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**GOVERNMENT OF PAKISTAN
MINISTRY OF FOOD, AGRICULTURE AND COOPERATIVES**

**COUNTRY STATUS REPORT ON
REGIONAL WOOD ENERGY DEVELOPMENT PROGRAMME IN ASIA
PROJECT ADVISORY COMMITTEE MEETING 5-8 NOVEMBER, 1991
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FORESTRY FACT SHEET OF PAKISTAN

<u>CATEGORY</u>	<u>FACTS</u>
(1) Area	88 Million ha
(2) Population	110 Million
(3) Rural Population	70 Percent
(4) Urban Population	30 Percent
(5) Population Growth	3.1 Percent
(6) Extent of Forests controlled by Forest Departments	10.853 million ha (5.4% of land area).
(7) Protection Forests	4,814,000 ha
(8) Productive Forests	1,477,000 ha
(9) Import of Paper and Pulp	Rs. 3,000 million/year
(10) Fuel wood Consumption	22 million M ³
(11) Fuel wood Needs by Year 2000	30 million M ³
(12) Area Under Cultivation	20,540,000 ha
(13) Area Under Irrigation	16,000,00 ha
(14) Sixth Plan Energy Consumption increase	6.6% per year (16.4 Million MTOE)
(15) Energy Consumption in 1992-93	21.5 MTOE
(16) Non-Commercial Energy Supply 1992-93	42.2% of total
(17) Bio-mass Household Energy	Urban 60% Rural 60%
(18) Cooking Fuel	
i. Wood	Urban 55% Rural 76%
ii. Cow Dung & Crop Residue	Urban 11% Rural 23%
iii. Kerosine Oil	Urban 16% Rural 1%

GENERAL

The prosperity and future welfare of Pakistan largely depends on the government's commitment to support rapid economic growth with adequate and assured energy inputs. Shortage of energy has been a formidable problem for the country in the last decade or so, and the outlook for the future holds several challenges. During the Sixth Five Year Plan (1983-88), energy consumption increased at a rate of 6.6% per annum, compared to a 6.8% per annum growth in Gross Domestic Product (GDP). The most rapid per annum increase was in the consumption of electricity (13.6%) and petroleum, oil and lubricants (8.5%).

It has been estimated that by the end of the current century Pakistan's population will become 150 million (growth rate 3.1%); the country will be consuming 250% more energy than in 1987-88. The structure of demand for energy is also expected to change in the coming years; currently oil and gas forms 41% of total energy supply, by the year 2000 this is expected to rise to 45%. If domestic production of crude oil does not increase by then, there will be a large gap which will have to be met through imports. Urbanization is expected to further increase the preference for an energy-intensive life-style, with growing use of energy-based appliances in almost every sphere of life, accelerating consumption in general, and that of commercial energy in particular.

ENERGY PICTURE

Primary commercial energy delivery during the Seventh Five Year Plan period (1988-93), increased at an average annual rate of 6.6%, (from 16.14 million tones of oil equivalent (MTOE) in 1987-88, to an estimated 21.5 MTOE in 1992-93). To stem increase in domestic sector, the government has undertaken measures to save energy consumption, including a National Energy Conservation Programme, and price rationalization. It is, therefore, expected that by the end of 1992-93 the share of the domestic sector will decrease marginally to 47.5% while the share of the productive sectors will register a small increase.

Industrial sector consumption will grow at an annual rate of 6.3% and its share will increase from 28.8% in 1987-88 to 31.3% in 1992-93. During the same period, total energy consumption is expected to increase from 29 MTOE to 36 MTOE. According to available data, it is estimated that primary non-commercial energy supply will increase from 12.5 MTOE (1987-88) to 14.5 MTOE (1992-93). In overall terms, the non-commercial energy supply is estimated to provide about 40.2% of total energy supply in 1992-93.

The data on delivered energy indicates that the domestic sector is the largest consumer of energy; its share in 1987-88 was 49.5%. The high share of the domestic sector is due to the prosperity of consumers and the desire to use modern gadgets, coupled with lower energy prices, due to the governments desire to provide cheap fuel alternatives etc., to the people.

