volume being purchased and the type of customer making the purchase.

In general, the traders do not think that fluctuations in prices of "substitute" fuels (kerosene, LPG) have any effect on the prices they pay or charge for wood fuels. Instead, they believe that woodfuel prices shadow fossil fuel prices because when prices of LPG or kerosene go up or down, so do prices of diesel, the transport fuel used in moving the wood fuels.

**Impacts on Employment -** Wood fuel flow systems generate considerable employment. Data on this matter however are still limited thus its impacts are not accounted for. The results of following studies provides indication how significant can its contribution be, in particular to rural employment.

Rapid Rural Appraisal (RRA) studies showed that in the mountainous areas of Nepal, about 35-40 Kg/day of fuelwood is collected and transported (backload) home per person-day. Transporting



[3] P25.00 = US$ 1.00

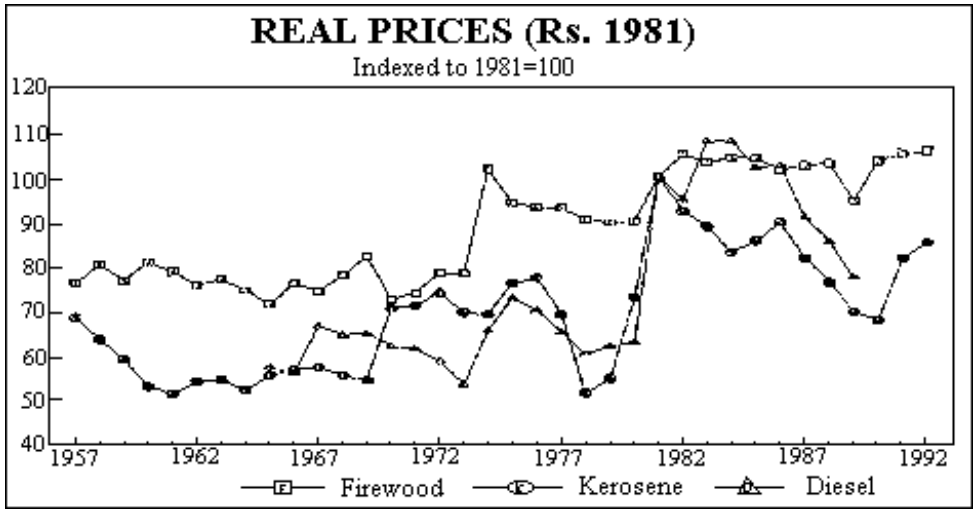



**Figure 3.6 Trends in Fuels Prices**
***Pakistan Household Energy Strategy Study***

it to the market and selling it takes another day. In the Philippines, a family can produced from 450 to 900 kg fuelwood per week. The fuelwood is then picked up by a middleman. In Indonesia, a farmer could gather about 0.16 M3 of fuelwood per day (about 50-70 kg) but he would need another day to transport and sell it in the market. The average amount produced per person-day, based on these RRA studies, ranged from 20-80 kg, depending on area, means of transport and distance to the market.(12)

The WB/UNDP ESMAP studies use a higher figure of between 1,600-2,700 person-days per 1,000 tons wood collected and sold to the market. Based on this figure, it was estimated that in the Philippines, up to 450,000 persons are involved in the production and supply of fuelwood given that about 3.3 million tons of wood fuels are traded and consumed in urban areas.(12)

In Pakistan, the traded woodfuel amounted to about 12.4 million tons in 1991-1992 representing 41% of the total fuelwood consumed. According to the survey, about 80,000 to 100,000 people were directly involved in this trade and there was a woodfuel business for every 2,500 inhabitants.(18)

The study in Pakistan indicated that the wood fuel trade is a business that generates annually the equivalent of US$450 million, equal to 10% of the value of Pakistan's exports in 1991-1992. Most of the traded woodfuel is coming from private farms constituting substantial earnings for farmers. It also constitutes an important activity for the transport sector as the woodfuel transport effort is believed to exceed 100 million ton-kilometers per year.

***Saxena*** cited a study in India which showed that headloading (to supply small, localized rural wood markets) have emerged as an important profession in the previous 15 years and it was estimated that at least 3 to 4 million people were involved in this profession, making it India's biggest source of employment in the energy sector. Headloaders, are generally poor landless people who have taken to this profession in the absence of other meaningful occupations. It is a low paid and a

high risk occupation, as pilfering wood from reserved forests for sale is an offence. ***Saxena*** pointed out that some people are alarmed by these developments believing that such efforts by rural dwellers to harvest and market wood can lead to further deforestation and land degradation.(23)

**Charcoal Systems -** ***Opart Panya*** presented charcoal making can provide income to rural people without other sources of income, particularly in of distress and the slack agricultural season, as he found in Northeast Thailand.

Urbanization has made available kerosene, LPG and electricity in many areas and may have encouraged a shift to these fuels by higher-income families. But for low-income families, fuel switching is driven not only availability and price of fuels but also affordability for new cooking appliances needed. Particularly for Northeast Thailand, which is the country's least urbanized region, wood fuels use will continue for long time.(19)

***Panya*** found that the dominance of small-scale rural enterprises in charcoal production appears to be a relatively recent phenomenon and is the result of a series of interrelated factors. They include: 1) an overall decrease in, and greater dispersion of, the region's remaining wood resources (a spatial pattern that makes it difficult to produce large quantities of charcoal at any one location, and therefore economically unattractive to larger-scale commercial entities); 2) a 1983 legal regulation passed by the cabinet that significantly reduced to 0.5 cubic meter the amount of charcoal which can be possessed for commercial purposes without a license (Secretariat of the Cabinet 1983); 3) increased villager awareness and knowledge of urban markets; 4) the growth of the rural market for charcoal (villages where wood is scarce) which posed distribution problems for larger-scale commercial entities; 5) continuing poverty and increasing cash needs in many rural areas which have increased the incentive for villagers to become involved in small-scale commercial charcoal activity, and, 6) improved entrepreneurial awareness and skills of urban migrant returnees who see small-scale charcoal and fuelwood trades as the first step into other kinds of commerce.

**CEBU WOOD FUELS TRADERS**

Some traders have been in the business of selling wood and charcoal for 30 to 40 years. A number of urban traders were, at one time, themselves rural traders of wood fuels. They moved to urban trading because it was considered less risky, or because they wanted to be closer to urban-based relatives. Newer traders entered the business after observing the success of a more established trading neighbor. This has resulted in a number of woodfuel trading “clusters” around the city, and although competition for customers can sometimes be keen cooperation often takes place between traders in terms of guarding stocks, lending money and/or supplies.

Very few traders show any inclination to give up woodfuel-trading in the immediate future although many complain of uncertainties with regards to tenure status of their dwelling or stall, supply and demand of wood fuels, and increased competition in the trade. While they may often complain of the difficulties of their occupation (declining sales, increased competition, theft, wastage, dirt, etc.) they also acknowledge the importance of this trade as a source of income.

The majority reported that their sales have remained fairly steady over the past few years, although for many complain this has not allowed them to maintain their standard of living in the face of generalized inflation and eroding purchasing power. Very few report sales getting better while a larger number, but less than half, report things getting worse due mainly to a combination of increased competition, declining household sales due to fuel-switching and declining commercial sales due to these users being supplied directly from the province. (3)

Most full-time charcoal "runners" are members of landless and smallholder households, and those beginner small local traders, who do other trading businesses at the same time. Part-timers include laid-off wage employers and migrant returnees, whose entrepreneurial awareness and skills have been accumulated from urban experiences. Many returnees see this as a learning experience for getting into commercial channels. Some see charcoal "running" as an opportunity to make quick and extra cash, while waiting for better and more permanent employment.

**CHARCOAL IN NORTHEAST THAILAND**

In *Si Sa Ket* Province where lands are flat and mostly dominated by paddy cultivation, farmers have planted indigenous trees on paddy buns and carefully manage “rotating cutting” to make fuelwood and charcoal. Most households interviewed reported that this method has provided them with more than enough fuelwood and charcoal supplies for all the year round. Coupled with tree pruning in annual land preparation, most of them were able to sell charcoal and fuelwood made from trees obtained from their private lands. (19)

In charcoal production, as in fuelwood, many draw the causal relationship between charcoal production and the degradation of forests. This gives charcoal production a destructive image and consequently becomes the basis for a policy that discourage the production and use of charcoal.

In Northeast Thailand, present-day charcoal entrepreneurial activities are less and less dependent on wood resources from national forest. In less wood-abundant areas, wood resources are obtained from privately owned lands. Here, trees standing on uplands are pruned, and those on paddy field are planted and carefully managed as the long-term supply for fuelwood and charcoal making. In relatively wood abundant areas, public lands and uncultivated uplands provide most of the wood for making charcoal.

This implies better and more effective tree management by farmers. Northeasterner, as long as charcoal is important to them, are adaptive and innovative in "managing" wood resource to meet the charcoal demand and making a fairly decent living out of it. What might also occur is that tree species preferred by local people may be different from what foresters may expect. Most of the species planted and preferred are those that are fast-growing and multi-purpose (as human food and/or animal fodders, fence, house construction, etc.), and better adapted to the local environment.

### 3.2.2.2 USE OF TRADED WOOD FUELS

**Consumption Patterns in Urban Areas -** Urban energy consumption patterns can also show the pattern of uses of traded wood fuels. In Cebu City, it was found that the poorer households purchases fuelwood (including coconut fronds) as their primary fuel. Most of the better off households predominantly use LPG, but many of them also buy fuelwood and charcoal as a secondary fuel or as fuel to prepare special dishes. More importantly, a large variety of both small and large-scale commercial establishments use wood fuels for heating purposes.(3)

In the case of Cebu City, 75% of total fuelwood consumption goes to the household sector, although this figure drops to 33% if *household-based commercial usage* is included in the commercial sector category (see discussion under wood fuel-purchasing households). Around 60% of charcoal is going to the household sector, declining to around 50% if household-based commercial usage of charcoal is included in the commercial sector. Commercial users of charcoal are mainly food processing and service establishments.

***Ouerghi's*** findings in Pakistan showed how fuelwood transition is driven by urbanization. The size of the city is strongly correlated with the proportion of fuelwood users and their level of consumption. Only 28.5% of households residing in large cities of 1 million inhabitants and above, which house about half of the urban population, use firewood and their average consumption is almost 30% lower than consumption of households living in smaller cities. Large cities generally enjoy a better supply of modern fuels such as piped gas (almost half of the households have access to it); and display higher income. Average energy expenditure in large cities is about 43% higher than in the smaller ones. As the urbanization rate in Pakistan is growing very fast, one should expect the growth rate of per capita firewood consumption to decrease (although, total volume of consumption may still increase).(18)

**Wood Fuel-Purchasing Households -** ***Ouerghi*** reports that urban households purchase 86% of their fuel needs which constitutes a direct financial burden. This makes urban households more sensitive to relative prices and inter-fuel substitution as their income changes. There are opportunities for woodfuel savings by introducing improved stoves which could be commercialized through wood traders. With household incomes increasing, fuelwood consumption is expected to decrease.(18)

On the other hand, ***Bensel*** reported that in Cebu, nearly one-fourth of household fuelwood consumption was found to actually be going to *commercial activities taking place within the household premises rather than directly for household cooking needs.* Most notable was the operation of informal food-vendors preparing and selling pre-cooked dishes out of their residence. The majority of these were found in low-income squatter settlements where they sell small portions of vegetable and meat dishes to neighboring households.(3)

Taste was the most important factor for nearly one-third of all fuelwood-using households in Cebu, but a perceived inexpensiveness was also important. These findings suggest that many woodfuel-using households have strong reasons for preferring this fuel and might not be automatically inclined to fuel-switch even if it becomes economically feasible.

Furthermore, fuel transition is not always a one way shift for many households, as can be seen by the fairly large number reporting a switch from kerosene back to fuelwood. Overall, however, there is a clear trend towards wider use of kerosene and LPG. But the perceived inexpensiveness of wood fuels will keep its attractiveness as secondary or supplemental fuel. *Bensel* concluded that it is certain that wood fuels will continue to be an important fuel in the household sector of Cebu for some time to come.

**Table 3.6: Primary Cooking Fuel for Cebu City Households, by Income Range (3)**

**HOUSEHOLD INCOME RANGE**
**(Philippines Pesos/$1.00 = PHP25.00)**

| Primary Fuel | 0 – 1999 | | 2000 – 4999 | | 5000 - 9999 | | 10000 - 19999 | | 20000 - highest | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % |
| Fuelwood | 52 | 53.4 | 75 | 31.9 | 33 | 20.0 | 8 | 9.9 | 0 | 0.0 | 168 | 27.9 |
| Charcoal | 3 | 9.8 | 15 | 6.4 | 7 | 4.2 | 1 | 1.2 | 1 | 2.5 | 32 | 5.3 |
| Kerosene | 13 | 15.9 | 57 | 24.3 | 36 | 21.3 | 3 | 9.9 | 2 | 5.0 | 116 | 19.2 |
| LPG | 4 | 4.9 | 56 | 23.8 | 76 | 46.1 | 56 | 69.1 | 32 | 30.0 | 224 | 37.1 |
| Electric | 1 | 1.2 | 0 | 0.0 | 0 | 0.0 | 1 | 1.2 | 2 | 5.0 | 4 | 0.7 |
| Sawdust | 0 | 0.0 | 7 | 3.0 | 1 | 0.6 | 0 | 0.0 | 0 | 0.0 | 8 | 1.3 |
| Others | 1 | 1.2 | 1 | 0.4 | 1 | 0.6 | 0 | 0.0 | 0 | 0.0 | 3 | 0.5 |
| Multiple Fuels | 2 | 2.4 | 21 | 8.9 | 11 | 6.7 | 7 | 8.6 | 3 | 7.5 | 44 | 7.3 |
| Not Cooking | 1 | 1.2 | 3 | 1.3 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 4 | 0.7 |
| TOTALS | 32 | 100.0 | 235 | 100.0 | 165 | 100.0 | 81 | 100.0 | 40 | 100.0 | 603 | 100.0 |

**Table 3.7: Woodfuel Use Patterns of Selected Industries and Institutions**
***Cebu Fuelwood Study (4)***

| Type of Establishment | Number surveyed | Woodfuel-Using | | End-Uses |
|---|---|---|---|---|
| | | Yes | No | |
| Noodle and Bijon Making | 7 | 6 | 1 | Boiler fuel |
| Rattan Furniture Mfg. | 12 | 9 | 3 | Boiler fuel for rattan pole bending |
| Feeds/Seaweed Processing | 6 | 3 | 3 | Boiler fuel/dryer fuel |
| Fashion Accessories Mfg. | 3 | 3 | 0 | Boiler fuel for bleaching and drying |
| Dried Mangoes/Fruits | 4 | 0 | 4 | Dryer fuel |
| Schools | 39 | 22 | 17 | Cooking fuel |
| Hospitals | 15 | 4 | 11 | Cooking fuel |
| Prisons | 2 | 2 | 0 | Cooking fuel |
| Mosquito Coil Mfg. | 1 | 1 | 0 | Dryer fuel |

**Industries and Enterprises -** In Asia and other developing regions, solid biomass fuels in the form of firewood, charcoal and other bio-residues have been used widely in many small and rural-based industries and enterprises. Industry and enterprise use (bricks, lime, textiles, food processing, etc.) also consume considerable amounts. When compared with the domestic sector, it appears to be rather small but nonetheless significant. This sector accounts for about 10-15% out of the total amount of energy consumed within the countries and has a share from 10-30% of the total amount of traditional sources of energy consumed as was shown in ***Koopmans'*** presentation.(12)

In the Cebu for example, the commercial sector accounts from one-third to one-half of woodfuel consumption. The commercial sector appears to also make wider use of commercially-traded wood wastes and non-wood biomass including coconut shells and husks, coconut fronds, coconut lumber off-cuts, bamboo, sawdust, wood shavings and various other forms of scrap wood.

*Aroon Chomcharn* pointed out that the use of wood fuels and other biomass in traditionally wood-fuel using industries and enterprises will depend on the price and supply security of these fuels relative to commercial fuels. These industries and enterprises will continue to use biofuels as long as biofuels can be competitive energy sources and supply is secure.(7)

### 3.2.3 SUSTAINABLE WOOD ENERGY SUPPLY SYSTEMS

**Sources of Wood Fuels** - ***Koopmans'*** review indicated that generally, a major part of the fuelwood use in the region comes from non-forest sources such as; scattered trees around homesteads, trees along roads and canals, trees on agricultural lands, woods from plantation crops, brushwood from waste lands, and trees on grass and range lands.(12)

He identified five *types of origins of woodfuels.* These five, of which the last two appear to be the most important are:

- direct tree cutting for fuel (from forests and non-forest sources)
- dedicated woodfuel plantations
- by-products of wood-based industries (lops and tops of trees)
- dead branches and twigs (in forests and non-forest areas), and
- surpluses from clearing activities.

To these five supply sources, one more could be added, wood obtained from construction activities (demolition of buildings, shuttering from concrete work, fences, etc.) - an important source for many urban poor families.

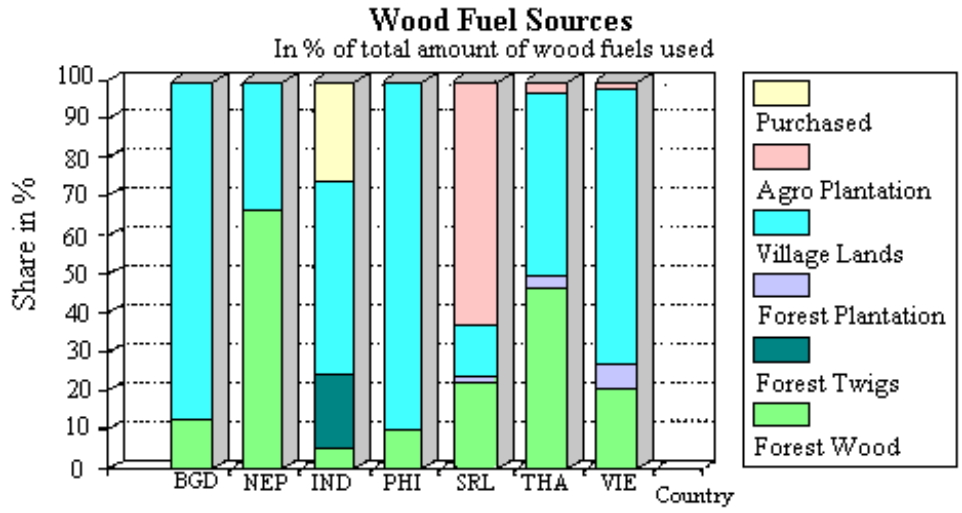



**Figure 3.8: Sources of Wood Fuels**

In Pakistan, the consumption of twigs as fuel is estimated at about 5.5 million tons for a sustainable level of 4.4 million tons per year. 'Me survey showed that only 8% of all trees have 75% or more of their crown removed and almost 68% of the trees were intact. During the same period, households consumed 7.6 million tons of shrubs which represents almost 78% of the total stock.(18)

In Bangladesh, it is common for farmers to sell wood from trees on their land. They themselves make do with lower grade fuels like residues. In most cases they only sell branches with the tree left standing. Only in cases where large expenses have to be met, such as for dowries, when whole trees are cut.(12)

In Vietnam, trees planted by the population under various schemes on their homesteads, along roads, school grounds, village areas, probably supplied about 8 M tons, equal to about 25% of the total amount consumed. Another 2.2 M tons were estimated to be available from forest plantations.(12)

Forest plantations and other tree growing activities are also important sources of wood fuels. In Sri Lanka, about 0.2 million tons of the 9.1 million tons of wood fuels came from forest plantations. In India, of the 131 M tons of fuelwood consumed, it was estimated that 4 M tons were from social forestry projects.(12)

Other sources of woody biomass in the region include coconut trees, rubber trees, oil palms, and tea bushes. Asia produces 93% of the world's rubber (wood from rubber trees), 87% of the coconuts (fronds, husks, shells and wood from trees) and 78% of palm nuts (shells, fronds). However, there are many competing uses for these products. Rubber wood is widely used for furniture making, coconut shells for activated carbon production, and husks and fronds as a mulch in plantations.(12)

**Assessing Wood Fuel Supply -** Most of the previous attempts to assess wood fuel supplies in the countries were replete with uncertainties. Some the factors identified follow here.(18)

***Ouerghi*** pointed out that an important result of the Pakistan study is the refutation of the "gap theory" as it allowed for the understanding of the adoption of "rural resource managers" to changes in resource situations. This theory is static and does not take into consideration behavioral changes due to increasing scarcity, higher demand and socioeconomic and cultural changes. This concept has been widely misused as it has invariably predicted a complete depletion of biomass cover within few decades in several countries. This of course did not happen.

***Soussan*** argued that the existence of fuelwood resources in a locality is not enough to guarantee that no-one experiences fuelwood problems. These resources must be available for use by all who need them. This is frequently not the case, and he identified a series of factors which limit access to wood resources, stressing that the form these access constraints take is highly locality-specific. This is only one of the factors which must be accounted for before detailed plans are developed for any place.(24)

Three broad groups of access constraints can be identified in rural areas (in urban areas access to fuels is a function of income and the development of fuel markets). These are limitations imposed by the location of the resources in relation to demand, by land tenure and ownership of biomass resources and, finally, by the way in which biomass resources are managed.

The *locational limitations on access* reflect features of the landscape. Most important is the distance between the sources of supply and the point of use. In many localities biomass fuels are gathered freely from the local environment, and the main cost of fuelwood use is the time taken by, usually, the women of the community to collect the fuel. Carrying large bundles of wood is also physically demanding. Resources beyond certain distance will take too long to collect.

**MAI Values**

One should be critical in using published Mean Annual Increment (MAI) values in assessing sustainable yields of standing stocks in forests. At present, MAI values are often based only on the standing stock of "commercial" species, thus excluding other species which are used for fuelwood. Also, measurements account only trees with certain dimensions and considers only trunk volumes, leaving out many small trees, shrubs and branches, which often are the larger part of the fuelwood gathered from forests. Using MAI figures may understimate the total amount available on a sustainable basis (12)

The time taken to collect fuels is also influenced by features of the terrain such as hills, rivers, gullies and so on. Locational constraints on access can be calculated in relation to the benefits accrued for the time and effort taken. Whether people are willing to pay this price depends on the alternatives to wood available, their income and the opportunity cost of the collectors' labor time.

A series of access constraints come from the *legal status of land* in an area. The availability of biomass resources inevitably depends on their ownership, which in turn is often a function of the ownership of the land on which they grow. Three broad categories of land tenure can be identified for our purposes:

- Land owned individually by the local community - basically private farmland.
- Land owned by the state, large commercial producers or other institutions controlled from outside the area - plantations, commercial farms, state forests and so on.
- Land resources which are "common" - legally owned by the state or through customary communal forms but with no legal proprietorial restrictions upon access to them - open rangelands and woodlands, hillsides, grazing lands etc.

The final category of access factors are those associated with the *system of biomass resource management.* This will reflect the prevailing social structure, resource management and harvesting techniques, non-fuel uses of different categories of biomass resources and the rights and obligations of different sections of the community. One typically finds great differences according to gender, class, age and so on within a community over the control and use of biomass resources. Gender roles are of critical importance here, as fuel provision is frequently the women's responsibility whilst the men control the resources (especially land and cash) from which the fuel comes and which would need to be available for many interventions to work. This division of rights and obligations is a critical factor for the success of attempts to address fuelwood problems.

**Wood Production for Energy -** In Pakistan, 125 million trees were planted by farmers during 1990-91 and the share of non-fruit trees was almost 90%. This wave of tree planting indicates that farmers realized that wood is a lucrative business. About 73% of the farmers who have been involved in non-fruit tree planting during 1990-91 have planted less than 20 trees each. The low number of trees planted suggests that these trees are scattered or planted in rows, and therefore are not displacing other agricultural crops. It has also been observed that farmers harvest their trees at a rather short rotation of about 6 years, which minimizes the negative impacts generally attributed to the shade of trees and maximize their return.(18)

However, it is clear that they regard *woodfuel as only a by-product of wood plantation.* Although trees have multiple functions, farmers indicated that the largest proportion of the planted trees (44.9%) was for timber. Only less than 7% of households planted trees for the sole purpose of fuelwood.

This type of wood production system, *agroforestry,* presents several benefits to the farmers. Besides the fact that trees shelter crops from desiccating wind and can improve soil nutrients, they generate substantial additional cash income to small farmers once they are sold. The study demonstrated that 100 border trees per hectare, give a discounted annual revenue of 10% of the returns from cotton-wheat and 60% from rice-wheat double cropping (when land rents are included). It also provides households with an important source of fuel that would have to be either purchased representing a financial burden or collected which would be translated into additional burden for women and children. Over half of the farms have an areas of two hectares or less, thus the potential for tree growing alongside the boundaries is significant.

*Large-Scale treeplantations* could be attractive to farmers as it requires considerably less labor and limited administration and management. It is also less sensitive to weather conditions and the harvest could be done at periods which are more convenient to the farmers. However, the time span needed between planting and harvesting could be a major obstacle for small farmers, although the up-front cost is generally low.

Here, the price of wood is a very critical issue as it could affect very much the viability of farm forestry in Pakistan. Excessive supply of industrial wood or market imperfections could contribute to lowering the prices leading to the crash. The survey findings have revealed that the tax system on wood transport across division boundaries is "onerous, inconsistent and poorly understood resulting in increasing opportunities for abuse". It was also found that farmers could increase substantially their income if they undertake their own harvesting and transport, and if they are provided with proper training on volume measurement and wood grading. However, in order to reduce the risk of a glut due to excessive supply, wood-based industries should be encouraged.

The Pakistan surveys indicate that the country has a standing stock of 210.8 million tons of biomass resources (including shrubs and bushes). This standing stock could generate a sustainable production of about 22.7 million tons per year. The relatively high productivity of the resources is mainly due to a large proportion of very young trees and the high productivity of shrubs.

***Ouerghi*** cautioned that extensive tree planting by farmers to meet the growing demand does not mean that there is no environmental degradation. Trees on irrigated farms can certainly not preserve the endangered ecosystems due to over-harvesting of natural forests and the deterioration of watersheds. Although the observed tree planting wave - if maintained- seems to be capable of sustaining the demand, there are localized areas suffering from land degradation. Semi-arid and rain-fed areas have the lowest per capita standing stock and rural household are mainly relying on collected fuelwood. If tree planting does not extend to these areas fuelwood use will certainly have negative impacts on the environment causing more hardship to poor households who can not afford to purchase fuelwood transported from other areas or switch to other modern fuels.

The possible positive impacts of increasing commercialized wood fuel use was documented in the Cebu study. Findings showed that even if the surrounding areas of the city had been 99.6% deforested (and has reportedly been in that condition since the end of the last century), wood fuel is available and being used by both household and the productive sectors in the city. Prices have remained relatively steady indicating some stability in its supply.(3)

In Cebu, rather than being a cause of resource degradation, much of the wood fuel system plays a crucial role in preventing it, as many of the degraded lands around the city, unsuitable for agricultural crops have been planted to trees of fuelwood species. However, there have also been instances of intercropping of short-rotational trees and corn plants. The degraded lands, many of which have steep slopes, would probably have been further eroded had not farmers took initiatives of planting trees to supply the growing demand of fuelwood and charcoal in Cebu City. Unfortunately, many proposals and programmes for resource development reflect inadequate awareness of this fact. Current thinking in both government and non-government circles demonstrate a gap in understanding of upland resource management systems in general and of the role of wood fuel resources management in particular.

***Panya*** studies of charcoal production in Northeast Thailand suggest that enhancing the economic viability of charcoal making may under many conditions prevailing in Thailand, bring about incentives for improved wood land management and tree planting, if accompanied by appropriate institutional support.(19)

**RESPONSES TO FUELWOOD STREESES**

Pressures on the biomass resource base are not simply a matter of fuel demand and scarcity; they relate to control over and the range of uses made of biomass resources. Where people are faced with shortages of biomass materials to meet these varied needs something has to give. What it is depends on local priorities and divisions of responsibility. In such circumstances, the needs of the poor and less powerful (women, the landless) take second place to those of those who control land and biomass resources. As is the case with other factors, biomass fuel stress is not derived from traditional forms of resource management. It is a product of the disruption of these systems; disruption which is in turn generated by a number of forces which vary in importance from locality to locality.

