



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



**PROCEEDINGS OF
THE NATIONAL WORKSHOP ON WOOD-BASED
ENERGY SYSTEMS FOR RURAL INDUSTRIES
AND VILLAGE APPLICATION**



**DHAKA, BANGLADESH
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FOREWORD

Bangladesh relies heavily on traditional energy sources for domestic, commercial and industrial applications. At the same time, fuelwood is in very short supply.

To address this and the many other environmental and socio-economic problems associated with paucity of tree cover, the government aims to increase tree resources on all kinds of land, particularly in village groves and homestead forests. Eventually, the area under trees could increase to 20% of Bangladesh's total land area.

At the same time, government policy is emphasizing conservation of wood and other biomass fuels through the introduction of fuel-saving technologies, for both domestic and commercial activities. The Institute of Fuel Research and Development (IFRD) of the Bangladesh Council for Scientific and Industrial Research (BCSIR) is involved in research and development of improved cookstoves.

However, so far, little attention has been given to the industrial sector. This sector uses about 20% of all woodfuels in Bangladesh, mostly in traditional and small-scale operations. There are major problems associated with outdated processing technologies and inefficient energy conversion technologies, as well as managerial and financial constraints. BCSIR and RWEDP joined hands to analyse the problems of these woodfuel-based industries in a national workshop in Dhaka in October 1996. Participating were experts and staff from various relevant organizations.

A principal finding of the workshop was that information on the subject is still far from adequate. Support programmes are needed for upgrading biomass energy-using rural industries and for training of the people involved. The workshop identified options to improve the situation and formulated a number of recommendations to policy makers and relevant authorities. The recommendations were presented to the Honourable Minister of Education, Primary and Mass Education and Science and Technology.

Expert advice and inputs during the workshop were provided by Mr Auke Koopmans, Wood Energy Conservation Specialist of RWEDP. Thanks are due to the Bangladesh Council for Scientific and Industrial Research and the Secretary of the Ministry of Science and Technology for their cooperation in this important subject.

Dr W S Hulscher,
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1. INTRODUCTION

1.1 Background

It is by now well established that biomass fuels play a vital role in rural energy supply in Asia. Fuels such as wood, dung and charcoal provide heat for cooking, and occasionally space-heating, for the vast majority of rural households. Although biomass is widely seen as a traditional, inherently old-fashioned energy source, stepping up the "fuel ladder" to more modern "conventional" fuels such as oil, gas and electricity is simply not an option in many areas, and these fuels are still far behind biomass in terms of their share in meeting rural energy demand over the region as a whole. Biomass is readily available and cheap or free in most rural areas, so it is far more attractive than conventional fuels, which must be paid for and which must be transported into the area, often at great cost. This situation will not change in the foreseeable future.

In Bangladesh, biomass fuels, including dung, accounted for around 73 per cent of total energy consumption in 1989/90, one of the largest percentages in the RWEDP countries. Of the estimated 39 million tonnes this represents, around 20 per cent came from woodfuels, in the form of fuelwood, tree residues etc.

According to the same survey (Habib, 1994), 20 per cent of that woodfuel was used in the industrial sector, the rest being used in households. Many rural industries, as well as less formal village applications such as catering and cremations, are as reliant on biomass energy as the household sector, particularly the more traditional industries involved in processing agricultural and forest products.

These industries are traditional, and often operate at or close to the source of the raw materials on a relatively small scale, using the same technologies and processes they have been using for decades. However, they play a vital role in rural economies. They provide employment and extra income for often poor rural areas cut off from development. According to one study (Hossain, 1984), 25 per cent of Bangladesh's rural workforce is employed in rural industries such as sugarcane-processing, yarn-dyeing and brick-making.

Yet these industries and village applications face a number of potentially serious problems, such as being stuck with outdated processing technologies, poor worker and management skills, lack of investment capital and fuel shortages due to growing populations and related increases in energy consumption, exacerbated by inefficient energy conversion technologies.

In order to bring these issues to the attention of policy makers and national planners in the relevant areas of the industrial, energy and forestry sectors; agricultural development authorities; and rural development authorities, it was decided to hold a national workshop on the subject, specifically on wood-based energy systems for rural industries and village applications. Representatives from these sectors, as well as from relevant regional and international bodies operating in Bangladesh, were all invited to participate in the workshop.