Non-commercial energy continues to play an important though diminishing role in the overall energy picture. It is estimated to decrease marginally during 1992-91 (from 43.7% in 1987-88 to 40.2% in 1992-93). This trend is expected to continue because non-commercial energy supply is expected to increase from 12.5 MTOE in 1987-88 to 14.5 MTOE in 1992-93, due to of substitution of commercial fuels and the denudation of forest resources.

In urban areas price of fuel wood has exceeded that of kerosine oil. The renewable energy resources are derived mostly from wood bio-mass. Upto the early fifties, wood was used as fuel in almost all urban and rural households. The discovery of natural gas and introduction of kerosine oil cookers, replaced the use of wood to some extent in urban areas by fossil fuels. Notwithstanding the growing scarcity of fuel wood, it is estimated that 90% of all rural households and 60% of urban households still meet their energy requirements from fuel wood and other bio-mass sources, thus wood remains the principal source of energy for domestic cooking and heating.

According to the Housing Census 1980, 70% households in Pakistan still use wood as fuel for cooking. The percentage of materials used as fuel for cooking in urban and rural households is

given as under:

<u>Cooking Fuel</u>	<u>Urban</u>	<u>Rural %</u>
Wood	56	76
Coal	-	-
Kerosine Oil	16	1
Gas	17	-
Electricity	-	-
Cow dung & crop residue	11	23

Apart from fuel wood, important bio-mass sources of energy are bagasse, animal dung, various farm residues such as cotton sticks and sawdust etc. Approximately 50% of domestic animal waste is burnt in Pakistan as dung cakes. The burning of animal dung is problematic as most of Pakistan's soils are deficient in organic materials and animal dung can provide an important soil amendment for maintaining organic content levels. Biogas is an other source of energy that provides a compromise for the use of animal dung as an energy source, but it has been developed/utilized in Pakistan to a limited extent only.

Fuel wood thus represents the largest share of non-commercial energy use in Pakistan, accounting for more than 50% of the consumption. Recent estimates of fuel wood demand are put at 22 million M³ per year, of this 90% is met from farm lands and 10% from state forests. The annual demand is expected to grow over 30 million M³ by the year 2000 putting great pressure on Pakistan's remaining forest resources unless affordable substitute fuels for household use are made available, or unless extensive community reforestation programs are undertaken.

According to a survey, the average per capita energy requirement for domestic cooking and heating in Pakistan is 0.05 Tons of oil equivalent (1 TOE is equal to 44.9 million kj), or 0.2 m³ of fuel wood each year. The projected domestic wood energy requirement by the year 2000 works out to be 7.5 million TOE's or 30 million m³.

FUEL CONSUMPTION PATTERN

The requirement of domestic energy is derived from a variety of commercial and non-commercial sources. The fuel consumption pattern in the country is tabulated as under:

TOTAL ENERGY CONSUMPTION

ENERGY SOURCE	7th Plan		8th Plan	
	1992-93 PTOE(000)	Share %	1997-98 PTOE(000)	Share %
<u>Commercial</u>				
Coal	2867	8.0	3972	8.6
Natural Gas	6201	17.2	8574	18.7
POL & LPG	8544	23.8	11144	24.3
Electricity	3244	9.0	5033	11.0
Others	639	1.8	749	1.6
Sub total	21494	59.8	29471	64.2
<u>Non-Commercial</u>				
Fuelwood	7455	20.7	8321	18.1
Biomass	7024	19.5	8134	17.7
Sub total	14479	40.2	16454	35.8
Total	35973	100.0	45925	100.0

The above table indicates that most of the rural population is dependent upon conventional fuels like fuelwood, cow dung and agricultural residues.

FUELWOOD PRODUCTION

There are two main sources of firewood in the country i.e state controlled forests and the private farmlands. The state controlled forests comprising 5% of the total area contribute 10% (2 million m³) of the fuelwood requirements. The farm lands meet 90% (20 million m³) requirements of the country.