All this tells us that there is no simple, uniform fuelwood problem in Developing Countries. Such problems are complex and varied. They express themselves indirectly: not as a quantifiable shortage of woodfuel but rather as some form of disruption to the local system of land resource management. They are part of a wider process of resource stress which takes different forms in different places. The key to understanding this variation to understand the notion of access constraints. Fuelwood problems are best understood as stages in an unfolding drama, in which people respond to the resource stress they face in a variety of ways. Some of these responses are desirable and sustainable, and form the basis for effective interventions. Others produce negative impacts, with steps taken as necessary responses to an immediate problem resulting in the longer-term undermining of the local production system. (24)

Finally, ***Saxena*** addressed some valid constraints about impacts to rural users when wood fuels get traded in urban areas. He pointed out examples in community forestry projects in India which have been successful in terms of physical production of wood, which may have enhanced supplies of fuelwood in urban areas, but did nothing to help the deficit of fuelwood in rural regions, nor the poor and landless benefited from it beyond wages. These experiences, he noted, highlighted the need about very clear institutional and policy decisions in the programmes. He saw that the main reason for the above was the uncertainty about the distribution of benefits generated from the increased wood production - who will gain and how.(23)

## 3.3 EMERGING WOOD ENERGY POLICY AND STRATEGY ISSUES

Energy and forestry policy decisions, including those from other sectors - from agriculture to rural development to macroeconomy - even if taken for other reasons other than wood energy concerns can significantly influence wood energy production, trade and use. Such policy and programme decisions can negatively impinge upon or can be designed to enhance wood energy development.

Given that wood will still be a significant energy resource in the foreseeable future, the policy environment should be conducive to maximizing the benefits of wood fuels. For policy makers in the

region, there is a need to understand comprehensively the dynamics of wood energy systems to be able to formulate policies towards effective wood energy development programme strategies.

***Soussan*** pointed out why understanding of wood energy systems can be complex. Wood supply, or in general biomass energy supply, is defined not only by the amount of resources available, but also, the access to these resources which can be constrained by location, land tenure and land management practices.(24)

Fuelwood problems do not express themselves as a simple and direct shortage of fuel. As resource stresses emerge people respond according to the opportunities open to them. These responses are variable, indirect and locality-specific. As earlier pointed out, *some of these responses are desirable and sustainable and form the basis for effective interventions.* Others produced negative impacts, with steps taken as necessary responses to immediate problem resulting in the longer-term undermining of the local production systems.

Rural localities, where fuelwood is usually a free good gathered locally should be distinguished from urban areas where wood fuels are a commodity produced elsewhere. The policy options which are appropriate for each of these different sets of circumstances will similarly be varied. To work, fuelwood policies must be tailored to the specific circumstances of people in places.

The oil and fuelwood "crisis" of the 70s has now been replaced by more complex concerns about the economic implications of debt burdens and restructuring policies and a wide range of environmental issues at local, national and global levels. Many countries are realizing the need to shift from energy supply-driven strategies towards integrated energy (supply-demand management) programmes for sustainable development.

Population growth and urbanization are changing the ways wood resources are managed and are producing new forms of fuelwood. stress. Resource pressures derived from population growth exist, particularly in mountainous, semi-arid and other fragile environments. In this, fuelwood use cannot be separated from other forms of land resource exploitation.

Urban growth rates of up to 10 percent per year are common and what were rural societies are becoming increasingly urban-focused throughout much of Asia. Urban populations will outstrip rural ones in most countries during the next generation. Urban energy demand is of increasing importance, and for many countries is likely to become a dominant energy policy issue in the near future.

### 3.3.1 WOOD PRODUCTION FOR SUSTAINABLE WOOD FUEL SUPPLY

**Wood Production Systems** - ***Chun Lai*** in his discussions of policy options for wood energy resource management strategies pointed out that policies should recognize the primary importance of natural forest areas and agroforestry in supplying wood fuels and other wood and non-wood products. He argued that *improved natural forest management and agroforestry* programmes can be developed to engender greater local participation, and can sustainably produce a larger volume and wider diversity of goods and services for the local and national economies.(15)

Improved natural forest management and agroforestry can be best achieved if strategies are developed on the basis of policies that explicitly recognize the legitimacy of customary laws, rights and practices as the foundation for community protection and management of forest and wood energy resources.

He noted that upon close examination, there are existing policy and legal provisions that can be the basis for action, to support community and individual initiatives in natural forest management and/or agroforestry in most countries. These provisions definitely exist in customary laws and practices. They may also exist in the prevailing forest policy and law, national agrarian codes, or in national constitutions.

> *"….. it seems rather odd for us to enforce the reserve forest law on people in the forest which became reserved only subsequently by the mere drawing of lines on pieces of paper. The problem arises inasmuch as with the delineation done, as these people became violators of law. From the view point of law it is a violation because the law was duly enacted. But according to natural law the violator of law is he who drew the lines, because people possess the right to live. Thus it is the authorities who encroached upon the rights of individuals and not the individuals who transgressed the law ….."*
>
> - *His majesty the King of Thailand in an address before a gathering of lawyers (quoted Rao 1992)*

He cautioned that policy reform or revision can sometimes serve to further centralize government authority. The criteria for evaluating any policy or law should be its real impact on the ground. What is needed to be established are firm policy implementation guidelines and procedures that can be easily understood and followed by local communities and responsible government officials. Increasing grassroots-level awareness of villagers and field staff would be a sound strategy of improving the implementation of policy. This requires concerted efforts to produce and disseminate information, in appropriate languages and media, on relevant policies, and the rights and responsibilities of participating communities and agencies. This information must be properly and systematically communicated through action training and education programmes in policy implementation at the grassroots-level.

**Wood Resource Management - *Saxena*** discussed the evolution and impacts of forest policies of India - particularly on subsistence wood fuel users -, and recommended that entire forest lands, both degraded and reserved, should be made to cater for people's need while, the farm sector should look after the market demand for timber. Based on India's experiences in addressing the "fuelwood problem" and providing supplies of commercial timber, ***Saxena*** listed down the advantages of this policy shift.(23)

He sees that people's cooperation would be easily forthcoming if reserve forests would be used for subsistence-oriented management of trees and mixed forests - the produce of which is gathered, rather than for raising plantation crops. *"Minor forest products"* (MFP) which provide sustenance as well as income to the poor, should be supplemented with shrubs, grasses and bushes to yield fibre, fuelwood (through twigs and branches, and not logs) and fodder in the shortest possible time.

He pointed out that given the inefficiency of administration and "soft" character of the political system, one could generalize that out of a tree the thick stem goes to the rich and the towns, whereas low value flowers and fruits, leaves, branches and twigs belong to the poor. Therefore one should opt for species which either give usufruct annually, or have high proportions of branches and twigs relative to stem wood.

Another advantage is that, trees which provide a lot of leaves, twigs, and branches enrich the soil much better than those which provide poles and timber alone. The objective of soil and moisture conservation would be better achieved through grasses and shrubs, rather than with plantations.

**Table 3.8: Differences in Farm Forestry and Public Forestry (23)**

| INDICES | FARM FORESTRY | TREES ON PUBLIC LANDS |
|---|---|---|
| 1. Use of land and labor | - intensive | - extensive |
| 2. Use of other inputs like water and fertiliser | - often used | - rarely applied |
| 3. Nature of output | - high value, to meet market demands | - fuelwood, fodder and MFPs (minor forest products) |
| 4. Ownership and control | - farmer | - government, or joint |
| 5. Species | - value in stem, often monoculture, fast growing | - value in crown, mixed forests, may be slow growing |
| 6. Benefit to landless | - nil, or at best indirect | - could be substantial |
| 7. Objectives | - to maximize economic returns | - to maximize welfare |

Conventional forestry based on clear felling disrupts the annual circulation of nutrients, and increases soil erosion. On the other hand, mixed forests draw and give nutrients to the soil at different stages of their growth, and hence are ecologically far more beneficial than plantations. As opposed to timber, which is the product of the dead tree, what should be emphasized *are products of the living tree - fruits, nuts, flowers and twigs.*

He pointed that such a policy shift will strengthen the position of the gatherers but will not demand "political will" to throw the contractors out, as they would hardly be interested in labor intensive and low market value produce like twigs.

The poor have gained little from past forestry programmes because they are not organized, and bureaucracy has failed to deliver to them a share from timber and pulpwood trees. The imperatives of industrial forestry required "keeping people out but allowing contractors in". Usufruct-based trees overcome both these problems. Under the proposed policy, technology produces an output which eliminates the need for both social and bureaucratic fine tuning.

**Table 3.9: Various Existing Programmes and Legal Mechanisms for Vesting Rights to Individuals and Communities in Some Countries in Asia-Pacific (15)**

| Country | Program/Govt. Implementor | Scope | Mechanism | Duration/User Rights |
|---|---|---|---|---|
| **Bangladesh** | Thana Reforestation & Nursery Project (agroforestry component); Forest Department (FD) | Nation-wide in remnant and degraded sal forests | **Individual** contract between FD and participating farmer in agroforestry; usually 0.4 – 1.2 ha plot/family | 1 year, renewable contract; farmer entitled to all agricultural crops, intermediate tree products and 50% of final tree harvest; FD makes major decisions |
| **Indonesia** | Java Social Forestry Programme; State Forest Corporation (SPC) | Java-wide on social forestry sites: usually on "critical" production forests | **Individual** contract between SFC and farmer participating in social forestry; usually 0.25 ha/farmer | 2-year, renewable contract; farmer gets all agriculture crops, fruit trees, fuelwood trees; timber species belong to SFC |
| **India** | Joint Forest Management (JFM) Program: State Governments and Forest Department (FDs) | 10 states have issued JFM guidelines (as of 8/92) in response to Govt. of India June 1990 circular | **JFM** contractual or lease agreement between State FD and user groups (e.g., 2,000 Forest Protection Committees in West Bengal State) | Duration of agreement variable, sometimes indefinite (June 1990 circular prescribed 10-year, renewable Working Scheme);beneficiaries given usufruct rights to grasses, branches, "minor" forest produce, and share of timber (usually 25%) |
| **Thailand** | National Forest Land Allocation/Reserved Forest Improvement Projects; HMG of Thailand and Royal Forest Department | Primarily in occupied forest areas of north and northeast | •**Individual STK** land certificate to forest land occupant based on 1982 occupancy survey<br><br>•In northeast, allocation of non-productive reserved forest land to **landless families** | • "temporary" land-use permit; gives farmer usufruct rights;>7 million rai allocated since 1982<br><br>•provides usufruct rights; target is >14 million rai in 5 years |

| Country | Program/Govt. Implementor | Scope | Mechanism | Duration/User Rights |
|---|---|---|---|---|
| **Philippines** | Integrated Social Forestry Program; Department of Environment and Natural Resources (DENR) | Nation-wide in upland areas | **Individual** Certificate of Stewardship Contract (CSC) between upland farmer and DENR (3-7 ha/family);<br><br>Individual or communal Forest Lease Management Agreement (FLMA) given to family, community or incorporated group<br><br>Community Stewardship Agreement (CSA); 13 CSAs (avg. size 3,400 ha) issued as of 12/90 to registered groups<br><br>Certificate of Ancestral Land Claim (CALC) given to communities or individual members | 25-year, renewable CSC (also for FLMA and CSA); can be inherited by offspring provides usufruct rights to farmer<br><br>gives rights to harvest, process, sell or use products grown on forest land<br><br>only for "cultural communities" registered with Securities & Exchange Commission, Manila; provides leasing of land of communal basis<br><br>task forces survey and delineate ancestral domains to recognize rights of specific indigenous cultural communities |
| **Vietnam** | National Land Allocation Program; State Forest Enterprises/District Agroforestry Services | Nation-wide, mostly in uplands; over 5 million ha allocated to families | Long-term production contract between government and private household or cooperative | 15-60 year renewable contract based on type of land and crop rotation; benefit-sharing defined for tree species |
| **Nepal** | Community Forestry Program; Forest Department (FD) | First developed in hill forests; later in Terai plains | Operational plan developed by user group and sanctioned by FD | Gives secure usufruct rights and legal control to user group; users protect and manage forests, receive all income |

He explained why *social forestry on common and private lands* have not been successful in meeting the fuelwood needs, particularly of the rural consumers who comprise, the large majority of users.

Although such 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.

Half of social forestry has been on private lands. As fuelwood was not seen as income generating, farmers preferred income giving trees, and continued to collect twigs and branches from public lands as before. Farmers, he said were not interested in using their scarce resources of land and capital to generate a product they could collect and it was unfair to load social concerns on farmers if they saw no economic returns.

**Collected and Traded Wood Fuels** - ***Saxena*** sees the need for policies to make a distinction between fuelwood from logs and fuelwood from twigs and branches. *Fuelwood from logs,* even if produced on public lands is out of the reach of the rural poor, as it gets traded (to urban markets and industrial users), and at best helps the urban poor. The rural poor can have access only to *fuelwood from twigs and branches,* which requires labor intensive process of collection and does not attract contractors' greed.(23)

Fuelwood shortages are not as pervasive as was earlier thought. Given that providing sources of livelihood to rural people is the more important concern, the objective of social forestry in reserved forest lands should be not only to produce twigs and branches (for fuelwood), but also to generate self-employment for the poor through the gathering of consumption goods like MFPs, wild fruits, and mulch. He proposed the *extension of social forestry to forest reserve lands* (where usufruct based trees would be planted along with short gestation grasses, shrubs and bushes) and *gear farm forestry to meet the farmers' priorities* (i.e., raising cash crops to generate income), rather than national priorities (i.e., forest protection).

In conclusion, ***Saxena*** defined that "scientific" forestry means wild fruits, nuts, MFPs, grasses, leaves and twigs become the main intended products from forests and common lands. Timber becomes just a by-product from large trees like tamarind, jack and sal.

### 3.3.2 WOOD ENERGY USE IN THE HOUSEHOLDS SECTOR

**Wood Fuels-Gathering Households -** *Ouerghi* pointed out that households gathering fuelwood for own use are not similar to those in the economically productive sectors and therefore needs to be addressed in a broader manner that reflects its close interaction with other aspects such as role of women, social development, land-use management and environmental impacts.(18)

In particular, one has to deal with labor availability and employment opportunities, especially for women who are mainly responsible for fuelwood collection and use in rural areas. He noted that so long as the labor of women and children are not valued, there are no incentives for households to purchase improved stoves or to switch from fuelwood.

A possible action is to *promote and encourage income generating activities for women in rural areas.* This will not only provide additional cash to poor households nut will also put a value on women's time, which make it more economical to purchase fuelwood instead of collecting it, and prepares households for switching to modem fuels by creating a more city-like situation.

If women are involved in income generating activities which will value their time and make it more profitable purchasing fuelwood than collecting it, improved stoves would have higher chances of success. Households will be motivated to use more efficient stoves because of its direct financial impact.

**Wood Fuels-Purchasing Households -** Woodfuel-purchasing households "compete" with productive uses of wood fuels such as in restaurants, bakeries and various small industries. To be able to define interventions for this sector, consumer behavior in the fuels market and the concept of energy transition should be understood to be able to define interventions for wood-fuel purchasing households.(24)

The type of fuel households use depends on factors such as income level, cost and availability of fuel and the time available to the women (wives, maids, elder daughters, in-laws) of the households to prepare and cook food. Generally, as household income increases and urbanization proceeds (coupled with increasing availability of modern fuels), there is a tendency for fuel use to increase, diversify and switch from wood and charcoal to commercial fuels. Indeed this is a good indicator of development.

Wood fuels as commodities are in direct price relationship with alternative "commercial" fuels. Wood fuels-purchasing households can be encouraged to *shift "upwards" through price mechanisms* to fuels like kerosene, LPG or even electricity by providing fiscal or financial (or both) incentives for the acquisition of "modern" cooking devices and the purchase of the fuels.

**Wood Fuel Transition - *Ouerghi*** cautioned that pushing a transition programme from wood fuels, particularly in rural areas, may not be economically better for a country. Woodfuel is an indigenous source which is renewable if managed in a sustainable manner. It simply means that the use of woodfuel could be a viable solution for both the country and households if the resources are sustainably managed and use in an efficient and less hazardous manner. It also provides poor households with the opportunity to switch from low quality fuels such as dung and crop residues to woodfuel, permitting the use of these as manure and soil conditioner.(18)

**Improved Woodstoves Programmes**

The programmes that have been successful have shared the following characteristics:

The programmes have focused efforts on a group of users that would most likely benefit from and consequently adopt improved stove. This group generally, but not always, involves those that purchase biomass fuels or have difficulty in collecting their fuels. The people who first adopt improved biomass stoves are usually not the very poorest groups in society, but rather those that have limited cash income and are spending a substantial portion of it on cooking fuel.

In the most successful stove programmes the stove itself is not heavily subsidized. This assures that the programme can be self-sustaining without extensive government support and that people are willing to pay for the benefits of the improved stove compared to the traditional stove.

The programmes are characterized by a significant interaction between those who design the stoves, those who produce the stoves, and those who are going to use the stoves. This interaction can come in several different forms, including formal surveys, focus groups to identify problems and prospects for a particular stove design, and actual household testing of stove designs.

Programmes that do rely on mass production of the stoves or stove parts seem to be more successful than programmes that custom build stoves.

External support for programmes should be limited to those factors which support the production and distribution of stoves, while subsidies to the stoves themselves should be zero or minimal. The support does not have to be large, but it must be sustained and can include support for stove design, laboratory testing, consumer surveys, information access, publicity campaigns, and perhaps credit support.

Stoves that are not valued very highly by the consumers simply will not be purchased, therefore putting pressure on the stove

This does not imply that households should be discouraged from using modern and cleaner fuels. However, increased wood supply from farm lands, income generation and better social conditions for rural women combined with educational programs regarding more efficient and less health hazardous use of wood fuels are certainly viable options worth considering.

**Table 3.10: Specific Fuelwood/Biofuel consumption (SEC) in Some Rural Industries (7)**

| Industry Type Activities | SEC Value Fuel Consumed/Unit Product | Source |
|---|---|---|
| a) Cottage activities | | |
| - Roasted gari (cassava) | 3.0 – 4.0 kg wood/kg. gari | FAO 1987 |
| - Rice parboiling | 0.3 – 0.4 kg husk/kg rice | (BGD) FAO/RWEDP 89d |
| - Bread | 0.6 – 2.2 kg wood/kg flour | (NEP) FAO/RWEDP 92 |
| - Palm oil | 7.0 – 9.0 kg wood/4.5 liters | FAO 1987 |
| - Smoked fish | 0.2 – 16.0 kg wood/kg prod. | FAO 1987 |
| | 1.4 kg coconut fronds/kg prod. | (IND) DNES/IIT 90 |
| - Cane gur | 1.9 kg bagasse/kg gur | (BGD) FAO/RWEDP 89d |
| - Date palm gur | 3.0 kg palm residues/kg prod. | (BGD) FAO/RWEDP 89d |
| - Beer | 0.4 – 1.0 kg wood/liter | FAO 1987 |
| - Potteries | 0.4 – 1.0 kg wood/kg prod. | FAO 1987 |
| - Silk cocoon processing | 14 – 34 kg wood/kg silk yarn | (BGD 89, PAK 89)* |
| Village enterprises | | |
| - Bricks | 0.3 – 1.5 kg wood/brick | FAO 1987 |
| | 0.1 – 0.4 kg wood/kg brick | (NEP) FAO/RWEDP 92b |
| - Ceramics | 1.0 – 2.0 kg wood/kg pot. | FAO 1987 |
| | 0.6 – 0.8 kg wood/kg pot. | (NEP) FAO/RWEDP 92b |
| - Tiles | 0.2 – 0.5 kg wood/tile | FAO 1987 |
| - Lime | 2.0 – 3.0 kg wood/kg lime | FAO 1987 |
| - Breweries | 0.2 kg wood/liter | FAO 1987 |
| - Soap | 0.4 – 0.6 kg wood/kg soap | (BGD 89, IND 89)* |
| Rural industries | | |
| - Bricks | 0.3 – 1.5 kg wood/brick | FAO 1987 |
| | 0.08 – 0.1 kg coal/kg brick | (NEP) FAO/RWEDP 92 b |
| - Tiles | 0.2 – 0.5 kg wood/tile | FAO 1987 |
| - Lime | 0.6 kg wood/kg | FAO 1987 |
| - Rubber smoking | 0.8 – 2.0 kg wood/kg prod. | FAO 1987 |
| | 0.3 – 0.6 kg wood/kg RSS | (MAL) FAO/RWEDP 90 |
| - Copra | 0.5 – 1.5 kg wood + coco resid/kg | FAO 1987 |
| - Tobacco | 5.0 – 12 kg wood/kg cured leaf | FAO 1987 |
| | 3.1 – 7.5 kg wood/kg cured leaf | (PHI) FAO/RWEDP 89a |
| - Tea | 1.5 – 2.0 kg wood/kg cured leaf | FAO 1987 |
| - Coffee | 0.75 – 2.0 kg wood/kg roasted bean | FAO 1987 |

Note* FAO/RWEDP 1989d and FAO/RWEDP 1989c, respectively.

### 3.3.3 WOOD ENERGY USE IN THE ECONOMICALLY PRODUCTIVE SECTORS

**Traditionally Wood Fuel-Using Industries – *Aroon Chomcharn*** reported that many possibilities for energy intervention exist to further efficient and sustainable use of wood fuels in this sector. Defining interventions depend on factors which include how these industries operate, their economic and socioeconomic performances, process and energy technologies use, labor working conditions, and environmental impacts. Unfortunately, most of such data are lacking. (7)

**Table 3.11: Estimated Energy and Labor Requirements of Some Rural Industries (7)**

| Type of industry | Share of biomass energy and labor as % of the production cost | | Country reference |
|---|---|---|---|
| | Energy | Labor | |
| Rice parboiling | 3.0 | 13.0 | Bangladesh |
| Tea | 5.0 | - | Nepal |
| | 5.0 – 12.0 | - | Sri Lanka |
| Tobacco | 9.6 | 26.0 | Bangladesh |
| | 19.2 | - | Philippines |
| | 5.2 | - | Thailand |
| | 48.0 | - | Pakistan |
| Bakeries | 4.8 | 6.7 | Bangladesh |
| | 7.6 | 14.2 | India |
| | 9.3-10.7 | 10.2-13 | Nepal (1992) |
| | 3.4 | 34.2 | Philippines |
| Bricks | 57.0 | 21.0 | |
| | 37.0 | 43.0 | Bangladesh (est) |
| | 77.3 | 22.7 | |
| | | | Thailand |
| Lime | 11.7 | 11.0 | Nepal (1992) |
| | 63.5 | 12.9 | |
| | 73.0 | - | Bangladesh |
| | | | Thailand |
| Clay tiles | 14.8 | 21.0 | Pakistan |
| Soap | 5.2 | 6.3 | Thailand |
| | 2.8 | 8.0 | |
| | | | Bangladesh |
| Timber drying | 60.0 | 12.5 | India |
| Rubber | 2.8 | 2.1 | Philippines |
| | | | Thailand |

***Chomcharn*** pointed out one key question is which rural industries deserve priority attention in development. Again, this would require an appropriate careful assessment for which the development criteria should be also established. He cited that in one FAO expert consultation, the criteria proposed included fuelwood consumption and intensity, labor, employment and income development, food production and security, nutrition and health and impact on the environment.

In particular he sees *opportunities for promoting energy conservation technologies and practices* since energy conversion efficiencies, in most cases and at all operational levels (cottage, village and rural), are generally low and highly variable - i.e., requiring large quantity of fuel per unit product output. He identified existing sectoral policy and programme directions which can limit development of wood/biomass-based rural industries.

Industrial development programmes in many countries lack clear policies and strategies specifically addressed to small and rural industries' needs. Often, this is due to lack of data in and planning skills for the sector. More crucial, is the lack of encouragement in (sometimes, even discouragement) wood fuel use in rural industries by industry sector authorities to avoid possible conflicts with forest/natural resources conservation agencies because of the belief that fuelwood use is a major cause for deforestation.

Such belief is prevalent also in the energy sector, thus, policies and strategies have focused on stimulating supply and use of fossil energy. This has weakened the possibilities of furthering use of wood/biomass energy resources which could have been produced by farmers and rural people. Furthermore, renewable energy programmes launched in many countries focused on relatively new non-conventional energy technologies, leaving out traditional uses of wood and other biomass fuels which are generally widespread but unrecorded.

***Chomcharn*** identified the many other consequences resulting from the inadequacy of information available for this sector all leading to lack of or weak policies for the development of small and rural industries in general and the furtherance of efficient use of wood fuels in this sector in particular.

**Industrial Heat and Power Production - *Ludovic Lacrosse*** reported that wood industries produce large quantities of residues that can be used for energy. Energy conversion technologies for such have been successfully utilized all around the world. But so far, wood residues have only been extensively used for heat production, rather rarely for power generation. Enormous quantities are still incinerated everywhere in the world without any energy recovery.(14)

He recommended the use of wood residues for electricity production, particularly through *cogeneration* which should be promoted through incentives by governments for two main reasons: the fuel oil savings it generates and its positive impact on the environment.

Wood industrialists are often reluctant to invest in biomass energy technologies because of lack of awareness, higher investment costs or a lack of confidence in the technologies. National energy agencies have a very important role to play in advising them.

More national or international programmes should be set up in order to inform them about the existing installations and helping them to carry out their feasibility studies. More demonstration projects should be implemented. Governments should also be convinced that it is the interest of their countries to limit their fossil fuels consumption for obvious economic reasons and environment protection. He cited the work of his organization, the Bangkok-based ASEAN-EC *Cogen Programme* in this field.

**CASE STUDY OF A WOOD-FUELED COGENERATION SYSTEM (14)**
**Wood Working Industry in Malaysia**

| | | |
|---|---|---|
| Activities | : | sawmilling, kiln drying, moulding |
| Production capacity | : | 3,000 t/month |
| Kiln Drying heat requirements | : | up to 2,200 MJ/h for drying 1,000 tons |
| Power requirements | : | 1,000 – 1,5000 kW |
| Biomass availability | : | 2,430 tons/month (sawdust, off cuts) |
| Biomass Lower Calorific Value | : | 11,7 MJ/kg |
| | | |
| Before: Diesel oil fired boiler | | |
| Diesel consumption | : | 7,560 t/year |
| Diesel cost | : | 1,580,000 USD/year |
| | | |
| Now: Biomass boiler + 2 turbines | | |
| Steam boiler | : | 16 t steam/hour at 22 bar (superheated) |
| Boiler consumption | : | 5 tons biomass/hour |
| Heat production capacity | : | 9,200 MJ/h (4 tons steam/hour) |
| Power capacity | : | 1,500 kW |
| Back pressure turbine | : | 600 kW (inlet: 22 bar; outlet: 6 bar) |
| Condensing turbine | : | 200 kW (inlet: 22 bar; outlet: 0.25 bar) |
| Investment | : | 1,410,000 USD |
| Annual Operation/ Maintenance Costs | : | 88,000 USD |
| | | |
| Internal Rate of Return | : | 53% |
| Payback Period | : | 2,2 years |

### 3.3.4 WOOD FUELS AS A COMMERCIALLY-TRADED GOOD

A central issue for understanding problems in commercialized wood energy systems is the structure of wood fuels flow to markets. This, along with the effect of government policies which influence fuel prices and availability, will dictate which fuels are available at what prices to urban consumers and other users purchasing wood fuels.

**Wood Fuels Flow** - ***Bensel*** discussed current regulations with regards to the harvesting and transport of wood fuels and other so-called minor forest products. This provide some initial insights of what policy interventions might be needed to improve trading and marketing of wood fuels and not to create the adverse impacts which many believe it will.(3)

The cutting of planted trees on titled lands in the Philippines has been deregulated, but in order to transport these trees certification of their origin is needed. Such a policy is a big improvement over past regulations, but it is possible that this could be improved even further.

As it now stands, this policy is not really being followed since field personnel are unable to certify the true origin of most of those applying for permits. Therefore, in some cases certification is being granted and used to transport "illegally" cut trees. On the other hand, in cases where a land-owner or farmer has only a small area planted to trees, it hardly seems worthwhile for them to make a trip to the offices that grant the certificates, even if the certification costs only a token amount. In this case "legally" cut trees would be transported illegally.

Rural traders put forward a number of interesting ideas for improving the policy on woodfuel transport that would save both the government and the traders and tree-growers time and money. One would be to “license" legitimate traders/ transporters of wood fuels based on prior experience and random checks on deliveries. Another, which is more realistic, is to drop the idea of certifying the origin of trees and instead pay attention to species. What this would imply is *granting free passage to selectplanted species (e.g., Leucaena leucocephala, Gliricidia sepium, Leucaena glauca* and *Cassia siamea* among others). Such an approach should be considered in light of the failure of the current system to determine origin anyhow, leading to a de facto species-based enforcement mechanism.