1.2 Structure of the Workshop

The inaugural session of the workshop, on 27 October, opened with a reading from the Holy Koran. Dr A Khaleque, director of the Institute of Fuel Research and Development (IFRD), Bangladesh Council for Scientific and Industrial Research, Dhaka, then welcomed the participants.

Dr Khaleque was followed by Mr Auke Koopmans of FAO-RWEDP, who outlined the importance of rural industries in national economies and that of Bangladesh in particular. He also spoke of the need



*Mr Fazlur Rahman
Secretary of the Ministry
of Science & Technology*

for an integrated, multisectoral approach to developing these industries, and the obstacles that stand in the way.

Mr Hiroyuki Konuma, the FAO Representative in Bangladesh, said the national workshop was particularly timely given the current rural energy situation in Bangladesh, and wished for a successful outcome. The chief guest, Mr Fazlur Rahman, Secretary to the Bangladesh Ministry of Science and Technology, then delivered the inaugural address, which was followed by remarks from Dr F Z Majid, Chairperson of the Bangladesh Council of Scientific and Industrial Research (BCSIR), Dhaka, and a vote of thanks by Dr A M Hasan R Khan, CSO, IFRD, BCSIR, Dhaka, ending the inaugural session.

Session 1 of the workshop proper consisted of three expert resource papers giving general background on the issues involved in wood energy use in rural industries and village applications. These papers were delivered by Mr Auke Koopmans of the FAO-RWEDP, Dr M Eusuf of the Bangladesh Centre for Advanced Studies and ex-chairman of the BCSIR, and Dr Mohd Abul Hashem of the BSCIC Training Institute. This took up the rest of the morning of Day 1.

In the afternoon, the first part of Session 2, on "Energy Conversion and ural Industries", began, and seven technical papers were delivered, followed by a short discussion period. The session continued on the morning of Day 2, with another five technical papers punctuated by discussion periods. Session 3, on "Energy Supply", took up the first part of the afternoon. Three technical papers were read and discussed. The second part of the afternoon was devoted to Session 4, a group discussion session on various topics raised during the previous technical sessions.

On Day 3, October 29, the participants were taken on two site visits. The first was to an improved stove programme in Gazipur, the second to some woodfuel-using industries in the area.

The closing ceremony took place on the morning of Day 4. The workshop's conclusions and recommendations were presented to the chief guest for the ceremony, Mr A S H K Sadique, Honourable Minister of Education, Primary and Mass Education and Science and Technology.



*Mr A S H K Sadique
Hon. Minister of
Education, Primary and
Mass Education, Science
and Technology*



Workshop participants visit a rice mill at Gazipur

2. CONCLUSIONS AND RECOMMENDATIONS

2.1 Conclusions

1. Biomass energy is an important source of energy in Bangladesh, contributing over 60% of final energy consumption. At present, it is often the only economically viable heat energy source available for many domestic and industrial applications.
2. Finding fuelwood and biomass energy supply for both domestic and small-scale rural industrial applications is becoming more difficult.
3. Replacing all biomass energy by commercial sources of energy is financially and economically unviable.
4. Biomass energy can be used in a sustainable manner through increased supply, substitution and more efficient use.
5. Although there is a lack of information on the exact contribution of rural industries and village applications to rural economics, they are considered a vital sector of the economy of Bangladesh. Employment statistics show that the small-scale sector alone provides a source of income and employment for over 2.5 million people.
6. There is a lack of appreciation of the importance of rural industries and village applications with regard to their contribution to the socio-economics of rural economics.
7. At present, a limited amount of data and information is available, which limits a proper analysis and understanding of the critical development issues of wood and biomass energy systems to support the rural industrial sector.
8. Fuelwood and biomass energy use in rural industries and village applications should be viewed in its totality (inter-sectoral), and interventions should thus be aimed at improving a number of aspects, such as productivity, product quality, working environment, socio-economic conditions and gender issues.
9. There is a lack of reliable information on specific energy consumption and the impact of energy costs on the financial performance of rural industries and village applications.
10. The process technologies used by rural industries are generally based on traditional technologies. These often can be considered as inefficient and polluting, with regard to both the working environment and the overall environment.
11. Limited progress has been made in small-scale industrial processes and fuelwood and biomass energy conversion and conservation technologies.
12. There is a need for technology transfer and development based on local needs and situations. Therefore, besides energy consumption, reliable information is also required on technologies used and processing methods.

