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The People's Fuel

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Project Information

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

Wood Energy News

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

Those wishing to obtain *Wood Energy News* can write to the RWEDP secretariat at:

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Publications

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It seems that in the old days in the Philippines, a popular love song told of a boy courting a girl. He promised her he would collect fuelwood for their household every day after she married him. Our search for the text of the song has failed. Is there a reader who can help us?

In Asia, woodfuels are the people's fuel. They are part of day-to-day life and of valued traditions and their use has been expressed in art down through the ages. The beautiful batiks pictured on the front and back covers of this issue of *Wood Energy News* are proof of that. Woodfuel use is intertwined with rural and even urban and national economies - many people earn a living from woodfuel-related activities.

Unfortunately, in many cases woodfuels are also associated with hardship. Too many people still lack the devices and facilities to allow them to use their fuels in a convenient, healthy and efficient way. The diffusion of technical improvements in households and industries is unacceptably slow. Furthermore, the woodfuel business provides a safety-net for the poorest of the poor. Indeed, many poverty stricken people survive thanks to activities related to the supply of woodfuels, whether their involvement is legal or illegal.

The feature stories in this issue of *Wood Energy News* represent a wide range of cases illustrating the many types of involvement of people with fuelwood and charcoal. The stories are all about people, men and women, who cope with their problems, or enjoy any improvements, or who just carry on and help themselves. The stories may remind us that ultimately it is the people, with their interests and problems, whom we are trying to assist.

For those readers who still believe that woodfuel only matters in traditional or poor economies in Asia, we have included a story from an American farm. The North American economy uses the same amount of woodfuel per capita as Asia. Indeed, wood is as modern as any other fuel and there is nothing wrong with that. What makes a difference are the resources and options available to people to help them produce, process and use woodfuels.

Front and back pages: Fuelwood carriers in Nepal

Programme Focal Points

Bangladesh: Chief Conservator of Forests, Forest Dept, Min. of Environment and Forest; Industry and Energy Dev., Planning Commission, Min. of Planning.
Bhutan: Dir, Dept of Power, Min. of Trade; Joint Secretary, Forest Services Division, Min. of Agriculture.
Cambodia: Chief Community Forestry Division, Reforestation Office, Dept. of Forests and Wildlife
China: DG, Dept of International Cooperation, Min. of Forestry; Dp. Dir INFORTRACE.
India: Inspector General of Forests, Min. of Environment and Forests; Secr., Min. of Non-

Conventional Energy Sources.
Indonesia: DG of Electricity and Energy Devt; Dir of Regreening and Social Forestry, Min. of Forestry.
Laos: DG, Dept of Forestry, Min. of Agriculture and Forestry.
Malaysia: DG, Forest Research Institute; DG, Economic Planning Unit, PM's Dept.
Maldives: Dep. Director, Agricultural Services, Min. of Fisheries and Agriculture
Myanmar: DG, Forest Dept; DG, Energy Planning Dept, Min. of Energy
Nepal: DG, Forest Dept; Executive Secretary, Water and Energy

Commission Secretariat
Pakistan: Inspector General of Forests, Min. of Env., Local Govt and Rural Devt.; Chairman, Pakistan Council of Appropriate Tech.; Chief, Energy Wing, Planning and Devt. Division
Philippines: Secretary, Dept of Energy; Secretary, Dept of Environment and Natural Res.
Sri Lanka: Conservator of Forests, Forest Dept; Sec., Min. of Irrigation, Power & Energy.
Thailand: DG, Royal Forest Dept; DG, Dept of Energy Development and Promotion.
Vietnam: Director, Forest Sciences Institute; Dep. Dir., Institute of Energy, Min. of Energy

Daily Cooking in a Village - India

Dr Jamuna Ramakrishna

An early morning start

The day starts early for Gowamma. The rest of her family is still asleep and it is dark outside when she lights the kerosene lamp. Still, the lack of light makes little difference, for her kitchen is dark even at mid-day as it only has a small skylight for light and air. She knows her kitchen and stove so well that the lack of light does not hinder her much. Gowamma has known this kitchen since she came as a fourteen-year-old bride twenty years ago.

Kitchen less smoky

The kitchen now has a new improved stove, tucked into one corner. It is less smoky than the old one and that is what she likes best about it. The smoke from the traditional stove used to make her eyes smart and often gave her headaches. The improved cookstove uses less fuel too, and that is more important now than it was before.

When she first came to this village in southern India nobody used cow dung cakes for cooking fuel but now they do.

It is becoming increasingly difficult to get enough woodfuel. Gowamma and her family cannot afford to buy it and so they rely on what they can gather from roadside plantations, and from time to time they collect twigs and branches from the small trees planted on the bunds of their small irrigated field. They are not able to grow enough to sustain themselves; for part of the year all the adults in the family work as agricultural labourers.

Saplings planted

Gowamma is grateful for her mother-in-law who persuaded the family to plant saplings on the bunds several years ago. As it is, she and her 10-year-old daughter spend almost two hours every day making sure the family has enough fuel. Often the wood is green and of poor quality. After the harvest she switches to using the readily available crop residues.

Gowamma saves the coconut husks and fronds for heating bath water on the old traditional stove. She also uses that stove when she has to cook for large numbers of people.

About five years ago she also got a kerosene stove that she uses mostly to make tea for visitors. She does not use it for cooking because the food tastes so much better when prepared with fuelwood. Also, the supply of kerosene is erratic.

Weekly budget

She has heard that the university people from the city, who put in the cookstove, are now testing improved biofuels and she is interested to know more about this. Though she is most comfortable cooking with wood - she knows whether different types burn quickly or will be smoky - she also knows that it would be good to make the wood go further since it is getting harder to come by. Gowamma is afraid that she may be forced to buy fuelwoods and although she is more or less free to run the kitchen as she wishes, she has to keep to a weekly budget with any extra expenses requiring the approval of her father-in-law.

The family had to pay for part of the cost of the improved stove. Overall, Gowamma is pleased with it, although she had to make some modifications. For instance, the cookstove had come with a metal lid for the fuel box. But it took too long to chop the wood so it would fit inside the box, so she removed the lid.

Gowamma's last task at night is to make sure that there is enough wood stacked in the kitchen for the morning tea and meal. It is still warm in the kitchen when she leaves.



Things are less smoky now that the new stove is in use

Dr Jamuna Ramakrishna is programme officer with the Humanistic Institute, Bangalore, India.

Trading Woodfuel in the Capital City - Cambodia

Sarah Burgess

Worlds apart

The newly opened five-star Hotel InterContinental towers above its surroundings. In its shadow, although it could be a world away, is a community of fuelwood traders who provide an important service to the majority of Phnom Penh's residents. Within Phnom Penh, 84% of households use fuelwoods as their main source of energy for cooking. In addition, these fuels are used extensively by industry and services. Fuelwood traders provide the capital with more than half its energy. Wholesalers can be found in several main city locations, operating in a highly complex and informal manner. One place is Kaodai, where several traders provide wood energy to households, small industries and handicraft centres.

Mrs Heng Sokha lives in a wooden house with her husband, parents and children. She has traded fuelwoods from her home since 1988. Before this, she traded small amounts of charcoal, as part of a more general trading business. Then a fuelwood transporter suggested she trade firewood. At the time there were five traders in the area, a number which has steadily increased.

Woodfuel sales form only one part of the household's income, approximately US\$2.57 per stere, part of which is paid out for labour and other business expenses. The profits cover the costs of food for the family, and additional income is earned by a banker, a government official and a policeman.

Many traders in Phnom Penh have well established trading relationships with transporters and suppliers, but Mrs Sokha trades alone. She drives to Dey Ambel, about 70km west of Phnom Penh, every 7-10 days to buy stock. Firewood in this area is poor quality and

is obtained from land cleared for agriculture. She usually buys five steres at a time. In front of her house, Mrs Sokha stocks two to three times this amount, and generally sells five steres per week to restaurants, bakeries, brick kilns, and domestic users.

Firewood is bought from the suppliers as logs, but many customers need them to be chopped for use. Therefore, Mrs Sokha employs one person to chop wood at a rate of about US\$1.14/stere.

Mrs Sokha says over the years little has changed in the way she trades.

The supply area remains the same, as does the quality of firewood. However, her business has gradually declined due to the growing popularity of LPG among wealthier households who use it for cooking, increased competition and because more users are buying wood direct from suppliers.

Checkpoint charges

The price of fuelwoods has remained low in relation to other essential commodities. It is now lower than earlier in the year, due partly to events following the

political changes in July. Before that time, checkpoints were located at major entry points into Phnom Penh, where transporters were charged a fee. The checkpoints have since been removed and Mrs Sokha, like other traders and large users, finds it cheaper to buy firewood directly from suppliers. Generally, there are few problems connected to the trade.

Low income families rely on people like Mrs Sokha to provide them with their main energy source. She suggested that the government could help her by setting higher selling prices for fuelwoods, but doesn't think this is a likely prospect due to the informality of the trade and the withdrawal of government control over energy prices during market liberalization.

She is worried that if the trade is banned, or if it becomes more difficult to make a profit, she and many other traders will go out of business. Most fuelwood trading households have more than one form of income generation, but for those relying solely on the trade, there are few real alternatives due to their lack of experience in other types of employment.



Piles of wood outside a trader's home near the Hotel InterContinental

Sarah Burgess is a consultant with the Environmental Technical Advisory Programme, Phnom Penh, Cambodia.

Meals on Wheels - Thailand

Joost Siteur

Eateries everywhere

In Bangkok, it is possible to find something to eat on the road at almost any time and place. At nearly every street corner there are vendors, many of whom use charcoal to boil, fry or grill their food.

Mrs Ubon Thammachariya runs a small food stall in an alley-full of such vendors. For 19 years she has sold 'khanom chin' - a kind of rice noodle with fish curry, topped with fresh and fermented vegetables - from the same spot. A plate costs 15 baht¹; 20 baht if it includes extras such as fish balls or a boiled egg. Six days a week, from 11.00 am until midnight, she can be found there, helped by her husband and sometimes her children. She uses two charcoal stoves to keep the curries warm.

An early start

Everyday she gets up at 3 am to buy fresh vegetables and fish at the market, after which she prepares her various curries. Other ingredients, such as the noodles and fermented vegetables, are delivered by her regular supplier.

A charcoal trader, who has been supplying her since she started, delivers charcoal every day. She prepares the curries in the morning using LPG, because it works faster than charcoal. During the day she has to keep the curries warm and for this she uses charcoal.

Although charcoal is more expensive than LPG, she prefers it because she considers charcoal safer since it can be left unattended. She says it also gives the food a better smell and taste. In one day she uses one seven-kilogram bag of charcoal, which costs 140 baht.

Joost Siteur is Associate Professional Officer/Wood Energy Planning with the RWEDP in Bangkok, Thailand.



Mrs Ubon Thammachariya prepares her khanom chin

Mrs Ubon buys the clay stoves at the same market where she buys the ingredients; 140 baht for a big one and 120 baht for a smaller one. She can use

them for only two or three months since they start to crack with the heat and under the weight of the heavy curry pots. Up until 10 years ago she could ask someone to repair the stoves but nowadays no-one can be found to do the job. She knows there are improved stoves that use less charcoal, but these are too small, and anyway she doesn't use much charcoal to keep the food warm.