Combining a species-based approach with a licensing system could open some interesting possibilities. First, "small" loads of wood or charcoal could be totally deregulated provided again that they consist of approved species. Larger loads could only be carried by licensed traders with the licensing being done over a 6, 12 or 24-month period. Money and time saved by the agency in not having to certify origins of trees could be put into the establishment of permanent checkpoints at the major entry points to the city. Volumes shipped by larger traders would be recorded each delivery and at time of license renewal a fee would be charged on per cubic meter basis, with this money used for manning of checkpoints and/or for reforestation programs.

Most of the traders agree to such a system since it would save them the hassle of having to regularly secure certification. The biggest obstacle to implementation of this or any other policy change is the highly centralized structure of government agencies. This proposal is being made for the province of Cebu only and may not be appropriate for other areas. Given the current system it is unlikely that something like this could be implemented unless the impetus comes from above.

**Table 3.12: Estimated Local Employment Potential of Different Household Fuels per Standard Unit of Consumed Energy (12)**

| Fuel type | Tons of fuel per Tera Joule | Estimated employment per TJ of energy consumed in person days 1 |
|---|---|---|
| Kerosene 2) | 29 Kilo litre | 10 |
| LPG 2) | 22 tons | 10 – 20 |
| Coal 3) | 43 tons | 20 – 40 |
| Electricity 4) | 228 MWh | 80 – 110 |
| Fuelwood 5) | 62 tons | 100 – 170 |
| Charcoal 5) | 33 tons | 200 – 350 |

*Note: 1) Where applicable employment covers growing, extraction, production, transmission, maintenance, distribution and sales, including reading meters. It excludes employment generated outside the country for fuels that are imported in a semi-finished state.*

*2) This assumes that crude oil (for refining), kerosene and LPG are imported.*

*3) This varies according to the capital intensity of the mine, the seam thickness, the energy value of the coal and the distance from the demand centers.*

*4) This varies according to the production methods, ranging from hydro to traditional oil/coal fired units and the efficiency of electricity generation, transmission and distribution.*

*5) This depends on the productivity of the site, the efficiency of the producers and the distance from the market.*

*Source: Estimates by World Bank mission members for the Philippine Household Energy Study (WB, 1992b)*

**Prices** - *Soussan* discussed that valuing and enforcing economic prices for biomass resources are problematic. This is especially true when dealing with communal resources. Reforming policies which distort markets and clarifying property rights, whilst not a complete answer, will go far to producing prices which reflect the true costs of resource exploitation. Collecting stumpage fees is difficult, but may be possible where an effective Forest Department has control over a clearlydefined area of forest. Similarly, the demand end can be addressed through ensuring the availability of competitively-priced alternative fuels such as kerosene. In other areas, effective control of wood resources by the local community is the basis for achieving prices which reflect the total value of these resources, so long as their exploitation is managed on a sustainable basis.(24)

Many policies outside the energy sector also lead to fuel price distortions. Relative tax and subsidies on different fuels rarely reflect a considered analysis of the development of a coordinated energy policy. All too often they are a political football, and tend to be biased towards the interests of urban-based elites. Similarly, access to capital for investments in small-scale, dispersed energy systems has been constantly sacrificed to large, centralized investments, with the electrical power sector dominating. Another is the widespread underpricing of rural products (especially foodstuffs) has tilted development towards the urban sector, resulting in the undermining of the rural production systems within which wood fuels are produced.

Urban fuelwood problems are an important and growing issue. The cost of these fuels to urban consumers (especially the poor) can be significant, and there is some (though patchy) evidence that in many places these costs are increasing.

**Charcoal Production & Trading -** *Panya,* as previously discussed, showed that charcoal production brings about strong incentives for better tree planting and better management of wood resources. Access to improved propagation techniques and free distribution of fast-growing tree seedlings will help to keep the production costs low and hence provide sustained financial returns.(19)

In designing and implementing rural resource management programme, the household or extended household, and/or small interest group are seen more appropriate units of management organization. Existing local organizations either formally or informally set up, though working well on problems in a village, are often seen as ineffective, in handling current resource problems, particularly in the case where the resource exceeds village boundaries.

In promoting tree planting on (degraded) government lands, more attention should be given to smallholder and landless farmers as contenders who can manage and make full use of wood resources. Some laws and regulations, particularly the 1975 Forest Act, should be modified to encourage individual households and/or small-scale village-based interest groups to manage and have full rights to use these wood resources.

Village common\public lands outside national forests show great importance and potential for wood resources. More adequate understanding of current situations and proper legal frameworks are urgently needed. A grass-roots approach is highly recommended for developing wood resource management schemes on common/public and private lands.

Because privately owned or claimed lands are indicated to be one of the most important sources of wood for charcoal production, there should be increased focus on promoting tree planting

on these areas. Species recommended for promotion are those that serve multiple purposes (i.e. used as food, medicines, and animal fodder) and are adaptive to local conditions (i.e., drought, low fertility soil, etc.)

Charcoal policies, namely totally banning small-scale charcoal production and discouraging the use of charcoal, would severely hurt low-income groups of rural population. Such policies are unwise as long as rural poverty has not been more effectively dealt with and viable economic alternatives are not readily available to the region's rural poor.

**Effective Wood Energy Programmes -** *Matthew Mendis* posed the key question to the conference participants: why the biomass resource base found in the developing countries is not being more effectively harnessed and utilized for commercial energy purposes? He pointed to a lack of a composite, analytical approach to the sub-sector.(17)

The lack of a coherent and composite framework for biomass energy program and project assessment and commercialization does not allow effective analysis, efficient development and commercialization of biomass energy programs and projects. In part, it is the analytical, policy framework used for commercial energy analysis and investment that can also be effective in the commercialization of biomass resources. In order to have significant commercial impact, the sub-sector must be diligently addressed in a broad policy framework that insists upon and encompasses integrated analyses in the following areas: (a) supply analysis; (b) technical evaluation; (c) financial/economic analysis; as well as (d) institutional analysis the latter of which defines, among other issues, mechanisms that allow national and international entities, including the private sector, to participate in and promote sustained follow-up and investment. In terms familiar to the oil and gas industry, it is the composite upstream and downstream parameters that must be effectively addressed in an integrated framework.

**FINANCIAL/ECONOMIC BIASES AGAINST BIOMASS ENERGY**

Incomplete analyses of all social costs & benefits from energy use
Employing discount rates that favor particular energy production systems
- high discount rates will favor low capital intensive projects

failure to account for direct and in-direct subsidies
failure to account for environmental externalities (16)

***Mendis*** argues that the key responsibility which the institution designated to promote biomass development and commercialization will have to assume, in addition to defining the immediate institutional areas outlined above, is that of general oversight and sustained effort. That is, more than the other prospective entities in the biomass development process, e.g. other governmental or non-governmental agencies, private sector participants, multilateral and bilateral donors, this principal institution will need to view the entire development process as an integrated chain of activities if development and commercialization efforts are to proceed. From guidelines for and the organization of resource data, to outlining market signal, to the institutional support required, the institutional entity will need to have a vision of the composite picture and the linkages that must assessed and solidified if commercialization is to move ahead.

### 3.3.5 CREATING A CONDUCIVE POLICY ENVIRONMENT

**Policy Objectives -** Interventions which operate at a local level will be doomed, however, in the absence of an appropriate policy environment. ***Soussan*** pointed out that this policy environment must create the circumstances in which the following set of goals can be realized:

a) It must empower local communities to have effective control over their local resource base, and especially over land and biomass resources, as it is from this that improved management of these resources will stem.

b) It should create an economic and political environment conducive to local empowerment and the sustaining of local solutions. The external policy environment frequently undermines local initiatives, however well-intentioned these may be. Policy-makers must create a climate which will nurture and support the local-level changes needed if fuelwood stress is to be alleviated and these vital resources managed in an efficient and sustainable manner.

C) Fuelwood policies must provide effective external support to ensure the availability of material and technical inputs for local-level solutions. This is a direct role in the implementation of fuelwood interventions, in which an effective partnership is built between the resources and knowledge of the local community and those of outside agencies.(25)

A key ingredient is to correctly value the environment and treat it as a central factor in policy formulation. The real costs of different forms of energy need to be assessed, and in this the true worth of environmental stocks, flows and sinks must be assessed and accounted for. To achieve this it is necessary to correctly price different fuels, to take account of these costs in investment decisions and to recognize that development is about more than simple economic growth. The quality of life and the maintenance of the environment are as important policy goals as the growth of per capita GNP.

**Strategies and Policy Interventions -** Although the activities undertaken in any fuelwood strategy will vary according to local conditions, in general policy interventions should seek to ensure the following:

To secure property rights, and especially to ensure the rights of those groups experiencing the worst problems over access to biomass resources. This should include customary and communal rights as well as private property rights.

To improve access to and the management of local land resources, including actions to remove factors which limit the access of local people to communal or state lands alongside the provision of knowledge and inputs to enhance the quality of existing land management practices.

To improve market functions by eliminating policy-induced distortions, internalize externalities through pricing policies and reduce uncertainties through more stable and predictable policies. These policies are particularly important where, as is normal in cities and increasingly common in some rural areas, biomass fuels are partly or wholly commodified.

The voice of the community should be to the fore, and effective institutional structures to give the actors on the ground a real level of control over the decisions which affect their lives need to be developed.

Along with this process of policy reform and institutional development, specific fuelwood sector strategies should be developed, accompanied by the further strengthening and reform of fuelwood planning institutions to create an effective implementation capacity. From this set of goals, ***Soussan*** identified four inter-related general policy directions:

*Improve the information base on which policies are developed* - Improve information is an essential first step, given the variety and complexity of fuelwood and other household energy systems. The 'tool kit" of conventional energy (or forestry) planning is not well suited to planning in this area, and many of the policy mistakes of the past have reflected a fundamental failure to understand the dynamics of biomass fuel production and use. These policies have too often been based on highly aggregated data and ill-informed assumptions about the forces driving biomass fuel production and use.

Effective monitoring is even rarer, and in most cases the available information does not allow accurate (or even crude) assessment of likely future mixes of modern and biomass fuels, nor the economic benefits and costs associated with different forms of fuel provision and consumption. Among the most pressing information needs are better data on household energy use, on fuelwood markets, on the fuelwood resource base and on tree and woodland management systems.

*Correct market failures and improve the functioning of markets* Economic manifestations of fuelwood stress often reflect market and policy failures that produce situations in which benefits are disassociated from costs, prices from scarcity, rights from responsibilities and actions from consequences. For example, open access forests allow wood producers to shift the costs of over-exploitation onto future generations. Similarly, policies which distort prices act as disincentives to improved efficiency and conservation, and result in fuel mixes which are clearly undesirable.

**SUSTAINABLE DEVELOPMENT**

Sustainable development approaches are based on the need to reduce inequalities in both current livelihoods and future prospects. Development policies must strive to meet the needs of all sections of the community as a goal which the needs of all sections of the community as a goal which stands alongside, or even takes precedence over, increased production and enhanced economic growth. Growth which excludes the disadvantaged can be attractive in the short-term, but will accumulate problems and injustices and will rarely be sustainable in the long-term. This is particularly true for sectors, such as fuelwood, where our concern is with resources which can be exploited for short-term benefits which ultimately destroy the resource base, or can be utilized in ways in which some short-term benefits are sacrificed for retaining the long-term integrity of the resources.

This goal of meeting the needs of the more disadvantaged gives rise to the final characteristic of sustainable development policies: the recognition of the need to devolve control over resources and over decisions which affect their lives, and in particular the global community must strive for development paths which allow local people greater control over the physical, financial and environmental capital on which they depend.

These principles of sustainable development provide a set of policy guides against which specific policy initiatives should be judged. They are not rigid criteria, and one of the key tasks of the policy maker is to find an effective balance between the complex and often contradictory impact of individual policy options on these principles. This means that the formulation of policy should be a flexible, consensual process in which as wide a level of consultation as possible is undertaken. (25)

The key market and policy failures are inappropriate property rights, incorrectly priced resources, policy-induced price distortions in capital, labor and commodity markets and over-valued currencies.

*Develop fuelwood sector strategies* - Providing better information and reforming market and policy distortions will create the pre-conditions for establishing effective fuelwood policies. Such policies need to be coordinated through fuelwood. sector strategies which are able to capture the local specificity of fuelwood problems and opportunities. This will determine the appropriate mixes of technical packages across supply enhancement, conservation and fuel switching options. It will also provide a structure for prioritising efforts and the institutional relationships between planning agencies and local communities.

Again, the central message is that simplistic, prescriptive technical fixes must be avoided and policies which integrate fuelwood problems with the management of the wider production system developed. Assessing the suitability (in economic, social and environmental terms) of technical alternatives to local and regional conditions should form the starting point for interventions designed in the strategic planning exercise. The management of existing fuelwood supplies, supply enhancement through increased production, demand management through conservation strategies, fuel switching policies and a range of measures to improve the efficiency of fuelwood use all have merits and disadvantages.

*Strengthen fuelwood planning institutions* - An improved institutional capacity is needed at local, national and international levels if the broad principles for fuelwood planning outlined here are to be translated into effective action. Although movement in this direction has begun in recent years, these initiatives need to be supported and built on; a process to which this paper is intended to contribute. Central to this is capturing the diversity and dynamism of local fuelwood situations. The different stages of fuelwood policy development outlined above form a starting point for the process of institutional development.

***Soussan*** concluded that fuelwood interventions must be rooted in local circumstances through a structure developed within an effective fuelwood strategy. Many countries will need external support to develop the capability for designing and implementing such fuelwood sector strategies, as this task necessitates both levels of resources and expertise not readily available to fuelwood planning institutions. This support can and should come from the international donor community, who are able to mobilize the resources and expertise for such initiatives.

## 3.4 METHODOLOGICAL ASPECTS OF POLICY AND STRATEGY FORMULATION

Many countries in the region have not remained unaware of these developments in wood energy. Initiatives in wood energy planning and discussions on policies affecting wood energy in the light of these new developments are already taking place.

Initial attempts by countries in the region to incorporate wood in energy planning activities have however been met by the problem of lack of or inadequate data. In many cases, initial efforts were first spent on defining acceptable methodologies for data collection. In some, the need was to develop techniques for data assessment and analysis for wood energy planning.

Nevertheless, these are just initial steps and they need to be broadened, strengthened and institutionalized. There is a need to enhance techniques and methodologies for data collection, management, assessment and analysis which can be made universally acceptable to planners. There is a need to develop institutions and human resource capabilities to undertake the wood energy planning activities. Such are prerequisites to be able to come up with concrete and objective description of the supply and use of wood energy in the different countries to be able to identify problems and opportunities, but more importantly, to allow for an objective and enlightened debate on the issues affecting wood energy systems so that suitable policies are defined and appropriate inputs and strategies are planned and implemented.

### 3.4.1 INTEGRATING WOOD ENERGY IN ENERGY AND FORESTRY PROGRAMMES

**Limitations of Available Data** - ***Koopmans'*** regional overview demonstrate that in all countries, there is a considerable amount of primary information, at the national level and often supplemented with additional studies that can be used to further elucidate specific aspects of wood

energy systems. However, the management of this type of information in a framework that allows for consideration of wood as one of the energy sources is not present.(12)

He pointed out that some of the problems deal with the quality of the available information. By comparing the that statistics form the basis of many planning exercises he found that the share of traditional energy sources (including wood) was often underestimated (by 50 to 300%). He saw the following reasons why the estimates vary:

the scale and nature of the interactions between resources and use, and
the variations in time and place.

Most of the aggregated statistics at the national level have ignored this diversity. In addition, there is:

insufficient distinction between domestic and industrial \ commercial users; and
lack of time series data providing insights in the evolution, development and adoption of the users and producers of wood fuels to changing conditions.

The type of research and surveys that have been implemented thus, have often been found to be unable to capture the diversity and complexity of the wood energy situation.

By underestimating the share of wood and other forms of biomass in total energy consumption, the importance of these resources for the national economy is underestimated. Wood fuels, as a component of forestry production is not accurately accounted for, lowering significantly the actual contribution of the forestry sector to GDP. This underestimation is aggravated by the ignorance of the incomes and employment generated in producing and trading wood fuels, and the implications on these by policy-induced fuel substitution programmes. The economic and social costs resulting from losses in income opportunities in particular farmers and marginalized rural dwellers, are not accounted for.

The lack of information on the relative contribution from forest and non-forest lands results in inadequate understanding of the responses of the local people as it affects the interactions between resource management and wood fuel supply and demand. This gives rise to a very generalized impression of supply-demand "gaps" which lead many to believe that reducing wood fuel use may result to decrease in deforestation. As such, policy measures have been adopted reducing consumption and restricting trade of wood fuels.

These inadequacies in information prevent the realization of the great potential of wood fuels to simultaneously contribute to major national energy, forestry and environmental objectives. Furthermore, the policy decisions and the strategies defined based on such information, most often, limit the attempts by the majority of the poorer people in Asia to improve their livelihood.

**Constraints of Planning Approaches -** These negative effects on the national and rural economy were underscored by ***Mendis'*** eloquent elaboration of the implications of not using the standard economic assessments in the planning of biomass development activities. He pointed out that standard approaches in the planning of conventional energy projects such as power plants usually include an analysis of the upstream and downstream effects. Such analyses are often not carried out for biomass projects, thereby introducing a bias against such projects, that is aggravated by inadequacies in national accounting and discounting procedures,. which e.g., do not reflect the depletion of non-renewable resources. He pointed out that if these biases were corrected that the

viability of biomass based energy development activities, particularly in the private sector would improve considerably. This would require a renewed commitment to the development of appropriate biomass energy conversion technologies, for both informal and formal sector industrial activities.

***Conrado Heruela*** in his presentation of the status of wood energy planning in Asia, sketched the implications of inadequate information for the attention wood and related biomass fuels receive in national energy planning activities. Though most countries attempt to follow an integrated energy planning approach in which the needs of all sectors, and the supply of all energy sources is considered, the present situation was summarized in the statement that "the traditional energy sector, which in some countries of the region is estimated to form up to 80 % of the total energy consumed has been the *bete noire* of energy planners..... "(1 0)

It was pointed out that rural energy planning activities, in which wood energy is a major component, need to be highly decentralized, but that for the purpose of national energy policy formulation aggregation of information is required as well. This puts special demands on the strategy for database development, and the organization of data for planning and the energy planning models used.

The above may easily lead to the impression of a dismal future for a fuel that seems to be rapidly fading away in the march of progress and accelerated development. However, studies presented by ***Ouerghi, Panya*** and ***Bensel*** in the *expert consultation* demonstrate that even in less conducive market and policy environments, the producers, traders and users of wood fuels may continue to think and act otherwise. The studies also indicate that wood fuels could not only represent an opportunity for those involved in the wood energy business, but also for those charged with formulating and planning energy and forestry policies and programmes.

### 3.4.2 EFFECTIVE METHODOLOGIES FOR DATA COLLECTION AND ANALYSIS

The studies presented in the *expert consultation* are not only exemplary in what was found, but also for 'how' valid and reliable information, useful for policy and planning purposes, can be obtained.

A mix of methods, including surveys with structured questionnaires of users, semi-structured interviews, analysis of secondary data, oral history, telephone interview, observation and ocular inspection trips was used. Traders proved to be most useful key informants providing information on categories of particularly commercial and industrial users and sources of wood fuels.

***Koopmans*** discussed that in order to be able to plan and draw up policies and strategies for the wood fuel energy sector, reliable information on at least two items are required:

Energy consumption and/or demand in the past, present and future, and
Energy supplies and its sustainability in the past, present and future.(13)

He related what can be achieved in assessing a country's wood energy situation under the *Tropical Forestry Action Plan* (TFAP) using secondary data with some field observations. Even given the constraints posed by secondary data and the limitations of field observations, he concluded that such wood energy studies can be a cost-effective way of getting some but at the same time a limited insight in the very complex system of wood fuel energy consumption and supply.

It appears that such quick methods often are sufficient to identify bottlenecks and constraints. They may be used to pinpoint to areas which face more problems than others. The time and money saved by using a "quick method" could then be used to carry out more in-depth studies in such areas. These could be either formal surveys or rapid rural appraisal techniques. However, this presupposes that results of these short "quick method" studies are presented in a dis-aggregated manner. By over-aggregating data, much information which may assist decision makers in drawing up action plans, is being lost.

The Pakistan study presented an example of an approach to gain accurate information and understanding of biomass energy use by households in Pakistan. 'Me Government of Pakistan felt the need to integrate household energy in the national energy planning process. The household energy strategy study project has attempted to answer these questions through an integrated supply resource assessment, woodfuel market study, and energy demand study.

The paper by ***Gary Archer*** presented the methodologies used for the supply study - *an analysis of low-resolution satellite imagery was combined with geographic data* to develop an effective agroecological zonation for the whole country. This provided a consistent sampling frame for estimating available fuel supply and for relating energy supply to demand. Next, twelve high-resolution satellite images (Landsat TM) were used for more detailed classification and selection of field samples. Variable primary sampling was used for automated selection of 1100 primary sampling units based on their percent vegetation cover. 'Me fuelwood supply measurements were done in these primary sampling units. This approach provided a sound basis for producing national estimates of woody biomass and crop residue availability for Pakistan. It also allowed the results of both fuel supply and demand studies to be accurately correlated and permitted successful development of a household energy planning data base for Pakistan.(1)

**Table 3.13: Agro-Ecological Zonation of Pakistan (1)**

| Zone | Description | Area ($km^2$) | Percent |
|---|---|---|---|
| 1 | Hyperarid desert | 58,738 | 6.7 |
| 2 | Arid desert | 193,604 | 22.1 |
| 3 | Transitional arid/semi-arid rangelands | 117,833 | 13.4 |
| 4 | Moderate productivity semi-arid | 74,819 | 8.5 |
| 5 | High productivity semi-arid | 61,180 | 7.0 |
| 6 | Sub-tropical rain-fed agriculture | 27,878 | 3.2 |
| 7 | Permanent snow | 25,019 | 2.9 |
| 8 | High mountain valleys | 18,964 | 2.2 |
| 9 | Alpine and temperate scrub and forest | 94,747 | 10.8 |
| 10 | Temperate and sub-tropical Himalayan foothills | 10,637 | 1.2 |
| 11 | Marginal irrigated | 1,940 | 0.2 |
| 12 | Moderate productivity irrigated | 74,533 | 8.5 |
| 13 | High productivity irrigated | 111,717 | 12.7 |
| 14 | Indus delta swamps | 5,619 | 0.6 |
| TOTAL | | 877,227 | 100.0 |

One of the challenges now is to put this information in such a format that it can be used as the basis for a continuous policy, planning and implementation process, in which wood energy development is considered on a rational basis.

Participants from other countries showed great interest in the process developed and implemented in Pakistan, and expressed interest in an effort to adapt the basic "integrated approach" of resources and uses, to their own countries. It may be expected that such adaptation could also reduce the cost of implementing such exercises elsewhere considerably.

Much work to develop and systematize such mix of methods to improve depth of understanding of resource systems, in a timely and cost-effective manner, has been carried out in the last decade at Khon Kaen University in Thailand. Results of the application of the *Rapid Rural Appraissal* approach to better understand the structure of charcoal making in Northeast Thailand was presented by ***Panya.*** He demonstrated how this type of study can help in better understanding of a crucial dimension of wood fuel resource systems: the adaptive strategies developed by rural resource managers and users to cope with changes in resource conditions and markets.(19)

That carefully "mixed approaches" can also yield better insights at national level was illustrated by ***Pujanes*** in her report on the Philippine rural energy needs survey, household energy consumption survey and study of the fuelwood supply systems in six urban areas in the Philippines. Though all these studies were principally carried out through formal questionnaires, the differences in design and focus of these studies provided useful complementary information, allowing for cross checks, and a more complete understanding of the processes involved in wood fuel use, trade and resources.(21)

*Elizabeth Remedio* discussed the methodologies used to gain a more in depth and comprehensive understanding of the wood energy system in Cebu - the production, distribution and consumption patterns of wood fuels. The study consisted of three phases:

Phase I - an urban households wood fuels consumption survey to *quantify the fuelwood consumption* of the various sectors of the city: household, commercial, industrial and institutional establishments.

Phase II - a woodfuel transporters/ traders survey to *understand how the local urban woodfuel market functions* in terms of price, cost, forms of transportation used, seasonality of sales, species preference, fuel characteristics and other aspects of the trading system.

Phase III - a woodfuel source of supply study to *examine the commercial flow of wood fuels from rural suppliers to urban users* including issues of woodfuel marketing, woodfuel as a source of income, land use patterns, land tenure arrangements and impact of future supplies.(22)

The study thus made use of different research methodologies in order to purposely meet the objectives of each phase. These methods include the use of formal-structured personal interviews, semi-structured interviews, collection of secondary data, oral history, telephone interview, team interview and triangulation and observation and ocular inspection trips. These strategies meant flexibility and adaptability to real-life situations. Moreover, these approaches were necessary given the time, resources and database limitations.

### 3.4.3 INITIATIVES IN WOOD ENERGY PLANNING

These demonstrations of effective ways of acquiring accurate and relevant primary information for wood energy planning, were complemented by four presentations discussing how such

information could then be formatted and managed for decision-making, and the type of institutional arrangements that should be considered.

**Wood Energy Modeling - *Charles Heaps*** presented (and later demonstrated) the *Long Range Energy Alternatives Planning Model* (LEAP). Early attempts to model the 'woodfuel crisis' were based on a number of -what are now perceived as simplistic- assumptions, in which the per capita consumption of a growing population was confronted with a declining resource, leading to rapidly growing 'gaps' to be closed by LPG, trees and stoves.(9)

LEAP attempts to avoid falling in this gap (or trap) by taking the following into account: biomass sources in all sorts of land uses, a disaggregated approach enabling the capture of interactions between resources, management, supply and uses; wood growth patterns; adaptability to various levels of data availability; and accounting for modem biomass options. Assistance in planning is through a scenario approach, through which the physical, economic and environmental impacts of different scenarios can be evaluated.

A special biomass module is presently being further developed, comprising land use modules, results from biomass inventories, as well as the demand and transformation characteristics of various biomass fuels, enabling an assessment of the adequacy and impacts of selected scenarios on the Biomass Resource Base.

In addition to this type of computer assisted approach, two other types of *PC-based applications for wood energy analysis and planning* were demonstrated: *Veena Joshi* demonstrated the database of results of over 600 rural energy surveys that have been done in India. She explained that such databases could serve a variety of purposes: It could prevent the organization of 'another survey' by making the results of inaccessible reports available. It was also explained that most district offices in India now have access to PCs, and that making appropriate software available could assist in the efforts to decentralized planning that is particularly relevant in rural energy planning.

***George van der Meulen*** demonstrated the RWEDP-supported development of a *simplified GIS decision support system.* An attempt to make the use of relevant geographical information (developed by research institutions) accessible to planning institutions and allow for the identification, monitoring and evaluation of sites for specific wood energy development activities.

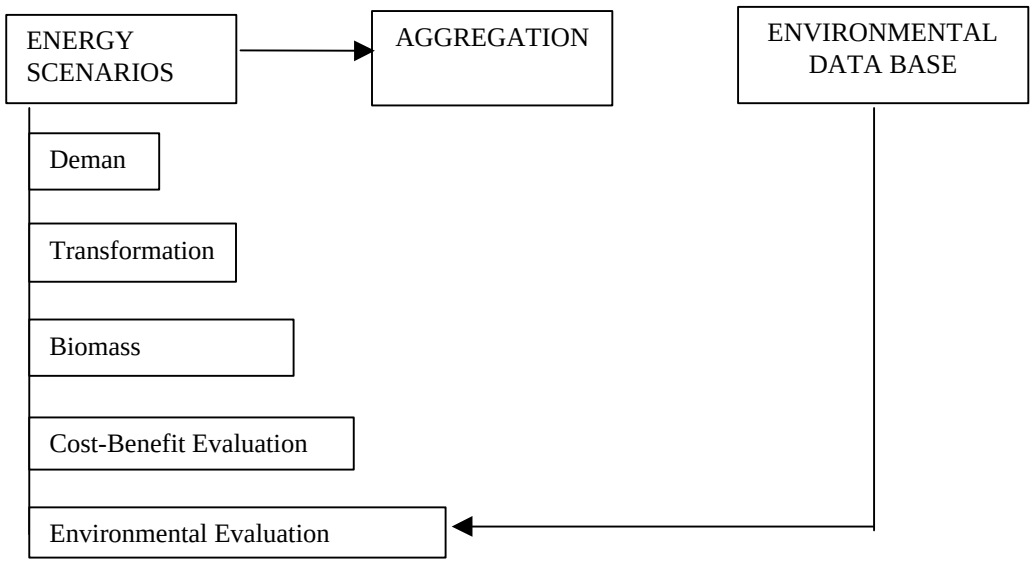
All emphasized in their presentations and demonstrations that models do not solve problems, but that they can only assist researchers and planners in their attempts to tackle the problems at hand.