13. Organizations which can support the rural-based small-scale industrial sector exist (the Bangladesh Small and Cottage Industries Corporation, the Bangladesh Council for Scientific and Industrial Research, the National Association for Small and Cottage Industries of Bangladesh, industrial branch organizations such as the Brick Manufacturing Association, etc.). Small-scale industries' access to these organizations is limited by various factors, including lack of technical background and capabilities in the industries, financial weakness, etc.
14. Cooperation between organizations that can provide support to the rural industrial sector, including village applications, is often weak or non-existent. There is a need to improve this situation, including co-ordination of their activities.
15. Due to a lack of information on the status of the rural industrial sector, in particular with regard to the supply of and demand for fuelwood and biomass energy, government action and support are lacking.
16. There is a lack of information and understanding of the users' needs at all levels of rural industries and village applications (owners, operators, labour, gender, etc.).
17. Information on pollution aspects of rural fuelwood and biomass energy-based industries is not available. Thus, the impact of pollutants on the health of rural workers and environment in general cannot be ascertained.

2.2 Recommendations

1. Development of the energy sector should encompass all sources of energy (gas, electricity, oil, coal, biomass, etc.). Apart from appropriate energy policies and planning, this should also be reflected in the respective budget allocations.
2. It is unanimously accepted that information available on wood/biomass energy use in rural industries is far from adequate. To enable proper formulation of supporting programmes and projects, comprehensive surveys should be carried out.
3. In order to establish effective links between the industrial, energy and forestry sectors, it is essential to form a body to coordinate activities at national and local levels. In addition, there is a need to build up a national consensus on the sustainable development of wood-based energy systems for rural industries and village applications.
4. Central and regional technical centres should be established or strengthened to carry out R&D and related studies for upgrading biomass energy-using rural industries.
5. There is large scope for sharing information and expertise on a regional level; therefore the work initiated by FAO-RWEDP in this area should be continued and expanded.
6. Training/consultation and awareness programmes for policy planners and entrepreneurs should be conducted regularly, in order to inform them about the latest developments in efficient use of biomass and reduction of emissions.
7. A long-term national-level policy on the use of fuelwood in rural industries for long-term survival and growth should be prepared.

8. Plantations in and around industrial premises, big colonies and along roads and railways tracks should be promoted. Support systems should be created for marketing of fuelwood products from these plantations.
9. Efforts should be made to upgrade the quality of biomass fuels.
10. More emphasis should be placed on plantation of nitrogen-fixing crops and trees, and other fast-growing species.
11. Women's involvement in the small and village industrial sector should be made effective by giving due recognition to their contribution to the rural economy.
12. The socio-economic impact of woodfuel-using industries should be assessed. For this, proper criteria need to be established.
13. Studies on process modification, process optimization and substitutions, and improvements in combustion efficiency should be conducted for different industries, in close cooperation with those industries.
14. Time savings, improvements in product quality and increased efficiency of biomass-based energy systems should be quantified.
15. Support should be provided for the small-scale industrial sector through training in upgraded technology, use and maintenance.
16. In order to support efficient wood and biomass energy systems in rural industries and village applications, audio-visual promotion material (radio, television, printed media) should be developed.
17. To create awareness on economical and efficient use of biomass energy amongst future citizens of the country, inclusion of these issues in secondary school curricula and other relevant curricula should be considered.

3. SUMMARIES OF PAPERS PRESENTED AT THE WORKSHOP

3.1 Rural Industries, Village Applications and Biomass Energy Use

Auke Koopmans, RWEDP

The paper provides an economic and geosocial introduction to Bangladesh, noting the large rural population and the status of rural industries. At an estimated 67 per cent of total national energy consumption in 1994/5, biomass energy is proportionally losing ground to other energy sources in Bangladesh, although actual biomass energy consumption is still rising. Around 20 per cent of biomass energy is used in small-scale industries, while the other 80 per cent is used in households. The paper notes that all estimates and generalizations regarding biomass energy use are based on small amounts of not very reliable data.

Discussing the future role of biomass energy, the paper proposes that it is certain to remain the main source of energy for millions of Bangladeshis for many years to come. However, the agricultural development needed to feed Bangladesh's swelling population over the next few years will probably have a major impact on the availability of biomass fuel, so integration of agricultural planning with forestry and energy planning is important. The paper goes on to discuss energy conservation, particularly its economics and lessons learnt from previous programmes.