NATIONAL ACTION PLANS OR ACTIVITIESWOOD ENERGY DATA COLLECTION:

Important steps were taken during 1983-88 to enhance energy planning, conservation and resource assessment capabilities of the government departments. The use of non-commercial energy sources, especially in the rural setting, is significant as its share is more than 40% of the total energy consumption.

The energy crisis in the seventies, forced the Directorate General New & Renewable Energy Resources (DGNER) to undertake rural energy survey in 1974-75 to estimate qualitative and quantitative aspects of non-commercial energy sources. A Fuel Use Survey was conducted by a donor agency in 1979, and a Household Income & Energy Survey was carried out in 1985. Additionally statistics have been gathered by various agencies (Pakistan Forest Institute (PFI), Ministry of Food, Agriculture and Cooperatives (MINFAC), Provincial Statistical Offices (PSO) and other agencies).

Despite this, data available is not reliable as these sources provide different estimates of the mean annual fuelwood production from state forests for the period 1971/72 to 1981/82 which shows 65.6% (Millington 1988) variation.

Data is tabulated below:

Estimates of
fuelwood output from state forests, 1971/72 to 1981/82

Output (M3)	Source
317,000	PFI
463,000	MINFAC
502,000	PSOs

Consumption

Year	Fuelwood	Charcoal	Agency
1974-75	10.75 m tons	40,280 tons	DGNER
1984	16.6 mm ³	-	MINFAC
1988-89	16.44 m tons (19.06 in 1993/94)	-	ADBP
1990	28 mm ³	-	PFI
2000 (?)	22 m tons	-	MINFAC

From the above analysis it is obvious that these estimates do not corroborate to give a correct picture for developing future strategy. Unreliable statistics pertaining to volume/biomass production are due to the fact that most forest inventories to date have been carried out at varying intervals in separate and unrelated exercises. Furthermore, deforestation processes are complex interaction of human and environmental factors which require time series data for complete understanding.

The need for accurate data collection has therefore been recognized to determine the wood resource in the country. Consequently, Pakistan Forest Institute has launched a "National Wood Resources Inventory" project to carry out this work. During 1989-90 survey of farm lands in NWFP was carried out and it was estimated that there are 80 million trees with 14 million M³ volume is available. These farm lands supply about 2.9 mm³ of timber and fuelwood annually for local consumption (Amjad 1991). The survey is now being extended to other areas of the country.

The Energy Wing of the Planning and Development Division of Government of Pakistan is engaged in carrying out Household Energy Survey with assistance of World Bank/UNDP to prepare a Master Plan on biomass. This data will be digitized for planning and programming to overcome the energy crisis in the domestic sector.

In 1987 a request was made to the international donor agencies for providing technical assistance to the Government of Pakistan for preparation of a National Forestry Development Master Plan in context of Tropical Forestry Action Plan (TFAP). Consequently, a Forestry Sector Master Plan for next 25 years is being prepared with the twin objectives of; (i) meeting future demand for forest and range land products; and (ii) reversing the deterioration of natural resource base.

Data compilation and analysis during the first phase includes: (i) using appropriate imageries supplemented by existing data, classification of broad land use and forest capability categories on a national and regional basis in sufficient detail to be suitable for national level planning; (ii) a ground survey of

private farms to assess existing wood stocks and annual wood removals; consumption and future requirements for fuelwood, industrial round wood, pulp and paper, grazing and fodder, including an analysis of land use allocation and management alternatives for the various land use and forest capability categories identified earlier. It will propose and prioritize socially acceptable, economically viable & environmentally sound programs and projects to contribute to meeting our requirements for forest and range products on a sustainable basis.

Data generated during the first and second phases will be used during the third phase of the project to formulate strategies on a national and regional basis for: (i) development of forest-based industries; (ii) meeting demand for fuelwood; (iii) conservation of ecosystems; and (iv) institutional development including manpower development, research requirements, policy measures and legislation.

The data pertaining to tree growth on farm lands has been stored in computers, and will be used to compile field survey data to present estimates of wood volume in cubic meter according to timber volume, small wood volume and total volume.