Meals on wheels

She could buy higher quality cement stoves which last for five to six months, but they are also more expensive at 250 to 300 baht. They are also a lot heavier, so she would not be able to put them on her pushcart. Mrs Ubon uses this to move her gear from her house to her selling spot and back, and during the day she puts the ingredients and the big stove on it. She says if better quality stoves of the same weight as her clay ones could be found, she would be willing to pay a higher price.

Over the years the price of charcoal has increased only gradually - 19 years ago it was 90 baht. It is the ingredients that have become more expensive and a dish that she first sold for seven baht now costs 15 baht. In a day she earns 500-600 baht, but she says her income has been affected by Thailand's current economic crisis, because until last year she used to make around 1,000 baht a day. These days she has fewer customers because more people have started to sell the same kinds of food.

¹ *There are 45 baht to one US dollar*

Teak Trees an All-Round Investment - Indonesia

Edwin Sujarwo

Planting for the future

Farmer Mr Suhadi, known locally as Pak Suhadi, lives in the poor village of Temuwuh about 40 km to the South of Yogyakarta in Indonesia. The lime soil in the hilly area makes it difficult to produce crops but Pak Suhadi manages to grow corn, cassava, and groundnuts on his 10,000m² plot. He has also planted teak trees around the edge of his land. Although they take years to grow, when they are big enough Pak Suhadi, 47, knows he can easily sell them for a good price as well as use their branches for firewood.

The farmer has 28 valuable teak trees. He could plant more but his other crops provide him with a more regular short-term return on his investment and he does not want the trees shading the crops. So far, he has sold two lots of trees. In 1990 he sold 19 trees, together worth Rp. 250,000¹. Each tree made him around Rp.13,000. At the time the trees were about 15 years old.



Shady teak fences are proving to be good for business



Newly planted Kleresede trees are used to create a fence.

In 1994 he sold four trees for Rp. 225,000, netting him around Rp. 55,000 each. He got more for the trees because they were bigger and wood prices had increased.

A growing account

Pak Suhadi never has problems selling the trees, with buyers approaching him for business. But he says he only sells when he needs some extra cash. He, like other growers in the area, views the trees as part of his savings. In selling the trees, Pak Suhadi strikes a deal with the buyer, insisting the latter take care of the cutting and transportation. He also demands that the root not be dug up and that around 20 cm of stump be left. Pak Suhadi says this allows the tree to grow again at an even faster rate. He has found that for a second growing it only takes a tree 12 years to reach a 20-cm diameter rather than 15 years for a first growing. One tree can usually be harvested four times and each time he will chop off the branches for use as firewood. He, his wife, and their three children, do not need to use any other fuel, except a little kerosene for their lamps.

Edwin Sujarwo works for Yayasan Dian Desa, Yogyakarta, Indonesia

Pak Mukidi makes a business out of wood

Many teak trees end up in the neighbouring village of Jatimulyo where carpenters use them to make doors, windows, furniture and other products. Pak Mukidi's main job is as a government officer with the water supply department. But he also runs a window and door-making business from home, employing five workers and one driver. His wife runs the business while he is at work. He says his village is famous for making windows and doors. In the past he used to go out with his father and when they found a suitable tree they would contact the owner. Now collectors bought and sold the wood. They also stripped off the bark and branches and sold these separately. Pak Mukidi says he thinks this is the cheapest way of doing things but he says it is now getting harder to obtain large teak trunks.

On average Pak Mukidi needs around seven to eight cubic meters of teak wood per month. Nothing goes to waste and any offcuts he cannot use are either used as fuel, sold to neighbours for Rp. 3,000 per bag, to small restaurants for Rp. 55,000 per mini-truck and for use by brickmakers.

¹ There are 8,575 rupiah to one US dollar.

Poplars Improve Farmers' Incomes - Pakistan

Dr K. M. Siddiqui

Famous for its fertility

Charsada is one of three central districts in Pakistan's North West Frontier province. This area is famous for its fertile soil and hard-working Pushtuns farmers, who grow numerous crops on their small holdings. If you visit their farms in March and April, you will find sugar cane and beet crops and widely spaced parsimon trees, as well as pear or peach trees in blossom.

Poplar trees are also a common sight and grow in abundance along the boundaries of every field and in schools and homesteads. This tract of land forms part of once-fabled Hashtnagar (eight lands) and was the cradle of the Gandhara civilization, whose remnants can be seen in many places. Numerous Buddhist stupas are testimony to the existence of a flourishing agriculture-based civilization more than 1,000 years before Christ.

A comfortable living

Naeem Pervez Khan is one of many thousands of farmers still practising this age-old profession in this thickly populated historic area. Naeem is a legal practitioner by profession, often visiting the cities of Peshawar, Charsada and Mardan in connection with his work. But he lives in his ancestral village of Mata Khel with his six brothers in an extended family. Together they own about 100 acres (40 ha) of land, on which they grow crops (mostly sugar cane and sugar beet), fruit and poplar trees. They have a few cattle for milk and meat.

The land is fertile and canal irrigation water is available all year in ample quantity for growing all kinds of crops. This land gives them enough income for a comfortable living.

Dr K. M. Siddiqui is former general director, Pakistan Forestry Institute, Peshawar, Pakistan.



Poplar trees, which are used to make matches and sports goods

A farmer's life is, however, never comfortable. His farm work starts early and ends late at night. It is tough work which gives him great satisfaction at the end of the day.

Farmers have grown poplar trees in this tract for many years. Earlier, Lombardy (*Populus nigra*) poplar trees were used but now only American (*Populus deltoides* clones) poplar trees are grown because they are fast growing and resistant to insect and fungus attack.

American poplars introduced

Naeem and all other farmers started planting American poplars in the early 1970s, as soon as the Pakistan Forest Institute introduced them in the tract. They export about 20,000 m³ of poplar timber every year to other parts of the country for the production of matches, plywood, sports goods, and so on, making the country self-sufficient in these products. Due to the lack of forests and wood resources, there is considerable demand for fuelwood in the area. All farmers, including Naeem, manage to sell branches and lops and tops of the trees as woodfuel in the local market.

Two important uses of poplar fuelwood are for cooking at home and in commercial establishments, and for curing tobacco leaves in kilns. Local farmers sell poplar woodfuel at the farm gate for PRS 65¹ per mound (40kg). The average retail price of woodfuel in Peshawar city ranges from PRS 85 to 90 per mound, depending on its size, moisture content and tree species.

Tree-growing farmers and woodfuel traders seem to try hard to maximize their share of the return by applying grading and cost-cutting measures. Increasingly, wood production on private farms is becoming a new system of land management in the irrigated fields of North West Frontier province.

Incomes improved

Its complementary role in improving farmers' incomes has been the motivating factor behind the introduction of fast-growing commercial tree species, like the poplar. Tree growth on the farmlands in Charsada district has made a significant contribution to the well being of farmers like Naeem Pervez Khan and improved the local economy.

¹ There are 44 PRS to one US dollar.

The Recovery of Fuelwood Forests - China

Zuzhang Xia

Massive deforestation

Sixty years ago mountainous Xixia County in Central China's Henan Province was dominated by forest, giving the largely rural population there plenty of woodfuel and charcoal. But in the 1930s and 1940s all that began to change.

War meant that huge amounts of charcoal were needed to make iron and steel. Later there was large scale deforestation to make way for agriculture, and in the 1980s there was a large industrial demand for timber. All this meant that primary forest was destroyed.

In the 1950s villagers living in Dongtaizi were surrounded by more than 1,533 hectares of primary forest but after large-scale cutting during 1958-1962 only about 26 hectares of forest was left. Forest in the plains was almost clear cut. In the late 1970s people began to suffer a severe fuelwood shortage. Soil erosion, river silting, mountain slides, and a decline in the output of forestry products followed.

Cutting banned

At about this time the local government began to act. It banned cutting for fuel and animal grazing in mountain areas to help the forests recover. The measure worked in relatively remote areas but in hilly and low mountain areas fuelwood remained in short supply and alternative fuels proved too expensive for the locals. In 1978, about 3,000 hectares of forest for fuelwood were planted in five south-eastern townships. This helped to some extent. During the Eighth Five-year Plan period (1985-1990), Xixia was selected as a pilot county for integrated rural energy development. This focused on planting forests for fuel in an effort to solve ecological problems. People were educated about the ecological, eco-

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Firewood from a replanted forest in Xixia County

nomics and social importance of the forests by means of posters, broadcasts and meetings.

The government came up with an overall fuel forest development plan and organised its implementation. The use of indigenous trees, such as oak and linden, with good fuelwood and other income generating properties, was stressed; less rent was charged to collectives promoting reforestation; and the government provided free saplings or subsidies.

Locals, cadres, farmers, collectives and provincial authorities all helped fund reforestation. Within five years the county had invested 1.95 million RMB¹ on woodfuel construction. Mountains were closed off, or closed to woodfuel collection at certain times of the year, and wood traders more tightly controlled.

Trees return

The result was that forest coverage in the county increased from 56% in 1990 to 60.7% in 1995. A recent investigation showed that 38.5 percent of fuel consumed in the county comes from wood, making it still the major energy source. However, although in the middle-high mountain areas there is a surplus of

wood, lower down there is a shortage and as development continues things are expected to worsen. Strong government support has helped bring about re-forestation but now there are concerns that a more market-driven economy will place less economic value on fuel forests.

Business grows

As a result, locals are concentrating not only on the value of forests for fuel but on other benefits forest materials can bring. In 1996, the county's fuelwood income was 54 million RMB, but total forest income amounted to 67 million RMB.

Measures adopted to promote the all-round value of forests include using sprouted saplings from cut oak stumps for growing edible Xianggu mushrooms and for low grade fuel, using oak leaves for raising silkworms, and extracting starch from oak seeds and tannin from oak shells. Wild red Xianggu mushrooms are also collected from the forests by villagers. The knock-on effect also means improved vegetation and more foodstuffs for livestock. In 1996, for example, the number of goats hit an historic high of 720,000.

Charcoal Makers Bring in the Money - Thailand

Pralong Dumrongthai

An ever-popular fuel

Charcoal use, particularly among rural Thais, is still very high despite the availability of LPG, electricity and natural gas. In fact, 9.3% of Thailand's energy comes from charcoal.¹

The Royal Forestry Department of Thailand (RFD) has been playing a vital role in promoting the development of plantations to help communities which use wood, particularly in cooking. One project it has supported is Thai Plywood Company's Lad-Krating Plantation Unit, established in Chachoengsao province in 1968. Here fast growing trees, including *Eucalyptus* spp, *Leucaena leucouphala* and *Acacia mangium*, have been grown on a plantation covering approximately 3,260 hectares. The total wood stock weighs some 100,000 tons. Much of the wood is used to make particle boards, but low quality wood and harvest waste gets turned into charcoal.

Charcoal production began in 1988 as a way of dealing with the huge amount of harvest waste and to meet the local need for charcoal. At the start of operations two 8 m³ brick beehive kilns were used, together with mud beehive kilns.