**Current Activities -** Decentralized energy planning activities that incorporate wood energy have been supported by (among others) FAO's Research and Technology Development Division. Particularly the formation of appropriate institutional arrangements for such decentralized planning and implementation of rural energy development is supported. The paper by *Gustavo Best* described the principles and the pilot activities in the Philippines, Indonesia, Sri Lanka, Laos and Vietnam.(4)

Another international support programme was presented ***by Jean-Yves Garnier.*** He discussed an overview of the importance of biomass energy in the six ASEAN countries (Brunei, Indonesia, Malaysia, Philippines, Singapore and Thailand) and the biomass energy modeling activities by the Jakarta-based ASEAN-EC Energy Management Training and Research Centre.(8)

**Figure 3.9**

## LEAP Program Structure (9)

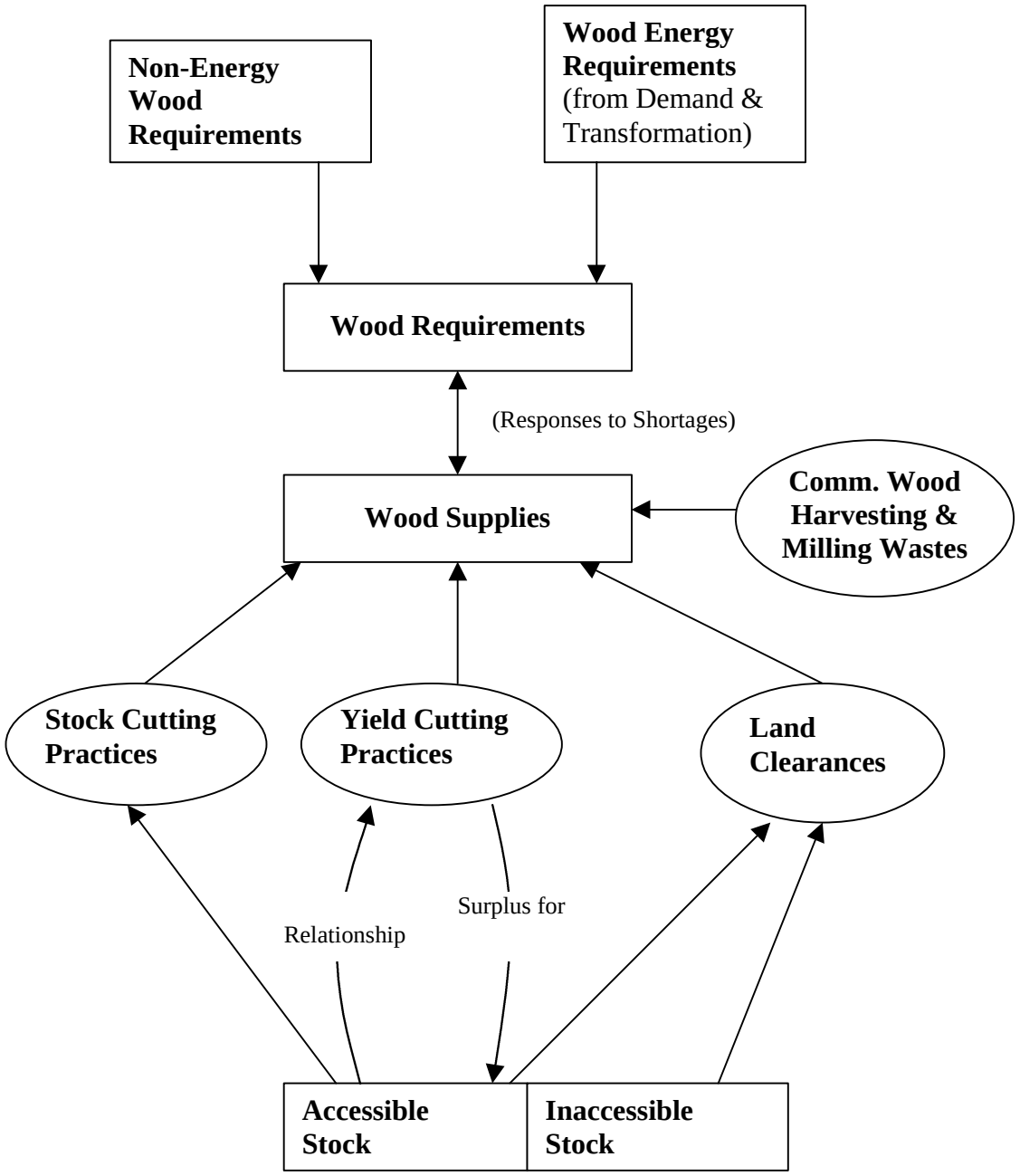



## 3.5 INSTITUTIONAL ISSUES IN WOOD ENERGY PLANNING AND PROGRAM IMPLEMENTATION

Along with the process of policy reform and institutional development, specific fuelwood sector strategies should be developed, accompanied by the further strengthening and reform of fuelwood planning institutions to create an effective implementation capacity. ***Soussan*** suggests the following to serve as the basic principles for institutional reforms:

**Figure 3.10**

**LEAP PROGRAM - Simplified Schematic of Wood Demands and Supplies (9)**



They should be *responsive to energy needs I demand.* This requires an end-use approach in which energy production capabilities are driven off by defined needs with no pre-definition of technical choices and flexibility over timing of interventions.

They need to *create effective channels for the participation* to allow effective bottom-up participation of fuelwood users and providers in all stages of planning.

They should *permit multi-sectoral cooperation.* Energy and forestry ministries will continue to take a lead role in the planning process, but other institutions may be the most appropriate implementation agencies.

The *full integration into planning procedures of the principles of sustainability,* in environmental, economic and institutional terms, by energy planning institutions.

The *state promotes effective decentralization* so that control of local resources are given to local communities.

Positive action to *create effective management structures and enhanced management skills is* needed to counter the negative impact that poor capacity in this field produces.

*External donors should facilitate the creation of sustainable planning procedures,* thus their operations should be re-evaluated to assure that they do as such.

*Fuelwood planning should be more flexible,* seeking indirect strategies and building a partnership between local people and planning institutions.(24)

### 3.5.1 DEVELOPING NATIONAL CAPABILITIES

**Institutional Set-Ups** - Joshi advocated a decentralized approach to wood energy planning, and the careful selection of problem areas for planning and implementation of activities. As a start rural, semi urban and urban areas should be distinguished, particularly for the identification of system boundaries the differences between these different types of areas are important. She also pointed at the large number of institutions to be involved in such exercises at national, state, and district or block level. Capacity building was identified as one priority to make decentralization work.

She put forward the following recommendations on how institutional structures for policy formulation, planning and implementation for wood energy development should be set-up:

At the policy level, a high-level body (i.e., wood energy commission) should be entrusted with the responsibility of improving the statistics on wood energy supply in co-ordination with the planning ministry which is responsible for collection of data. This body can develop plans in co-ordination with other ministries (forest, agriculture, land related, rural and urban development etc.)

At the regional level, collection and analysis of data can be the responsibility of the planning department in co-ordination with the department of forests, rural and urban development, public works, small scale industries, revenue, and agency for new and renewable sources of energy.

The development of various norms based on the analysis of wood energy systems should be the responsibility of the local planning department at the district level in co-ordination with the implementing agency and other departments.

Strengthening of capabilities and development of local institutional linkages should be the focus in the immediate future.(11)

### 3.5.2 DECENTRALIZATION AND INTEGRATION

**Implications of Decentralization -** ***Binayak Bhadra*** noted in his presentation that governments are now specifically seeking to enhance the participation of the local population in development through local community organizations and greater emphasis fallen on the involvement of private sectors and nongovernmental organizations. The overall policy environment is significantly different from the past, and therefore this has many implications towards institutional policies. The major shifts in institutional policies emanate from the acceptance of the need to move rapidly towards deregulation and decentralization.(5)

The decentralization of the planning process and its implementation are a pre-requisite to decentralized energy planning. The foremost institutional policy thus consists of creating the appropriate institutional capability to carry out decentralized planning. This may require acts and regulations for decentralization to be operationalised. Such judicial, legal and regulatory framework is often a necessary condition for the success of the decentralization process, although experience shows that they by themselves are usually not sufficient conditions.

The institutionalization of the planning functions and processes will require, amongst other things, increasing and deepening the awareness of the new political leadership and the accompanying reformed institutional structures. The implications is that, resource requirements, both financial and technical manpower, are initially high. The establishment of decentralized planning process however means that the decision making and resource generation authorities are transferred to the local level, which makes it possible to enhance the local resources mobilization and their effectiveness in the development process. Peoples' participation in development activities is also expected to flourish as accountability and transparency will be achieved in them.

At present, local level capabilities in rural energy planning, are far short of the need. This is primarily due to the fact that the local level planning is also weak. It is thus, necessary to create and / or strengthen local level energy planning institutions so that they are able to analyze the dynamics of energy demand and supply, and assess the impacts of various energy initiatives that may be locally viable. The central energy planning institutions themselves are however not well funded, and thus may find it difficult to extend themselves to the local level directly. Under such circumstances, it becomes important to draw both non-governmental organizations and private sector into local energy planning activities, by devolving some of the rural energy sectors to them. It is also important to find enabling mechanisms, whereby local resources may be brought to bear upon the local energy planning activities.

**Integration for Effective Decentralization -** Decentralized energy planning requires the establishment of institutional linkages and coordination between various line agencies, financial and credit institutions, and the technology institutions, both at the macro and the micro levels. At the macro level, inter-sectoral and inter-agency coordination are necessary in policy making, planning, resource mobilization, programme implementation, monitoring and evaluation. Establishment of specific administrative procedures for policy, programme and project formulation needs to be established, with clear demarkation of lines of authorities and responsibilities. Similarly, the procedures for implementation, monitoring and evaluations need to be setup, again with clearly defined and unambiguous responsibilities and authorities. Such procedures need to be defined not only for governmental units, but also for the non-governmental organizations and private sector participants.(5)

Local level coordination is needed to bring about an effective participation of all the relevant component units of various line agencies in policy, programme and project formulation. 'Me coordination function usually rests with the local level planning units. Establishment of specific administrative procedures for policy, programme and project formulation needs to be established, with clear demarkation of lines of authorities and responsibilities, also at the local level. The coordination among community groups, credit institutions, NGOs and local governmental units is also needed. The important functions of the local NGOs relate to their function as intermediaries and go-betweens in the process to help mobilize financial and technological resources, in solving energy problems at the local level. They can function well as "match-makers" in bringing together outside finance and technology to bear upon local resources in local development (energy related) activities. They can also function as conduit for finance and technological and management inputs between the line agencies (and outside donors) and the community groups.

**Institutional Mechanisms -** *Socrates Apollo Botictic*, by presenting a case study of the Philippines, discussed the advantages of building an institutional network which can provide an effective linkage between national program planning agencies and target program beneficiaries and provide the latter access to expertise needed in local planning and implementation of program projects and activities. He expounded on the responsibilities of national agencies for overall macro-level program planning, assuring inter-sectoral (or horizontal) linkages and the allocation of resources to the programs. He reiterated the arguments for involving beneficiaries in project (local-level) planning and implementation. He then argued the need for a decentralized mechanism to translate national plans to projects and activities appropriate to the conditions of the localities but however points out the constraints presented by highly centralized government agencies faced with limited resources and expertise.(6)

The Philippines tried to address the problem by utilizing the Department of Energy's Affiliated Non-conventional Energy Centers. The Affiliated Noncon Energy Centers (ANECs) are colleges and universities located in various regions of the country tapped by the Department of Energy's Non-Conventional Energy Division (DOE-NCED) as its partners that will undertake rural energy planning activities in behalf of the DOE-NCED. These ANECs have been in existence for an average of three to five years and at this time, they have already developed linkages among the different role players in the renewable energy industry in the rural areas such that they are being tapped as the principal conduits in the dispersion of fuelwood management activities.

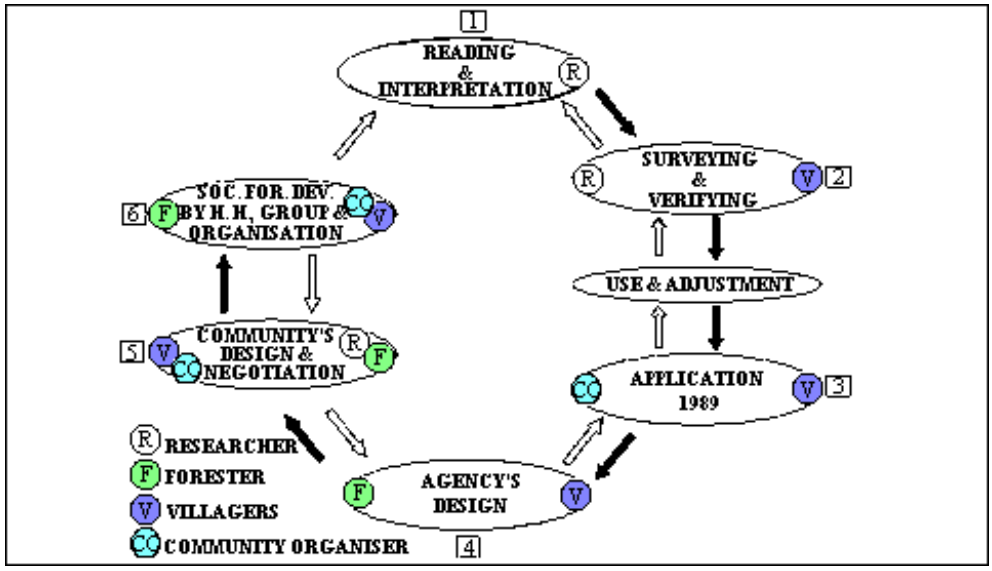
To equip the ANEC personnel with the necessary skills related to energy planning and even non-conventional energy technology design and installation, various short courses/workshops are prepared and conducted by the DOE-NCED and participated in by ANEC representatives. Local and even international seminars/trainings on technical aspects as well as economic/financial issues are prepared for ANEC staff who have now 'graduated' as experts in the renewable energy field.

### 3.5.3 PEOPLE'S PARTICIPATION

**Approaches for Local Participation -** *Cor Veer* presented a pilot project of Chiang Mai University done in Northern Thailand (based on a paper written by ***Uraivan*** Tan-&M-Yong) in response to increasing questions on the efficacy of forest protection projects through resettlement of villagers living in forest lands and reforestation strategies done without consultation with affected villagers.(27)

In this project, a key tool developed, tested and applied is *participatory land use planning(PLP),* in which a local group formation for natural resource management is a central element. The pilot project's emphasis on the sociological dimension of land use planning leads to a methodology that differs considerably from the way land use planning is often carried out.

PLP is a process through which conditions are created for frequent communication and discussions, thereby contributing to the strengthening of the institutional basis of agreement on rights and responsibilities in the implementation of activities. PLP is a process involving the Thai Royal Forest Department (RFD) and villagers in communication that gradually focuses on mutually acceptable land management strategies with the assistance of university- and village-based facilitators.




Thus compromises are forged in which the needs of the villagers are met through adaptation and compromise in RFD's strategies to achieve forest policy objectives, through improvement of land use practices, user rights, and compromises in the conflicting interest of various local groups. In the process, both the villagers and the land management agency (RFD) gradually redefine their expectations and thereby their relationships. One of the central PLP principles is that all relevant information is accessible for all parties.

**Role of NGOs -** ***Matee Suwana-adht*** discussed the potential of NGOs in contributing to wood energy development which can be fully realized only if all parties concerned make an effort to work towards the common goals for the benefit of the rural people. Intermediation between government institutions and program beneficiaries by NGOs is one component of a formula for more effective implementation of wood energy strategies. It is no doubt a major and very important component.(26)

Non-governmental organizations' capacity is however limited in many ways especially in resources - financial, human and technology. There is also a limit to the growth and expansion of NGOs - normally at the expenses of effectiveness and social acceptability. Within and among NGO

communities - national, regional and international - the combination of many or all of the various key components mentioned above are known as *networking* which is increasingly recognized as a powerful tool for affecting changes in a coordinated and consolidated manners.

Other components, i.e. intermediation between the program beneficiaries and other key "actors", must also be understood and considered for inclusion as complementary components of the formula. These components include intermediation in relation to the academics, the mass media, members of parliament or politicians, and the private business sector. Additional components include religious institutions and donor (technical assistance agencies).

If management strategies can be found to enable local people to participate, if NGOs, the media, and the business sector can be mobilized to become more actively involved, and if gender issues are identified early on in project planning, future wood energy development programs could break much new ground through shared concerns and compromising consensus. She submitted then recommendations which government, donors and the NGOs community can should undertake to address these concerns.

### 3.5.4 REGIONAL COOPERATION AND SUPPORT

***Egbert Pelinck*** presented the following guiding principles of a regional cooperative programme:

- support national activities
- promote technical cooperation among developing countries (TCDC) in the region
- facilitate the transfer and sharing of information between countries
- provide a cost effective way of generating new knowledge of relevance to the region
- provide a cost effective way for collective training of national functionaries
- facilitate access to human resources and technical skills within and outside the region for advisory services, including the formulation of projects
- facilitate access to potentially available sources of financial support to national programmes facilitate the forging of intersectoral linkages at regional and national level. (20)

**WOOD ENERGY DEVELOPMENT**

The development objective addresses the following major sector policies and priorities:

*Forestry*: the improved management of tree and forest resources by villagers, including adding value on-site through processing and marketing support,

*Energy*: the development of renewable, indigenous sources of energy to contribute to diversification of energy mix and self-sufficiency in energy supply,

*Poverty alleviation*: to improve the livelihoods of rural people and those working in informal sector activities, among others by generating income and employment,

*Environment:* to arrest the degradation of forest resources and other land use systems, through sustainable patterns of natural resource management and utilization and to contribute to efforts to reduce greenhouse gas emission,

*National economic considerations*: more productive uses of local (woodfuel) resources and providing an additional energy supply option for economic growth and development, and,

*Women*: to create the opportunity for women, play an important role in planning and implementation of wood energy programmes and strategies. (20)

The long term development objective of the new regional programme is to contribute to a sustainable production of wood fuels, their efficient processing and marketing, and their rational use for the benefit of households, industries and other enterprises.

This new programme will address the (potential) concerns of institutions and people, whose policies, programmes and actions are affecting the production and use of wood fuels. They can be grouped in three:

those who collect, organize and analyze information to provide the analytical basis for formulating policies and defining development plans and strategies involving wood energy

those who define and choose policies, programmes and strategies including the prioritization of projects, activities and the allocation of resource inputs to them and

those who execute the programmes and strategies and implement the projects and activities.

Finally, the programme has identified the following three immediate objectives to address and achieve within the implementation period:

To contribute to an improved database on wood energy at regional and national level and to improve the capacity of institutions to generate, manage and assess such data at regional, national and subnational level.

To contribute to the development and adoption of improved wood energy policies, plans and strategies in member countries.

To improve the capabilities of government, private and community-based organizations in implementing wood energy strategies and programmes.

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[3] (II) – Identifies papers presented and discussed at the **Expert Consultation on Data Assessment and Analysis for Wood Energy Planning**, full copies of which are in Volume II of this report.

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27. TAN-ICM-YONG, - *"Participatory Land* Use (III)

# Chapter 4

## PROCEEDINGS OF THE EXPERT CONSULTATION ON DATA ASSESSMENT AND ANALYSIS FOR WOOD ENERGY PLANNING

*Transporting wood fuels to urban markets on jeepneys in **the Philippines** - Some of wood fuel traders in the Philippines have been in the business for 30 to 40 years already.*

*Participants in the hands-on session on the use of PC-based planning models for wood energy planning.*

*Visit by participants to the **Ban Pae Community Forestry** to exchange information with villagers managing the forest.*

# Chapter 4

## PROCEEDINGS OF THE EXPERT CONSULTATION ON DATA ASSESSMENT AND ANALYSIS FOR WOOD ENERGY PLANNING

### 4.1 RATIONALE

The general objective of this consultation was to determine methodologies for data assessment and analysis for wood energy development and planning. The consultation also aimed to:

- Assess the present status and adequacy of information on wood energy development in Asia and identify what is needed in determining further planning of development strategies and policy interventions in the sector.

- Review existing methodologies and experiences concerning wood energy assessment, monitoring and planning in the context of forestry and energy analysis and planning.

- To determine techniques for the formulation of strategies for implementation of wood energy development programmes well-integrated into national programmes.

- Formulate specific recommendations to strengthen national capabilities in the collection and analysis of wood energy data for monitoring changes in wood energy development, assessing impacts of interventions, and for the developing of plans suitable for integration into forestry and energy programmes.

The participants were mostly heads or senior staff of energy and forestry planning agencies of the member countries and some senior staff of planning units of natural resources and state planning bodies. All 11 member countries were represented. Six countries were represented by both their forestry and energy departments. Ten resource persons came from within and outside the region.

### 4.2 SUMMARIES OF DISCUSSIONS AND RECOMMENDATIONS[1]

#### 4.2.1 OPENING SESSION

The consultation meeting was inaugurated with speakers representing the local Government of Chiang Mai Province - Vice Governor Pongpayom Vasaputi, the Department of Energy Promotion and Development of the Royal Thai Government - Deputy Director General Sompongse Chantavorapap, the Food and Agriculture Organization Forestry Department in Rome - Dr. Miguel Trossero and RWEDP - Chief Technical Adviser, Mr. Egbert Pelinck.

#### 4.2.2 TECHNICAL SESSIONS

Mr. Egbert Pelinck opened the technical sessions with a presentation *"Why a Wood Energy Planning Workshop?"* The workshop was to examine new and more accurate information and analysis to develop new perspectives in wood energy. It intended to focus on how such information

[1] This Chapter is based upon the presentations of the papers for each session and the reports of the rapporteurs.

was obtained, and managed and how it would support the decision makers. A good data and information base can facilitate a rational debate towards effective policies. The deliberations were expected to identify policy issues to be addressed in the following *policy seminar.* These policy discussions should ensure adequate attention of national policy makers and international donors towards the needs of poor people. For RWEDP, the outcome of the workshop can assist in developing follow-up activities for the regional programme.

## SESSION 1: 'WOOD ENERGY DEVELOPMENTS IN ASIA"

The objective of this session was to review the current degree of understanding of the present importance and further potential of wood energy, the options for solving the present fuelwood problems and the barriers to and potentials for wood energy development in the region.

The Chairperson of the session was Dr. P.P.S. Gusain of India and the rapporteur was Dr. Veena Joshi. ***A panel discussion*** followed the presentations with delegates from Bhutan, Myanmar and Vietnam as members of the panel commenting on the presentations and sharing their own country experiences. An ***open forum*** came after.

**Summaries of Paper Presentations:**

- ***"Wood Energy Development in Asia: Assessment*** of Critical Issues, ***Constraints and Prospects"*** by Mr. Auke Koopmans (HSEBV Engineering Consultants - Chiang Mai, Thailand)

  Information on demand and supply of wood energy in the 11 RV#/EDP member countries is very comprehensively summarized here. The countries were low energy consumers but energy demand was rapidly increasing. Urbanization was identified as a major trend. The paper pointed out the significant discrepancies in data from international and various national sources. But there were some firm observations and trends obtained.

  Available sources shows that only 15 to 50% of wood fuels comes from forest lands thus highlighting the importance of non-forest lands which are not generally included in supply estimates. Moreover, most supply estimates do not account for accessibility factors. The informal sector plays an important role in wood fuels supply and use but is not considered in calculating the contribution to GDP which was apparently significant.

  Reasons for ineffectiveness of past interventions made were cited such as incorrect understanding of the wood energy situations particularly the differences at local levels, and the lack of involvement of beneficiaries in project planning and implementations. The speaker concluded that the wood energy systems were complex and needed linking of institutions at all levels (i.e., energy, forestry, agriculture, industry and population departments). The prospects for wood energy lie in our ability to involve the people at the grassroots level in decision making and in developing knowledge at all levels.

- ***"Wood Fuel Use in the Household Sector in Pakistan"*** by Dr. Azedine Ouerghi (Household Energy Strategy Study Project - Islamabad, Pakistan)

  Mr. A. Ouerghi presented the results of a government study (with ES" assistance) to examine household energy use in Pakistan. The study showed that 79% of population depends on fuelwood and it accounts for 60% of energy use. Its price has remained very steady.

Transition from fuelwood to "modern fuels" occurs with urbanization and increases in income. The availability of fuelwood at no private cost is identified as a major reason for such transitions not taking place in rural areas.

The country has a standing biomass stock of about 210 million tons including all types of trees, shrubs, bushes and twigs which can provide a yearly sustainable productivity of 23 million tons. These are mostly young trees growing mainly on farmlands. Annual consumption (for both households and industries) is estimated around 32.5 million tons. Using the "gap theory" to project that there will be a depletion of resources is considered misleading since the theory is static and does not account for behavioral changes due to increasing scarcity, higher demand and sociocultural changes. The gap has existed all along and the growing demand is being met through extensive tree planting. This can be confirmed by the relative stability of wood fuel prices and the young age of trees. 70% of wood energy demand leaves trees undamaged but data on shrubs lands indicate that there can be land degradation.

The paper described two mechanisms to improved wood supply in general including wood fuels; small-scale forestry and large-scale forestry and what the government can do to enhance each strategy. Potential solution appears also in creating employment for women who can have financially rewarding alternative uses of their time than collecting fuelwood and who can then can buy wood instead and use improved stoves. The applicability of each solution depends on the specific conditions of the province and agro-ecological zone being considered.

- ***Charcoal in Northeast Thailand"*** by Mr. Opart Panya (Department of Geography, Victoria University of Wellington - Wellington, New Zealand)

Mr. O. Panya examined the "Charcoal Production in Northeast Thailand" in the context of current government policies which set a legal limit on possession of charcoal to 0.5 cum. The charcoal production activity in northeast Thailand was examined in three communities as a wood based, small-scale, income-generating enterprise. The study shows that charcoal making is important to low-income population as an income generating activity, charcoal also provides low cost modern fuel to rural and urban poor. However, when and why people shift to charcoal from fuelwood and vice-versa is not well understood. The author recommends that lower income households should be considered as organizational units to encourage tree planting on public lands. The planning methodology should be such that it works and allows learning from the grass-root level. A need to review government policy on charcoal was identified.

- ***"Wood Energy as a Commercial and Industrial Fuel in Cebu City, Philippines"*** by Mr. Terrence Bensel (Complex System Research Center, University of New Hampshire - Durham, New Hampshire, USA)

The study examined the consumption of wood fuels in the household, commercial and industrial sectors, and the trading network including transportation and marketing. The author pointed out that the link between the use of current fuelwood and deforestation was weak as the forests were already degraded a century ago. The 650,000 people in Cebu City used LPG, Fuelwood and Kerosene as major fuels. Food vending was a household commercial activity and accounted for large consumption of wood. The study points out that 20 to 25% of households switched from fuelwood in the last five years. The share of fuelwood is

decreasing but not the quantity. The deregularization of oil industry will lead to increase in the price of LPG and kerosene by about 30%, which may cause a shift back to wood fuels.

The traders were found to be an excellent source of information for reconstruction of history of wood fuel use including species-wise. 'Me trade was competitive, profit margins were small and a need was perceived to change attitudes towards the traders as exploiters of forest resources. A variety of wood fuels were used by different category of users. Barbecue vendors, use charcoal, bakeries use firewood. Many industries use the waste generated in their processes. The supply of fuelwood was estimated based on information from traders, records about certificate of origin and field waste. The role of checkpoints was questionable.

In the scenario for the future, wood and charcoal will continue to be an important source of energy. A change in perception about traders and about the role of wood fuels in environmental degradation is needed to prevent wrong policies from benign adopted. 'Me people are conscious of conservation and no demand side intervention are needed except improving the charcoal kilns. The permit system needs a review and supply side interventions are possible.

- After the paper presentations, there was an *audio-visual presentation* ***entitled "Wood Fuels Supply and Use Systems in Cebu"*** by Ms. Elizabeth Remedio and Mr. Terrence Bensel.