This compilation programme is applied to both standing trees sampled and estimates of trees removed in the past year. Analysis of 71% of the total of 3,500 samples from Punjab, Balochistan and Northern Areas, collected up to July 1991, have resulted in the following estimates of available wood volume per hectare:

Timber	1.6 m ³ /ha
Small Wood	1.8 m ³ /ha
Total Volume	3.4 m ³ /ha

APPLICATION OF SURVEY RESULTS

This survey will provide the Forestry Sector Master Plan Project with an estimated wood volume growing on the 20,920,000 ha of private farm lands in Pakistan (Agricultural Statistics of Pakistan, 1988-89). This and an estimate of annual withdrawals (current estimates are 1 is to 4), will provide the project with

a guide to one source of wood that can then be considered along with others to ascertain the magnitude of the current wood supply/demand scenario. It would also have a significant effect upon the size, location and timing of future forest establishment programs.

FUEL WOOD ENERGY ACTIVITIES

The energy needs, especially in the rural areas are met from fuelwood. Planting on farm lands is traditional in this country, and is done to meet the farmers local timber requirement. In Sindh, Huries (agro-forestry system) cultivation of *Acacia nilotica* was started in 1858. Country's entire match industry is fed by wood produced on the farm lands mostly from the NWFP. For the last four decades, the Provincial Forest Departments are regularly engaged in motivational drives to encourage farmers to undertake planting on their lands. During the last ten years over 1200 million plants have been planted in public and private sectors, using different models in different ecological zones. As a result of these efforts, 90% of the country's fuelwood requirements are now met from farm produced wood.

The Government's concern for participation by the people in successful forestry related projects has assumed greater importance in view of the food security, environmental improvement, regulation of quality water for irrigation, power generation and uplift of the rural poor that accrue from such activities. On-going development projects lay considerable emphasis on creating/strengthening village organizations (Malakand Social Forestry Project and Agha Khan Rural Support Programme).

A systematic effort to launch large scale country-wide tree planting programme on private farm lands was launched in 1985 under the Forestry Planning and Development Project. More than 140 million plants are planned to be planted till 1993, through transfer of planting and nursery technology to the cooperating farmers, under different spatial configurations conforming to their needs. The project has gained considerable momentum during the

past six years, and tree culture on farm lands has now become a village ritual. The trees planted enthusiastically are fiercely guarded by the farmers.

WOOD ENERGY CONSERVATION

Rural society in Pakistan thrives on a system interlinking agriculture with small vocations and rural industries such as charcoal making, curing tobacco, brick making, pottery/ceramics, lime stone curing, treating bamboo, black smithy, rural bakery and ovens, gur (brown sugar) making, ground nut roasting, and many other vocations and cottage industries.

Villagers and farmers often engage in these pursuits along with farming to supplement their income and improve rural economy. It is estimated that more than one million tones of wood is consumed annually in the rural industries and village applications.

The rural industries and village applications use 13% of the total energy and 31% of the bio-fuels utilized in the country. The trend to consume fuelwood is expected to increase with the setting up of additional industries to meet the growing demand of the rural population. Private fuelwood production sources supply the bulk of the need, therefore, it can be intensified through ongoing social forestry programs throughout the country. In accordance with the revised Forest Policy (1991) greater emphasis has been placed on participatory forestry.

The national economic plan conceives activities in the context of "a least energy consumption strategy". This requires ranking of energy conservation investments alongside all other energy supply options, to pick up a mix of cost effective investments. The government envisages taking the lead in mobilizing a national energy conservation effort, thus energy conservation programs have been made mandatory for both the public and private sectors. It is apparent that national energy policy is mainly concerned with supply and demand of commercial fuels such as electricity, oil, gas, coal, etc.

National energy plans have so far not recognized or considered

the needs of small scale rural industries, and have been concerned with larger industries in the urban centers or with export oriented industries. Although there is a probability of developing other renewable energy sources such as solar, wind, mini-hydro, etc., fuelwood and agri-residues will continue to be the main available rural energy sources. Energy Investment Plan has so far not fully recognized this important fact.