Charcoal-making kilns in operation

There are now eight 8 m³ and four 20 m³ brick kilns. On average the smaller kilns produce 25 30 kg sacks per day and the larger kilns, 52 sacks.

Production success

Local workers run the operation, with each brick beehive kiln being overseen by one experienced employee. They work on a commission basis: the more charcoal they produce the more they get paid. Lad-Krating Plantation Unit pays 28 baht per sack or about 700 baht for each 8 m³ kiln of charcoal. It takes seven days and nine days to load, fire

and empty the two sized kilns. Workers are required to wear masks but some find them too inconvenient. However, the workers say they are happy with their jobs and the amount they are paid.

The plantation unit chief says that charcoal production has been a success. It has no problems selling its stock, which last year amounted to 15,904 sacks - up from 985 sacks in 1990 - at 100 baht per sack. Charcoal production is one of the main income sources for the Lad-Krating Plantation Unit. Most charcoal users are either locals or restaurants in Chachoeng-sao and neighbouring provinces. Traders deliver the charcoal to shops and restaurants in small-trucks capable of carrying 20 sacks. The unit chief says that he believes charcoal has a strong future in rural areas because other energy sources had risen in price. It is also sold abroad. In 1996 the Kingdom exported 8.7 million kilogrammes of charcoal².

¹ *Department of Energy Development and Promotion of Thailand, Energy Situation in 1996 report.*

² *Forestry Statistics of Thailand*



Preparing the wood for charcoal making

Pralong Dumrongthai is technical officer for the Wood Energy Research Subdivision, Royal Forest Department, Bangkok, Thailand.

Forest People Adopt New Stove - Vietnam

Tran Ngoc Dang

New stoves installed

The introduction of more efficient heating stoves into hilltribe villages in Vietnam is proving to be a big success. For years the ethnic minorities have cooked food and pig swill in the early mornings and late at night on simple stone and tripod open fires. But now new cooking-heating stoves have been installed in homes in De Tham commune, in Trang Dinh district of Lang Son province.

Here 788 households, totaling 4,000 people of chiefly Tày, Nùng and H'Mông descent, live in houses on stilts. During winter the temperature can drop to 2°C leaving old people and children shivering at night in their poorly insulated homes. Those without the new stoves have to burn large logs to keep warm and this means the average per capita consumption of wood is a high 1,700-2,100 kg per year.

In addition, the depletion of forests in the area means that women and children almost daily have to walk a minimum five kilometers to collect individual wood loads of around 35 kg.

Laws inadequate

The same story is true for the other minorities - the Dzao, Thái, Trai, Muông, Cao Lan, Pu Péo, M'Nông, Ê De - who live among the mountains and high plateaus in 45 of Vietnam's 61 provinces. Forest cover here has shrunk from 43 pct in 1943 to 28.2 pct in 1995.

Laws to protect the forests from cultivation and timber extraction appear inadequate due to a lack of motivation from the minorities in dealing with wasteful cooking and home heating methods.

Tran Ngoc Dang is director of the Forest Science and Technology Application Centre, Hanoi, Vietnam.

It was with government help that a number of foreign-funded and RWEDP projects assisted the Forest Science and Technology Application Centre (FSTAC) in developing, with help from local farmers, the improved BLN cooking stove and then the BLNS cooking-heating stove, first tried at Trang Dinh.

Cooking and coughing

Villager, Mrs Hoang Thi Chung, says the open fires pollute homes and leave cooks, and the old and young, coughing and with eyes watering. However, all this began to change with the building of 10 BLNS stoves in the commune, in the villages of Na Ao, Ha Tai, Coc Tai, Dana Na, Pac Luong, Khau Ngo, Keo Tay and Ninh Deng, after a short course to show farmers how to build the stoves. Mrs Hoang Thi Chung had one of them. The new stove has a BLN-design stove body and pipes connected to a heating box on which the elderly and children sleep.

Materials available

An evaluation of these first users found that: farmers can easily build the units with materials from the local market for US\$9-10; 30-50% fuel savings can be

made; cooking times are reduced by 30-35%; temperatures are higher by 7°C-10°C; there is much less smoke; and fire hazards are substantially reduced. As a result, a further 100 BLNS stoves have been installed - 20 in Na Ao and 80 in the villages mentioned earlier.

Helping hands

FSTAC staff were unable to cover the commune's eight villages but they received help from those who already had the stoves in explaining how to use them. The stoves are also now being used in Moc Chau (Son La) and in other provinces.

A year after installation, commune farmers reported that the stoves had been working well, with only minor defects, which users had repaired. Five more households had also built stoves. Mr Lang Van Thanh, chairman of the commune's People's Committee, said: "Farmers here are very satisfied.

"This has helped them have more time and resources for farm cropping and for attending to old people and children, particularly in winter."



A family uses the new cooking-heating stove

Sita Makes a New Chimney Hood - Nepal

K. M. Sulpya

Keeping the home fires burning

Wood is essential to villagers living in Nepal's Dalchoki village. Not only is it used for cooking and heating but in their home brewing and khuwa (solidified buffalo milk) making industries.

But wood is not easy to come by in Lalitpur district and the majority ethnic Tamangs, as well as the Brahmins, Chetris and Magars, have to use a large percentage of low-grade fuel, in the form of sticks and branches.

Government forests

Sita Tamang collects woodfuel from private and government forests nearby. Her family cuts tree branches and dead trees, leaving the wood in the forest and then collecting it between once a week and once a month. It takes nearly four hours to do this and she must pay Rs13 to Rs25¹ for the privilege of taking wood from the government forests.

Her brother-in-law can collect two bhari (120 kg) of wood in a day, although most family members are involved in the task. Sometimes she hires labourers to collect woodfuel for her home brewing industry.

Sita has also convinced her sister and brother-in-law to plant *Alnus nepalensis* on their sloping land. Not only do these fast-growing trees help prevent landslides but they can be sources of woodfuel, and anyway the land is not suitable for agriculture.

Kitchen improvements

Sita also wanted to make improvements in the kitchen. She wanted not only to make a stove with a chimney hood but to stand when she cooked, instead of squatting. She had seen cooking done this way in teashops and small restau-

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Sita Tamang using her stove before the new hood was installed

rants and her sister and brother-in-law supported her idea. She weaved a bamboo basket to create a chimney hood and then plastered it with mud.

Less smoke

She believes her stove now uses less wood and the food cooks faster and with less smoke and particles swirling around the kitchen. With less smoke she can dry maize and meat. The stove is also safer with fewer backdrafts. This means that both the children and the two-storey wood and stone home are less at risk. In her kitchen, she has placed a wood table and rack to the left of the stove, with a water jar to the right. The wood is kept in a small space under the stove. Her utensils, spices, oil and butter are to hand and she chops her vegetables on the table. Sita says she can weave the bamboo basket hood for Rs 100.

Chicken wire hood

Neighbour Man Bahadur Ghalan, a Tamang, has also created a chimney hood in his kitchen by covering four thin bamboo poles with chicken wire and plastering the whole structure with mud and agri-residues. However, it is not as efficient as Sita's. His hood only removes about two-thirds of the smoke and his wife bumps her head on it while cooking.

¹ There are 62.8 Rs to one US dollar

The People's Fuel

Woodfuel supply implies labour for growing, harvesting, wholesaling, transporting and retailing. Per unit of energy, the labour involved in these woodfuel businesses is about 20 times larger than for kerosene. Woodfuel business is the main source of income for about 10% of rural households, and for about 40% of their cash earnings.

In times of hardship, or when harvests are insufficient for subsistence, the opportunity to generate income in woodfuel businesses provides a safety-net for poor people, many of whom are women.

On the demand side, woodfuels are a basic commodity serving the daily needs of some two billion people in RWEDP member-countries.

However, access to the fuels is very skewed. In areas or times of scarcity, landless and unemployed people and low-wage earners suffer from high prices resulting from the non-availability of woodfuels.

Fuelwood for the Tobacco Industry - The Philippines

Rudy P. Bareng and Inna P. Acebedo

Teenage grower

Virgilio T. Bulong was 16 when he started tending his tobacco crop - now he is 65 and thinking about switching to another crop due to the shortage of fuelwood. For 49 years he has been growing tobacco in Barangay Palongpong, Batac, Ilocos Norte. The tobacco supplements the family income he gets from his main rice crop.

Mr Bulong grows Virginia tobacco, introduced to Ilocos Norte in the 1950s and one of the most important tobacco varieties in the Philippines. The curing industries are mostly located in the northern provinces of Ilocos Norte, Ilocos Sur and La Union, where most tobacco is grown.

Tobacco leaves must be dried promptly after harvesting to prevent them deteriorating. Mr Bulong cures his leaves in his barn for four to five days using a fuelwood fire. There are three stages: the yellowing stage, which usually takes about 24 hours at 40°C; the colour fixing stage which takes 50-60 hours at 42-50°C; and finally the leaf and midrib drying stage which takes another 24 hours at 71°C. The process requires eight to 10 m³ of fuelwood per season.



Tobacco farmer Virgilio T. Bulong

Prices rise

For the first 10-15 years Mr Bulong used two hectares for his tobacco crop but he gradually reduced the area due to the cost of chemicals, insecticides and fertilizers, labour, and due to the diminishing supply of woodfuel. At first, the wood came from Burgos, in the far north of Ilocos Norte. A broker would find out from the farmers how much wood they needed and then order it. Between the early 1960s and early 1980s, a cubic meter of wood rose from about 20 pesos¹ to 100 pesos. The wood used came from the *Casuarina equisetifolia*, *Albizia lebbekoides* and *Ficus benjamine* trees. Mr Bulong says he ordered eight to 10 m³ of wood but also collected wood (*Zissigium dulce*, *Pithecellopium dulce*, and *Mangifera indica*) from a nearby forest, using dead wood or trees toppled by storms.

During the early 1980s he shifted to another supplier when the broker from Burgos stopped coming because there was no more wood in the area. Between the early 1980s and 1992 Mr Bulong got his wood from a supplier in Currimao town, in the south of the province. Trees here include *Gliricidia sepium*, *Pithecellopium dulce* and *Acacia farnesiana*. When he started buying, the prices were 100-150 pesos per cubic meter but in 1992 they reached 350 pesos, excluding the cost of transportation. Mr Bulong hired a large truck for 400-700 pesos per six to eight-cubic-meter load. He also got wood from the forest, even cutting trees to supplement his supplies.

Supplies scarce

After 1992, supplies from Currimao, became scarce and the woodfuel sold became smaller, making it no longer suitable for curing. Mr Bulong found

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The tobacco curing barn

another supplier in Bacarra, Ilocos Norte, but he says the wood he gets from there is not as good because it includes driftwood collected from river banks. He has to cut trees in his own forest to augment that which he buys. As a result he has had to reduce the size of his tobacco farm to 2,500 m².

Farmers say they are planting trees to replace those being cut, but mostly with fruit trees like Eke mangoes (*Mangifera indica*), narra and mahogany. Alternative fuel sources have been introduced by the National Tobacco Administration (NTA), a government entity overseeing the industry. The administration introduced ricehull but farmers were unhappy with its low energy value and said it was messy and labour intensive to use. In 1993 it began persuading farmers to use coal briquettes. This led to a slowdown in the destruction of the forests but Mr Bulong does not like them. Now he is experimenting with a mixture of woodfuel and coal briquettes. Mr Bulong is getting on in years and this and the wood supply problem mean that he is now thinking of giving up tobacco and farming garlic, mango, corn or tomatoes as a second crop.