3.2 Biomass-based Energy Systems and Rural Development

M Eusuf, BCAS

The paper identifies 37 rural industries and village applications which consume significant amounts of biomass energy. The fuel requirement for rural industries is discussed, along with the economics of biomass energy use and the potential for replacing biomass fuels with other energy sources. The paper ends with recommendations on achieving sustainability in biomass energy (according to the paper, more biomass is being consumed than can be replaced each year, resulting in a net depletion of resources), data, fuel production, fuel conservation, fuel processing and international assistance. Overall, a coordinated, intersectoral approach is suggested.

3.3 Use of Biomass Fuels in Small and Cottage Industries

Dr Mohd Abul Hashem and Eng M Sohrab Hossain

The paper outlines the role of energy in national development and gives tables comparing biomass with commercial energy supply and showing energy consumption in different sectors. Bangladesh now has one of the lowest per capita energy consumption levels in the world. However, consumption is expected to rise by about 7.1 per cent per year, and the extra demand will be met mostly by the private energy sector. The paper outlines Bangladesh's own energy resources and imports, and the patterns of energy consumption by the industrial sector, including small-scale industries. Possible substitutes for biomass energy are listed and briefly discussed. The rest of the paper is a description of the Bangladeshi Energy sector's energy management programme for rural cottage industries, and a set of conclusions and recommendations. A brief description of BSCIC's work is appended to the paper.

3.4 Use of Compressed Rice Husk Briquettes in Rural Households: Gonoshasthaya Kendra's Experience

Iqbal Hossain, Senior Engineer, Gonoshasthaya Kendra

The paper lays out the experiences of the Gonoshasthaya Kendra (GK) charitable trust in introducing compressed rice husk briquettes as a cooking fuel to substitute fuelwood in communities of Rohingya refugees, in order to reduce damage to the surrounding forest from fuelwood extraction. The CRH briquettes were supplied to the refugees by the UNHCR. With funding from the EU, GK conducted R&D work on improving briquette manufacturing and end-use technologies like stoves. The findings of the experiment were that the CRH supplied met only 17.5–38.4 per cent of the fuel needs of families in the communities, though the improved stoves were so much more efficient that all requirements could have been met if they were commonly used. The Rohingya complained that the new stove was too smoky and hot, both of which were major problems in their small, confined kitchens. (Normal kitchens in rural Bangladesh are considerably larger, so this was not regarded as a major obstacle to the wider introduction of CRH.) Kerosene stoves, which were experimentally introduced at the same time, were found to be cheaper in terms of fuel requirements and were more popular, as they produced little smoke and little excess heat, even though cooking on them took longer than on the improved CRH stoves. Conclusions are drawn from the experience and possible areas for future research are suggested. Annexes to the paper include a report on a visit to a CRH factory and information on Rohingya cooking habits.

3.5 Wood Energy Systems for Bakeries, Roadside Restaurants and Sweetmeat Shops

Dr A Khaleque, BCSIR IFRD

The paper gives an overview of the rapidly expanding bakery, small roadside restaurant and sweetmeat industries in Bangladesh. Woodfuel and other biomass fuels tend to be used in all of these. However, in the few areas in which natural gas is available the owners rapidly change to gas-fueled cookers. The paper focuses on bakeries. Those using biomass fuels use a large traditional oven, the *tandoor*. Rapidly increasing demand has multiplied the number of small rural bakeries. However, fuel prices, along with difficulties in obtaining raw materials and competition from larger urban bakeries, pose problems for these businesses. The paper describes the production of breads and sweetmeats in such small bakeries and in roadside restaurants and sweetmeat shops. It also describes traditional ovens and stoves used by these three industries. The paper concludes that due to the increase in demand and the lack of knowledge about woodfuel use that persists in these industries, extensive R&D is needed to develop the technologies they use.

3.6 R&D Activities for Fuelwood Conservation in Bangladesh

Dr A M Hasan R Khan, BCSIR IFRD

The paper opens with a review of the energy situation in Bangladesh. This is followed with descriptions of the traditional stoves in use in Bangladesh and various types of improved stoves currently in R&D or on the market. It ends with a list of four recommendations: more funds should be allocated to research in the improved stove programme; R&D should focus on portable stoves, which are more popular than fixed stoves in urban areas; exchange visits should be arranged between stove experts in the region; and an expert committee should be established to standardize stove testing procedures.