Regional Wood Energy Development Programme (RWEDP)

Under the sponsorship of Food and Agriculture Organization of the United Nations, a Regional Wood Energy Development Programme is in operation in ten Asian countries including Pakistan. Through this programme a network of national focal points has been established to cover both governmental and non-governmental institutions. The Government of Pakistan and other national institutes such as PFI Peshawer, PFRI Gatwala, PARC and NARC Islamabad, are in contact with other regional and international networks e.g., RERC, INTREP, USAID-F/FRED, CNRE, REDP, TERI, etc., for exchange of information and cooperative support.

RWEDP strengthens the capabilities of the government and various NGO's of Pakistan, to implement the national wood energy programs by providing training, expertise, and promoting the exchange of information on all levels, and this is highly appreciated.

Pakistan looks forward to the particular catalytic support from the RWEDP, to increase the impact on national projects. The regional dimensions in respect of new methodologies & technologies developed in other countries within the region and outside will enhance the capabilities of the programme implementing agencies to develop wood energy resources through integrated approach. In this context frequent study visits, workshops and expert consultations provide professionals the access to the experiences of other professionals/countries and help adapt their situations. The pooled expertise at national and regional levels will create a core group of interacting skills to bear on common problems.

MANAGEMENT OF WOOD FUEL RESOURCES

Pakistan has a total land area of about 88 million ha, with 10.853 million ha under the control of the Forest Departments, this includes 6.119 million ha range lands which is an important source of grazing. The actual area under forests is 4.737 million ha, which comprises 5.4% of the total land area. The area under productive forests is 1.477 million ha, while 4.814 million ha are protected forests. The breakdown of forests by types and ownership is given in the following table.

FOREST AREA BY TYPES, OWNERSHIP & PRODUCTIVITY

(Million ha)

TYPE	AREA	STATE OWNED	PRIVATE	PRODUCTIVE FOREST
Coniferous	1.959	1.197	0.762	0.931
Irrigated	0.392	0.233	0.159	0.142
Riverain	0.296	0.296	-	0.246
Scrub	1.702	0.900	0.802	0.158
Coastal	0.347	0.345	0.002	-
Others	0.041	0.017	0.024	-
Total	7.737	2.988	1.749	1.477
Percentage	100.0	63.1	36.9	31.2

The area under Government forest is almost static as no new lands are being earmarked for afforestation. As the country does not produce surplus food, agriculture has been given precedence over forestry. It does not seem prudent to earmark additional areas for afforestation, due to these and other climatic and biotic constraints, from the land fit for agriculture. The meager resource is being rehabilitated by planting new trees. An effort is being made to improve the yield per unit area by planting comparatively

fast growing tree species and protection from grazing.

The irrigated plantations are producing much less hard wood timber and fuelwood than their potential. Shisham (*Dalbergia sissoo*) plantations can yield 8.2 m³/ha per year on average sites and as high as 11.2 m³/ha per year on good sites. Babul (*Acacia nilotica*) plantations can yield 8.2 m³/ha per year on average sites in riverain forests.

The coniferous forests (both dry and moist) are found in Northern and Western part of Pakistan. Many of these forests are Reserved Forests, but at lower elevations where not regulated there has been over grazing and much forest fire damage. These forests are used extensively for extraction of timber, fuel wood, medicinal plants and grazing. These forests are important for conservation of soil and water in upland areas comprising 35.192 million ha on which nation's low land agriculture sector depends, and which is in a state of increased degradation.

The coniferous resource which is 80% of the total forest area is neither being maintained for high productivity nor protected against degradation. The increasing demand for wood and its products in this area is greatly outstripping supply. Consequently, most of the upland coniferous forests have lost their regenerative capacity because of immense population and live stock pressure. The Protected Coniferous Forests in upland and scrub forests are heavily burdened with all types of user rights to obtain timber for construction/repair of hutments, agricultural implements, fuelwood, grazing, resin collection and other minor forest products. Because of high population growth since the last settlement (in the beginning of this century), these rights have multiplied, making management of the forests extremely difficult.