**Highlights of Discussions:**

The discussions focussed on the following points:

- The reliability of supply side estimates.
- The limitations of gap theory.
- The problem of promoting interventions in rural areas.
- The stress on forest resource is area specific in many countries with adequate forest cover.
- The environmental implications of use of shrubs for firewood from non-forest areas were not clear.
- The manpower needs and instructional implications for using improved methods and techniques to understand wood energy systems better should be identified.
- A review of the impact of government regulations on sale of wood by farmers.

## SESSION 2: 'WOOD ENERGY IN NATIONAL PLANNING EXERCISES"

The objective of this session was to review the experiences in the region in defining, developing and implementing wood energy planning activities and efforts to integrate wood energy into national planning exercises, and to determine the crucial elements that can make wood energy planning a successful exercise.

The chairperson of this session was Dr. Charit Tingsabadh of Thailand and the rapporteur was Ms. Aida C. Pujanes. ***A country roundtable discussion*** followed the presentations. Representatives of each country shared information on how they carry out the energy planning process and the status of their wood energy planning activities.

**Summaries of Paper Presentations:**

- ***"Wood Energy Data Assessment and Planning Activities in Asia"*** by Mr. Conrado S. Heruela (RVtIEDP/FAO - Bangkok, Thailand)

  The presentation focused on the evolution of the energy planning process in the region, the constraints and problems being encountered in the energy planning activities as well as the importance of an integrated energy planning (1EP) approach. In the presentation, the speaker also highlighted the role of traditional energy sources specifically wood energy planning in the whole process. He further pointed out that "The traditional energy sector, which in some countries of the region is estimated to form up to 80% of the total energy consumed, has been the *bete noire* of energy planners".

  ***"An Approach to Energy Assessment and Planning for Sustainable Development - Status of Implementation in Asia" -*** a paper prepared by Dr. Gustavo Best (FAO/AGRE - Rome, Italy) and presented by Dr. Miguel Trossero (FAO Forestry Department - Rome, Italy).

  The paper discusses how rural energy problems have a higher and different kind of complexity, calling for equivalently different approaches, since classical planning methodologies and strategies used in the modern sectors cannot be applied to the dispersed and normally small and decentralized energy requirements of rural populations.

  The paper describes the approach used in those activities, and discusses the experiences gained in the light of the on-going efforts of RWEDP and FAO Headquarters to establish a closer link between the policy and planning efforts on wood energy with overall rural energy planning, and with overall energy policies at the country level. The paper discusses the pilot activities carried out in rive Asian countries.

  A central conclusion is that there is the need and demand from countries for assistance in this field. The activities described were only of a pilot nature, and full technical assistance activities are still to be in place. The activities carried out showed clearly that wood-energy programmes cannot be carried out in isolation from other programmes which have a strong bearing and definite influence on the future patterns of wood utilization.

  Of particular importance is the influence of the institutional reforms being promoted in most countries. The apparent "shrink" in the role of the state regarding operational energy matters should not lead to a further impoverishment of rural people, especially those at the energy subsistence level. The enhanced emphasis on private sector and peoples participation should open new doors for energy development through the establishment of small enterprises and the liberalization of production and conversion rights. It is nevertheless necessary for the governments to retain and consolidate their role as regulatory bodies for the establishment of appropriate natural resource and taxing policies, and to make sure that the poorest of the rural people are not, even more than before, left out of the economic development thrust enjoyed by other groups.

**Highlights of Discussions:**

In the round table discussion, the country participants shared their respective energy planning process and the status of wood energy planning in their countries. Some of the points and issues raised were:

- status of information on wood energy supply and use in member countries and the methodologies used for gathering this information - gathered either by forestry or energy departments

- initiatives by countries in integrating wood energy planning in energy planning activities either through renewable energy planning or rural energy planning - activities were conducted both at the national and local levels

- constraints and limitations encountered by countries in conducting data collection and planning exercises such as; involvement of many agencies, focus of attention on "modern fuels' in the energy sector and on commercial timber in the forestry sector, and inadequacy of information

- social problems encountered while introducing improved cookstoves as part of wood energy conservation programmes

The discussion shows that the various countries have already recognized the importance of wood energy planning although the implementation is at various stages.

**SESSION 3: "METHODOLOGIES FOR DATA COLLECTION AND ASSESSMENT FOR WOOD ENERGY PLANNING"**

The objective of this session was to identify appropriate techniques for the collection and analysis of data on the supply and utilization of wood energy. The Chairperson for this session was Ms. Nenny Sri Utami of Indonesia and the rapporteur was Mr. Terrence Bensel. A ***country roundtable discussion*** ensued wherein not only experiences in wood energy data gathering activities were shared, but also, questions were asked to clarify some points about the presentations.

**Summaries of Paper Presentations:**

- ***"The Use of Secondary Data Cum Field Ohservations as a Preliminary Method for Wood Energy Analysis"*** by Mr. Auke Koopmans (HSE, Green Fields - Chiang Mai, Thailand)

  The paper discussed how Tropical Forestry Action Programmes and individual country forestry master plans have provided some insight into current problems and constraints. Most of these studies have been "desk" studies costing around US$ 20,000 - 30,000. But these studies can only be as good as the underlying available data. With regards to wood fuels, data needs include energy consumption and demand, energy supplies and sustainability, and additional data may be helpful but one also needs to keep focussed. Some sources for this data are official statistics, reports, studies and perhaps wood fuel traders, but with respect to the former there are problems in the reliability of the data.

  If very little country data is available then a prudent application of comparable data from other countries or from international organizations could lead to a fairly good first approximation. Some problems encountered with secondary data are that much of this information is static in time and place, supply data often only based on forestry statistics ignoring non-forest sources, and that not much attention is paid to issues of accessibility and social/cultural factors. By way of conclusion, Mr. Koopmans pointed out that studies based on the use of secondary data can serve as a good starting point for more detailed studies to be done in the future.

❖ ***"The Use of Formal Structured Surveys in Wood Energy Consumption and Wood Fuel Row Studies"*** by Ms. Aida C. Pujanes (Department of Energy - Manila, Philippines)

Ms. Pujanes, underlined the importance of such studies as they can define the scope of various projects, help in evaluation of energy strategies, help in defining size and scope of projects, and aid in assessing the impact of projects on households. Ms. Pujanes divided her discussion into two parts relating to the Household Energy Consumption Survey (HECS) and the Fuelwood Supply Systems Study (FWSS). The objectives of the HECS was to assist the government in defining the important issues in household energy supply and demand patterns, assist the government in using this information to develop appropriate policies and programmes to improve household energy situation, to assist in developing the capabilities of Office of Energy Affairs (OEA) staff in data analysis, and to provide supplemental data to a World Bank rural electrification study.

The HECS sample frame consisted of 5082 households, half rural, half urban. The questionnaire focussed on issues of energy consumption at household level and issues of availability and accessibility of various fuels. Data validation efforts led to the dropping of 12% of the sample. Problems encountered in the conduct of the HECS included difficulty in estimating household energy consumption (respondent recall), conversion of local units into standard energy measures, key punching/encoding effors, and design of enumerator processing manual. The HECS survey was found to be fairly inexpensive because it was done as a rider to an existing Statistics Office survey. The HECS found that fuelwood, charcoal and crop residues account for 77% of household energy consumption with greater importance in rural areas but still a significant importance in urban areas.

The FWSS had as its objectives to characterize marketing channels for wood fuels, patterns of distribution, efficiency of marketing systems, and to locate end-users of wood fuels. The FWSS was carried out in six urban areas in the country targeting fuelwood gatherers/charcoal makers, rural/urban traders, ruraVurban industry users of wood fuels, and transporters/wholesalers/retailers. The project cost of FWSS was also low because it worked through existing Affiliated Non-Conventional Energy Centers (ANECs). Problems encountered in conduct of FWSS included a paucity of secondary data, time constraints, and financial constraints. Nevertheless, the survey found out some interesting things including a large variation in biomass resources between regions, the importance of wood fuels as source of income, a highly efficient network for transport and distribution of wood fuels, and that the overall biomass situation in the country is favorable.

❖ ***"Methodologies for Wood Energy Supply and Utilization Studies In Pakistan",*** a paper prepared by Mr. Gary Archer (Household Energy Strategy Studies - Islamabad, Pakistan) and presented by Dr. Azedine Ouerghi

Mr. Ouerghi first presented the overall conceptual design of the Pakistan Household Energy Strategy Study (HESS) consisting of both demand and supply components. Sample selection for the demand study was based on a stratification scheme whereby the country was divided into provinces and then on the basis of whether it was rural or urban (with urban areas being further divided into large and small cities). Surveying of households was done using both male and female enumerators in order to increase validity of responses. Field survey teams entered data immediately into a computer in order to facilitate a follow up visit in cases where responses seemed unreliable. In addition, close supervision, spot checking and retraining of

some enumerators helped increase confidence in accuracy of data collected in the field. With regards to both demand and supply surveys, collecting the data was not as much of a problem compared with the problem of how to extrapolate this data to a national level.

He then discussed the use of remote sensing and field inventory as a method of carrying out assessment studies of wood resources and burnable crop residues, and how such studies are related to energy consumption studies.

The Pakistan Household Energy Strategy Study (HESS) includes a national survey of available fuelwood and burnable crop residues. In order to complete the work within the timeframe and available budget, it was necessary to develop rapid, cost-effective methods to carry out the surveys. Analysis of low-resolution satellite imagery (NOAA AVHRR) was combined with geographic data to develop an effective agro-ecological zonation for the whole country, to provide a consistent sampling frame for estimating available fuel supply, and for relating energy supply to demand. The resulting zonation was used as the first stage of a multi-level sampling scheme. The second stage involved the use of twelve high-resolution satellite images (Landsat TM) for more detailed classification and selection of field samples. Variable probability sampling was used for automated selection of 1100 primary sampling units based on their percent vegetation cover. The vegetation classification for each Landsat scene was overlain on the agro-ecological zonation and sampling expansion factors generated. Field work for fuelwood supply measurement was based on efficient variable-probability sampling.

This approach provided a sound basis for producing national estimates of wood biomass and crop residue availability for Pakistan. Development of a national sampling frame based on agro-ecological zonation allowed the results of both fuel supply and demand studies to be accurately correlated and permitted the successful development of a household energy planning database for Pakistan.

- ***"Methodologies for the Study of the Wood Energy Situation in a Rapidly Urhanizing Area: A Case Study of Cebu City, Philippines"*** by Ms. Elizabeth Remedio (Department of Economics, University of San Carlos - Cebu City, Philippines)

Ms. Remedio started by emphasizing the importance of wood energy systems as a source of energy and income, and by pointing out that despite this importance little is understood of these systems. The study in Cebu aimed to increase the understanding for that region. In order to do this a variety of methodologies were employed to meet the needs and objectives of the study. The lesson learned was that there is no clear package approach to doing this kind of study, instead the techniques developed out of the types of data needed and the financial and time constraints faced.

The study was divided into three phases looking at wood fuel consumption, wood fuel marketing/transport, and wood fuel supply. In terms of consumption, this area was broken down into two components, households and commercial/ industrial/ institutional users. The primary objective of the first phase was to quantify consumption of wood fuels by above sectors. Household survey utilized simple random sampling techniques while commercial survey used these plus non-probabilistic techniques due to nature of sector. The importance of editing the data collected during this phase was emphasized. The second phase used nonprobability sampling to look at the urban wood fuel trading and distribution network. The third phase was even more qualitative, using RRA - inspired methods to investigate issues

of land use, species preference, supply sources, land tenure and cropping patterns on wood fuel production. This phase also looked at the role of wood fuels as a source of rural employment and income generation. Finally, a list of suggestions was offered to those who might consider doing a similar type of wood fuel flows study.

**Highlights of the Discussions:**

The session was opened by Mr. Conrado Heruela with questions for the country representatives and included:

- Do you need upgrading of your wood energy data in terms of timeliness, adequacy and reliability?
- What upgrading steps have to be taken?
- What are your capability building needs?
- Who needs capability building? At what level?

During the discussion period the following were the concerns and questions raised by the participants:

- the detailed procedures, costs and training requirements needed to conduct the Pakistan wood energy supply studies which used low-resolution satellite imagery and high resolution satellite images (Landsat TM)
- what follow-up activities should be done after studies such as the Pakistan Household Energy Studies are finished, particularly in terms of wood energy planning and policy formulation
- the importance of establishing baseline data and to study the factors "driving" energy supply and demand in order to be able to make forecasts
- the role of Technical Cooperation among Developing Countries (TCDC) in assisting other studies in conducting studies similar to that of Pakistan's
- how to account for variation in accessibility to wood fuels, rather than just looking at total biomass resource
- sustainability of data collection processes and the positive impacts of externally-assisted studies, like the one done in Pakistan, on the capabilities of local experts

## SESSION 4: "METHODOLOGIES FOR DATA ANALYSIS FOR WOOD ENERGY PLANNING ENERGY MODELLING"

The objective of this session was to identify criteria for determining suitable energy models which can be used in data analysis for wood energy planning. The Chairperson of this session was Mr. Bashir Ahmed Wani of Pakistan and the rapporteur was Dr. Azedine Ouerghi. A ***country roundtable discussion*** followed the presentations. Countries either shared their experiences in energy modeling or indicated their needs to be able to do modeling exercises.

**Summaries of Paper Presentations:**

- *"Considerations* **in** *Energy Planning Models for* **Wood Energy Planning",** a paper prepared by Dr. Charles Heaps, Dr. Michael Lazarus, Dr. Paul Raskin and Dr. David Von Hippel (Stockholm Environment Institute - Boston, Massachussetts, USA) and presented by Dr. Heaps

  Dr. Heaps presentation looked at methods for modeling wood fuels and other biomass energy systems. A brief overview of wood fuel issues was given and early attempts to model wood fuel supply and demand using the methodology which came to be known as "gap theory" were described.

A critique of these efforts was used to develop design criteria for future modeling efforts. In particular, the following desirable model characteristics were identified: (1) Models must not assume that deforestation is caused only by wood fuel use. Instead they need to be based on a complete inventory of land-uses. (2) Because patterns of both consumption and tree growth are highly location specific, any model must take a flexible geographic disaggregation perspective. (3) Models must consider the interaction between rural and urban energy systems and properly account for transitions from traditional to modem energy use patterns (as embodied in patterns of fuel switching). (4) Models must account for a wide range of wood growth patterns, for example by accounting for re-growth of wood from fallow lands. (5) Since there is often a lack of reliable primary data, models must be flexible and user-friendly to assist users to make intelligent generic estimates where data is unavailable and to identify priority areas where further data needs to be collected. (6) Finally, models must also allow for the analysis of modern biomass options. Biomass energy must not be treated only as a problem, but also as an opportunity.

The LEAP (Long-range Energy Alternatives Planning) system was described as an example of a model which attempted to meet these basic design criteria. A brief overview of the LEAP model structure and its methodology was given with particular emphasis on the biomass module.

Brief case studies describing the implementation of LEAP in a variety of different situations were given including details of studies in Kenya, Tanzania, Senegal and Costa Rica.

Finally, some limitations to the implementation of energy planning models were noted. These include the weakness of energy planning agencies in many developing countries, shortages of skilled personnel, and various political constraints such as vested interests. Software tools cannot solve these problems, but can help to catalyze solutions by elucidating data needs and by helping planners to address important policy questions.

- *"Energy Modelling Studies on Wood and Biomass Energy in the ASE,4N Region"* by Dr. JeanYves Gamier (ASEAN-EC Energy Management Training and Research Centre - Jakarta, Indonesia)

Dr. Gamier presented the current attempts of the ASEAN-EC Energy Management Training and Research Centre (AEEMTRC) to integrate wood and biomass energy in its effort to project the energy situation in the ASEAN region up to the year 2020, through the project called ASEAN 2020. He discussed the various activities of the Center and of those of other institutions in the region which have contributed to their efforts.

Aside from ASEAN 2020, AEEMTRC has also the ASEAN Database Project, the *Valente* Project and the Integrated Urban Energy Project. He focused in particular on the ASEAN 2020 project discussing the constraints they face in conducting such study. The project aims to provide a regional perspective where member countries (Brunei, Indonesia, Malaysia, Philippines, Singapore and Thailand) may situate their national plans. It supports rather than replaces the long-term studies made by the countries.

The Center use several energy planning methodologies and tools, especially two computer softwares. The first one, Energy Tool Box, deals mainly with the forecasting of the demand which constitutes an essential input to the second modeling program (EFOM-ENV) which optimizes the energy supply-demand for several time horizons taking into account various parameters and constraints (resources, prices, environment, among others).

The Center has included biomass in the ASEAN 2020 programme starting May 1992 which required additional data and some upstream work on both Energy Tool Box and EPOMENV. A new set of country reports which will include biomass energy strategies is expected to be finished in late 1993.

**Highlights of Discussions:**

The Chairperson requested the participants to indicate the experience they have in wood energy planning and modeling. The experiences reported by the countries in the region may be classified at three levels:

- Countries with no experience but willing to use some sort of modeling. The need for assistance was also mentioned in this field.
- Countries with some sort of experience in wood energy planning. LEAP, ENERPLAN, MEDEE-S are some of the models used. The need for more accurate data was mentioned as a mojor limitation.
- In some cases, countries have developed their won models to suit their own requirements and the level of data they have.

During the discussions some concerns were raised regarding the use of models without clear specification/clarification of the underlaying assumption and the quality of input data.

## SESSION 5: "METHODOLOGIES FOR DATA ANALYSIS FOR WOOD ENERGY PLANNING PROJECT APPRAISAL

The objective of this session was to identify methodologies for evaluating and assessing wood energy strategies and projects in comparison with other energy supply options. The Chairperson for the session was Mr. U Shwe Bin of Myanmar and the rapporteur was Ms. Elizabeth Remedio. An ***open forum*** followed the presentation.

**Summary of Paper Presentation:**

- ***"Expanding the Use of Financial, Economic and Environmental Criteria in the Formulation of Developmental Plans for Wood Energy"***, a paper prepared by Mr. Matthew Mendis, Mr. Jeffrey Mullaney and Ms. Marcia Gowen (Alternative Energy Development Inc. – Silver Spring, Maryland, USA) and presented by Mr. Mendis.

  Mendis started his presentation with the point that utilization of efficient, modern wood energy systems for meeting household and commercial/industrial demand offers the Asian region a potentially enormous net savings in terms of capital, natural and human resources. Yet one major impediment tot the development and more efficient use of modern wood energy systems is the accounting or financial framework. The present system used by the financial sector (i.e. the multilateral, bilateral and national development agencies) fails to adjust for the long-term environmental net benefits of sustainable energy use. The financial/economic criteria used for assessing energy projects by the financial sector generally accounts for only financial prices and utilizes discount rates that have inherent biases favoring fossil fuels over wood energy or other biomass fuels. In many cases, the environmental damages of

conventional energy systems in the upstream (resource procurement and handling) and downstream (energy production, transport and waste disposal) sides are ignored by the financial sectors' conventional evaluation system. In contrast, extended cost-benefit analysis, that includes the full social and environmental costs of prospective energy options, could lead towards alternative views on the viability of biomass energy systems, as well as more positive investment decisions by financing institutions.

The paper explored several key, inherent problems in the conventional financial and economic criteria used by the financial sector and demonstrates that many of the social benefits from wood energy systems were either ignored, or marginalized. The key elements that were discussed include: (a) The current versus preferable accounting or criteria methods for determining economic worth of wood and other energy systems by the financial sector; and (b) the failure to conduct comprehensive upstream and downstream analyses of alternative energy systems.

The paper briefly discussed the related issue of the lack of reasonable institutional/policy frameworks and financial instruments for fostering the market penetration of innovative, modem wood energy technologies. Prior to discussing these themes, however, a brief overview highlights the significant contribution of the biomass sub-sector in Asian countries.

**Highlights of the Discussions:**

The following were the issues raised during discussion:

- the problems with treating biomass at level equal to oil and gas
- a change in project evaluation approaches is not a guarantee for a change in the directions of investments
- need to carefully evaluate experiences in developed countries in "modern" applications of biomass energy before they are initiated in developing countries
- the basis for accounting for pollution and other environmental factors
- effectiveness of application of favorable discount rates to accelerate development in certain sectors
- informal sector may not know anything about "discount rates" but they are "experts" since they have their own way of practicing the concept
- experiences in the region on commercialization of wood energy projects

## SESSION 6: "WOOD FUELS IN ENERGYPLANNING: POLICYAND INSTITUTIONAL ISSUES"

The objective of this session was to identify policy and institutional issues to be addressed to achieve effective integration of wood fuels into national energy planning exercises. The Chairperson for this session was Mr. Muhammad Katebi of Bangladesh and the rapporteur was Mr. Opart Panya. An ***open forum*** followed the presentation.

**Summary of Paper Presentation:**

- ***"Data Assessment and Analysisfor Wood* Energy *Planning. Policy and Institutional Issues"*** by Dr. Veena Joshi (Tata Energy Research Institute - New Delhi, India)

Joshi started her presentation with a review of the previous discussions to provide the appropriate perspective and framework to her discussions.

Wood along with other biofuels will continue to contribute significantly to the total energy consumption. In some consuming sectors, they play a critical role. Hence, it is important that the national energy planning exercises formulate policies to develop sustainable wood energy systems consistent with the objectives of environmental conservation. The global environmental concerns are likely to result in more opportunities for improving the forest resource situations in developing countries. However, lack of adequate relevant information on different wood energy systems in a national framework may hamper efforts to develop forest resources to achieve multiple goals set by global environmental concerns, national environmental objectives and the energy and non-energy demands on the resource. In this paper, the implications on policy and institutional structures are examined if capabilities for data assessment and analysis for wood energy planning are to be developed/strengthened.

The wood energy systems are quite varied in nature. The nature of the resource, the mechanism of fuel extraction, its transport, sale and use influences the resource condition and determines opportunities for developing these wood energy systems. Ibis makes the task of collecting and analyzing relevant information quite complex. Here, the wood energy systems are classified as urban, semi-urban and rural, based on how the wood fuel is largely acquired. These represent consumption centers with distinctly different characteristics and planning units. Each category of wood energy system is then examined in terms of different components such as - resource, management of resource, transport of fuel, processing of fuel, fuel markets and end uses. For each of the components the data requirements and analysis needs are assessed. The different tools available to gather this information are discussed. An institutional framework is proposed to collect, collate and use this data for different energy systems. The institutions and agencies involved in managing the resources in each of these wood energy systems differ and hence the policies also would vary. For each of these wood energy systems inter-sectoral linkages are identified and requirements of information and decisions are discussed. Opportunities to improve the quality and quantity of wood energy is examined.

The status of national wood energy and forestry planning is presented and examined in the context of the framework explained earlier. The conclusions deal with the lacunae in present methods of collecting information for different components of the energy system. The recommendations address how capabilities could be strengthened to plan for wood energy systems at local and national level. The inter-sectoral linkages and linkages at different planning levels are identified and recommendations about co-ordination are made.

**Highlights of Discussions:**

The following were the points raised during the discussions:

- at present, every country has a coordinating body or "commission" at the national level that deals with energy issues
- actions and initiative are departmentalized and coordination seems to be the main problem
- too much focus on technological aspects (to meet end-use demands), participants agree for an energy need-based approach and the general response is to create technological options;
- political awareness should be raised in order to promote biomass energy.

### 4.2.3 COUNTRY PRESENTATIONS

Although there was no separate session in this meeting for country presentations, many of the country delegates prepared country papers. They read out the relevant portions of their papers in each session during country roundtable discussions following the paper presentations.

### 4.2.4 GROUP WORKSHOPS

The participants in the workshops were divided into ***three working groups.*** Members of each group came from both the forestry and energy sectors.

Each working group was given a specific topic to discuss and make relevant recommendations which they presented in the ***plenary session*** during the last day of the consultation. They were given at least one-and-half hours each day to work on their assignment.

## WORKING GROUP 1 – "ENERGY" GROUP

This group discussed issues relating to *wood energy utilization* (i.e., rural and urban, commercial and non-commercial, domestic and other sectors), including the implications on the energy-economy interactions and the linkages between the energy and forestry sectors, particularly in the area of planning, policy formulation and programme implementation.

The Facilitator for this group was Mr. Suwarmin and the rapporteur was Mr. Matthew Mendis. The group members were:

- Mr. Gopal Mahat - Bhutan
- Mr. Dhan Lall Shrestha - Nepal
- Mr. D.C. Wijeratne - Sri Lanka
- Dr. Charit Tingsabadh - Thailand
- Ms. Ruby T. Buen - Philippines
- Ms. Shubhra Bhatia - India
- Ms. Nenny Sri Utami - Indonesia
- Mr. M.N.A. Katebi - Bangladesh

Resource persons who joined the group discussions were:

- Dr. Aroon Chonicharn - RWEDP
- Dr. Veena Joshi - TERI

**Group Conclusions and Recommendations:**

A. Background

The "Energy" Working Group discussed the "issues relating to **wood energy supply** and its implications on the linkages among energy, forestry and other relevant sectors". The group met for informal discussions on four separate occasions during the period of the RWEDP Expert Consultation. The following is a summary of the findings, conclusions and recommendations of the Group.

B. Problems and Opportunities in Wood Energy Development

The Energy Working Group discussed specifically the problems and opportunities in wood energy development as it related to other sectors and sub-sectors of the economy. In this regard, the Energy Working Group concluded the following:

(a) Energy Sector:

*Problems:* Wood and biomass energy will continue to be a major component of total energy consumption in many developing countries in the region for the foreseeable future. However, there is little understanding and reliable information on the extent of wood energy supply and demand within the overall energy sector of most developing countries. This is particularly true where wood energy is utilized as a "non-commercial" fuel by the rural poor. There is also a weak understanding of the market mechanisms of the wood energy sub-sector.

*Opportunities:* Structured wood energy development will result in a positive contribution to the overall energy sector needs of the countries of the region while simultaneously developing an indigenous and sustainable energy resource.

(b) National Economy:

*Problems:* The value of wood energy (especially when used as a "non-commercial" fuel) is not adequately accounted for in the national income accounts. National and, in many cases, local institutional accountability for the role of wood energy in the national economy is generally non-existent.

*Opportunities:* Productive activities (such as agro-forestry, village woodlot, energy plantations, etc.) that result in increasing the supply of wood energy can be further supported and expanded. Expanding the supply of wood energy where economic and feasible can help reduce the level of imported fuels used especially in the rural domestic, commercial and industrial sectors and the urban low-income domestic and informal sectors.

(c) Agriculture and Rural Development:

*Problems:* Trees are not a significant part of the present farming system in most countries of the region. In the past, expansion of agricultural land has been at the expense of forests and tree growing land. In many cases, this expansion of agricultural lands has been a significant contributor to the problem of deforestation and loss of tree growing lands. Agricultural land use and tenure patterns in many countries also inhibit wood energy development in conjunction with agricultural and rural development.

*Opportunities:* Wood energy development can have a positive impact and contribute greater value added to agriculture. Wood energy development can also provide additional income for the farmer. Wood energy development in association with agriculture generally has positive local environmental benefits such as soil preservation and watershed management. From the perspective of rural development, programmes for wood energy development can result in rural employment, income generation for women and unskilled labor and requires low capital investments.

(d) Urbanization:

*Problems:* Increased urbanization has resulted in increasing significantly the pressure on wood energy supply in the vicinity of the urban centers. In most instances, programmes for wood energy development to meet the needs of urban areas have not kept pace with the rapid urban growth rates

resulting in rapid wood energy price increases, dislocations of fuel supplies and economic hardships especially for the lowest income groups in the urban areas.

*Opportunities:* Urbanization provides an opportunity for market forces to work thereby providing monetary benefits for wood energy development. However, in many instances, this monetary value has not been reflective of the true economic value or replacement costs of wood energy resulting in the accelerated mining of the resource in the surrounding areas.

(e) Industrial Development:

*Problems:* Wood energy has been an important factor in supporting small-scale rural and urban industries. However, the growing scarcity of wood fuels threaten the survival of these industries. Therefore, wood energy development is an important factor if the economic viability of these industries is to be sustained.

*Opportunities:* The use of wood energy, especially within rural industries, like urban wood fuel demand provides an opportunity to capture the economic value of wood fuel production if correctly priced.

(f) Environment:

*Problems:* The inappropriate/inefficient use of wood energy in the household and commercial sectors can contribute to indoor air-pollution and human health hazards especially for women and children. Wood fuel supply derived from non-sustainable sources will also result in land degradation and other local environmental impacts. Wood energy development done with insufficient background research can result in agricultural and silvicultural problems.