3.7 Biomass Fuels Used for Pottery and Ceramics Making

Dr Lulu Bilquis Banu, BCSIR IFRD

An overview of the ceramics and pottery industries in Bangladesh is given. Most pottery and traditional ceramics production is in cottage industries, where all members of the household are involved in the process. It is also seasonal, and the producers tend to be farmers producing pottery in the winter months. Modern ceramics production does not use wood or biomass fuel, while 30 per cent of fuel used in the traditional units is wood and the rest is other biomass types, depending on local availability. A description is given of the kilns currently in use and the improvements made. Many traditional potters are finding it increasingly difficult to find fuel and clay, and a link up with the agro-forestry sector is suggested. The paper ends with recommendations: any attempts to develop the traditional pottery sector should address gender and child issues; R&D in kiln technologies should involve participation of the potters themselves; potters' cooperatives should be formed to improve marketing, including export, of their products; a skill and design development programme for the traditional pottery sector should be started; and the Government and NGOs should take the initiative in these matters.

3.8 Energy Use in Brick Industries in Bangladesh

Mr Md Abdur Rouf, BCSIR IFRD

The paper provides an overview of the brick industry in Bangladesh, which contributes around one per cent of GNP. Two types of kiln are commonly used, though the more efficient, larger-scale Bull's Trench type is rapidly replacing the *pui bhata* type. The kilns use woodfuel, other biomass (particularly bamboo roots) and coal, sometimes mixed with waste oil or old tyres. Government restrictions on woodfuel use in the brick industry are often ignored. Many brick manufacturers are experiencing severe fuel shortages. Observations on various aspects of the industry are given. It is noted that there is a serious shortage of skills in the industry, so a lot of bricks are defective; however, the efficiency of the Bull's Trench kiln is hard to improve significantly. A change to more advanced technologies like the vertical shaft brick kiln would yield far more positive results (primarily a 50-per cent saving in energy used), but would also require a change in operational practices. The brick industry at present is causing fuel shortages and, as units are often near urban centres in order to be close to the consumers, it is also causing bad pollution in the form of toxic gases from incomplete combustion of fuel. The author recommends that the brick industry switches completely to coal (though not low-quality, polluting coal) as fuel. He also recommends stricter enforcement of the restrictions on woodfuel use, and the banning of further brick manufacturing premises being built near urban areas.

3.9 Problems and Prospects of Rice Parboiling in Bangladesh

Dr A M Hasan Rashid Khan and Md Amir Hamza, BCSIR IFRD

In Bangladesh, rice parboiling and related processing account for 62 per cent of industrial biomass consumption. Six to seven per cent of the rural workforce is involved in traditional husking and parboiling, some of which is even done at household level. Modern intensive mechanized methods are gradually gaining ground. The main fuel used in traditional parboiling is agricultural residues, but this is a low-quality fuel, and the smaller units find it hard to compete with modern factories running on electricity. Detailed descriptions of the parboiling process and of various stoves used in traditional parboiling units are given. The paper closes with conclusions and recommendations, the latter mainly about improvements to the stoves used in the industry.



Dr A M Hasan Rashid Khan

3.10 Fuelwood Used in Herbal Medicine

Mr Enayetul Islam, BCSIR Laboratories

The paper opens with a discussion of the traditional medicine situation in Bangladesh. BCSIR Laboratories sees these as a potentially lucrative export due to Bangladesh's rich natural endowment, but lack of skills and wholesale use of medicinal plants as fuel are major obstacles. Publicity campaigns and other means should be used to educate people about which plants are of medicinal value and so should not be used as fuel, and stoves should be made more efficient to reduce fuel needs, the author recommends.

3.11 Dissemination of Improved Stoves Developed in BCSIR

Dr A M Hasan R Khan, BCSIR IFRD

The paper opens with the rationale behind the improved stove programme: that consumption of biomass fuels is estimated to be far ahead of the rate of biomass replacement, and this problem is certain to get worse as Bangladesh's population grows. The next section gives descriptions of the various types of improved stove currently available in Bangladesh.

It is noted that while new stove designs could be leased to entrepreneurs in order to capitalize on their marketing skills, many designs involve simple adaptations of traditional stoves, which users can do themselves, so the entrepreneurs' stoves would be less attractive to consumers. Also, people tend to adopt new stoves when they see their neighbours using them, so distribution of a few prototypes is considered the best starting point for dissemination efforts. The BCSIR has already tried advertisements of new stoves through the mass media, which yielded good responses and valuable market information. Following up on this, lecture/seminars were staged in areas where a lot of interest had been shown. This again yielded useful information and established useful contacts in areas of particular interest. Training and demonstration sessions were then held to show representatives of various groups and organizations how to build the stoves and to give them a chance to compare them with existing models. Stoves were then made available for sale at cost price at the IFRD, and user reactions monitored. The BCSIR IFRD then launched the Fuel Saving Project, training unemployed rural youths in construction of improved stoves, biogas plants and improved lamps. This ran from 1988 to 1991. The Government has now approved the 15.1 million tika Improved Stove Dissemination Project for 1994–96, a description of which is given.