¹ There are 39.65 pesos to one US dollar.

Woodtraders as Patrons - The Philippines

Rene E. Albuero

Trading since the 1970s

Woodtraders Simeon and Leona Porio live in Panalipan, Catmon, on the Philippine island of Cebu. They have been in the business, operating on a small scale, since the early 1970s.

The couple started out by providing a collection point for woodfuel gathered by itinerant rural people who cut and dried the wood and bundled it according to various specifications. These bundles were then picked up on a weekly basis by a trader based in the town.

When the Department of Environment and Natural Resources (DENR) started regulating the trade in the late 1970s in an attempt to protect the environment it became increasingly difficult to meet demand. In 1981, DENR personnel advised the Porios to grow *Leucaena* species on their property both in the fallow areas and in spaces among the coconut trees. They took on the idea after visiting the upland barangays in the neighbouring town of Carmen where fuelwood plantations had been already been established.

The Porios started out by establishing an ipil-ipil (*Leucaena leucocephala*) plantation. They now have mature ipil-ipil groves on three and a half hectares on three separate plots. Ten farming families are involved in maintaining and harvesting the plantation. Trees of marketable size are peeled, cut into regular lengths, dried and bound in six-inch bundles and delivered to the Porios for P2.00¹ per bundle. They are then sold by the Porios for P3.50 per bundle in the market. Between August and December, when there is peak demand, the prices are fixed at 3.50 and P5.00 respectively and during this time much of the supply has to come from elsewhere.

Rene E. Albuero is project leader at the University of San Carlos' Affiliated Nonconventional Energy Centre, Cebu, Philippines.



Coconut fronds are gathered and then bundled together

Other fuelwood species like *Gliceridia sepium* and various fruit-tree species are also used, as are coconut fronds, which are normally second-choice fuels. The fronds are collected from plantations, and cut and bound into bundles. They are sold to traders for P1.50-P2.00 per bundle.

Traders as patrons

Whereas traders once only provided collection points they are now the main providers of fuel, overseeing marketing networks. They are also seen as "patrons" to those farming families involved in the trade, providing them with not only cash advances but credit from their stores

which supply basic necessities such as rice, canned goods, and even livestock feed. Such advances or credit are paid off when wood is delivered to the trader. The system ensures deliveries of hard-to-get woodfuel for traders other than from their own plantations. The in-town traders rely on their rural network of suppliers for a steady supply of wood.

In 1985 the Porios set up their own supply store at their collection centre in sitio Ilaya. The decision paid off and a year later the Porios bought a delivery truck. This turned them into mainstream traders allowing them to develop woodfuel outlets in the city and eliminating the middleman. The truck also al-

Environmental problems are being overcome

Between the 1960s and early 1970s the fuelwood trade in Cebu relied largely on supplies from rural people and farmers who collected it from copses and ravine woodlots. However, as the market grew it became harder to meet demand and the harvesters turned to collecting coconut fronds and to poaching private woodlots. In the meantime, the government's "Green Revolution" programme began to make an impact in the early 1970s. This resulted in the introduction of new, fast-growing species such as the ipil-ipil. While this alleviated some of the demand for woodfuel, it also led to an increase in poaching, as well as unrestrained harvesting. It was then that the DENR stepped in with regulations requiring woodfuel traders to obtain cutting and transport permits. Checkpoints were also set up on roads into cities. As demand continued to grow, the only option left was to establish commercial woodlots. The Philippine island of Cebu was long considered an environmental disaster due to the loss of forest cover but recent studies on woodfuel use seem to lay these fears to rest. The growing demand for woodfuels has in fact brought some structure to the marketing of wood.

lowed them to collect provisions for the store.

However, there were problems. First, the supply of wood proved inadequate to meet the growing demand. The Porios' plantation was only able to provide on average one truckload of wood every week and even then one-third of it came from other sources. The shortfall made the supplier-trader relationship extremely important but sometimes harvesters owing loans to the store but needing cash would quietly take their wood elsewhere.

Irregular deliveries

A second problem is the irregular delivery of woodfuel from the trader's own plantation. This happens when labourers have to give their time to other seasonal farm work. And operators of the woodfuel market outlets might also cause problems. They rarely pay cash on delivery, usually delaying payment until the following delivery. This works well enough when deliveries and payments are regular but the system is disrupted when there are irregular deliveries or payment defaults.

Such problems forced the Porios to reduce deliveries to once a week, thereby making supplies more regular, and to limit who they dealt with.

The practice of establishing sustainable woodfuel plantations (especially of coppicing species) has spared the environment from further abuse and the poaching of wood from private lots has been largely curtailed.

¹ *There are 39.65 pesos to one US dollar.*

A Garden of Trees - Sri Lanka

Anoja Wickramasinghe

From generation to generation

Ranmenike, 64, is applying lessons passed down from her ancestors to make the most of the family land and the trees which grow on it.

For generations her family has lived in Udatenna, near the town of Medamahawara, in an area characterized by rugged terrain. Despite being married she has remained at her parents' home based almost at the centre of nearly 0.8 hectares of land, which might be better described as a home-garden. The family household has four rooms with wattle and daub walls, cow dung floors and a thatched roof. Here her husband, son, daughter-in-law and grandchild live.

Woodfuel a priority

On the land there are 32 species of tree - the family assets. Ranmenike takes great pride in them because she helped her mother plant and nurture some of them and before that her ancestors tended the trees. Among the varieties are coconut, jak, mango and other fruit trees. Ranmenike says: "I grow and maintain all these trees for many purposes, but woodfuel is one of my priorities. Every tree in this garden produces woodfuel. When I need to plant new varieties I just find seedlings in the neighbourhood and plant them in a space." She "manages" the trees by thinning and pruning during breaks from her domestic duties. She also gathers dead wood, particularly coconut fronds, husks, shells and branches

and twigs from trees, particularly the jak, avocado, mango, and alstonia varieties. Ranmenike even collects enough coconut palm wood to be able to sell the excess.

Ranmenike says: "I don't have to spend hours walking long distances or creep onto state land or onto private property to gather sticks. I'm proud to say that I get more than I consume daily."

In tune with the seasons

She is in tune with the seasons and knows when the trees will provide her with what she needs. For example, although the dead fronds from the coconut trees are available all year, she knows that she gets the bulk in the middle of the year.

For the last 10 years Ranmenika has sold wood to neighbours from her garden. She collects the fronds and sells the hard sections at 60 cents a time, whereas husks go for 30 cents apiece. The money she makes goes on beetle nuts or on books for her grandchild. She often sorts the better wood and stacks it ready to be sold, while the less popular twigs, husks and shells she uses as cooking firewood.

Ranmenike is one among hundreds of rural women who use the trees around their homes to meet their daily needs and make a bit of extra cash.



Ranmenike keeps a part of the production for sale

Prof. Anoja Wickramasinghe works with the Dept of Geography, University of Peradeniya, Sri Lanka.

Cookstoves Change Lives - Myanmar

Steven W. Honeyman and Aung Kyaw

Poor fisherman

San Maung, 25, lives on the banks of Ngamoyeik Creek, a small tributary of the great Yangon River which flows into the capital of Myanmar from the North. He is a poor fisherman and every day he boards his small river craft before the sun breaks the horizon. He spends long days on his fishing boat trying to catch enough to feed his extended family of 18 who live together in a 14-foot by 24-foot bamboo hut, trying to survive on only two incomes. Some days he is lucky enough to sell a small surplus of fish at the local market to supplement the family income.

Two years ago, San Maung's wife, Khin Win, heard about a new stove while shopping in the market. She attended a demonstration of the "A-1 Cookstove" presented by Population Services International (PSI), a world-wide specialist in social marketing. PSI had initiated the world's first social marketing project of fuel-efficient cookstoves with a grant from Texaco Oil Company provided to UNDP/UNOPS and with support from the FAO/RWEDP and local NGOs. The Ministry of Forestry and Ministry of Science and Technology (formerly the Myanmar Scientific Technological Research Department) all played a vital role in the design and development of the cookstoves.

Stove talk

Khin Win listened while they explained how the A-1 stove burned woodfuel much more efficiently than anything else on the market and could potentially cut her fuel costs in half. She was surprised to hear that more than 400 truck-loads of wood from all over the country arrive each day in the capital. She heard how the reduced consumption of wood would not only save the few remaining forests

Steven W. Honeyman and Aung Kyaw work with Population Service International, Yangon, Myanmar.

around Yangon but also fuel savings would mean a few extra kyats in their pockets. She surmised that, over time, these savings would help her family begin the slow climb out of poverty that made survival the only goal of their day.

That evening, when her husband arrived from the river, she discussed what she had heard. Together, they planned to buy not one but two of the new stoves. San Maung would use one on his boat, reducing the amount of woodfuel he would have to carry to cook his meals. Khin Win would also use one at their home to cook sticky rice balls which she sold in the market. Together, not only would they save on their fuel costs but the A-1 Cookstove would allow them to increase their income from their small home-based micro-enterprise.

Easier to cook

The next day Khin Win took the few remaining kyats of her family's savings and bought two A-1 Cookstoves. She and her family soon realised there were other benefits. For example, the new stove produced far less smoke in their small house, improving her family's health and making it easier to cook. In addition, the cookstove would easily burn several of the fuels available, including woodfuel, rice husk, sawdust, coal dust and kerosene coal briquettes, charcoal, scrap wood, dried leaves and agricultural waste.

She also noticed that because fuel ash was kept within the body of the stove and could easily and safely be removed, her home was cleaner, freeing up extra time. It heartened her to know that the women's families who produced the stoves were also benefiting from the wages they were earning.

Neighbours remarked that the long life span of the new stoves far out-last other stoves available. She noticed that cooking times were reduced compared with neighbours who used slow-starting and expensive electric hot plates. And finally, Khin Win felt safer knowing there were far fewer sparks produced from the stove, reducing the chance of fire in her home.

Better life

Today, nearly two years on, San Maung and Khin Win still cook fish, vegetables, rice and tea on their A-1 Cookstoves. Neighbours also bought them for their families. San Maung and Khin Win still battle at the edges of poverty but they are convinced their lives are better and the environment and forests around their home a little better off. Thanks to the support of Texaco, the government of Myanmar, UNDP/UNOPS, FAO/RWEDP and the innovative social marketing of PSI, nearly 8,000 families have purchased A-1 Cookstoves.



A fisherman takes his cookstove with him on his daily trip

A Potter's Family Produces Stoves - Cambodia

Jaap Koppejan

Pressure on the forests

On the banks of the large Tonle Sap lake in central Cambodia lies the town of Kampong Chhnang. Many of those living here and in the surrounding villages work in agriculture and fishing and to some extent in the fuelwood trade. More than 95% of the population use fuelwoods for cooking, but an increasing amount of wood from the hills around Kampong Chhnang is also being taken by boat to the capital, Phnom Penh.