Guzara or the Communal Forests (locally called Shamilat), are the owned by an individual, family or a group of village households/clans. These forest are located in the uplands of Murree Hills (Punjab), and Hazara (NWFP) and meet the needs of the local population in terms of timber, fuelwood and fodder. In the Punjab management of guzara forests is with the civil administration. In

NWFP management is controlled by the Forest Department in collaboration with 31 Guzara Societies. The management objectives of some of the cooperative societies are not compatible with those of the Forest Department. In certain cases there appears a concerted effort to over harvest these forests and the land cleared is brought under agriculture for short term gain.

PROGRESS TOWARDS SUSTAINABLE SUPPLY OF RESOURCES:

The existing natural forests, irrigated forest plantations, riverain forests and linear plantations under public sector, produce only 10% of the country's fuelwood requirements, while the farm lands and lands other than government forests meet the remaining 90%. The government forests are suffering from illicit felling, lopping, grazing and forest fires. The riverain forest are under depletion due to lack of annual inundations. The irrigated plantations are suffering from poor management and inadequate water supplies. In order to improve the situation and to meet the emerging challenges, the government has revised the National Forest Policy in 1991.

The salient policy objectives are as follows:

- Meet the requirements of timber, fuelwood, fodder and environmental needs by raising forest area from 5.4% to 10% during the next 15 years.
- Conserve the existing forest, range land and wildlife resource by sustainable utilization, and develop them to meet the ever increasing demands.
- Promote social forestry programs.
- Encourage planting of fast growing multipurpose tree species in public and private sectors to meet the industrial and domestic demands.
- Rehabilitate waterlogged, saline and degraded lands through biological amelioration.
- Promote NGOs to create public awareness of the need for environmental improvement.

PARTICIPATORY PLANNING AND MANAGEMENT:

The magnitude of Government concerns for participation of the people for success of the forestry related projects has assumed greater importance and for the most part, the package of incentives and awareness programs has led to individuals and union councils to develop as an effective tool for the extension of forestry activities on forest and non-forest areas. Some of the important projects involving participatory approach are as follows:

FORESTRY PLANNING & DEVELOPMENT PROJECT:

The Forestry Planning and Development Project, assisted by the US Government, is operational in all four provinces of Pakistan. This is based on the concept that the farmer who is interested in planting trees will achieve his objective despite of opposition or setback, with the minimal material assistance from the project. On it's part the project will impart full technical assistance, including transfer of technology to the farmer. As such the Tree Farmer is committed to labor and other inputs; and the project is committed not to touch the tree.

The project has 5 operational thrusts aimed at helping Pakistan to increase it's energy self sufficiency and reduce deforestation by taking forestry assistance to the people and encouraging development of the private sector in forestry.

- Strengthening forest policy.
- Reversal of deforestation through tree crop management on private lands.
- Improvement of forestry education and training.
- Expansion of forestry research.
- Development of farm forestry outreach.

The project assists farmers to establish Kissan (Farmer) Nurseries in and near villages where other farmers are willing to plant trees and, after the plants are ready, these are purchased by the project, against cash payments to the Nursery operator. A total of 2,715 farmers have been trained in Kissan nursery operations.

It is envisaged that these nurseries will produce 129.75 million seedlings at a cost of Rs. 155.536 million. These seedlings will then be distributed free of cost to be planted over an area of 105,500 acres in all the four provinces of the country.

Advantages of the project:

- Transfer of tree nursery and tree planting/management technology to the farmer.
- Cash income for the nursery farmer after 4 to 6 months.
- Double benefit to the tree planter, one that he gets free seedlings and the second he does not have to travel far to a nursery, which would add to his overhead costs.
- Training of the Forest Department Project staff in outreach and extension ventures.
- Training of the Forest Department Project staff in modern forestry techniques.