*Opportunities:* Wood energy development can help in reclaiming degraded/marginall deforested lands. Wood energy development can also have positive environmental impacts on watershed management and land use. - Sustainable wood energy development can contribute to reducing the rate of carbon emissions to the global environment while meeting the growing energy demands of countries.

(g) Women:

*Problems:* The continued use of wood energy as a primary source of domestic fuel in traditional stoves and kitchens will continue to have negative impacts on the health of primarily women and children due to exposure of smoke and other combustion emissions. The scarcity of wood fuels tends to impact, more directly, the welfare of women as they are the primary gatherers of wood energy.

*Opportunities:* Wood energy development provides additional employment and income opportunities for the rural women and the disadvantaged.

D. Strengths/Weaknesses of the Energy Sector in Support of Wood Energy Development

(a) Policies:

At present, energy policies in most countries are weak or non-existent with regard to support of wood energy development. Reasons include: (i) no representation of wood energy advocates in the national policy development framework; (H) other sectoral policies tend to have a negative impact on wood energy development; (iii) the myth and fear of deforestation

have led to the omission of policies that would support wood energy development; (iv) there is an inadequate understanding of how the wood energy sector works as a system and what is needed to support it; (v) there is a prevailing perception that no major investments are needed for the support of wood energy development and that wood energy development is independently triggered and self sustaining; and (vi) the present institutional structure of the energy sector favors centralized/commercial energy sources and is not conducive to managing many critical wood energy development issues. The present trend for decentralization and privatization of the energy sector in many countries of the region could also lead to difficulties in formulating a coherent wood energy development policy that addresses the non-commercial aspects of wood energy.

(b) Plans/Programmes/Strategies:

Due to the general weakness of wood energy policies in most countries, plans, programmes and strategies for wood energy development are also weak, inappropriate or non-existent.

(c) Linkages:

Wood energy development with regards to supply requires the active participation of the land development authorities, including the forestry, agricultural and energy sectors. The general weak linkages between land development/use the forestry, agriculture and energy sectors has hampered a coordinated development of wood energy.

E. Recommendations and Priority Actions in the Energy Sector

(a) The contribution of wood fuels to the national energy requirement must be recognized and acknowledged. Within this context, the contribution of wood energy to the national economy and welfare must also be recognized.

(b) In recognition of the above, the formulation of a coherent wood energy development policy framework must be undertaken.

(c) There is a need to coordinate the efforts of the various sectoral institutions in achieving a coherent wood energy development policy.

(d) There is a need to regularly develop and update reliable data on wood energy to support the formulation of policies. This should be a regular part of the compilation of national energy statistics.

(e) The lack of adequate trained and informed personnel to carry out supportive wood energy development activities must be addressed.

(f) 'Mere is a need to develop appropriate, reliable and cost effective wood energy supply and conversion technologies.

(g) New planning approaches are required to address the issues of scale and adoption of technologies in the household sector. In developing these new approaches, the involvement of end users is necessary.

## WORKING GROUP 2 – "FORESTRY" GROUP

This group discussed issues relating to *wood energy supply* (i.e., production from forest and non-forest sources, wood fuels flow, wood fuels markets) and its implication on the linkages among energy, forestry, and other relevant sectors particularly in the area of planning, policy formulation and programme implementation.

The group facilitator was Mr. Opart Panya while the rapporteurs were Mr. Auke Koopmans and Mr. Terrence Bensel. The members of the group were:

- Mr. U. Shwe Bein - Myanmar
- Mr. H. Dwiprabowo - Indonesia
- Mr. P.P.S. Gusain - India
- Mr. I.S. Karki - Nepal
- Mr. Wilas Techo - Thailand

Resource persons who joined the discussions were:

- Mr. E. Pelinck - RWEDP
- Mr. T. Bensel - UNH
- Mr. A. Koopmans - HSE
- Dr. Veena Joshi, - TERI
- Dr. M. Trossero - FAO-Rome

**Group Conclusions and Recommendations:**

A. This group had the task of discussing issues relating to wood energy supply and its implications on the linkages among energy, forestry and other relevant sectors. In order to achieve this the group first focussed on the issue of where wood fuel supplies are likely to originate from, specifically on the issue of forest vs. non-forest sources. What resulted was a matrix showing the source of wood fuels, likely potential supplies from that source, various impacts of using that resource base as a source of wood fuels, and possible constraints to developing each result base as a source of wood fuels.

B. The first wood resource base discussed was national forest land. The importance of these forests as a source of wood fuels will vary from country to country depending on extent of forest cover and proximity of population to these forests. Assuming the assistance of such forests, and accessibility to them, wood fuels could be sourced from them in a number of different forms. First, non-timber trees in these forests are estimated to make up 10% of standing biomass for both natural and plantation forests. These 10% figure is intended to account for pruning and thinning of managed forests as well as dead wood collected from forest floor. As the remaining 90% of forest biomass is logged, a significant amount of logging wastes (30% of total biomass) will be produced which have the *potential* of being used as fuelwood. Once the logs are removed from the forest there will still be a significant amount of milling wastes in the form of off-cuts and sawdust.

Therefore, the potential of national forests as a source of wood fuels is significant:

| | | | |
|---|---|---|---|
| (a) | Non-timber trees (10%) * | 100% | .10 |
| (b) | Logging waste (30%) * | 90% | .27 |
| (c) | Milling waste (40%) * | 63% | .25 |
| | Total | | .62 |

It's conceivable that as much as 62% of the biomass in national forests could be used for wood fuels. The numbers we are using, however, are only estimates and can be expected to wary somewhat between regions.

The impact of using national forests as a source of wood fuels is mainly positive. Utilization of wood wastes and non-timber trees increase the value of the total forest product and could serve as a potential source of income and employment to local residents.

However, the *constraints* to using national forests as a source of wood fuels are also enormous. First, there is the issue of physical accessibility to these forests. For Indonesia, it was pointed out that the most extensive tracts of national forest are far from population and consuming centers.

Second, there is the issue of "social" accessibility. Even if the population is close to the national forests this does not guarantee that they will be allowed access to them. This concern is closely related to forestry policy and legal considerations with regard to access to national forest lands.

Third, there are potential competing uses for non-timber trees, logging and milling wastes, besides use for wood fuel. For example, wastes could conceivably be used for production of particle board or be converted into charcoal for activated carbon production instead of for energy use.

A final point was raised during the workshop discussion and that relates to the fact that national forest lands in most RWEDP countries are now severely degraded, consisting of mainly secondary growth species. Better management of such logged-over forest areas as a source of wood fuels and other products needs to be addressed.

C. The next supply area considered was private, including agricultural lands. These lands could yield wood fuels from plantations, from fruit trees, from trees in agro-forestry systems, from marginal land plantations, and agricultural residues. Also, clearance of forested areas for agricultural purposes could also yield fuelwood.

Such wood fuel production on private land has both positive and negative impacts. Negative impacts relate to a potential decline in food production if lands are taken out of agriculture for tree production. Positive impacts involve income derived from sale of trees grown on private lands, and possible beneficial environmental impacts of such tree-planting activities. These environmental benefits relate to trees as a means of soil improvement, erosion control, and improved farm productivity.

Constraints identified in private land wood fuel production were varied and specific to different approaches used. First, tree planting on these lands could compete with other uses, especially crop production. Second, uncertain land tenure/land rights of many farmers would tend to diminish enthusiasm for tree-planting. Third, over reliance on a few species could create mono crop problems. Fourth, tree planting on marginal lands could compete with livestock. Fifth, possible constraints with respect to marketing of trees grown on private land could impede this activity. Finally, the use of crop residues for fuel could have negative impacts on soil fertility.

D. The final wood fuel source identified was common lands. This category covers all types of common lands used for wood fuel collection. The existence of these lands is important as a source of wood fuels for some of the more marginalized sectors of society. But the

sustainable use of these lands is becoming difficult due to a number of constraints. First, traditional management systems for common lands are becoming inappropriate in a number of areas due to the social/cultural changes taking place. Second, these lands are often appropriated by local influentials as land in general becomes scarce. In the future, the area of common lands will likely to be reduced considerably.

E. A final source of wood fuels mentioned was scrap wood and it was pointed out that forestry master plans should consider the recycling of lumber/construction wastes as wood fuels.

F. From the discussions a number of policy issues came to the fore:

(a) Review of regulations/laws regarding access to national forest lands and utilization of forest/logging wastes.
(b) Review of regulations regarding planting and harvesting of trees on private lands.
(c) Review of policy and extension work relative to fuelwood or multi-purpose tree species.
(d) Closer analysis of macro-level policy impacts on forestry/fuelwood issues.
(e) Closer coordination and collaboration between agencies in any way involved with wood fuel supply/demand, specifically, energy, forestry and agriculture.
(f) Review of responsibilities and activities of agencies relative to their role in sustainable wood fuel development. For example, should the forestry department be the lead agency or should energy?
(g) A need for more research, extension and promotion of the potential of wood fuel production on private lands, especially through agroforestry and multi-purpose tree species systems.

By suggesting a review of some of these policies, it was not said that they needed to be changed. But a closer review, keeping in mind lessons learned from other countries in the region, could lead to better policy and action programmes.

## WORKING GROUP 3 - NWOOD ENERGY PLANNING" GROUP

This group discussed the issues relating to *wood energy planning* (i.e., data base development, supply analysis, demand analysis, integration with national energy planning) and its implications on the corresponding responsibilities of the energy and forestry sectors.

The facilitator for this group was Dr. Azedine Ouerghi while the rapporteur was Dr. Charles Heaps. The members of the group were:

- Mr. Nguyen Minh Bao - Vietnam
- Dr. Abul K.M. Masood - Bangladesh
- Mr. Songsak Vitayaudom - Thailand
- Mr. U Soe Tint - Myanmar
- Mr. Bashir Ahmed Wani - Pakistan

**Group Conclusions and Recommendations:**

The third working group enjoyed a free ranging discussion which resulted in the following comments, conclusions and recommendations.

Inevitably woodfuel issues are often given low priority when other more pressing problems such as poverty and the provision of family planning, health care, water and sanitation also loom large. Nevertheless, woodfuel and biomass energy issues were identified as serious problems.

The identification of problem areas and the development of solutions must arise from a "bottom-up" participatory approach to energy planning. It is emphasized that energy planning cannot be carried out in isolation from wider development planning. National energy, forestry and agricultural plans all need to be placed within an overall development framework. In all countries, better coordination is required between the ministries responsible for these issues. Overall, more attention needs to be given to wood and other biomass fuels in developing national social, economic and environmental policies. Incorporating woodfuel resource data in particular, and biofuel data in general, into published national accounts is suggested as one way to give these issues a higher profile in the planning debate.

The lack of primary data in most member countries is hampering energy planning efforts. Uck of non-forest resource data (e.g. for farm trees and bushes and shrubs) is one example of an area where reliable quantitative data is lacking. Furthermore, because of a lack of common definitions and a lack of consistency between different studies conducted in member countries, it is often difficult to rely on secondary data sources.

Human resource and financial constraints of institutions are thought to be a major problem. Shortages of skilled manpower and funding restrictions limit what can be achieved by forestry departments and energy ministries. In particular, more resources are needed for the training of field workers. A disproportionately large amount of funding is allocated to consultancies. Better value might be gained from limited available funds by making more use of the region's own experts.

The current FAO expert meeting was considered a valuable forum for the exchange of ideas, information and experiences. It is important that such exchanges continue in the future. Projects such as the one currently being completed in Pakistan (HESS) will be an important source of information for the region. Data, methodologies, and other lessons learned from this study need to be communicated to other countries in the region. Efforts should be made to adapt and generalize the methodologies and data developed as part of the Pakistan study.

**Suggested Ministerial Responsibilities in Woodfuel Planning**

| Planning Phase | Ministrial Responsibility |
|---|---|
| Assessment of Wood & Biomass Resource | Forestry/Agriculture |
| Assessment of Consumption | Energy |
| Integration, Analysis & Planning | Inter-Ministry Coordination |
| Extension Services Implementation | Forestry |
| Conservation Implementation | Energy |

### 4.2.5 PLENARY SESSION

The plenary session was chaired by representative of FAO Headquarters, Dr. Miguel Trossero while Mr. Matthew Mendis acted as rapporteur. The outputs of the three working groups were presented and discussed. A summary of conclusions and recommendations was approved by the plenary session.

**Overall Conclusions and Recommendations:**

A. Background:

The objective of the Plenary Session was to present and discuss the findings, conclusions and recommendations of the three specific Working Groups that were formed at the initiation of the RWEDP - Regional Expert Consultation on Data Assessment and Analysis for wood Energy Planning. The three Working Groups and their general tasks are briefly outlined below:

(a) Working Group 1 - Energy: This group was charged with the task of discussing the "issues relating to **wood energy utilization** and its implications on the energy – national economy interaction and the linkages among energy, forestry and other relevant sectors".

(b) Working Group 2 - Forestry: This group was charged with the task of discussing the issues relating to **wood energy supply** and its implications on the linkages among energy, forestry and other relevant sectors.

(c) Working Group 3 - Wood Energy Planning: Ibis group was charged with the task of discussing the issues relating to **wood energy planning** and especially its implications on the responsibilities of the energy and forestry sectors.

B. Summary of Plenary Discussions:

A written and oral summary report by each of the working group (see Section 4.2.3 above) was presented at the Plenary Session. It is important to note that while each of the Working Groups worked independently, many of their conclusions - though arrived at from different perspectives - are either similar or supportive of each other. Following the oral presentation of the Working Groups, the Country Participants and Resource Persons provided comments and raised a number of questions. The net results of the Working Group presentations and the subsequent discussions was the emergence of a number of "common themes" which are listed below in no order of priority:

(a) National Economy:

The failure to adequately account for wood energy (especially when used as a "non-commercial" fuel) in the national income accounts or GDP has contributed to the failure to recognize its overall value to national economies.

(b) Common Definitions/Methodologies/Language:

The wood energy sector needs to establish a mature and universal set of definitions, methodologies and language in order to advance the development and management of the

resource base. The present status of wood energy data development and assessment has not led to full confidence in assessments of the availability or utilization of the resource.

(c) Political Awareness/Commitment:

There is a critical need to increase the political awareness of and commitment to the specific role of wood energy in most developing countries. In many developing countries, wood energy is the primary source of energy and is the only source of energy for the rural and urban poor. As such, the role of wood energy is crucial to the social welfare of major segments of the population. Present political awareness and commitments do not appear to recognize this fact.

(d) Sector Linkages:

The general weak linkages between land development/use, the forestry, agriculture and energy sectors has hampered a coordinated development of wood energy.

(e) Appropriate Technologies and R&D:

There is critical need for more appropriate and efficient wood energy conversion and utilization technologies. End-user needs must be incorporated at the design stage and this can best be done by direct involvement of the end-user in the design process. Additionally, the tendency to test and demonstrate imported technologies in developing countries should be discouraged.

(f) International/National/Local Coordination:

There appears to be insufficient coordination of international national and locally sponsored wood energy development programmes. In some developing countries this has led to some programmes trying to reduce the dependence on wood energy while others are trying to increase the dependence on and supply of wood energy.

(g) Human Resource Development/Training:

There is a continuing need for the provision of training and fostering of qualified persons to meet the needs of the wood energy sector. This is especially true if wood energy data, assessments and planning are to be incorporated in local and national level energy and economic planning.

(h) Reliable, Accurate and Current Data to Support Policy and Planning:

The emphasis on addressing wood energy development through appropriate policy and planning programmes at both the national and local levels dictates the need for more reliable, accurate and up-to-date data on wood energy supply and demand. Obtaining wood energy data should not be a one time "static' process but a repetitive "dynamic" process and should be made a regular part of the compilation of national energy statistics.

(i) Promote Tree Growing on Private, Marginal and Degraded Forest Lands:

Active programmes to promote tree growing on private, marginal and degraded forest lands should be supported. To the extent feasible, the promotion of tree growing should be done within a framework of economic incentives for the tree growers.

(j) National and Local Wood Energy Planning:

To be effective, wood energy planning must be done at the national as well as local levels. National wood energy planning without local participation will result in misrepresentations and difficulty or resistance in implementation. Wood energy planning at the local level without national coordination could result in a mismatch of local and national objectives and a collapse of the local strategy due to external counter-acting forces.

(k) Importance of Understanding Wood Energy Balances and Flows:

A prerequisite to effective wood energy planning at any level is the solid understanding of wood energy balances and flows.

(l) Economics of Wood Energy Development:

The economics of wood energy development must be considered prior to the promotion of any wood energy development programme. Within this context however, careful and serious consideration must be given to the "non-quantifiable" or "externalized" social and environmental benefits and costs associated with wood energy development and the alternate options.

(m) Investment Requirements:

Investment requirements of wood energy development must be considered at the outset in order to arrive at achievable wood energy development programmes.

C. Other Issues

In addition to the above common themes, the Chairman of the Plenary Session pointed out that the three working groups had failed to specifically address the important issue of charcoal production and the unique characteristics of this wood fuel flow. The point was stressed that charcoal tends to be produced from wood taken from forest lands and that measures to control and/or improve the process are needed. Given the increasing role of charcoal in urban areas, opportunities for "sustainable charcoal development" must be investigated.

D. Conclusion

The Plenary Session was concluded with the general acknowledgement that the RWEDP has played an important role in addressing many of the issues listed above. Furthermore, it was stressed that the RWEDP needs to continue its catalytic role in stimulating national and local wood energy planning and policy formulation, human resource development and TCDC amongst the countries of the region.

### 4.2.6 CLOSING SESSION

Statement of thanks were read by representatives of the resource persons - Dr. Veena Joshi, the country participants - Mr. D. C. Wijeratne of Sri Lanka, and FAO Headquarters - Dr. Miguel Trossero. Mr. Egbert Pelinck closed the consultation meeting after distributing tokens of appreciation to the all the participants.

### 4.2.7 FIELD VISIT

The day after the consultation was devoted to a field visit which was organized by Mr. Klaus Enevoldesen with local support provided by Mr. Auke Koopmans and the Chiang Mai Regional Forestry Office, Royal Forestry Department through their Director - Mr. Chamnarn Juntapirak and their Chief Community Forester, Mr. Somjin Ruengkij.

The participants observed the operations in a ***brick making factory*** using wood fuels, the production process in a *briquetted sawdust* **charcoalfactory,** and the operation of a ***tobacco flue-curing barn*** which had partly shifted from fuelwood to lignite. The participants enjoyed lunch in the **Ban *Pae Community*** Forest maintained by the village people to protect watershed areas.

# Chapter 5

## PROCEEDINGS OF THE SEMINAR ON POLICY INSTRUMENTS FOR IMPLEMENTATION OF WOOD ENERGY DEVELOPMENT PROGRAMMES

*Fuelwood headloading in **Nepal** - Headingloading to supply small, localised rural wood markets have emerged as an important alternative profession in rural areas.*

*Policy makers from energy and forestry agencies of RWEDP member countries discussed papers presented and their own country experiences.*


*RWEDP expressing its appreciation to the owners of the sawdust charcoal briquetting plant for hosting the participants of the two meetings*

# Chapter 5

## PROCEEDINGS OF THE SEMINAR ON POLICY INSTRUMENTS FOR IMPLEMENTATION OF WOOD ENERGY DEVELOPMENT PROGRAMMES

### 5.1 RATIONALE

When appropriate methodologies for data assessment and analysis for wood energy planning have already been defined, the next important step is to create the conditions for the successful implementation of programs and strategies developed from the wood energy planning exercises. The proper policy instruments that give the mandate and provide resources to planning units to do wood energy planning within the national planning process, and to the right agencies to implement wood energy strategies should be in place.

Planners however, with the use of their methodologies, can only identify and assess various strategies, scenarios and programme options. It is still the policy maskers who have the responsibility to choose or recommend to state Officials the suitable scenario, strategy or program. The policy maker has a broader understanding of the economic, social and probably, most importantly, political agenda of the state than the planners for making such strategic decisions.

It is therefore crucial that policy decision makers in sectors affecting wood energy development, in particular, the energy and forestry sector, be in a position to discern what policies and strategies will work for or against wood energy development in their respective countries given the broad national political, economic, social and probably, environmental aspirations of their national leadership.

RWEDP has organized this seminar to discuss policy issues relating to wood energy development. The general objective of the seminar was to determine how policies and institutional structures can be modified to be used as effective instruments to develop and strengthen the planning and implementation of wood energy development programmes and the participants be made critically aware of this.

Within this overall objective, the seminar in particular aimed to:

- Review policies relating to wood energy development and experiences in implementing program strategies and identify the crucial elements that make for success or failure in wood energy development programs related to policies.
- Review macro-economic and sectoral policies in energy, forestry, agriculture, rural development and environment to determine their positive and negative effects on wood energy development policies.
- Present and review the results of the assessment done in the first workshop with regards to the present status of information and data on wood energy development in Asia and of the planning capacities of the sector.
- Identify the specific information required by policy makers for policy and programme decisions and by the target populations to enhance its participation in action.
- Recommend priorities for future action in wood energy development in Asia.

The participants to this seminar were key senior staff of national energy and forestry agencies. All of the member countries were represented. Eight countries were represented by both their forestry and energy sectors. 12 resource persons came from within and outside the region. Observers from the Chiang Mai Regional units of both the forestry and energy agencies of the Royal Thai Government also attended the meeting. Their statements are in the Appendix.

## 5.2 SUMMARY OF PROCEEDINGS

### 5.2.1 OPENING SESSION

The meeting was opened with statements from the representatives of the Government of Chiang Mai Province - Vice Governor Pongpayome Vasaputi, the National Economic and Social Development Board of the Royal Thai Government - Assistant Secretary General Pairoj Suchinda, the Netherlands Embassy - Deputy Permanent Representative of the Netherlands to ESCAP, Mr. Paul Vehmeyer, FAO Headquarters - Dr. Miguel Trossero and RWEDP Chief Technical Adviser Mr. Egbert Pelinck.

### 5.2.2 TECHNICAL SESSIONS

Mr. Egbert Pelinck opened the technical sessions with an explanation of the rationale and objectives of the seminar. He also briefly discussed the results and relevance of the *expert consultation on data assessment and analysis for wood energy planning* conducted a week before to this seminar.

Mr. Conrado S. Heruela of the RWEDP presented the *"Summary of Results of the Consultation Meeting on Data Assessment and Analysis for Wood Energy Planning".*

**KEYNOTE SESSION**

The objective of the keynote session was to present a good understanding of appropriate policies and strategies for wood energy. The session "set the scene" on the ways in which wood and other biomass fuels are produced and used within the context of local production systems. The Chairperson for this session was Mr. Jagdish Kishwan of India and the rapporteur was Ms. Ma. Eloida C. Balamiento. **A country roundtable discussion** followed the presentations. Countries shared their views on energy and forestry policies existing in their respective countries.

**Summary of Paper Presentation:**

- ***"Advancing Our Understanding of Wood Energy Towards* Appropriate *Policies and Strategies"*** *by* Dr. John Soussan (University of Reading - Reading, England, UK).

  The goal of this paper is to analyze the production and use of wood and other biomass fuels. A central theme is that both fuelwood problems and potential solutions to these problems are specific to people in places. Policies in this area must capture and build on the ways in which the uses of biomass fuels respond to the problems they face and the opportunities they perceive. This paper examines the nature and origins of fuelwood problems; identifying the main factors causing fuelwood stress and resource deterioration. It focusses on the relationship of fuelwood problems to other development issues, the forms fuelwood problems

take and features of fuelwood production and use systems which offer opportunities for effective and sustainable interventions.

The paper argues that the key to understanding fuelwood is to analyze the direction and speed of change in fuelwood production and use and the relationship of these patterns to the development of the local production system should be seen as the starting points of analysis. The perceptions and priorities of the people on the ground must be sought; a process which is in itself desirable and which can form the starting point of their wider participation in the creation of solutions to the problems they reveal. The adoption of such an approach is not in itself a complete answer to the problems surrounding the creation of effective fuelwood projects on the ground but it will produce an orientation (as much as anything, a way of thinking) which is the first step to building such solutions.

- This was followed by an ***audio-visualpresentation*** entitled *"Wood Fuels Supply and Use Systems in Cebu"* by Ms. Elizabeth Remedio and Mr. Terrence Bensel.

**Highlights of Discussions:**

The participants shared information about forestry and energy policies and programmes in their respective countries relevant to wood energy supply and use. Many of the country representatives indicated that wood energy is a major concern in both their forestry and energy programmes. Key points raised were:

- country information on forestry resources, other sources of wood fuels, wood fuel consumption and of other biomass energy resources
- community forestry programmes and their impact on wood fuel supply
- national energy policies
- energy surveys conducted in the countries
- institutional mechanisms for wood energy extension programmes supported by either forestry or energy departments such as community and social forestry programmes, improved cookstoves programmes, dissemination of alternative energy technologies such as biogas stoves and solar cookers
- institutional linkages to address the wood energy sub-sector, particularly between energy and forestry departments

## SESSION 1: 'POLICY ISSUES ON WOOD ENERGY SUPPLY AND USE"

The objective of this session was to identify policies in the energy, forestry, macro-economy and other sectors beneficial to or constraining wood energy production and utilization, and present policy options which may have to be adapted to promote wood energy development and also support the strategic objectives of the related sectors. The Chairperson for this session was Mr. U Soe Tint of Myanmar and the rapporteur was Mr. Terrence Bensel. An ***open forum*** followed the paper presentations.

**Summaries of Paper Presentations:**

- ***"Energy Policies and the Utilization of Wood Fuels"*** by Mr. Conrado S. Heruela (RWEDP/FAO - Bangkok, Thailand)

  This paper examined how overall energy policies in the region have impacted on the supply and utilization of wood fuels. It was pointed out that while wood fuels' relative share in energy

balance of RWEDP countries is decreasing due to economic development, its absolute level of consumption is actually increasing due to population growth and absence of alternatives in rural areas. Official thinking and subsequent policy relating to energy sector has changed much in response to initial oil shocks. Official thinking on role of wood fuels has also been undergoing change, especially with regards to its link to deforestation. Unlike purely market-driven approach to energy in the past, current energy policy has a wide mix of supply and demand-side interventions. At this point in time, given our understanding of the role of wood fuel in energy system, issues to consider include price/supply developments in world oil markets, economic development and socioeconomic trends in developing countries, environmental issues and energy use, complexity and diversity of wood fuel markets/situations, and developments in the use of other renewable forms of energy. Policy concerns that arise from this relate to our level of understanding of wood fuel systems, techniques for project appraisal and how that affects budget/investment decisions, and the institutional structure of Government bureaucracies which are perhaps too centralized and lacking knowledge of non-conventional energy systems.

- ***"Impact of Forestry Policies on the Production and Use of Wood Fuels"*** by Dr. N. Saxena (Society for the Promotion of Wasteland Development - New Delhi, India)

  Dr. Saxena began his presentation by saying that forestry policies for production of fuelwood and for the management of tree resources in India have either been imperfect, or detrimental to the objective of sustainable afforestation efforts. Degradation of forest lands has continued unabated, and social forestry on community lands has not been a viable programme. Despite this, fuelwood prices in India after 1985 have generally declined. There are two reasons for this anomaly. First, farmers in the commercialized and surplus regions of India produced a great deal of eucalyptus wood, which had to be sold as fuelwood, being surplus to the needs of poles and pulpwood. But a fall in market price of fuelwood may not always indicate better availability for the poor gatherers. Second, in many semi-arid regions the natural spread of *Prosopis juliflora* shrubs provides in India excellent fuelwood for both consumption and sale at almost zero opportunity costs to the poor. These positive developments, though unconnected with government policies, still leave out a large proportion of rural population for whom fuelwood is either scarce or a source of livelihood, both factors leading to further deforestation.

  In this paper he argued that fuelwood scarcity has a regional dimension, which must be appreciated for seeking an alternative policy framework for afforestation of degraded lands. Second, in many areas fuelwood is a lesser priority for rural households than increased income. The poor face many other shortages and have many other concerns besides fuelwood, including food, employment and cash. Wood fuel problems must therefore be tackled indirectly, and the main focus should be on making degraded lands more productive. Third, ownership pattern of land is a determining factor in policy formulation of rehabilitation of degraded lands; that is, the three category of lands - forest, village, and private - need different policy framework for increasing their productivity. Forest and village lands should be used for subsistence oriented trees, supplemented with shrubs, grasses and bushes to yield fibre, fuelwood (through twigs and branches, and not logs) and fodder in the shortest possible time. On the other hand, degraded private lands in agriculturally surplus areas should be used for market-oriented trees, and in deficit areas for complementary agroforestry.