The increased gathering of woodfuel is putting more and more pressure on the forests, which used to surround Kampong Chhnang town. Now it takes gatherers a few hours by oxcart to get to the forests. The journey is not only time-consuming but dangerous since there are still many landmines buried, a legacy of the country's civil war. Woodfuel and charcoal have become more expensive for these reasons.

Traditional stoves

Portable clay stoves traditionally used in the area have one hole and a platform in front of the fire opening to hold firewood and ashes or on which to smoke fish. Made by a few pottery families in Kampong Chhnang the affordable stove is easy to use and widely available, with or without the smoking platform. It is used to boil, fry, steam and grill food. However the stove is quite inefficient.

The cost and problems associated with getting wood led the Indonesia Cambodia Rural Development Project (ICRDP) a few years ago to try to introduce a more energy efficient stove into the area. It wanted to help the mainly ethnically Vietnamese people living on stilthouses and boats on the lake and local land-based villagers to save wood and money.

In attempting to help, the ICRDP first carried out a rural survey to find out the



Making a portable stove

occupation, family make-up, incomes, and cooking habits of those who used the traditional stoves. A new stove was then selected and a local manufacturer chosen and trained. Where the old stove had one pot hole and high pot rests, the new one has two holes and low pot rests.

Trial period

A small number were produced and distributed to find out people's reactions. First users were not that impressed. They found that without a platform it was hard to smoke fish. So the stove was modified and a platform added. So far, some 600 stoves have been distributed. Most users are happy, although some complain that the stoves crack quickly. This has been put down to the habit of sprinkling water on the hot

stove after cooking, so the ICRDP has suggested another layer of clay be added to the stove after installation, if portability is not a requirement.

A family affair

The family making the new stove consists of four women, three men, their children and parents. The men and children, once out of school, collect clay from the hillside and riverbed, and then sieve and mix it with water at home. Two of the women form the different stove parts while the third assembles the stoves. After being dried in the sun they are then fired together in the open under a wood and straw fire. This technique, which is used by other potters in Kampong Chhnang, demands a lot of fuel. Although the ICRDP installed a more efficient brick kiln this was removed recently to free up space for a marriage.

The new stove is more expensive than the old one. The potters are paid 2,500 riels¹, whereas the old one gave them 1,000-1,500 riels. However, the new one has two pot holes instead of one so they may sell less. It also takes around twice as long to make because there are more parts which have to be accurately made. When one of the women producers started enlarging the chimney hole at the back of the stove to speed up the drying process ICRDP staff had to explain that she was also reducing its efficiency. The stove is still being demonstrated by several NGOs. Once proven, it will be sold on the market.

¹ There are 2,700 riels to one US dollar.



New double-mouthed stoves which reduce the amount of wood used by 20-38%

Supplying the Ever-Increasing Demand - Pakistan

Dr G.R. Keerio

Trucks loaded at depot

Middle-aged Mr Allah Bachayo Sanjrani runs a semi-permanent bulk depot in the village of Khaber near Hyderabad city in Sindh. Here trucks are loaded with woodfuel. Mr Sanjrani inherited the business 22 years ago from his parents who used to cut and then market the wood using hired transport. The eight-member family, of which he is head, live in the village of his ancestors 12 kilometers from the depot. They have never grown Hurry wood (so called because it is grown under a rotation wood production and soil improvement system called Hurry) because members do not own farmland.

Mr Sanjrani switched to woodfuel transportation because the family considered it to be more profitable. Initially he started up as a transport agent, supplying hired trucks to other transporters and traders. Later on, after gaining experience and improving his financial position, he bought trucks and tractors, completely switching over to the transportation business.

Loading up

Mr Sanjrani owns three trucks and four tractor-driven trolleys and hires more, particularly in the winter season when there is more demand for woodfuel in the cities. He buys Hurry wood and transports it to the bulk depot where after proper conversion and sorting it is transported to the main cities of

Hyderabad and Karachi 45 and 215 kilometers away respectively. There it is sold to wood brokers and middlemen.

The woodfuel is usually converted into one-metre billets at the depot site. In the summer only two to three trucks per day are loaded but in the winter it is between six and eight. A truck can carry 10-13 tons of woodfuel depending upon wood thickness and moisture content.

The depot site, spread over an area of 1.5 hectares costs Mr Sanjrani Rs 2,500¹ a year to rent. He charges Rs 2,000 for a trip to Karachi and Rs 1,200 for Hyderabad. In winter, transport rates cost about 10-15 percent more than in the summer. Transportation rates are constantly rising due to the increasing costs of petrol, trucks and spare parts. There is no shortage of trucks in the vicinity. Mr Sanjrani says there are six more transporters within 5 km².

Unskilled workers employed

His business employs 45-50 skilled and unskilled youth who transport and load and unload the fuel. They earn Rs 100-150 per day. There is no shortage of such labour in the area. The depot business has a big impact on the community. It not only provides families with an income but the depot is a meeting place for villagers.

Although Mr Sanjrani is not so well educated his business has made him a popular and prominent figure man in the locality.

When asked about the future of the business Mr Sanjrani said waterlogging and salinity problems in the wood growing areas meant there was a gradual degradation of farmland. The resulting decrease in Hurry production was evident. In addition, profit margins had been hit by above average price rises in materials, supplies and wages as well as increased local taxes.

Business hopes

However, Mr Sanjrani said he had high hopes that the business would flourish due to the ever increasing demand for woodfuel in Sindh. He plans to buy two more trucks and further strengthen his business.

Sindh, the southern province of Pakistan, forms the lower part of the Indus River basin. The region is climatically semi-arid and the agricultural lands are artificially irrigated by the world's largest contiguous irrigation system. Agriculture and forestry are the main land uses. A rotation system is used by agroforestry farmers, with a short rotation of six to seven years. Closely spaced *Acacia nilotica* are grown in block plantations, ranging in size from one to five hectares. The wood is used for woodfuel and pit props in the coal mining sector.

¹ There are 44 rupees to one US dollar.

Fuelwood for Brick Kilns - Pakistan

L. Kella

Archaeological finds

Mohen-Jo-Daro and Harrapa archaeological sites confirm the use of baked bricks in the Indus Valley well before

Dr G. R. Keerio is Divisional Forest officer in the Forest and Wildlife Department, Government of Sindh, Pakistan.

5000 BC. They were used in the construction of houses and forts. Back then wood was the major fuel source for baking mud bricks and the same is true today. Despite the availability of coal and fossil fuels, wood is preferred because it is easy to get hold of and cheap.

L. Kella is a conservator of forests in Hyderabad, Pakistan

Mud brick making

Mr Muhammad Arif Pathan, 35, is a mud brick maker based near Sakrand town in Sindh province. Mr Arif Pathan - the head of a family of four - has been baking and marketing mud bricks for 15 years. His kiln can bake 50,000 bricks when he uses wood and an extra 20,000 when he uses coal. He uses all types of wood which can be easily found on

adjoining farmland and other production areas. Mr Arif Pathan seldom uses coal, buying it only when it is cheaper.

Loading the kiln

He employs 55 skilled workers. They make the bricks, load the kiln, fire it, and sort out under and over-baked bricks. The under-baked ones are fired again.

Mr Arif Pathan, like other kiln owners, prefers to use *Acacia nilotica* wood over *Prosopis cineraria*, Mesquite and *Tamarix dioca*. If there is a shortage of wood he uses low-caloric value wood like *Salvadora oloides* and its roots. Private farmlands are the main production areas but Mr Arif Pathan also buys wood from adjoining state forests and government fallow lands. *A. nilotica* and *P. cineraria* are planted in forests and on farmland, but *T. dioca* and Mesquite grow naturally

in depressions and dry areas respectively. The woodfuel is supplied by local contractors. Stumps extracted during land clearing are also sold by farmers.

Production costs

Mr Arif Pathan says the cost of running the kiln depends on several factors, including the type of wood used, its moisture content, whether it has been attacked by insects, and the time of year. These factors mean that high-energy and density *A. nilotica* and insect resistant *T. dioca* are the favoured woods. They are better than *P. cineraria* and Mesquite which are prone to insect attack after drying.

The cost of wood ranges from Rs 20-25¹ per 100 kg for *S. oloides* to Rs 55-75 for *A. nilotica*. It takes 350-500 kg of

wood to bake 1,000 bricks depending on the wood used. However, when a new kiln is used it takes 30-40 percent more wood in order to bake the kiln lining.

Donkey deliveries

Wood is delivered on donkey carts and by camel back on shorter one to 10 km distances, and by tractor and truck on longer distances. Mr Arif Pathan buys the wood from traders on site on the basis of weight. He says there is an ever increasing demand for bricks in the province and presently no shortage of woodfuel. The only problem he occasionally faces is when he produces more than 10 percent of under or over-baked bricks.

¹ There are 44 rupees to one US dollar.

Life Around the Fire - Thailand

Tjuk was born in a small agricultural village in Sakornakhorn province, Isaan, Thailand. She remembers:

“The head of the family was my grandfather, who had seven children, all living in the same compound. I remember the days in the compound as being very happy. There was always someone to talk to and play with. The women were responsible for cooking the food. The smell of burning wood in the stoves was pleasant. I remember my grandfather had a small family charcoal kiln somewhere on the back of our land. Once every two weeks the men of the family went out to collect wood, which was readily available around the village at that time. They collected it on a cart and brought it back home.

“There my grandfather was responsible for the production of charcoal. It was unpleasant, dirty work, and nobody else in the family liked to do it. A lot of smoke came out of the kiln and grandfather suffered a great deal making charcoal for us. The women in the house, however,

Tjuk (Wijitra) , Support staff, RWEDP, Bangkok, Thailand

appreciated the charcoal very much. It gave a special, delicious taste to the food, it did not produce smoke in the kitchens. Even the cooking pots stayed clean on the outside. The charcoal, produced by my grandfather, was only used by my family. He did not sell it to neighbours, basically because they had their own kilns or other energy resources.

Things are now very different

“Sometimes, when the charcoal was finished before the production of the following load, the women used sticks in the stoves. Because my family was at that time an agricultural family, it did not have the cash to buy charcoal in the market. Nowadays, the situation for my family in Sakornakhorn province is drastically different. My grandfather died a long time ago. Extended family members left the house for city jobs, like myself. I’m working for the RWEDP in Bangkok and the head of the family in Sakornakhorn is now my uncle, who is a fruit farmer and grows mango and rambutan in his fields, for the markets around Sakornakhon. Since the death of my grandfather, no charcoal has been produced for the family. Nobody wanted to take over his re-

sponsibilities for production. Now, wooden sticks are the main energy source for cooking. The wood is still collected by men in the household, once in two weeks. The collection, is more difficult these days because the forests around the village have disappeared. The main source of wood for cooking is the family’s private land.

“Because my uncle is a fruit farmer, he planted fruit and firewood trees in the old agricultural field of my grandfather. The firewood production of these fields is sufficient for the cooking. The use of gas for cooking was also considered by my family. They have a gas stove but hardly use it. I think this is because the price of gas went up over the last few years and my family was used to using wood. So it is easier for them to use wood instead of going to the market and buying expensive gas.