The next section is a list of the organizations involved in the stove programme, and a description of their roles. The paper ends with a suggested strategy for development of renewable energy technologies and a list of recommendations.

3.12 Dissemination of Improved Stoves by the Bangladesh Rural Development Board (BRDB) in Rural Areas of Bangladesh

Mr Md Shah Alam, BRDB

The BRDB is an autonomous government agency concerned with rural development and alleviation of poverty. With its extensive grass-roots networks in rural areas, it has potential to become a key player in stove dissemination initiatives. Brief descriptions are given of previous involvement in stove dissemination: one a series of training sessions involving BRDB cooperating partners at the end of 1991, and the other training courses for local groups under the new Improved Stove Dissemination Project. Some course participants were selected for a paid role in dissemination. However, the project is due to end at the end of 1996. The paper closes with recommendations, mainly about training and institutionalization of a permanent dissemination and training programme.



Col. Quazi Tajul Islam

3.13 Dissemination of Improved Stoves by ANSAR-VDP in Rural Areas of Bangladesh

Col. Kazi Tajul Islam, ANSAR-VDP, Dhaka

The ANSAR and Village Defence Party is the largest voluntary organization in Bangladesh, with around 4.5 million volunteers, half of whom are female. Construction of improved stoves is incorporated into volunteer training programmes, and use of improved stoves is one of the criteria for “best village” awards in each area. Obstacles encountered so far include the fact that poor villagers often cook outdoors and are unwilling to invest time or money in an improved stove which may be

destroyed by rain;•, that parts and raw materials are not always available at an affordable price in the areas where the stoves are to be installed;•, and that lack of adequate funds mean Ansar-VDP officers cannot pay visits to local areas to supervise implementation. Recommendations are given to address these issues.

3.14 Gur Making Using Bagasse in Bangladesh

Mahfuza Khanam, BCSIR IFRD

Gur is raw sugar made by evaporating off the water in sugar cane, or occasionally date and palm, juice. Heat for this process is obtained by burning bagasse, which is what remains of the cane after it has been crushed to extract the juice (about 15 per cent of the original cane by weight). *Gur* making is always traditional and on a small scale. Because the urban market prefers refined sugar, no modern technology has been developed for it and people living in areas near modern sugar mills are not allowed to produce *gur*. In the modern sugar industry, bagasse is used to produce power for the crushers as well as process heat, but this is not true in *gur* manufacture. The *gur* and sugar industries, if efficiently run, could produce a surplus of bagasse, which is a relatively high-quality fuel, but it is not easy to transport. Some competing non-fuel uses for bagasse also exist. Suggestions for improvements to the present design of *gur* furnaces (*tafals*) are given. BCSIR IFRD has already developed an improved model and expects to start installing it very soon.

3.15 Fuelwood Used for Yarn Twisting and Dyeing

Nuran Nahar Begum, BCSIR IFRD

Traditional yarn production is gradually giving way to mechanized production. However, many small-scale producers still operate. In traditional units, fuel is used in steaming the yarn during the twisting process, and in heating the dye solution. The most commonly used fuel is wood. Descriptions of manual and machine dyeing are given, followed by descriptions of traditional and improved stoves. Efficiencies in the traditional



Mrs Nuran Nahar Begum

stoves are between five and 15 per cent, and the stoves are highly polluting. The paper ends with lists of constraints to the industry and recommendations.

3.16 Fuelwood/Biomass Fuels Used in Sericulture/Catechu Industries

Ranajit Kumar Sarker, BCSIR Laboratories

Sericulture (production of silk yarn) and production of catechu (a concentrated, dry extract of *Acacia catechu* used in dyeing and tanning) are relatively minor rural industries in Bangladesh. At present, the major constraint is fuel cost, because the traditional combustion technologies still widely used are highly inefficient. The most commonly used fuels are wood and biomass residues. Fuel is used in sericulture to boil the cocoons of the silkworm in order to extract the fibres. It is used in catechu production to boil and evaporate off water containing chips of *Acacia catechu*. Descriptions are given of production methods and stoves employed, along with specific energy consumptions. The paper recommends that improved stoves be introduced in these industries to make the industries more healthy for the workers and more competitive, in order to capitalize on the large demand for both products in the international market.

