Fuelwood: a high-potential renewable resource!

In rural areas of many developing countries fuelwood constitutes the only energy source – often with negative impacts on humans and the environment. Wise management and modern technology can guarantee a sustainable use of this valuable resource, as some examples from Latin America demonstrate.

Since the beginning of humankind, wood has been the most important energy resource for cooking and heating. This hasn't changed over several thousand years, and today, more than two billion people in developing countries rely on this source of energy. The reason is simple. They have no alternative, because other energy sources like petrol or gas are too expensive for economies based on rural livelihoods and renewable sources like wind or solar energy are often not developed yet. In sub-Sahara Africa, approximately 75 percent of the population depend on wood for cooking and heating, in Asia two thirds, and in South America only a quarter.

The global production and consumption scenario: some figures

Fuelwood is the most important produce of forests world-wide. Total wood supply accounts for roughly 3.45 billion cubic metres. The share of fuelwood is about 1.89 billion cubic metres. Looking at the different continents, we can notice considerable differences. Africa and Asia account for 75 percent of global wood fuel production and consumption. Only ten percent is consumed in South America, eight percent in Europe and three percent in North America. Consumption is increasing in Africa due to population growth, but slightly decreasing in Asia owing to urbanisation and the switch to modern energy sources. The share of fuelwood in a country's energy mix varies considerably. In the least developed countries, it often amounts to more than half. Depending on a country's economic ability to access fossil fuels like petrol or gas, the percentage of fuelwood will decrease respectively. But inside a developing country, too, one may find considerable differences. Cities are provided with electricity or gas, whereas the electricity grid seldom reaches out to rural areas. Some countries have particularly favourable natural conditions. In Costa Rica, for instance, almost the entire energy demand is covered by hydro-power. Therefore no strong demand exists for fuelwood. In contrast, in the neighbouring country of Honduras, fuelwood is essential for rural people to survive.

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The same resource, but different perspectives and opportunities

In industrialised countries, like Germany or Austria, the discussion on increasing energy prices, renewable energies and CO_2-saving measures has promoted a steadily increasing use of wood as an energy resource in the last few years. There are several objectives: to look for more energy independence from fossil fuel, to reduce CO_2 emissions, to intensify the use of industrial wood residues in particular, and so on. As a result, the wood pellet production industry has grown, and stove and hearth building has once again become modern. Heating systems based on

Photo: C. Alvarado

Worldwide, some 1.89 billion cubic metres of wood are used for fuelwood each year.

Photo: C. Alvarado

Improved stoves can halve fuelwood consumption.

wood with fully-automatic control have resulted in steady improvements in efficiency. The technological climax of developments is cogeneration, or combined heat and power, plants to simultaneously provide houses with heating and electricity. Nowadays, some villages in Europe are energy self-sufficient solely on the basis of using wood. Crucial aspects of this successful development have included: a sustainably usable resource potential, sufficient demand, an innovative research landscape, a clear legal framework and funding policies.

Especially in the rural areas of developing countries, fuelwood often constitutes the only energy source. As an alternative to overcome energy poverty, in line with Millennium Goal 8, development partnerships and technology transfer from the North to the South ought to be increasingly promoted. Two of the most important success factors also exist in developing countries: the resource potential is there, and so is demand. The other two factors present a challenge that development co-operation needs to address.

The development policy dimension of fuelwood use

The collecting of fuelwood, done mostly by women and children, means spending a lot of time and energy – time and energy that is then lacking for education or income-generating activities. So, the possibilities for development are limited. Often, the stoves inside the houses produce a lot of smoke, causing health problems. Where we find high population pressure, collecting of fuelwood can lead to forest degradation and at least destroy the resource base. Often, people are conscious of the negative social and ecological consequences, but for lack of economic means, they have no alternatives. Development activities should address this issue, aiming at offering energy alternatives for the rural regions (e.g. wind and solar energy) and promoting the sustainable management of fuelwood production.

At political level, the conditions for reducing energy poverty in rural areas should be improved by providing electricity or gas, or by promoting decentralised energy supply systems based on wind or solar energy. The often-heard argument of the high costs is quite short-sighted: if millions of people migrate into the cities, if rural areas erode step by step, destroying the resource base for food production, this will be far more expensive!

The technical improvement of stoves is quite advanced world-wide. The fuelwood-saving potential is very high: properly managed, these stoves need only 50 percent of the fuelwood required otherwise. In many West African countries and in the Central American countries of Nicaragua, Honduras and Guatemala, plenty of families have switched to efficient stove models. The introduction of a new technology means an exceptional challenge for extension staff. Intelligent strategies of convincing and promotion are needed. Explaining the technical advantages is the smallest problem. What is more important is to deal with traditional barriers and overcome the people's inherent anxiety about anything new.

A question of sound management

Creativity in forest policy is needed to facilitate and promote community management models for producing fuelwood in natural forests. Important issues include solving the legal aspects of property and usufruct, but also systems of sustainable forest management for fuelwood production. What could be relatively easy is the introduction of the system of "equal areas", where you divide the whole area into as many sub-areas as the regeneration time of the forest lasts in years. Each year, the harvest of one sub-area is permitted. The example of the Caatinga ecosystem in North Brazil involves 20 of these sub-areas. In general, rotation cycles of 15 to 30 years are feasible. If more accurate knowledge about the annual increment of the forest is available, a system of "equal yields" can be implemented. Here, the whole area is divided into sections with equal amounts of harvest. A further alternative is the establishment of energy wood forests in marginal areas with tree species that not only produce fuelwood but also contribute to the improvement of soils. A classic example of a positive outcome from wood fuel plantations is the Green Belt Movement in Kenya (www.greenbeltmovement.org).