“It is somehow strange to see that, now that I’m living together with my younger brother in Bangkok, I don’t cook food any more, but rely, as so many people living in apartments do, on food vendors in the street.”

It's a Jolly Good Business - Bangladesh

Much of the woodfuel used in Dhaka comes from the deciduous forest at Sreepur in Gazipur district. A 1991 census put the population of the 150-m² area at 0.32 million. Sreepur people have always lived in close harmony with the forests but now the government is planning to establish a 500-acre Export Processing Zone (EPZ) in the area, which may change locals' lives for ever. Dr Lulu Bilquis Banu looks at the lives of a wood wholesaler, collector and retailer.

The wholesaler

Mr Salimuddin, 55, is a Muslim, and is well-off thanks to his wholesale business which sells round wood, branches and twigs. He lives in a one-storey medium-sized building, and has a shop in Joina Bazaar, near the Dhaka-Mymensingh road. There are 18 people in his extended family and his two sons help him run the generations-old business. Mr Salimuddin says: "It's a jolly good business."

He has been involved in the business for 35 years, the last 25 of which have been profitable - a fact he puts down to the building of the road and the growth in construction work and brick making.

Leftovers used

The woodfuel he sells goes to Dhaka, with the round wood being used in construction work and the branches and twigs for brick making. The leftovers - bark and sawdust - are used in household cooking and by bakeries and restaurants. Local household and small-scale industry get their fuelwood from the twice-weekly village market.

Village householders do not buy fuelwood from Mr Salimuddin. He does an average of \$200 per day in business,

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Collecting the wood

selling five tons of round wood and twigs.

Mr Salimuddin's suppliers are exclusively men, called Toria, from the village. He says the wood comes from homestead forest land rather than from government reserve forests. However, 40 percent of his round wood was Gozari which normally comes from government forests.

He says wood trading is less risky than other businesses since he doesn't have a lot of money invested.

Many classes involved

Many people from different socio-economic classes are involved in the trade. Mr Salimuddin identified the following in his business: two people to measure the wood; two people to process it (paid commission of one cent per 40 kg of wood); village children to collect wood chips from his yard. (He pays them three cents per 40 kg and sells it for four cents); the middle man who buys the wood from the village and sells it to him; the Kurali (the person who cuts down the tree. He is paid one cent per cubic foot); the transporter; the homestead

forest grower; the men who collect the wood from the government forest - most are poachers; and the women and children who collect twigs and branches from the government forest, again mostly poached. Mr Salimuddin thinks the planned establishment of an Export Processing Zone (EPZ) in the area might boost the country's economy but says it will also have a bad impact on both the natural and social environment. He wants to see forests created on degraded forest land.

The collectors

Wood carrier Ms Hanilda Begum is a middle-aged illiterate divorcee who lives with her mentally-retarded sister Halinia.

On average she collects two head-loads of wood a day. The most Ms Begum can carry on her head is 55 kg. She collects twigs and branches from nearby forest land, mainly by poaching. The forest is near and she could make 10 trips a day but she says that would be greedy and it would hurt the interests of other women and children who do the same job. Anyway, there is only a limited supply of wood.

Ms Begum's aunt Ms Sokina Bibi, a widow with a 10-year-old daughter, Mariam, does the same job and many village children collect woodfuel for household consumption.

The retailer

College-educated Kamal Ahmed lives in a mud and corrugated-iron-roof house typical of the area. He is not married and his earnings help pay for the education of his two brothers and one sister who are at university and college. Apart from trading woodfuel he also helps run a stationary shop in the village market and sometimes works on his own agricultural field.

He buys woodfuel collected from both homestead forests and government forest land and sells it at a 50 percent profit. He also buys wood from the vil-

lage market and sells it for a 20 percent profit.

Big trees disappearing

Mr Kamal says that five years ago there were big trees in the village and at that time 40 percent of villagers were involved in the business, and one could run a family with the money made. Now only five to 10 percent of villagers were involved and they had to do other jobs like labouring to make ends meet.

He backs the EZP idea because he sees it as providing jobs for the younger generation and he is ready to sacrifice the environment in order for people to have employment.



A retailer ready to sell his bundle of wood

A Woodfuel Carter - Sri Lanka

Anoja Wickramasinghe and
Ranjith Wickramasinghe

Bullock-cart deliveries

Sirisena is a wood trader - a carter - who acts as an intermediary in the retail wood trade in Kandy city, the capital of Sri Lanka's central highlands. He started selling woodfuel about 12 years ago as a 21-year-old, initially splitting billets at the wood depot near his home, later going on to help his father with the bullock-cart deliveries. Sirisena is confident that woodfuel has a future because of the increasing price of alterna-

tive energy sources. The business supports his wife and son and his small house in Suduhampola.

Most evenings Sirisena loads his cart at the depot ready for the morning delivery which runs from 6.30 am to about 11.00 am. He then has a break for 2-3 hours, before again loading his cart.

"I buy woodfuel in hundred-weight units and sell it in kilograms," he says. Split wood that he buys from the depot for nearly Rs 2.00 per kilogram he sells for Rs 2.40 a kilo.

Enjoyable work

And he enjoys his regular daily delivery route. "You can see that almost every morning customers are waiting for me," he says. Sirisena has a monopoly on their custom since other carters, as a rule, do not work each other's patches. He often has a boy who helps him, paying him Rs 20.00¹ or so, depending on sales.

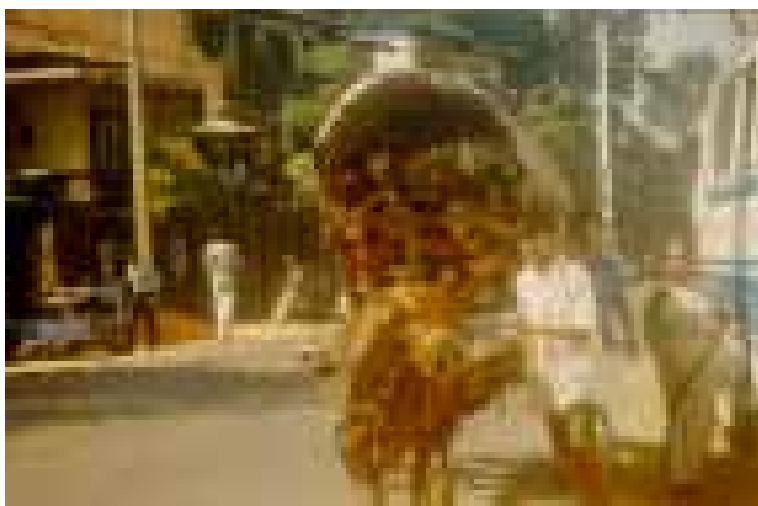
Tempted to use gas

Although he knows the new generation is tempted to use gas, Sirisena believes customers will continue to use wood because it gives the food a better taste.

Sirisena makes about Rs 250-300 per day, just enough to cover his daily expenses. Out of this he has to buy fodder for his bullock at Rs 40 per day.

¹ There are 59.3 rupees to one US dollar.

Prof. Anoja Wickramasinghe and Ranjith Wickramasinghe work with the Department of Geography, University of Peradeniya, Sri Lanka.



*A woodtrader
out on his
daily round*

Cooking for Pigs - Laos

Sheila Oparaocha

Slash and burn farming

A combination of a rapidly growing population and slash-and-burn farming is affecting the Lao PDR forests but pig raising by women villagers and the use of better stoves may help counter the problem.

In Ban Kampanien, in Xieng Khouang province, researchers have been looking at how slash-and-burn agriculture can be replaced with other income generating businesses. Out of a wide range of agriculture systems examined, pig raising has been identified as one of the most viable farming systems for the area because of the high demand for pork from a growing urban market. The pigs would need to be confined and fed at least twice a day to fatten them as quickly as possible. However, the women need to be convinced that they will not have to work much longer hours collecting firewood to boil pig swill.

Although the economic and social life of the Hmong village is centred around the slash-and-burn agricultural system, which sees farmers cutting down all the trees and shrubs on a patch of upland forest and burning them to make way for hill-rice, corn, tubers and legumes, it means that after two to three years the field is abandoned and the farmers move on. By taking up pig farming villagers would help avoid damaging the forests. Whereas in the past, farmers returned to a slash-and-burn site only after 10 to 20 years, depending on the recovery rate of the area, rapid population growth

and government efforts to restrict areas for slash-and-burn agriculture mean that now little new land is available. This has put more pressure on those areas where slash and burn takes place and now the fallow period for land used is often only five to seven years, resulting in much lower yields. Rice yields are said to be 2,000 kg/ha in the first year and 900 kg/ha in the third year. The long-term sustainability of traditional slash and burn farming is now in doubt.

Pig farming proposal

When the pig-farming proposal was put to the women villagers, who are traditionally the pig raisers, they unanimously opposed the idea because they said they would have to spend hours more collecting firewood to prepare the pig swill. Women from among the 90 households said that to feed the pigs once a day meant having to spend two to three hours, three or four times a week, collecting wood. It then had to be hauled home on their heads, backs and shoulders or by pushcart. With more pigs their workload would become unbearable. As the wife of the headman said: "The women would become the pigs' slaves."

While animal husbandry needs to become more productive attention must also be paid to reducing the drudgery and hours of the women's work. One way is to replace their mud-built fireplaces with fuel-efficient stoves to help cut the amount of firewood the women need and therefore the hours they spend collecting it. The improved stoves would also help improve the health of the women and

their families by significantly reducing the smoke wafting around their kitchens.

In addition, the women would be able to devote more time to making money, creating a change in their household role and changing gender relations, thereby increasing their autonomy

Shifting agriculture

New income generating ideas for sedentary farming are needed because mountain-dwellers in Laos have been banned by the government from slash-and-burn farming. The shifting agricultural method is still used by a rapidly growing population of around 170,000 mountain-dwellers but it has been blamed for an average decline in forest cover of 0.2 percent a year. Despite this Lao P.D.R. is covered by an estimated 47 percent of forest (approximately 11.2 million hectares according to the FAO, 1995), which represents one of the highest forest cover percentages in Asia.

The anti-slash and burn policy was first articulated in the mid-1980s. It forbids the felling of old forest for agriculture and suggests resettling those cultivators involved in upland slash and burn methods. The policy has had quite an adverse impact on the upland Lao Sung and Lao Theung communities who make up 32 percent of the population. They are dependent on the forest for their livelihood and employment.

Ban Kampanien village sits in a valley on a main road 14km from the Vietnamese border, 120km east of the provincial capital of Phonsavan.

Switching to Woodfuel Cropping - Nepal

Arjan Kraijo

The good old days

Mr Min Bahadur Gurung is an influential village leader in the Gurung village of Ghandruk, Nepal. His father was the

last of the village's seven Lords, or Mukyas. Looking back on that time he remembers that the Mukyas and a for-

est guard comprised a forest management committee.

Sheila Oparaocha is Research Associate at the Asian Institute of Technology, Bangkok, Thailand.

Arjan Kraijo of the University of Twente, is working with RWEDP as a research assistant

He recalled: "It cared for the forest by bringing in wood-cutting and livestock grazing on a rotational basis. Each household was allowed a certain quantity of forest products according to family size and situation. Firewood could be collected in the autumn, winter and spring, green wood in the spring, and reeds and jute in the autumn. Committee members made regular visits to the sites and if villagers were caught breaking the rules they were fined."