- ***"Relating Macro-Economic and Sectoral Policies with Wood Energy Supply and Use"*** by Dr. John Soussan (University of Reading - Reading, England, UK)

  The approach to fuelwood policies presented in this paper seeks to identify steps needed to create a policy environment through which sustainable change to addressing fuelwood problems can be achieved. Translating broad policy principles into realizable mechanisms for change at the local level is a challenge which needs a clear analytical process which sets out the action required at the different scales.

  For fuelwood, the form problems take and the scope for successful interventions are interwoven with other dimensions of the local production system. The interaction of environment and economic forces at a local level result in a series of resource stresses of which fuelwood is but one. Just as there is not one fuelwood problem there are many potential solutions. 'Me key is to identify what will work where and why. It is from this basis that solutions which reflect local circumstances can be built.

  Dr. Soussan pointed out that interventions which operate at a local level will be doomed, however, in the absence of an appropriate policy environment. This policy environment must create the circumstances in which the following set of goals can be realized; to empower local communities to have effective control over their local resource base, to create an economic and political environment conducive to local empowerment and sustaining of local solutions, and to provide effective external support to ensure the availability of deficient material and technical inputs for local-level solutions.

- ***"Wood* Energy Health *Effects* in developing Countries"** a paper prepared by Mr. Kirk Smith (East-West Center - Honolulu, Hawaii, USA) and presented by Mr. Cor Veer (RWEDP/FAO - Bangkok, Thailand)

  The main points of the paper are that there have been few systematic studies of wood fuel - health interactions, that wood fuel use has direct and indirect impacts on health and welfare (mostly, but not always, negative), and that the practical implications of these impacts suggest a need for developments in terms of fuels and stoves among others. The direct impacts of wood fuel use are generally all negative and center around health effects of exposure to smoke. Although data for these effects are not conclusive, the potential of these impacts are serious enough to warrant consideration of health effects in energy planning. Practical implications of such a consideration lead to a number of "technical fixes" in terms of types/forms of fuel, stove design and kitchen design, among others. The conclusions are:
  (a) a need to understand interactions between biofuel use, household labor efficiency and health in order to better design effective strategies; (b) need to identify and move with local evolutionary paths, such as with improved stoves, and; (c) the need to establish kitchen comfort and safety as a basic human need in its own right.

  Dr. Chomcharn briefly added that improved fuels and improved stoves are the best way to reduce indoor air pollution associated with all fuels and that there is a very real problem with people moving down the energy ladder to the use of residues as fuel.

**Highlights of Discussions:**

The following are the questions and concerns raised during the discussions:

- the need to give due attention to wood energy given that wood fuels will remain a significant energy sources for many households in the region, particularly rural and urban poor households which comprises the majority of the population and for many of whom a significant increase in income to allow them to shift to "modern fuel" in the immediate future is not likely
- the process of evolution of forestry policies and its adaption to existing circumstances, political environment and the problems generated when policy formulation is left alone in the hands of the bureaucracy
- the need for interaction not only between forestry and energy agencies but also with the agricultural departments given the findings of significant portions of wood energy resources are actually coming from agricultural land and also the potential that degraded lands present for wood production for energy
- the need to consider the rapidly changing role of the state, (because of privatization and economic liberalization) and its impact on forestry and energy policies, particularly how such changing role of the state could create many positive opportunities but could also be potentially damaging to the most marginalized sectors of society
- it depends on each individual countries and the conditions existing in them to determine who should take the lead role in wood energy programmes; the forestry or energy departments? or maybe another department?

## SESSION 2: "POLICY OPTIONS FOR WOOD ENERGY DEVELOPMENT"

The objective of this session was to identify policy initiatives needed to develop and strengthen national and sub-national planning and program implementation capabilities in wood energy development. Session 2 was divided into two parts.

Mr. Ananda Bahadur Tbapa of Nepal chaired the first part and the rapporteur was Dr. N. Saxena. A ***country roundtable discussion*** and an ***open forum*** followed the presentations.

The Chairperson for Part 2 was Mr. Rafiq of Pakistan and the rapporteur was Mr. Socrates Apollo A. Botictic. An ***open forum*** also followed the presentations.

**Summaries of Paper Presentations - First Part:**

- ***"Policy Initiatives for Developing Capabilities in Wood Energy Data Assessment and Integrated Planning*** by Dr. P. P. S. Gusain (Development Alternatives - New Delhi, India)

  This paper discussed how energy planning in most countries had been supply-oriented, focusing mostly on the power and petroleum sectors. It presented efforts implemented so that planning activities expanded towards integrated energy planning approach. As such, planning now includes assessment and analysis of the demand sectors and other supply sub-sectors. It pointed out that one of the most difficult, if not the most difficult, component of such a capability building programme is developing capabilities in the assessment and analysis of traditional energy supplies (such as wood fuels, other biomass energy sources and animal power), and energy planning for the rural sector. The paper identified policy initiatives needed so that capability-building programmes can adequately address the special attention (to data assessment and planning techniques and institutional structures) needed to formulate strategies for traditional energy supplies, particularly wood fuels. Consideration is given to the fact that wood fuels are increasingly being commoditized and its possible impacts on rural energy users.

- ***"Policy Options for Wood Energy Resource Management Strategies"*** by Mr. Chun Lai (APAN/FAO - Bogor, Indonesia)

  Dr. Lai discussed that in the Asia-Pacific region, "antiquated" forest policies and laws have had the unintended effect of increasing degradation of forest resources, and also adversely affecting the livelihoods of wood fuel producers and rural users. Although many past and current programmes focus on tree plantation for wood fuel production needs, natural forests and agroforestry provide the lion's share of wood and non-wood forest products. Emerging throughout the region are innovative policy options to support community-based forest resource management, which can sustainably produce a wide range of products (including wood fuels) and services. These new options include: joint forest management, community agreements, and individual stewardship agreements. Examples and problems of these options and implementation mechanisms are examined. The recognition and legitimization of customary laws, rights and practices are seen as the crucial vehicle for real policy implementation in the field.

- In lieu of paper of Mr. Kirk Smith titled ***"Opportunities and Policy Options in The Use of Woodftids in the Household Sector. Learning Lessons from Improved Cookstoves Programs",*** a ***panel discussion*** was organized where Dr. Aroon Chomcharn and Mr. Nguyen Duy Thong were asked to speak. Copies of the joint ESMAP/UNDP report titled *"What Makes People Cook With Improved Woodstoves? A Comparative Review",* written by Mr. Douglas Barnes, Mr. Keith Openshaw, Mr. Kirk Smith and Mr. Robert van der Plas was distributed to the participants.

**Highlights of Discussions - Part 1:**

Many of the points raised dealt with issues relating to improved cookstoves programmes:

- how can market systems answer wood fuel problems which is generally non-monetized, on the other hand, there was also a recognition that an increasing number of wood fuel users are buying their wood - there is a need to categorize users first before determining the most appropriate strategies
- the role of fuel prices in the success or failures of improved cookstoves programmes and other wood energy development strategies
- need for integrated planning among forestry, energy and agricultural departments and the fact that energy departments generally do not have extension units
- need to see also the positive roles politicians can play in extension programmes
- the importance of technology innovation in the success of improved cookstoves programmes

**Summaries of Paper Presentations - Part 2:**

- ***"Opportunities and Policy Options for Traditional Woodfuel Using Industries and Enterprises"*** *by* Dr. Aroon Chomcharn (RWEDP/FAO - Bangkok, Thailand)

  Dr. Chomcharn started his presentation by defining rural industry/enterprise and its scope. Then he proceeded by focusing on various types of woodfuel-based rural industries and their contribution to the national economic and social development efforts and future trends. Policies considered as hindrances to fuelwood-based rural industrial development for four sectors (industry, energy forestry and agriculture) were mentioned and finally, Dr. Chomcharn outlined development perspectives and other interventions supporting rural industries.

- ***"Opportunities and Policy Initiatives for Wood-Fueled Industrial Heat and Power Systems"*** by Mr. Ludovic Lacrosse (ASEAN-EC Cogen Programme - Bangkok, Thailand)

  Dr. Lacrosse touched on the potential wood energy use in bigger-sized wood industries. He discussed possible cogeneration application for these industries and the technical and financial assistance being offered by an on-going programme namely the "ASEAN-EC COGEN Programme". He pointed out what national governments can do to be able to tap the potential in this area. He noted that the first problem confronting them is the lack of awareness of key decision makers on the potential for wood-fueled industrial heat and power systems.

- ***"Opportunities and Policy Optionsfor Private Investments and Entrepreneurial Activities in Wood* Energy"** prepared by Mr. Matthew Mendis and Mr. Jeffrey Mullaney and presented by Mr. Mendis (Alternative Energy Development Inc. - Silver Spring, Maryland, USA)

  Mr. Mendis posed to the participants the question why biomass resources are not being effectively harnessed and used for commercial energy purposes? He suggested that this was due to the lack of a composite and analytical approach to the biomass sector in three areas: i) supply analysis - lack of supply data is a problem; ii) technical analysis -tends to dominate the assessment process; iii) financial/economic analysis - critical link in the development chain. Mr. Mendis contended that it is often the institutional setting that is most often overlooked in biomass evaluation.

**Highlights of Discussions - Part 2:**

The following points were the highlights of the discussions:

- the countries recognized that there is a potential for commercializing the use of wood fuels for bigger and "modern" applications but their energy departments had to focus on power development first which many see as the more immediate need of their country, and since building power generation systems largely involve building of conventional energy systems, energy programmes have almost always focused on development of conventional energy systems,
- the role of small and rural-based industries was recognized and the potential benefits of their use of wood fuels as source of energy for processing too, but countries have problems in terms of improving technologies for energy conversion, extension work to disseminate the technology and to internalize in financial and even economic analysis equity and environmental factors
- the role of financial factors, particularly interest rates, in the success of commercial applications of wood energy and other renewables which usually have higher front-end costs but lower operating costs compared with conventional systems
- the issue of property rights, including the rights of communities' access to resources as it relates to the commercialization of wood fuels
- the negative impressions created by present inefficient ways of utilizing wood fuels in small and rural-based industries, i.e., heavy smoke, high heat radiation from burning devices
- initiatives by countries to use biomass-fired cogeneration systems and other "large-scale" applications of wood energy and current resources on new non-conventional energy technologies for biomass such as alcohol production, gasifiers, tree production
- the issues of devoting land for production of food vs. land for production of biomass energy

## SESSION 3: 'INSTITUTIONAL POLICY ISSUES IN WOOD ENERGY PLANNING AND DEVELOPMENT"

The objective of this session was to identify institutions and other bodies and their respective roles in the planning and implementation of wood energy development programs and the policies needed to institutionalize these roles. Mr. Rajakaruna of Sri Lanka chaired this session while Dr. Chun Lai acted as rapporteur. An ***open forum*** followed the presentations.

**Summaries of Paper Presentations:**

- ***"Participatory Land Use Planning in Social Forestry',*** a paper prepared by Ms. Uraivan TanKim-Yong (Chiang Mai University - Chiang Mai, Thailand) and presented by Mr. Cor Veer (RWEDP/FAO - Bangkok, Thailand)

  Mr. Veer presented the six steps used by an extension group from Chiang Mai University in their pilot social project in Northern Thailand. Mr. Veer identified for each step the particular roles of the researchers, the communities and the government representatives. Their objective was to arrive at an operational land use plan to serve as a guide for implementation of improved land use practices. The paper discussed the experiences generated in the applications of the said approach. The experiences pointed to a need for more institutional analysis and human resource development with forest departments in charge of implementation of forestry policies. Also, there is a need for interdisciplinary approaches to analysis of rural systems; and to build the capacities of regional institutions, i.e., extension programmes in regional universities which can help foresters and others in the approaches and techniques developed in this pilot studies in Northern Thailand.

- ***"Intermediating Between Government Institutions and Program Beneficiaries in the Implementation of Wood Energy Progrwns"*** by Dr. Malee Suwana-adht (SVITA Foundation - Bangkok, Thailand)

  The presentation was on the involvement of NGOs as intermediaries between universities/ government agencies and beneficiaries. Dr. Malee started by pointing out that the different sectors generally have different perspectives on common issues. One reason for this is a communication gap, thus there is a need for mediation. In doing mediation work, NGOs are guided by their previous experiences. They realized that all have concerns but usually not shared concerns. All have visions but not a shared vision. All have goals but not shared goals. Each has strategies but not mixed or diversified strategies. Each has a mandate but not a common mandate. She then shows the need for dialogues - to have knowledge of the different perspectives, joint diagnosis to arrive at a common understanding and shared concerns, consultations to come up with shared visions and goals and research to develop diversified and mixed approaches to common goals. A prerequisite to all of these is a positive attitude from all concerned, that all "actors" become part of the solution and not the problem and the recognition for a common goal. NGOs can play a key role in these dialogues and fora. Dr. Malee provided recommendations to NGOs, governments and donors to achieve this.

- ***"Decentralization of Institutional Responsibilitiesfor Wood Energy Development"*** by Mr. Socrates Apollo P. Botictic (Department of Energy - Manila, Philippines)

  This paper discusses the advantages of building an institutional network which can provide an effective linkage between national program planning agencies and target program

beneficiaries and provide the latter access to expertise needed in local planning and implementation of program projects and activities. The paper expounds on the responsibilities of national agencies for overall macro-level program planning, assuring intersectoral (or horizontal) linkages and the allocation of resources to the programs. The paper reiterates the arguments for involving beneficiaries in project (local-level) planning and implementation. The paper then argues the need for a decentralized mechanism to translate national plans to projects and activities appropriate to the conditions of the localities but however points out the constraints presented by highly centralized government agencies faced with limited resources and expertise. The paper presents a case study of how the Philippines tried to address the problem. The paper then identifies policies needed to encourage and institutionalize such a national network, using primarily regional universities and agricultural colleges to provide institutional support for rural energy assessment, local planning and technology dissemination.

- ***"Inter-Sectoral Unkages Towards Integrated Planning and Program Implementation"*** by Mr. Binayak Bhadra (National Planning Commission - Kathmandu, Nepal)

  Mr. Bhadra started his presentation by noting that, wood energy planning, specifically the wood demand and supply assessments, must be made an integral part of the integrated rural energy planning process. 'Me decentralization of rural energy planning and implementation activities requires local level energy planning institutions be created. In the context of fuelwood energy planning, the institutional policies are derived from the need to decentralize rural energy planning and implementation processes. There is a need to setup institutional policies related to property and use rights, which provide for effectiveness of resource management initiatives. The other institutional policies relate to the establishment of coordination mechanisms at the local level, needed for effective functioning of local NGOs, community institutions, user groups, and other local governmental and support (credit and technology) institutions.

**Highlights of the Discussions:**

- Comments and questions regarding planning approaches included:
  - need to give communities a stake in the projects being developed to make participatory planning successful:
  - institutional constraints in implementing bottorn-to-up planning and decentralized planning because of regional disparities and differences in conditions
  - the question on which level bottom-up and top-to-bottom approaches should meet - at which level would wood energy planning be effective
  - specific planning approaches to commercialization of wood energy as energy planning has concentrated on conventional energy
- donor agencies can play a key role in institution building and developing the appropriate approaches for wood energy planning and programme implementation
- government need to deal with NGOs even if their concerns and interests are varied , they need to recognize diversity in unity and realize the role of NGOs to create front line "disturbances" to attract attention of authorities to other issues
- the importance of a conducive political environment, democratization, to succeed in decentralization
- issue of what forms of management for developing wood resources, i.e., corporate, government, community, private - in what cases is community management better than private management

## Session 4: "Future Agenda for Wood Energy Development in the Region"

This session was chaired by Mr. Bayani Nera of the Philippines. Ms. Elizabeth Remedio acted as rapporteur.

**Summary of Paper Presentation:**

- ***"Thrust and Prioritiesfor*** Regional ***Cooperation Program" by*** Mr. Egbert Pelinck (RWEDP/FAO - Bangkok, Thailand)

  Mr. Pelinck stated that the purpose of his paper is to review the need and potential for regional cooperation in wood energy development in Asia. According to him while a considerable amount of experience and knowledge has been built up in the wood energy sector over the past decade, still, not a single country has approached all aspects of wood energy development in the same level of priorities. This is because of the diversity of culture, socioeconomic development and institutions.

  A host of problems that needed to be addressed were enumerated. He emphasized though that many of the problems can be addressed by existing national programmes, national organizations and local organizations that have specific structures and mandates to address them. A number of these problems however, are not locally specific and this is where national organizations could benefit from regional cooperation and support.

  He presented eight principles of regional cooperation and support. He further made known the future agenda of the regional wood energy development programme in Asia (1993-1998), the long term development objective of which is "to contribute to a sustainable production of wood fuels, their efficient processing and marketing, and their rational use for the benefit of households, industries and other enterprises". Mr. Pelinck underscored the major thrust of the project will be on human resources development through a comprehensive training and awareness raising programme on wood energy development and wood energy issues in participating countries. Technical Cooperation among Developing Countries (TCDC) would be another important feature of the new project.

**Highlights of Discussions:**

Reactions to the presentation included mostly suggestions such as:

- thought be given about NGO inclusion in the project both in the planning and implementation of activities
- emphasis should be more on wood energy side than on wood production side, mainly because
- there are more projects already on wood production
- since a lot of activities at present have started to focus on global environment, and since a lot of LDCs are now required by the Climate Convention to make assessments of their carbon emissions, the programme could help address the issues of green house gas as it relates to wood energy
- countries will be requesting the programme to assist them in identifying and supporting national institutions that could contribute to national wood energy development.

Mr. Pelinck thanked everyone for the suggestions and promised to consider them in finalization of the activities of the new regional programme.

### 5.2.3 COUNTRY PRESENTATIONS

Although there was no separate session in this meeting for country presentations, many of the country delegates prepared country papers. They read out the relevant portions of their papers in each session during the open forum following the paper presentations.

### 5.2.4 CLOSING SESSION

Statement of thanks were read by Dr. John Soussan on behalf of the resource persons, Mr. Wickrana R. Rajakaruna on behalf of the country delegates, Mr. Erick Lysen as an observer, Dr. Miguel Trossero as representative of FAO Headquarters, and Mr. Egbert Pelinck for RWEDP. Mr. Pelinck closed the seminar after distributing tokens of appreciation to all the participants.

### 5.2.5 FIELD VISIT

A field trip was organized for the participants before the start of the seminar. They visited the same sites visited by the participants of the expert consultation.

# APPENDIX 1

## EXPERT CONSULTATION ON DATA ASSESSMENT AND ANALYSIS FOR WOOD ENERGY PLANNING (23 TO 27 FEBRUARY, 1993) CHIANG MAI, THAILAND

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# APPENDIX 2

## SEMINAR ON POLICY INSTRUMENTS FOR IMPLEMENTATION OF WOOD ENERGY DEVELOPMENT PROGRAMMES (1-3 MARCH, 1993) CHIANG MAI, THAILAND

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| | | |
|---|---|---|
| 3. | Dr. John B. RAINTREE<br>Network Social Scientist<br>Winrock International - F/FRED<br>P.O. Box 1038 Kasetsart Post Office<br>Bangkok 10903, THAILAND | Fax: 5611041<br>Tel: 5791977 (Off.)<br>2781486 (Res.) |
| 4. | Mr. Erik LYSEN<br>Manager New Developments<br>NOVEM, P.O. Box 8242<br>3503 RE Utrecht<br>THE NETHERLANDS | Fax: 31-0-30316491<br>Tel: 31-0-30363424 |
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| 6. | Mr. Winai PANYATHANYA<br>Head of Wood Energy R & D<br>Royal Forest Department<br>Wood Energy R&D Section, Forest Products<br>Research Div., Technical Forest Office<br>Bangkok, 10900, THAILAND | Fax: 5614872<br>Tel: 5798532 (Off.)<br>5791366 (Res.) |
| 7. | Ms. Patcharaporn UTATAN<br>Forest Technician, Level 4<br>Chiang Mai Regional Forest Office<br>Muang District, Chiang Mai Province<br>THAILAND | Tel: 62-053-276100<br>Fax: 62-053-274431 |
| 8. | Mr. Somjin RUENGKIJ<br>Chief Community Forestry Division<br>Chiang Mai Regional Forest Office<br>Muang District, Chiang Mai Province<br>THAILAND | Tel: 62-053-273881 |
| 9. | Mr. Seree Kangvankij, Head<br>Chiang Mai Regional Energy Center<br>Muang District, Chiang Mai Province<br>THAILAND | |

## LIST OF FAO/RWEDP SECRETARIAT

1. Mr. E. Pelinck, Chief Technical Adviser
2. Dr. A. Chomcharn, Wood Energy Conversion Specialist
3. Mr. C. Veer, Rural Sociologist
4. Mr. K. Enevoldsen, Associate Professional Officer/Wood Energy Dev.
5. Mr. C. Heruela - Consultant, Wood Energy Planning

Administrative Support Staff:

6. Ms. Cristina Sriratana, Administrative Assistant
7. Ms. Navaporn Liangchevasoontorn, Secretary
8. Ms. Panpicha Issawasopon, Clerk Typist

## LIST OF INAUGURAL SPEAKERS

1. Mr. Pongpayome Vasaputi, Vice Governor, Chiang Mai Province
2. Mr. Pairoj Suchinda, Deputy Secretary General, NESDB, Royal Thai Govt
3. Mr. P. Vehmeyer, Deputy Permanent Representative of the Netherlands to ESCAP, Netherlands Embassy, Thailand
4. Mr. Miguel Trossero, Senior Forestry Officer, Wood Based Energy, FAO/HQRS

# APPENDIX 3

## REGIONAL EXPERT CONSULTATION ON DATA ASSESSMENT AND ANALYSIS FOR WOOD ENERGY PLANNING
## Chiang Mai Orchid Hotel, Chiang Mai, Thailand
## 23 to 27 February 1993

## PROGRAMME

### BACKGROUND

The FAO Regional Wood Energy Development Programme in Asia has been operational since March 1985 in 11 countries of the region.

Since then, thought and action about the role and prospects of wood fuels have undergone considerable change. In the mid-eighties, the ideas about fuelwood were dominated by the perception of widespread and rapidly growing fuelwood crisis. This was thought to be associated with rural hardships in the form of long time spent on fuelwood gathering, particularly by women, that would affect agricultural labour and productivity, in the worst case even the diet of the people. Also fuelwood gathering was at the time perceived as a major cause of deforestation.

These issues were much debated in the forestry sector and strategies to tackle them emphasized reduction of fuelwood consumption through more efficient charcoal production systems and cooking devices and substitution by other fuels. Also, increased production of fuelwood was advocated through planting of fuelwood species, and energy plantations. At the same time some pilot programmes were initiated in the energy sector to explore the role of fuelwood in the "modern" energy sector, for power generation. Much R&D work was undertaken in gasification and densification.

Experiences with these strategies and the large number of studies undertaken in the past decade have contributed to a much more differentiated picture of the structure and functioning of wood energy systems, the main issues to be addressed in the development of indigenous energy sources, the strategies to be applied in planning and implementation of wood energy programmes, and the policies that presently constrain wood energy development, as well as how these could be adapted to enable and enhance wood energy development for the benefit of rural users, traders and producers, the urban and industrial users, the national economy and the global environment.

Today, wood remains to be the dominant domestic energy source for most rural people in the developing countries of Asia. In some cases, over 90% of domestic energy is still supplied by wood. In addition to satisfying domestic energy requirements, wood is also used in supplying energy for many rural industries; brick kilns, lime kilns, drying tea and tobacco, smithies potteries and various village handicrafts. Wood continues to be significantly used in many urban areas in Asia for cooking in both households and commercial establishments. Such current patterns of use indicate that wood will remain to be a significant indigenous energy resource for the foreseeable future in most countries of the region.

However, the wood energy supply situation in many areas continue to degenerate. The rapid depletion of tree cover and forests, consequent to increasing population, expansion of agriculture, overgrazing by livestock and over exploitation of forest resources for commercial gains, including fuelwood and charcoal supplies to urban markets and industries, continues in many parts of the region and have seriously affected wood energy supplies in those areas. The shift to the use of other biomass, such as dried dung, straw, rice husks and even plant roots continues. Where these materials formerly returned to the land the latter becomes impoverished deprived both of the essential nutrients in the waste and of the humus it would otherwise provide. Where they were formerly useful animal feed, there is consequent loss to the food production system.

Energy and forestry policy decisions, including those from other sectors - from agriculture to rural development to macroeconomy - even if taken for other reasons other than wood energy concerns can significantly influence its production, trade and use. Such policy and programme decisions can negatively impinge upon or can be designed to further wood energy development. Negative effects can only be avoided or mitigated and positive effects enhanced if there is more reliable information on wood energy. This allow for accurate and objective inputs to planning to formulate the needed and appropriate strategies, programmes and action plans.

Weak, or inmost cases, lack of wood energy planning leads to the absence of wood energy strategies which are clearly formulated and adequately integrated with national energy, forestry, agriculture and rural development programmes. This is a major drawback for resolving wood energy problems such as providing wood for basic energy needs, as well as, its sustainable use to supply energy for development.

It is in this light that this consultation on wood data and assessment for wood energy planning is being organized by RWEDP. The consultation aims to:

1. Assess the present status and adequacy of information on wood energy development in Asia needed to determine further planning, development strategies and policy interventions in the sector.

2. Review existing methodologies and experiences concerning wood energy assessment, monitoring and planning in the context of forestry and energy analysis and planning.

3. Formulate specific recommendations to strengthen national capabilities in the collection and analysis of wood energy data for monitoring changes in wood energy development, assessing impacts of interventions, and for the developing of plans suitable for integration into forestry and energy programmes.

**General Objective:**

To determine methodologies for data assessment and analysis for wood energy planning to facilitate integration of wood energy into national energy and forestry planning and to identify the policy, strategy and institutional implications of the adoption of these methodologies.

**Target Group:**

Heads or senior staff of units involved in rural energy and/or national energy planning and forestry planning, also; heads or senior staff of planning units in the natural resources, rural development, agriculture, or national/state planning sectors.

**Schedule:**

23 to 27 February, 1993

**Venue:**

Chiang Mai Orchid Hotel, Chiang Mai, Thailand

## AGENDA

**DAY 1 - 23 FEBRUARY 1993**

| Time | Activity |
|---|---|
| 0830 - 0900 | **Registration** |
| 0900 - 1030 | **Opening Session** |
| 1030 - 1100 | **Coffee Break** |
| 1100 - 1130 | **Workshop Introduction**<br><br>Why a Wood Energy Planning Workshop?<br>by E. Pelinck (RWEDP - FAO/RAPA, Thailand) |
| 1130 - 1300 | **SESSION 1: Wood Energy Development Experiences in Asia**<br><br>**Objective:** To review the current degree of understanding of the present importance and further potential of wood energy, the options for solving the present fuelwood problems and the barriers to and potentials for wood energy development in the countries of the region.<br><br>**Paper 1.1: Woodfuel use in the Household sector of Pakistan**<br>by A. Ouerghi (ESMAP - Pakistan)<br><br>**Paper 1.2: Charcoal in Northeast Thailand**<br>by O. Panya (KKU - Thailand)<br><br>**Paper 1.3: Wood Energy as a Commercial and Industrial Fuel in Cebu City, Philippines**<br>by T. Bensel (UNH - United States) |

1300 - 1400 **LUNCH BREAK**

1400 - 1530 **Paper 1.4: Wood Energy Development in Asia: Assessment of Critical Issues, Constraints and Prospects**
by A. Koopmans (HSV&E - Thailand)

**Audio-Visual Presentation: Woodfuel Supply and Use Systems in Cebu**
by E. Remedio (USC - Philippines) and T. Bensel (UNH - United States)

**Panel Discussion # 1:** Reactions from a panel composing at least representatives from the energy, forestry, national planning sectors. Open forum follows.

1530 - 1600 **TEA BREAK**

1600 - 1730 **Workshop # 1:** The participants shall validate the problems and opportunities in wood energy identified in the paper presentations and the panel discussion. They shall establish the need for proper methods for data assessment and analysis for wood energy planning to formulate appropriate policies and intervention strategies for the supply and use of wood energy.

**DAY 2 - 24 FEBRUARY 1993**

0900 - 1030 **SESSION 2: Wood Energy in National Planning Exercises**

**Objective:** To review the experiences in defining, developing and implementing wood energy planning activities and efforts to integrate wood energy into national planning exercises, and to determine the crucial elements that can make wood energy planning successful.