The required funding should be generated from sources of international climate financing initiatives. Sustainable fuelwood forests (natural forests) or energy wood forests (plantations) contribute twofold to a positive carbon balance. During the growing phase, they retrieve CO_2 from the atmosphere and deposit it in the plant and in the soil. Used as fuel, an equivalent value of fossil-fuel CO_2 emission is avoided.

World-wide, the use of biomass for heat and power could save more than a gigaton of carbon (GtC) annually by

2030. The co-firing of biomass with coal could save nearly 0.5 GtC per year at fairly modest costs. Savings in the traditional biomass and charcoal sectors could amount to another 0.5 GtC, although a considerable effort would be required in this sector to overcome the higher investment cost, the complex socio-economic and cultural issues surrounding traditional biomass use and the transaction costs associated with providing the equipment and reliable biomass supply.

Industrial timber and fuelwood production in Honduras

Timber	Year					
	1997	1999	2002	2003	2004	2006
	Cubic metres (in thousands)					
Production	665	795	759	971	920	874
Export	65	37	40	0	12	68
Consumption	600	758	719	971	911	811
Fuelwood	**Year**					
	1997	1999	2002	2003	2004	2006
	Cubic metres (in thousands)					
Production/ Consumption	6,038	6,382	8,732	8,710	8,699	8,668

The case of Honduras

Honduras, in Central America, is one of the poorest countries in the world. Out of a population of 7,385,000 inhabitants, as counted in 2006, 4,418,640 are living in poverty. This poverty is also reflected by some figures showing forest production in the period from 1997 to 2006 (see table). More than 90 percent of forest production is designated for fuelwood. The related activities are informal and illegal, and without any existing management plans. The species utilised depend on the ecosystem where the rural community lives. Due to high transportation costs, harvesting is done quite locally. In 20 percent of households, Roble (*Quercus segoviensis*), Encino (*Quercus sapotifolia*), Carbón blanco, or Golden Wattle (*Acacia sp*), and Quebracho, or Wild Tamarind (*Lysiloma sp*), are used. In the central south region, Pino, or Hazelnut Pine (*Pinus oocarpa*), is frequently used. As a result of reduction or elimination of these species, others enter the "basic energy basket" like Nance (*Byrsonima crassifolia*), Spanish Elm (*Cordia alliodora*), Guacimo (*Guazuma ulmifolia*), Maderado (*Gliricidia sepium*) or Guanacaste (*Enterolobium ciclocarpun*).

Based on an average harvest of approximately 120 cubic metres of fuelwood per hectare, loss or degradation of forests appears on 72,200 hectares. No attention is given to replanting or management. Without any doubt, this practice is resulting in forests being destroyed in just a few years' time. Setting out from population growth and rising energy demand up to 2035, and based on "business as usual", forest area degradation and subsequent destruction could increase up to 150,000 hectares per year. The new forest law has responded to this prospect with the notion of fostering the establishment of plantations for energy purposes, giving incentives like technical advice, tax exemptions or free transport of the products for commercialisation. Simultaneously, it is foreseen to provide every household with improved stoves, which could save up to 50 percent of fuelwood input. This should be accomplished within the first five years of the programme, when the new plantations are in the growing age. With the corresponding tasks of, and responsibility for, afforestation and plantation management being assigned to the municipalities, a yearly establishment of more than 80,000 hectares is projected, reaching approximately 400.000 hectares with a yield of 80 cubic metres per hectare after five years. In the first year of harvest, an amount of approximately five million cubic metres could be harvested, covering – in combination with the improved stoves – the population's fuelwood demand.

Such ideas are initial positive signs of the severe problem of forest degradation and destruction by fuelwood, due to "extractivism" instead of "management", being addressed. But this is not enough. There is an urgent need not only to feature fuelwood production more prominently in forest policy and forest legislation, but also to promote, finance and implement corresponding forest management schemes more intensively and consistently.

Source of general facts and figures:
What wood fuel can do to mitigate climate change, FAO Forestry Paper 162, 2010

Zusammenfassung

Die Diskussion um hohe Energiepreise und die Abhängigkeit von fossilen Energieträgern hat in vielen Industrieländern dazu geführt, dass Holz als Energiequelle in den vergangenen Jahren wieder äußerst attraktiv geworden ist. In den ländlichen Räumen vieler Entwicklungsländer stellt Brennholz nach wie vor die einzige Energiequelle dar. Der ungeregelte Zugang zum Holz und seine unsachgemäße Nutzung haben jedoch oft negative Auswirkungen auf menschliche Gesundheit und Umwelt. Durch verbesserte Verbrennungstechnologien und eine vernünftige Forstpolitik kann das enorme Potenzial der Ressource Holz nachhaltig genutzt werden und so einen Beitrag zur Überwindung der Energiearmut leisten. Der Beitrag zeigt dies anhand verschiedener Beispiele aus Lateinamerika.

Resumen

La discusión en torno a los altos precios de la energía y la dependencia de las fuentes energéticas fósiles ha llevado a que – en muchos países industrializados – la madera haya vuelto a ser extremadamente atractiva como fuente de energía. En las regiones rurales de muchos países en desarrollo, la leña sigue siendo la única fuente de energía. Sin embargo, el acceso no regulado a la madera y su uso inapropiado tienen a menudo repercusiones negativas para la salud humana y el medio ambiente. A través de mejoras en la tecnología de combustión y una política forestal razonable, sería posible utilizar el inmenso potencial del recurso de la madera de manera sostenible, con lo cual se contribuiría a superar la pobreza energética. Este aporte prueba dicha hipótesis con la ayuda de distintos ejemplos de América Latina.