But with the forest nationalization act of 1957 and the appointment of other leaders in Ghandruk effective forest management came to an end. Local management was replaced with government oversight. All Nepal's forests were nationalized and the Mukyas lost their authority over almost all their lands. Official written permission was required from a distant Forest Office to cut down a single tree, and further confusion was created when traditional village forest boundaries were altered. Several weak leaders of the Panchayat ruled the area at the time and they failed to establish an effective forest management system. One Panchayat leader was elected chairman on the basis that, if they chose him, they could cut down trees for timber and fuelwood with few restrictions. Many households and commercial wood-sellers took advantage of his election and stockpiled large

amounts of timber and firewood. The natural resources were drastically over-exploited as a result.

Forest exploited

At the time Mr Min Bahadur Gurung was in the Indian Army and when he returned he saw how important it was to save the forest. He said: "Before it was easy to collect fuelwood and fodder in Ghandruk. Dense forests had existed south west of the village, so it took only one or two hours to collect wood. We were able to visit the fuelwood collection site twice a day. Nobody had trees on their private land because there was enough forest around the village. When I came back only a few trees stood and shrubs covered the land following exploitation of the forest."

Improvements begin

Things began to improve with the introduction of a new forest management system in 1986. Under Mr Min Bahadur Gurung's leadership, in March 1987, the first Conservation and Development Committee was established, with help from the newly formed Annapurna Conservation Area Project. A project forest nursery was established which gave free seedlings to villagers who wanted to plant trees. Mr Min Bahadur Gurung

was the first to plant trees on his agricultural land. "It is good for the environment to have more forests," he said. Sadly, many locals are only planting trees because their agricultural land would otherwise lie fallow. Mr Min Bahadur Gurung explained: "Many young people prefer to live in Kathmandu and Pokhara. Life is hard in the mountains. You have to walk for at least five hours to reach the nearest road and the climate is colder than in the cities."

Uncertain future

The farmers staying in Ghandruk are becoming old and will soon not be able to work in the fields. Who is going to work their fields for them? Furthermore, rice production in the mountains is more expensive than on the plains and even the hotels in Ghandruk prefer to buy rice from the plains, he added. He said the lack of interest in mountain agriculture meant villagers had only two options: to leave the land fallow or plant trees. Mr Min Bahadur Gurung can now harvest enough fuelwood from his own trees for household needs and in the future he expects to harvest some timber. Ghandruk's farmers can see the benefits of having trees on private land and are following his example. Nowadays, the main source of fuelwood comes from trees on private land.

Woodfuel on an American Farm - USA

Patrick B. Durst

Household heating

I grew up in a household of 11 people—my parents, five brothers and sisters, two grandparents, and a great-uncle. The house was large and it was a major task to keep it warm during Wisconsin's long winter months when temperatures could fall at night to -40°C.

My earliest recollections of household heating include a wood cook stove upstairs where my grandparents lived, a

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wood-burning space heater on the ground floor, and a large furnace in the basement, which provided the main source of heat for the house, and seemed to require almost continuous feeding of coal and wood.

It seemed a momentous day when my parents replaced the wood/coal burning furnace with a modern gas one in 1968. We thought that the days of splitting and carrying wood, and removing ashes, were gone forever. My grandmother, however, who lived another 17 years, somehow still always liked to have a fire in her wood-burning cook stove, just as she always preferred to bake her delicious home-made bread in it rather than in the gas-burning oven alongside.

The convenience of heating homes with gas or fuel oil motivated virtually all rural families in that part of the country to install gas or oil furnaces by the early 1970s. But the high costs of gas brought on by the energy price shocks of the 1970s brought on a renaissance of fuelwood use. Modern, efficient wood-burning heating stoves and furnaces became trendy and practical.

Thrifty and pragmatic

Always thrifty and pragmatic, my parents installed a modern wood-burning heater to supplement the main gas-burning furnace. In reality, the wood-burning stove served as the primary source of house heat for many years to

come. My father estimates that 80 percent of the direct costs of heating the farmhouse were saved by burning wood instead of using gas alone. Of course, wood collection and use has its costs too (e.g. investment and operating expenses for chainsaws, trucks or trailers to haul the wood, axes and splitting mauls, opportunity costs of labour). But just like Asian families view the costs of wood as minimal or zero, so do many American farmers.

Southwest Wisconsin is rugged and very hilly. The valleys and ridgetops have mostly been cleared for crops but the steep hillsides remain mostly wooded, covered with valuable oak-hickory and maple forests. Numerous small-scale forest industries operate locally, buying logs from private farms for making lumber, furniture, pallets, and railroad ties.

Saw mill waste used

Locals seeking wood for home heating generally obtain it from the loggers, who do not want the tops and branches of felled trees, from dead or fallen trees, from trees selected for thinning from farm wood lots, and from sawmill operators selling off their "waste". Live trees are almost never cut for fuelwood. The tops and branches from logging operations are the most important source since most farmers harvest logs commercially from their own land only once every 10-20 years. Neighbours and relatives are usually allowed to collect wood from farms, following logging operations, for free.

Oak, hickory, elm, and maple are the preferred woodfuels because of their high density and heating value. Tops

and branches of maple and hickory can be collected up to three years after the trees have been felled. However, oak and elm can be collected five years or more after logging.

Fuelwood is usually cut by chainsaw into 0.4 meter lengths, split with a splitting maul, and stacked to dry for at least one year prior to burning. This is crucial to reduce moisture content to acceptable levels for use in heating.

When available, many rural families prefer to purchase slabs and edgings from local sawmills. The residue is a disposal nuisance for the mills, so they charge only US\$5 per bundle (about 1.5 steres).

Savings made

In the Durst home in Wisconsin, 12 to 15 "face cords" (a local unit of measure of stacked wood measuring 4ft x 4ft x about 16 inches), equivalent to about nine to 12 steres of woodfuel, are burned each winter. To use gas would cost US\$600-\$700 per year more.

Modern wood-burning heating stoves and furnaces cost from US\$600 for room-style heaters, to several thousand dollars for add-on furnaces or complete home wood heating systems. There are generally no legal restrictions to installing wood heating stoves in homes.

Having a well-built house chimney and keeping it clean are very important for safety. The Durst farmhouse chimney, which is over 80 years old, is cleaned two or three times every year. It is flue-lined and has withstood several chimney fires over the years.

A rough estimate is that 10 percent of rural farm families in southwest Wisconsin today heat their homes entirely with wood. Another 30-35 percent use wood, supplemented by standby gas or oil systems. Lower real gas and oil prices mean that the financial incentive to burn wood is reduced and with more couples working away from their farms there is often no one at home to keep the wood fires burning.

Wood is clearly not just a fuel for developing countries or poor societies. Even in modern well-developed areas such as in rural America, fuelwoods still play an important role in everyday life. Most families can afford to pay for gas or oil heating, but some take considerable satisfaction in saving money on fuel bills by burning wood.

Others value the physical exercise and the opportunity of being outdoors associated with cutting and splitting wood.

Farmers' pride

For most farmers who burn wood, there is pride in maintaining a large, well-stacked woodpile and in being less dependent on imported fuels. For others, there is a feeling of "rugged individualism" associated with cutting their own wood and being directly involved in providing warmth for their families. As my father told me: "May your woodpile last long, stay dry, and burn clean."

The Native American Indians who lived in this part of Wisconsin, and the European settlers who arrived in the early 1800s, relied heavily on fuelwoods for heating and cooking. A significant number of rural families still do.

Publications

Energy Plant Species - Their Use and Impact on Environment and Development

Edited by Dr. N. EL Bassam, Head of the Energy Crops Research Unit of the Federal Agriculture Research Centre (FAL), Braunschweig, Germany. Based

on contributions from a distinguished panel of experts from around the world.

Biomass currently accounts for about 15% of global primary energy consumption and is particularly important as an energy resource in developing countries. It will undoubtedly play an

increasing role in the world's energy consumption.

What crops make up this large percentage of our energy resources? Where do they grow and what can be done to boost the levels of production? What

impact does their cultivation have on the environment and development?

The publication starts with an outline of the importance and production of biomass, and then of biofuel feedstock. It then goes on to cover all the main potential energy crops. For each main species it gives a brief description, outlines the ecological requirements, methods of propagation, crop management, rotation and production, harvesting, handling, storage, processing and utilisation and finishes with selected references.

The text moves on to look at the regional distribution of energy crops, logistics systems, impact on the environment and climate and some social and economic analysis before ending with perspectives and conclusions.

This publication can be ordered from James and James Ltd, e-mail: orders@jxj.com

Web Page: <http://www.jxj.com>

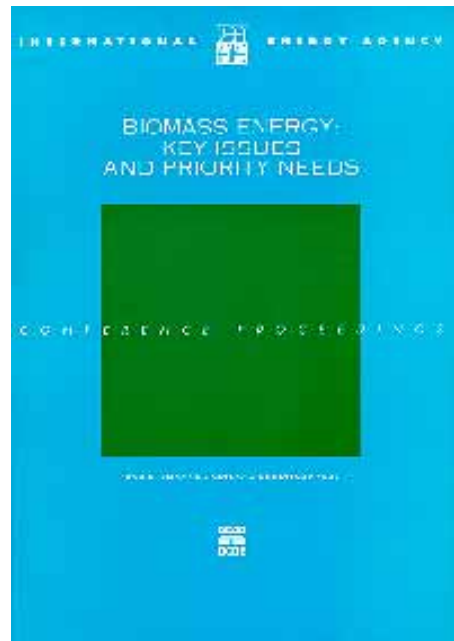
Impact of Alternative Energy Technology in Reducing Pressure on Forest Resources.

Case Study from Ghandruk, Discussion Paper 1, Series No. Mei 97/5 ICIMOD, by Kamal Banskota and Bikash Sharma

The introduction of alternative energy and fuel-efficient technologies in Ghandruk has brought about significant changes to the level of energy use as well as to the overall energy efficiency among lodges. Several factors can be identified as playing an important role in this.

There is little doubt that tourism has played a major role. It has enabled the lodge community to increase their incomes, making it possible for owners to afford the technology to bring about change in energy use.

The second factor which has helped bring about significant change is the role of the ACAP. ACAP, as a non-profit NGO, has been supporting a number of community development and conser-



vation activities by involving both locals and lodge-owners in order to strike a sustainable balance between local needs, tourism management, and nature conservation.

The Lodge Management Committee (LMC) and the Conservation and Development Committee (CDC) are the key grass roots institutions established to help sustain socio-economic transformation and various conservation-related programmes. Among these, the forest conservation awareness programme can be assumed to have played an important role.

A third important factor that has helped bring about energy transformation has been the development of appropriate technologies. Lodge owners have been able to use the technologies readily without much additional cost. Besides efficiency gains, lodge owners have also realised the health benefits as the new technologies emit less smoke. The interaction between developers and users has been a very important factor in their adoption.