3.17 Policies and Strategies for the Production of Fuelwood in Bangladesh

Sunil Kanti Bose and Tareque Muhammad, Department of Forestry

The paper provides an overview of the forestry situation in Bangladesh. At present, wood is the third most important fuel after agri-residues and natural gas. As there is little prospect of commercial energy sources meeting the inevitable increase in energy demand, traditional sources (fuelwood and biomass residues) must bear the brunt. At present, forests contribute three per cent to GDP, but only one per cent is invested back into them, so forestry is viewed as revenue-generating sector rather than a service sector, an attitude which the author believes should change. A description is given of Bangladesh's forest resources, which are under extreme pressure from the growing population. Also, almost half of state forest area is unproductive. National development plans have included afforestation drives, and previous and current afforestation efforts are discussed. A major emphasis since 1979 has been participatory forest management. No fuelwood plantations have been created, but all the forests produce fuelwood as a by-product. A Forest Master Plan was approved in 1993, which is intended to achieve sustainable forest and environmental management within its 20-year span. Constraints to the programme are listed, including uncertainty over land tenure and the lack of a participatory attitude among rural people. Conclusions and recommendations are also given, most of which, the paper says, are already recognized by the master plan. A lack of research on fuelwood species is noted as a significant problem to be addressed.

3.18 Energy Supply Policies in Relation to Sustainability of Biomass Fuels

Prof. M Nurul Islam

The paper opens with an introduction to biomass fuels and the need for coordination between different sectors in their development. The second section gives an overview of the energy situation in Bangladesh. Section 3 sets out the objectives of the Bangladesh National Energy Policy, and discusses relevant issues: data base, energy conservation and area-based planning. Section 4 focuses on the government's Policy on Renewable and Rural Energy. The main policy issues are that all energy development should seek sustainability and minimal environmental impact; that rural energy is to be prioritized in all development of the energy sector; that biomass energy is certain to play a major role in Bangladesh's energy sector for many years to come; and that penetration of commercial fuels into rural areas must be pursued, as the country will not be able to produce enough biomass fuel to meet future demand. Specific policy issues are then discussed at length.

3.19 Upgrading of Biomass Fuels

Mr Kazi Akhtaruzzaman

Biomass is used at such high rates for fuel etc. that the fertility of the soil is going down and erosion is rising. To reduce the demand for biomass fuels, there are two options: improving stoves etc. and upgrading the fuels. Major methods of upgrading are discussed. Biomethanation produces biogas and leaves a residue which is a good fertilizer. The Government's Biogas Pilot Plant Project aims to set up pilot biogas plants in every part of the country. The next method discussed is briquetting, and the merits of various residues which can be briquetted are laid out. Gasification is considered to have potential at the small scale, but no gasifiers are currently thought to be in operation in Bangladesh. Charcoal is a good fuel and already used, though wood shortages of constrain development of the charcoal production industry. Two recommendations are given to close the paper: that more and reliable data and information on biomass energy in Bangladesh be obtained, and assistance and training be given to make up for the lack of experience and knowledge in Bangladesh on upgrading biomass fuels.



Mr Kazi Akhtaruzzaman in discussion with Mr Auke Koopmans and Mr Jaap Koppejan of the FAO RWEDP

4. LIST OF PARTICIPANTS

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5. PROGRAMME OF THE WORKSHOP

October 27

Morning

Inaugural Session

Venue: IFST Seminar Hall

- Welcome Address by Dr A Khaleque, Director, IFRD, BCSIR, Dhaka
- Address by Mr Auke Koopmans, Wood Energy Conservation Specialist, FAO-RWEDP, Bangkok, Thailand
- Address by Mr Hiroyuki Konuma, FAO Representative in Bangladesh.
- Inaugural address by the chief guest, Mr Fazlur Rahman, Secretary, Ministry of Science & Technology
- Remarks by Dr F Z Majid, Chairperson, BCSIR, Dhaka
- Vote of thanks by Dr A M Hasan R Khan, CSO, IFRD, BCSIR, Dhaka.