**Paper 2.1: Wood Energy Data Assessment and Planning Activities in Asia**
by C.S. Heruela (RWEDP - FAO/RAPA, Thailand)

**Paper 2.2: An Approach to Energy Assessment and Planning for Sustainable Development - Status of Implementation in Asia**
by G. Best (AGRE - FAO/HQ - Italy)

**Panel Discussion # 2:** Reactions of representatives from energy planning units of countries which have initiated wood and/or rural energy planning activities. Open forum follows.

1030 - 1100 **COFFEE BREAK**

1100 - 1200 **Workshop # 2:** The participants shall identify factors that make wood energy planning a fruitful exercise and validate these factors by discussing how these lead to concrete and practical outputs.

1200 - 1300 **SESSIONS 3: Methodologies for Data Collection and Assessment for Wood Energy Planning**

**Objective:** To identify appropriate techniques for the collection and analysis of data on the supply and utilization of wood energy.

**Paper 3.1: The Use of Secondary Data cum field observations as a Preliminary Method for Wood Energy Analysis**
by A. Koopmans (HSV&E - Thailand)

**Paper 3.2: The Use of Formal Structured Surveys in Wood Energy Consumption and Woodfuel Flow Studies**
by A. Lafrades (OEA - Philippines)

1300 - 1400 **LUNCH BREAK**

1400 - 1430 **Paper 3.3: Methodologies for Wood Energy Supply and Utilization Studies in Pakistan**
by G. Archer (ESMAP - Pakistan)

1430 - 1500 **Paper 3.4: Methodologies for the Study of the Wood Energy Situation in a Rapidly Urbanizing Area: Case Study of Cebu City, Philippines**
by E. Remedio (USC - Philippines)

1500 - 1530 **Panel Discussion # 3:** Reactions by Selected Participants

1530 - 1600 **TEA BREAK**

1600 - 1730 **Workshop # 3:** The participants shall discuss the bases for choosing the different types of data collection techniques from which a suggested set of guidelines for conducting data assessment for wood energy planning is evolved.

**DAY 3 - 25 FEBRUARY 1993**

0900 - 1030 **SESSION 4: Methodologies for Data Analysis for Wood Energy Planning - Energy Modelling**

**Objective:** To identify criteria for determining suitable energy models which can be used in data analysis for wood energy planning.

**Paper 4.1: Considerations in Energy Planning Models for Wood Energy Planning**
by M. Lazarus (SEI - United States)

**Paper 4.2: Energy Modeling Studies on Wood and Biomass Energy in the ASEAN Region**
by W. Wisaksono (AEMMTRC - Indonesia)

**Panel Discussion # 4:** Reactions by Selected Participants

1030 - 1100 **COFFEE BREAK**

1100 - 1300 **SESSION 5: Methodologies for Data Analysis for Wood Energy Planning - Project Appraisal**

**Objective:** To identify methodologies for evaluating and assessing wood energy strategies and projects in comparison with other energy supply options

**Paper 5.1: The Use of Financial, Economic and Environmental Criteria in the Formulation of Developmental Plans for Wood Energy**
by M. Mendis (AED - United States)

**Panel Discussion # 5:** Reactions by Selected Participants

1300 - 1400 **LUNCH BREAK**

1400 - 1530 **Workshop # 4:** (for Sessions 4 & 5) The participants shall validate the basis for choosing models for wood energy data analysis and criteria for formulating developmental plans for wood energy.

1530 - 1600 **TEA BREAK**

1600 - 1700 **Workshop # 5:** Hands on Exercises on Energy Modelling (Optional)

**DAY 4 - 26 FEBRUARY 1933**

0900 - 1030 **SESSION 6: Woodfuels in Energy Planning: Policy and Institutional Issues**

**Objective:** To identify policy and institutional issues to be addressed to achieved effective integration of woodfuels into national energy planning.

**Paper 6.1: Data Assessment and Analysis for Wood Energy Planning: Policy and Institutional Issues**
by V. Joshi (TERI - India)

**Panel Discussion # 6:** Reactions by Selected Participants

1030 - 1100 **COFFEE BREAK**

1100 - 1300 Presentation of Summary of Results
Discussion, Recommendation and Conclusion

1300 - 1400 **CLOSING LUNCH**

**DAY 5 - 27 FEBRUARY 1993**

Whole Day **FIELD VISIT**

# APPENDIX 4

## SEMINAR ON POLICY INSTRUMENTS FOR IMPLEMENTATION OF WOOD ENERGY DEVELOPMENT PROGRAMS
## Chiang Mai Orchid Hotel, Chiang Mai, Thailand
## 1 to 3 March 1993

### PROGRAMME

### BACKGROUND

The FAO Regional Wood Energy Development Programme in Asia has been operational since March 1985 in 11 countries of the region.

Since then, thought and action about the role and prospects of wood fuels have undergone considerable change. In the mid-eighties, the ideas about fuelwood were dominated by the perception of widespread and rapidly growing fuelwood crisis. This what thought to be associated with rural hardships in the form of long time spent on fuelwood gathering that would affect agricultural labour and productivity, in the worst case even the diet of the people. Also fuelwood gathering was at the time perceived as a major cause of deforestation.

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Experiences with these strategies and the large number of studies undertaken in the past decade have contributed to much more differentiated picture of the structure and functioning of wood energy systems, the main issues to be addressed in the development of indigenous energy sources, the strategies to be applied in planning and implementation of wood energy programmes, and the policies that presently constrain wood energy development, as well as how these could be adapted to enable and enhance wood energy development for the benefit of rural users, traders and producers, the urban and industrial users, the national economy and the global environment.

Today, wood remains to be the dominant domestic energy source for most people in he developing countries of Asia. In some cases, over 90% of domestic energy is still supplied by wood. In addition to satisfying domestic energy requirements, wood is also used in supplying energy for many rural industries; brick kilns, lime kilns, drying tea and tobacco, smithies potteries and various village handicrafts. Wood continues to be significantly used in many urban areas in Asia for cooking in both households and commercial establishment. Such current patterns of use indicate that wood will remain to be a significant indigenous energy resource for the foreseeable future in most countries of the region.

However, the wood energy supply situation in many areas continue to degenerate. The rapid depletion of tree cover and forests, consequent to increasing population, expansion of agriculture, overgrazing by livestock and over exploitation of forest resources for commercial gains, including fuelwood and charcoal supplies to urban markets and industries, prevails in many parts of the region and have seriously affected woo energy supplies in those areas. The shift to the use of other biomass, such as dried dung, straw, rice husks and even plant roots continues. Where these materials formerly returned to the land the latter becomes impoverished deprived both of the essential nutrients in the waste and of the humus it would otherwise provide. Where they were formerly useful animal feed, there is consequent loss to the food production system.

Energy and forestry policy decisions, including those from other sectors - from agriculture to rural development to macroeconomy - even if taken for other reasons other than wood energy concerns can significantly influence its production, trade and use. Such policy and program decisions can negatively impinge upon or can be designed to further wood energy development. Negative effects can only be avoided or mitigated and positive effects enhanced if there are more reliable information on wood energy. this allow for accurate and objective inputs to planning needed and appropriate strategies, programs and action plans.

Weak, or in most cases, lack of wood energy planning leads to the absence of clearly formulated wood energy strategies which are adequately integrated with national energy, forestry, agriculture and rural development programs. This is a major drawback for resolving wood energy problems -providing wood for basic energy needs, as well as, provision of sustainable supply for development. This is therefore why an expert consultation titled "Data Assessment and Analysis for Wood Energy Planning" is being organized by RWEDP. The objective of the workshop is to determine methodologies for data assessment and analysis for wood energy planning to formulate strategies for implementation of wood energy development programs well integrated into national programs.

However, after appropriate methodologies for data assessment and analysis for wood energy planning has been defined, another important step is to create conditions for the successful implementation of programs and strategies developed from the wood energy planning exercises. The proper policy instruments that give the mandate and provide resources to planning units to do wood energy planning within the national planning process, and to the proper agencies to implement wood energy strategies should be in place.

Planners, with the use of their methodologies, can only identify and assess various strategies, scenarios and program options. It is still the policy maskers who have the responsibility to choose or recommend to state Officials the suitable scenario, strategy or program. The policy maker has a broader understanding of the economic, social and probably, most importantly, political agenda of the state than the planners for making such strategic decisions.

It is therefore crucial that policy decision makers in sectors affecting wood energy development, in particular, the energy and forestry sector, be in a position to discern what policies and strategies will work for or against wood energy development in their respective countries given the broad national political, economic, social and probably, environmental aspirations of their national leadership.

RWEDP is thus organizing this seminar to discuss policy issues relating to wood energy development. The workshop aims to:

1. Review policies relating to wood energy development and experiences in implementing program strategies and identify the crucial elements that make for success or failure in wood energy development programs related to policies.

2. Review macro-economic and sectoral policies in energy, forestry, agriculture, rural development and environment to determine their positive and negative effects on wood energy development policies.

3. Present and review the results of the assessment done in the first workshop with regards to the present status of information and data on wood energy development in Asia and of the planning capacities of the sector.

4. Identify the specific information required by policy makers for policy and programme decisions and by the target populations to enhance its participation in action.

5. Recommend priorities for future action in wood energy development in Asia.

**GENERAL OBJECTIVE**

To determine how policies and institutional structures can be modified to be used as effective instruments to develop and strengthen the planning and implementation of wood energy development programmes.

**TARGET GROUP**

Key senior staff of energy and forestry national agencies.

**SCHEDULE**

1 to 3 March 1993

**VENUE**

Chiang Mai Orchid Hotel, Chiang Mai, Thailand

## AGENDA

**DAY 1 - 1 March 1993**

| Time | Activity |
|---|---|
| 0830 - 0900 | **Registration** |
| 0900 - 0930 | **Opening Session** |
| 0930 - 1000 | **COFFEE BREAK** |
| 1000 - 1030 | **Seminar Introduction and Presentation of "Wood Energy Development Experiences in Asia"** (A Summary of the Results of Group Workshops of the Expert Consultation Meeting) by E. Pelinck/C. Heruela (RWEDP - FAO/RAPA {Thailand}) |

**KEYNOTE SESSION**

| | |
|---|---|
| 1030 - 1100 | **Keynote Paper - Advancing our Understanding of Wood Energy Towards Appropriate Policies and Strategies** by J. Soussan (ETCF - UK) |
| 1100 - 1130 | **Audio-Visual Presentation: Woodfuel Supply and Use System in Cebu City, Philippines** by E. Remedio (USC - Philippines) and T. Bensel (UNH - USA) |
| 1130 - 1300 | **Country Roundtable Discussions/Open Forum**<br>Chairperson: India<br>Rapporteur : M. Balamiento (AEEMTRC) |
| 1300 - 1400 | **LUNCH BREAK** |

**SESSION 1: Policy Issues on Wood Energy Supply and Use**

**Objective:** To identify policies in the energy, forestry, macro-economy and other sectors beneficial and constraining to wood energy production and utilization, and present policy options which may be adapted that may promote wood energy development and also support the strategic objectives of the related sectors.

| | |
|---|---|
| 1400 - 1430 | **Paper 1.1: Energy Policies and the Utilization of Woodfuels** by C.S. Heruela (RWEDP - FAO/RAPA, {Thailand}) |
| 1430 - 1500 | **Paper 1.2: Impacts of Forestry Policies on the Production and Use of Woodfuels** by N. Saxena (SPWD - India) |
| 1500 - 1530 | **Paper 1.3: Relating Macro-Economic and Sectoral Policies with Wood Energy Supply and Use** by J. Soussan (ECTF - UK) |
| 1530 - 1600 | **TEA BREAK** |
| 1600 - 1630 | **Paper 1.4:** Wood Energy and Environment by K. Smith (EWC - USA) |

1630 - 1730 **Country Discussions/Open Forum**
Chairperson: Myanmar
Rapporteur : T. Bensel (UNH)

**DAY 2 - 2 MARCH 1993**

**SESSION 2: Policy Options for Wood Energy Development**

**Objective:** To identify policy initiatives needed to develop and strengthen national and sub-national planning and program implementation capabilities in wood energy development.

0900 - 0930 **Paper 2.1: Policy Initiatives for Developing Capabilities in Wood Energy Data Assessment and Integrated Planning** by P. Gusain (AED - India)

0930 - 1000 **Paper 2.2: Policy Options for Wood Energy Resource Management Strategies** by C. Lai (APAN - FAO/RAPA {Indonesia})

1000 - 1030 **Paper 2.3: Opportunities and Policy Options in The Use of Woodfuels in the Household Sector: Learning Lessons from Improved Cookstoves Programs** by K. Smith (EWC - USA)

1030 - 1100 **COFFEE BREAK**

1100 - 1300 **Country Roundtable Discussions/Open Forum**
Chairperson: Nepal
Rapporteur : N. Saxena

1300 - 1400 **LUNCH BREAK**

1400 - 1430 **Paper 2.4: Opportunities and Policy Options for Traditional Woodfuel Using Industries and Enterprises** by A. Chomcharn (RWEDP - FAO/RAPA {Thailand})

1430 - 1500 **Paper 2.5: Opportunities and Policy Initiatives for Wood-Fueled Industrial Heat and Power Systems** by L. Lacrosse (AECP - ASEAN {Thailand})

1500 - 1530 **Paper 2.6: Opportunities and Policy Options for Private Investments and Entrepreneurial Activities in Wood Energy** by M. Mendis (AED - USA)

1530 - 1600 **TEA BREAK**

1600 - 1730 **Country Roundtable Discussions/Open Forum**
Chairperson: Pakistan
Rapporteur : S. Botictic (OEA)

**DAY 3 - 3 MARCH 1993**

**SESSION 3: Institutional Policy Issues in Wood Energy Planning and Development**

**Objective:** To identify institutions and other bodies and their respective roles in the planning and implementation of wood energy development programs and the policies needed to institutionalize these roles.

| | |
|---|---|
| 0900 - 0930 | **Paper 3.1: Involvement of Beneficiaries in Local Planning and Implementation of Wood Energy Programs** by U. Tan-Kim-Yong (UCM - Thailand) |
| 0930 - 1000 | **Paper 3.2: Intermediating Between Government Institutions and Program Beneficiaries in the Implementation of Wood Energy Programs** by M. Suwana-adht (SVITA - Thailand) |
| 1000 - 1030 | **Paper 3.3: Decentralization of Institutional Responsibilities for Wood Energy Development** by S.A.P. Botictic (OEA - Philippines) |
| 1030 - 1100 | **COFFEE BREAK** |
| 1100 - 1130 | **Paper 3.4: Inter-Sectoral Linkages Towards Integrated Planning and Program Implementation** by B. Bhadra (HMG - Nepal) |
| 1130 - 1300 | **Country Roundtable Discussions/Open Forum**<br>Chairperson: Sri Lanka<br>Rapporteur : C. Lai (APAN) |
| 1300 - 1400 | **LUNCH BREAK** |
| 1400 - 1500 | **SESSION 4: Future Agenda for Wood Energy Development in the Region**<br><br>**Paper 4: Thrust and Priorities for Regional Cooperation Program** by E. Pelinck (RWEDP) |
| 1500 - 1530 | **Discussions/Open Forum**<br>Chairperson: Philippines<br>Rapporteur : M. Mendis (AED) |
| 1530 - 1600 | **COFFEE BREAK** |
| 1600 - 1700 | **PRESENTATION OF SUMMARY OF MEETING AND CLOSING SESSION** |

# APPENDIX 5

## Report on the Field Visits

On the 27 and 28th February 1993 two separate field visits, for the data assessment and the policy groups were arranged, to observe wood energy development in action and related activities in Chiang Mai, namely: brick manufacture, carbonized sawdust briquetting, tobacco leaf curing and a locally managed community forest.

Woodfuel based industries play an important role in northern and other parts of Thailand. Based on a recent survey (Thai Forestry Master Plan 1992), the industrial consumption of woodfuel in **northern provinces** by the formal sector (plants that are registered with provincial industry authorities) was found to be some 4.6 million cubic metres, with estimated market value (at factory gate) roughly Bath 1 billion/year (US$ 40 million). It also reported that estimated number of people directly employed by these northern fuelwood using industries was about 21,300. The bulk of fuelwood used by these industries was found to come from non-forest lands, especially the rain tree (Samanea saman) that was formerly raised for lac cultivation but now very popular for wood carving and furniture making and thereby rendering a considerable amount from the tree and mill residues of fuelwood.

In general, however, fuelwood has become scarce due to increasing demand and shrinking supply. The theme of the field visit was the issue of transitory response of users to this scarcity in a fast developing economy, like of Chiang Mai district.

### 1. Brick Factory

The factory visited produced utility and decorative bricks for local markets of Chiang Mai. Its production capacity, employing a mechanized soil mover and an electric power extruder, was about 10,000 pieces/day, with the value varying from Baht 0.75 - 1.50/pcs. 15-20 labourers were employed with a slightly higher proportion of females. A large shed was used for drying of raw bricks and a small portion was used for housing the extrusion department as well. A series of four rectangular wood-fired kilns was installed in a separate shed. Since fuelwood has become scarce and more expensive, many brick factories have switched to rice husk fired temporary clamp kiln. However due to a market niche for high-fired darker color bricks, wood-fired bricks are generally preferred and command a better price, in addition to a faster firing cycle and ese of control with wood fired kilns. Fuelwood price varied from about 300 - 500 Baht/metric ton, delivered to the factory. The brick industry is energy and labor intensive. Fuelwood and labor costs currently ran at about 40% each while other raw materials (clay, electricity, management etc.) and maintenance accounted for the remaining 20% of the production costs.

After the logging ban imposed in 1988, fuelwood supplies have become erratic, more expensive and have to be transported from Lampang province some 80-100 km. away. The management wanted to change to bunker oil firing system but unable to try it due to a lack of technology. Though simple in house improvements and more efficient firing techniques of existing kilns could be achieved; e.g. providing a door in front of the firebox, installing a fire grate to enhance combustion, splitting of large fuelwood logs and fuelwood yard drying, could result in substantial fuel

savings as evidenced in other countries. (In Sri Lanka fuel savings of about 30% and the pay back on investments just in a week has been reported). The management, however, attributed a constraint for such improvements on the absence of technical advice and service.

**Major issues discussed at the site**

a) **On fuelwood scarcity.** Due to uncertainty of long term fuelwood supply and present government policy discouraging the use of wood, the brick manufacturer expressed his concern and desire to shift to other fuels such as bunker oil and diesel even knowingly that such a shift would add more to the cost of production. Sustainable fuelwood supply and production policy, strategies and local arrangements and necessary public supports were keenly discussed, especially by the forestry experts present.

b) **On fuel substitution.** As appeared the industry could either switch to poorer fuels as rice husk and/or lignite (very poor grade local coal) but due to present production setting and technology, it would be difficult to obtain good quality bricks and productivity level. A possibility for substitution by bunker and diesel oils was considered quite an unlikely option in the short term because of the higher fuel cost and a technology had not yet been established locally. The discussions concluded, at the end, that there was a need for fuelwood supply security.

C) **On energy conservation.** Recognizing that even simple in-house improvements on kiln firing practice that could substantially conserve fuelwood had not been adopted by this and other manufacturers, due to various reasons, while at the same time the company complained about fuelwood cost and scarcity, the participants discussed two issues: a) how to motivate/educate the brick kiln owners and kiln firing workers for positive change, b) how concerned government institutions could be asked to pay attention and be involved, in addition to providing support for technology upgrading advice on improved practice, training and raising awareness on environment implications, etc.

## 2. Carbonized Sawdust Briquette Factory

The factory was established about 3 years ago with a total investment of about Bahts 3 million. not including the land. The sawdust raw material was collected free of charge from sawmills and woodworking mills located in Hangchat districts of Lumpang province some 100 km away. Cost of oil and labor for a 5-ton truck transport of sawdust was said to be only Bahts 350500 and often the sawmill owners paid 40 Bahts incentive to the collecting workers in removing sawdust from their mill premises.

The factory production line consisted of a conveyor system which fed screened sawdust into a wood fired rotary dryer to reduce its moisture to about 8-10%. Three electrical preheated screw presses were worked by men labor feeding dried sawdust wheel-barrowed from the storage bin into the machine. A combined capacity of the presses was about 3-5 tons briquette/day to match the capacity of six brick beehive kilns presently installed for carbonization. The kiln loading capacity was about 3.5 tons of briquettes (hexagonal shape, hollow core with external diameter of 5 cm. and 60 cm. long). The carbonization cycle of a kiln took about 7-10 days giving charcoal yield of about 1.2 tons.

*Fuelwood stacked behind the furnaces for use in the dying of bricks.*

*Finished products in the sawdust charcoal briquetting factory piled in front of the kilns.*

Carbonized briquetted sticks were then bagged, 20 kg. each (in weaved fertilizer like sacks) and sold directly, mostly to the restaurants and hoteliers for meat barbecuing. The average daily output was about 700 kg charcoal, with exfactory priced at Bahts 7/kg while regular charcoal traditionally produced and available in the market was priced only for 3-5 Bahts/kg. The consumer preferred the new carbonized briquettes as it provided very uniform product (size, shape and quality) that greatly enhanced cooking service efficiency over the regular, but variable quality charcoal. The production appeared to be quite profitable as direct production costs (labor, electricity, raw material etc.) amounted to about Bahts 50,000/month, or about 40% of the product output value. The electricity cost alone, however, accounted for about Bahts 10,000/month. Maintenance requirements for the press screws were considered high, needing re-surfacing every 2-3 days, which was carried cut by own workers. Market demand, as informed, was increasing.

**Major issues discussed at the site**

**a)** **Wood energy development opportunity.** Participants, discussed this unique situation where (waste) raw material supply, product market demand, available production technology and a keen entrepreneurial venture had opened up a new ground for a specific wood energy product that was highly appreciated by consumers.

**b)** **Air pollution.** Participants raised the problem of heavy smoke emitted from the screw press section without proper evacuation which was harmful to workers' health. It was suggested that the smoke be channeled in the furnace used for drying of sawdust located near by. The smoke from the charcoal kilns, which would be equally pervasive, however, was not resolute but some suggested to carbonize the briquettes in remote place, far from communities.

**C)** **Technology transfer.** Some participants discussed the need and suitability for transfer of this type of technology to other countries.

### *3.* Village Tobacco Leaf Curing

In northern Thailand, which accounts for about 95% of the country total tobacco grown, fuelwood and lignite were used as a source of energy for tobacco curing. By the latest survey, majority of tobacco curing centers were still heavily dependent on fuelwood. In Ban Pae where the village curing barns were visited, lignite was increasingly used and fuelwood normally was for initial ignition. The barn had some what standard sizes of 6 x 6 square meters floor area and height ranging from 6-9 meters.

Lignite which is available in Lumpang and Lumpoon provinces is of low quality and is not favored by users as combustion gives off bad smell of sulphur, in addition to thigh foreign matters (stones, sand, dirts, etc.) that often claimed upto 30-40% of the delivery. The price of lignite delivered to the barn was about Bahts 500-600/ton, having heat value of 15-20 MJ/Kg, if subtracting rejects of 30%, a net price would then became Bahts 700-850/ton. On a contrary, fuelwood with similar heat content (16 MJ/Kg) cost about Bahts 350-600/ton. Further, the heat utilization efficiencies of the barn, fired with fuelwood and lignite were reported as 15% and 11%, respectively. This confirmed why wood was still much preferred over lignite wherever available. But due to the scarcity and strict regulation/control of fuelwood, tobacco barn owners were obliged to use more lignite. The wood

requirement per kg. cured tobacco was found to vary but on average about 7 kg. wood/kg. cured leaves. Most barns operated only for 3-4 months in a year (i.e. curing 10-15 batches/yr., each requiring about 100 hrs. cycle).

Most of the tobacco is grown by small farmers who normally have their leaves cured by the village barn operators while contracted farmers normally sends green leaves to central curing stations. The village barns, also deliver cured tobacco to the central curing stations for further processing (sorting, packing, etc.). Farmers normally operate with a quota system to prevent over-production which would result in low prices.

**Major issues discussed at the site**

**a)** **Fuelwood availability in the village.** Despite apparent shortages trees from farm plots, with good production planning for fuelwood, eg. through organized pruning and lopping could provide considerable firewood to the village barns. There were large tracts of natural protected forests, especially the village owned community forests but the Village Committee did not allow users to collect firewood while at the same time occasionally auctioned it to the outside fuelwood procurers. Improved community forest managment and sustainable collection of fuelwood from fallen/dead trees for village industrial applications, like tobacco curing could collectively bring added benefits to the villagers.

**b)** **Health problem related to lignite burning.** Some experts raised concerns over a promotion of small scale (and inefficient) combustion of poor quality lignite containing high sulphur at village level that could have serious health implications to the villagers and children. Besides in appropriate dumping of highly acidic lignite ashes could damage the productive farm lands as well as water contamination.

**c)** **Transition to LPG.** LPG tobacco leaf curing by direct heating system is normally employed in the large scale formalized sector. It was considered that adoption of such a modern system in small scale operated only few months in a year at village level was difficult, though such a system was more than as efficient compared with the traditional flue curing method. The constraint appeared mainly due to the economy of scale.

**d)** **Wood energy conservation.** With the present wood-fired flue curing system, the barn efficiency was around 15-17%. Through an enhancement of combustion of the furnace and a better control of the curing process inparticular the humidity and temperature plus a prevention of barn leakage would increase an overall barn efficiency to 25% or more (i.e. reducing the fuelwood consumption by ca. 40%). This option however has to be supported by the policy that encourages an efficient use of wood rather than prohibiting it which so far has resulted in a non or low participation of private sector both in fuelwood supply/production and end use technologies.

**4.** **Ban Pae Community** Forestry

Ban Pae is situated about 30 km. to the south-east of Chiang Mai, Muang district. The settlement, which was established some 50 years back, today consists of 86 families, 298 persons in total. The area is considered a dry zone with annual rainfall of 1,270 mm. during May-October and the mean annual temperature is about 26 deg. Celcius. The village area covers about 1,000 rai (160

hectares), half of which has been designated as community forestry. The majority of the villagers work on their own farms, producing rice during the rainy season and tobacco leaf, thereafter The water reservoir and the good tree cover of the watershed was witnessed even in the dry period of the visit and the village tap water system had been recently completed and made operational.

The type of existing natural forest is the so called "dry mixed deciduous forest", dominated by Teak, Dipterocarp, Shorea and Terminalia species. Standing volume was reported to vary from 150-450 cubic meters/ha. Merchantable wood (DBH > 20 cm. and clear bole > 3 m.) is less than 10%.

The main purpose of this community forest is to ensure sufficient water supply for household and farming. Other products from the forest are restricted to the collection of nontimber products such as mushrooms, bamboo shoots, Shorea leaves (roofing material), herbal medicine, honey, ant eggs, wild boar hunting, etc. Fuelwood collection is regulated through the occasionally auction. Due to easy access to urban areas in Chiang Mai, many young and active villagers find regular or supplemental works in the city for which the income earned significantly supporting the family income.

The traditional and informal management of this community forest, as informed, dated back to the time since they started building the settlement. It was based on their ancestor's experience where they were forced to move from the old place due to water shortage for farming. This area is being loosely managed by a forest protection group comprising the Village Committee, chaired by the village headman. Rules established by the committee for the utilization of the forest products apply to all villagers. Because of a close kinship among the villagers, they are relatively effective. Violators of the rules from the village would be fined while outsiders would be reported to the local forest officer. Even though no formal agreement exists between the village and the Royal Forestry Department, the relationship with the forest authority so far has been good. A small 2 hectare village woodlot planted with Eucalyptus was recently established with the seedlings provided by RFD.

**Major issues discussed at the site**

a) **Importance of water reserve.** Based on their ancestor's experience water conservation is considered too vital to compromise, though it is possible to better manage and utilize other forest products (eg. bamboo, and rattan introduction in moist areas, enrichment planting of high value species in low density area, etc). Exchange of these ideas took place with the villager group. Some participants reported that people in their countries were more concerned with wood products than water and competitive use, especially for grazing has been a problem.

b) **Legal problem.** Many participants raised the issue of the legality of the rights of local people over this forest land but the villagers as a group did not appear to worry about. The accompanying forestry officer informed the participants that the government, through the Royal Forestry Department, was in a process of devising a mechanism to transfer management authority and rights to the local groups under the community forestry scheme.

**c)** Transition into monetary economy. While in many countries community forests were established to provide products directly to community members the participants noted with interest that this community was auctioning the fuelwood collection from the community forests. Individual villagers were reported to buy fuelwood for their own use at the market, while the village committee decided on the use of the money received from the auction.

*Ban Pae Community Forestry*