Clearly, several factors, such as awareness of new technologies and conservation, grass roots' institutions, affordability, availability, and design, appear to be important in climbing up the energy ladder. The process of moving up the energy ladder cannot, however, be expected to take place quickly.

The process is rather slow for the simple reason that the rural economy is low subsistence. This is why, even after the introduction of electricity in Ghandruk, the switch from firewood to electricity for cooking and heating has not taken place.

A number of issues and challenges need to be carefully addressed to sustain the process of energy transformation. This requires not only integrated environment and economic policies and programmes but also an effective institutional framework from grass roots to national level.

Biomass Energy: Key Issues and Priority Needs

Author: International Energy Agency, OECD

In this publication are the conference proceedings of the meeting in Paris of February 3-5, 1997, on Biomass Energy: Key Issues and Priority Needs are included. The workshop assembled a world-wide panel of biomass energy experts from international and non-governmental organisations, government, academia and private industry.

The policy implications of both modern and traditional biomass use and the latest modelling and information gathering methodologies were examined in detail to improve understanding and share information about this important energy source. The proceedings provide a cross-cutting overview of current biomass energy policies and programmes.

A follow up meeting is organised in Paris for March 23-24, 1998. See Events section on page 26.

National Training Course on Integration of Woodfuel Production and Marketing

The Punjab Forestry Research Institute (PFRI) of the Forest Department of the Punjab Province and the Department of Agriculture Marketing (DAM) of the University of Agriculture, Faisalabad, collaborated with RWEDP in the organization of the national training course on "Integration of Woodfuel Production and Marketing in Faisalabad, Pakistan", which was held 28–30 October 1997. The national training course was a follow-up to the sub-regional training workshop on "Integrating Woodfuel Production into the Implementation of Agriculture, Forestry and Rural Extension Programmes in South Asia". This was held on 24–30 October 1995 in Dhaka, Bangladesh.

The course was attended by 28 senior and middle-level participants. It was supported by 19 resource persons who represented multi-sectoral agencies/disciplines related to wood energy development in Pakistan.

The training course was inaugurated by the Secretary of the Government of Punjab and a large number of senior forestry officials from the province, as well as lecturers of the Agriculture University, were present as distinguished invitees. Many senior forestry officials, including the Chief Conservators and Conservators from Punjab and Sindh Provinces; the Director General of PFI, the Director of PFRI, and the Professors and Associate Professors from the Agriculture University assisted the course as resource persons.

Many issues related to wood energy production, flow and utilization, including those based on the findings of field studies, were presented in the course to highlight the role of and contribution of woodfuel in Pakistan and in the host province of Punjab, including the role of non-forest areas in fuelwood production, the social and environmental aspects of wood energy development, and

the gender specific role in it. The course was evaluated as a success by the participants and the resource persons from the Sindh have requested RWEDP consider in the coming year repeating a similar training course in their province. A summary report of the training course is being finalized by the PFRI.

Cambodian National Training on Successful Dissemination of Improved Cookstoves

The Cambodian National Training on Stove Selection and Dissemination was held from 12 to 22 December in Kampong Chhnang, 100 km Northwest of Phnom Penh. The training was organised by CEDAC (Centre d'Etude et de Developpement Agricole Cambodgien), with assistance from Concern Worldwide, PRASAC-1 and the recently started Cambodia Fuelwood Saving Project (CFSP). The workshop was technically supported by the Asia Regional Cookstove Programme (ARECOP) with financial assistance from RWEDP. The training was attended by 11 delegates from NGOs, five from government departments, two from Universities, one villager and one FAO officer from the FAO project 'Participatory Natural Resource Management in the Tonle Sap Region'.

All participants are in one way or another involved in dissemination of improved cookstoves in provinces all over Cambodia. Five of the 20 participants were women. The National training is the first follow-up activity of the Regional Training of Trainers (TOT) for Successful Dissemination of Improved Cookstoves which was organised by ARECOP with support of RWEDP in July 1997 in Lombok, Indonesia. In this TOT, 20 trainers from eight RWEDP-member countries were able to familiarise themselves with the training materials, the process of improved cookstove selection and dissemination and the participatory training methods that are to be used in the national trainings after translation into the local language. All National Trainings on Improved

Cookstove Selection and Dissemination sessions to be organised aim to 'decentralise technical knowledge' to the participants (field workers) and help them address and deal with varying users' considerations. The stove selection framework used initially assesses technical and natural resources available as well as socio-economic and cultural patterns in order to identify the main needs and constraints. Using his/her technical knowledge, the field worker should then come up with a more appropriate design and a dissemination strategy for the stove based on local conditions. Skills transferred to ICP field workers through the national trainings include:

1. Evaluation of stove design based on combustion and heat transfer concepts, knowledge of raw materials and technical stove parts;
2. Stove design based on the needs, wants and conditions of the target group in addition to technical knowledge;
3. Construction techniques for a selected number of stove designs;
4. Determining an appropriate dissemination strategy for the improved stove based on existing technology dissemination channels;
5. Incorporation of gender analysis into stove design, selection and introduction;
6. Monitoring and troubleshooting a stove programme.

ARECOP has designed a training scheme in which trainees will be guided through the above process in a participative manner, using realistic case studies. For the Cambodian Training, all the training materials developed (posters, transparencies and training manuals) have been translated from English into Khmer.

National Workshop on Production, Utilization and Marketing of Woodfuel, Vientiane, Lao PDR, 24-28 November 1997

The workshop was organised by the Department of Forestry with support from FAO-RWEDP from 24 to 28 November 1997 in Vientiane. The workshop, which was attended by 42 persons, was the first of its kind in Lao PDR.

It was designed to maximise the use and dissemination of data and information presently available in the country, primarily to raise awareness on the role and importance of wood energy. It is expected that the results of the workshop will serve to guide and support the formulation and planning of wood energy policies and development in the future.

From the point of view of achievement, the workshop was successful in bringing together many responsible individuals from relevant institutions, including the private sector, on a common platform to discuss the issues related to wood energy and to enhance their understanding. The workshop tried to give a thorough overview of the country's wood energy systems based on locally available information. It identified some crucial elements as being needed reforms in the sector. During the lively group discussions, which formed an integral part of the workshop, the participants drew up four sets of recommendations. These recommendations cover specific aspects of wood energy development e.g. wood energy policy, woodfuel production, woodfuel utilisation and woodfuel marketing. The recommendations are expected to serve as guidelines for the development of the wood and biomass energy sector in the near future.

LEAP Tutorial, Kunming, Yunnan Province,

RWEDP is currently in the process of organising national training workshops on wood energy planning. The training courses are to be followed up by case studies on wood energy planning at national, provincial and district level, which will serve as on-the-job-training.

During the case studies, the Long-range Energy Alternatives Planning model (LEAP) will be used for data analysis and storage and the development of scenarios. LEAP has been chosen for this purpose because of its flexible data structure, and because it includes a biomass module which can be used for the analysis of biomass resources. Most countries have little experience with the use of LEAP, so tutorials will be organised at the start of each case study.

The first case study was implemented in China. From 16-20 February 1998, RWEDP, together with the Institute of Energy and Environment Protection (IEEP), organised the first LEAP tutorial in Kunming, Yunnan Province. Participants were people from energy offices at national, regional and county level, involved in the case study at the different levels.

Apart from the use of the different modules of LEAP, participants also learned how to deal with incomplete data, and to use assumptions for the development of demand and supply scenarios.

Events Information Addresses

NBEIA	National BioEnergy Industries Association, 122 C Street, NW, 4th Floor, Washington DC 20001 ☎ +1-2-2-383 2540, 📠 +1-202-383 2670
UT	The Course Administrator, Technology and Development Group, VOK/CT 1807, University of Twente, PO Box 217, 7500 AE Enschede, The Netherlands. ☎ +31-53-489 4377; 📠 (31)-53-489 3087; ✉ j.r.m.borghuis@tdg.utwente.nl
ANUTECH	Administrator, ANUTECH Development International, PO Box 4, Canberra ACT 2601, Australia. ☎ +61-2-6279 8427; 📠 +61-2-6249 5875; ✉ anutech.courses@aplemail.anu.edu.au
IUFRO	Don Lee, College of Agriculture and Life Sciences, Department of Forest Resources, Seoul National University, 103 Seodoondong, Suwon 441-744, South Korea.

Events

Event, description (info)	Venue, date
<p>Fourth International Renewable Energy and Energy Efficiency Asia-Pacific 1998 Organised by Alternative Development Asia Ltd. (NBEIA)</p>	<p>Shanghai, China 14–16 Oct 1998</p>
<p>Expert Workshop on Biomass Energy: Data Analysis and Trends Organised by the International Energy Agency the workshop will focus on biomass data collection, analysis and modelling. It will bring experts together from all over the world with the aim of promoting the exchange of information and co-operation between national and international organisations. There will be discussions on statistical and analytical methodology used by the IEA. Its studies will be compared with similar studies, and the policy implications of projected energy trends will be examined with particular attention paid to environmental aspects.</p>	<p>Paris, France 23–24 March 1998</p>
<p>Energy Management and Cleaner Production in Small and Medium Scale Industries Aimed at those management staff involved in planning and aiming for cleaner production in their industries; policy makers from government organisations, industrial associations and institutes involved in industrial development and energy; and consultants. The course will introduce participants to current best practice in energy management and cleaner production, identify energy and environment-saving options, understand the potential of waste materials, help prepare the execution of energy and environmental audits, and for those in developing countries, help reduce industrial emissions, conserve energy and analyse the choice of fuels and machinery. There will be both lectures and site visits. (UT)</p>	<p>Maastricht/Enschede, The Netherlands 5 Oct–7 Nov 1998</p>
<p>Stand Alone Rural Electrification, Energy and Environment for Sustainable Rural Development Offered to policy advisors, government officers, utility company staff, those involved in energy and rural development projects, academics and NGO staff. The objective is to help those attending identify appropriate energy technology for a given situation, set up and manage projects, use state-of-the-art technologies, attract financing for projects, help keep the environment free of pollution, examine renewable energy and reduce dependency on imported fuels. (UT)</p>	<p>Enschede, The Netherlands. 18 May–20 June 1998</p>
<p>Forest Conservation Genetics: Principles and Practices Participants will see how forest conservation genetics is key to conserving forest diversity. Critical genetic management issues include the effects of forest fragmentation, the use of forest corridors to maintain gene flow and the influences of harvesting on gene pools. The course will help give an understanding about population genetics, the impact of people on forest genetics and dynamics and conservation. Studies will be both classroom and field-based. (ANUTECH)</p>	<p>Canberra, Australia 21 Sept–2 Oct 2 1998</p>
<p>Environmental Assessment for Development Projects The course is for resource planners and project professionals. It will develop skills in environment assessment for use in project planning and management. It will look at project screening, environmental appraisal in project design, monitoring and evaluation. It will develop skills in impact assessment, and social assessment of resource development projects and environmental accounting, including cost benefit analysis. The course also includes an introduction to the worldwide web and relevant web sites. (ANUTECH)</p>	<p>Canberra, Australia 12 Oct–6 Nov 1998</p>
<p>Forest Ecosystems and Land Use in Mountain Areas (IUFRO)</p>	<p>Seoul, South Korea 12–17 Oct 1998</p>

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