Session 1: General Background

Venue: BCSIR Conference Room

Chair: Dr A Khaleque, Director, IFRD, BCSIR, Dhaka

Rapporteur: Dr Lulu Bilquis Banu, PSO, IFRD, BCSIR, Dhaka

- "Rural Industries, Village Applications and Biomass Energy Use", by Mr Auke Koopmans
- "Biomass-based Energy Systems and Rural Development", by Dr M Eusuf, Ex-Chairperson, BCSIR, Dhaka
- "Use of Biomass Fuels in Small and Cottage Industries", by Dr Abul Hashem, Eng. M Sohrab Hossain, BSCIC, Dhaka

Discussion and close of Session 1

Afternoon

Session 2a: Energy Conservation and Rural Industries

Venue: BCSIR Conference Room

Chair: Mr Auke Koopmans

Rapporteur: Mahfuza Khanam, SSO, IFRD, BCSIR, Dhaka

- "Use of Compressed Rice Husk (CRH) Briquettes in Rural Households: Gonoshasthaya Kendra's Experience", by Iqbal Hossain, Sr Eng., Gonoshasthaya Kendra, Savar, Dhaka
- "Wood Energy Systems for Bakeries, Restaurants and Sweetmeat Shops", Dr A Khaleque, Director, IFRD, BCSIR, Dhaka

- "R & D Activities of Fuelwood Conservation in Bangladesh", Dr A M Hasan R Khan
- "Biomass Fuels Used for Pottery and Ceramics Making", by Dr Lulu Bilquis Banu, PSO, IFRD, BCSIR, Dhaka
- "Energy Use in the Brick Industries in Bangladesh", Mr Abdur Rouf, SSO, IFRD, BCSIR, Dhaka
- "Problems and Prospects of Rice Parboiling in Bangladesh", Dr A M Hasan R Khan
- "Fuelwood Used in Herbal Medicine", Enayetul Islam, PSO, BCSIR, Chittagong

Discussion and close of Session 2a

October 28

Morning

Session 2b: Energy Conservation and Rural Industries

Venue: BCSIR Conference Room

Chair: Professor M N Islam, BUET, Dhaka

- "Dissemination of Improved Models Developed in BCSIR", by Dr A M Hasan R Khan
- "Dissemination of Improved Stoves by the Bangladesh Rural Development Board (BRDB) in Rural Areas of Bangladesh", by Md Shah Alam, Deputy Director (Field Services), BRDB, Dhaka
- "Dissemination of Improved Stoves by ANSAR-VDP in Rural Areas of Bangladesh", by Col Kazi Tajul Islam, Director (Training), ANSAR-VDP, Dhaka

Discussion

- "Gur Making Using Bagasse in Bangladesh", by Mahfuza Khanam, SSO, IFRD, BCSIR
- "Fuelwood Used for Yarn Twisting and Dyeing", Nuran Nahar Begum, IFRD, BCSIR
- "Fuelwood/Biomass Fuels Used in Sericulture/Catchu Industries", by Ranjit Kumar Sarker, PSO, BCSIR, Rajshahi

Discussion and close of Session 2b

Afternoon

Session 3: Energy Supply

Chair: Dr M Eusuf

Rapporteur: Nurun Nahar Begum, SSO, IFRD, BCSIR, Dhaka

- "Policies and Strategies for the Production of Fuelwood in Bangladesh", by Mr Sunil Kanti Bose, Asst Chief Conservator of Forests and Mr Tareque Muhammad, Asst Conservator of Forests, Forestry Department, Dhaka
- "Energy Supply Policies in Relation to Sustainability of Biomass Fuels", Prof Nurul Islam, Institute of Appropriate Technology, BUET, Dhaka

- "Upgrading of Biomass Fuels", Mr Kazi Akhtaruzzanman, PSO, IFRD, BCSIR, Dhaka

Discussions and close of Session 3

Session 4: Discussing the Issues

Chair: Mr M A Matin, Member (Science and Technology), BCSIR, Dhaka

Rapporteurs: Mr J Koppejan, Associate Professional Officer, FAO-RWEDP, Bangkok, Thailand; Dr A M Hasan R Khan

Group Discussion, on policies and planning, implementation, R & D, financial considerations etc.

October 29

Field Trips

Visit to improved stove programme at Gazipur

Visit to woodfuel-using industries of the woodfuel resource/supply system

October 30

Closing Ceremony: Assembly Hall

- Address by Dr F Z Majid, Chairperson, BCSIR, Dhaka
- Presentation of the conclusions and recommendations
- Address by the chief guest, Mr A S H K Sadique, Honourable Minister of Education, Primary and Mass Education and Science and Technology
- Chairperson's remarks, by Mr M Fazlur Rahman, Secretary, Ministry of Science and Technology