Achievements of the project are:

- 78 million saplings raised in 2722 farmer nurseries.
- 72 million saplings planted on 95,720 farms.
- 59,750 farmers trained in tree farm technology.
- 13,758 acres of marginal lands improved through tree culture.
- 5,000 acres of watershed area improved.
- 14 long and 80 short term overseas fellowships provided.
- 671 foresters provided in country training.
- 45 B.Sc/M.Sc scholarships provided for training at PFI.
- 6 B.Sc/M.Sc scholarships provided to women for training in forestry, at PFI.
- 13 market sector wood based studies completed.
- 2 International symposia on forest policy and wood producer-users linkages organized.
- 134 research articles/reports and proceedings published.
- 4 research centers established.
- NGOs/PVOs strengthened.

MALAKAND SOCIAL FORESTRY PROJECT:

Malakand Social Forestry Project supported by Netherlands Government is operational in the Malakand division of the NWFP, since 1989. The Malakand division is spread over 952 square kilometers mainly comprising mountainous area with narrow valleys. About 250,000 people inhabit 51 villages in the area. The population comprises several social groups, ranging from rich landowners to poor tenants. Socio-economic conflicts amongst the different groups made the Forest Department realize that successful reforestation of the denuded hills could be possible through integrated approach with active participation of all the land users. In view of this, the project was initiated with the following objectives:

- increase the living standard of the villagers by initiating community development activities.
- increase sustainable production of the community owned hillsides through members' active participation to ensure long lasting benefits.
- Organize Village Development Committees for self-development process.

These objectives are realized through reforestation, range management, erosion control and other village development activities. About 7,000 ha have been afforested, and range improvement of 3,000 ha has been done. 20 Village Development Committees (VDC's) acting as mediators between the village community and Forest Department, have been organized. On termination of the project it is expected that these committees will continue to carry out the development activities and manage the village plantations independently.

The project also facilitates the organization of village women interest groups, training of female motivator's, money saving programs linked with immediate development activities, introduction of improved cooking stoves and fruit nursery development. Training courses are arranged for villagers, nursery operators, forest

watchers and departmental staff. The programme covers a wide range of topics in forest and fruit nursery related subjects, planting techniques, plantation management and village extension.

Extension forms the essence of the activities to organize and strengthen VDC's. VDC's are especially occupied in the preparing utilization schemes for the income from the village plantations (fodder, firewood and timber), and to create interest in community savings. Other extension activities include village and school nurseries, organization of mass tree planting campaigns, introduction of farm forestry and production of extension and educational material for school children, women and villagers.

Agha Khan Rural Support Programme:

The Agha Khan Rural Support Programme (AKRSP) covers 7,000 square km of Northern Pakistan with a population of approximately 10 million. The region is mountainous and devoid of vegetative cover, with farming activity restricted to terraces on slopes and flood plains in the valleys. Forest resource is scarce and spread in small pockets away from habitations. Much time specially that of women is spent in fuel wood collection and even then many homes are not adequately heated in the severe winters. In order to foster sustained yield of forest products, and accelerate soil formation on newly opened lands, the promotion of tree plantations has formed an integral parts of AKRSP's land development programme.

In 1987 AKRSP started a 2 years pilot afforestation programme and established 1400 village organizations. About 7.5 million seedlings have been envisaged to be planted in a period of 5 years in Baltistan, Chitral and Gilgit. The afforestation programme is being implemented through Village Forestry Specialists drawn from the community and given necessary training in afforestation and nursery management. Comparable village level women organizations have also been involved and trained for tree planting activities.

PROBLEMS AND CONSTRAINTS TO EFFECTIVE FORESTRY PROGRAMS:**PROGRAMME OBJECTIVES:**

The Provincial Forest Departments manage state forests. The forestry officials are trained towards regulatory functions to harvest timber and fuelwood to earn maximum revenue. The Forest Departments are not therefore geared to meet the emerging challenges of the population growing at a rate exceeding 3% each year. 90% of the wood produced from the farm lands is being consumed locally to meet domestic energy requirements. The programme to develop farm woodlot has not been conceived to integrate with other disciplines for uplift of the rural poor. There are many existing afforestation programs but all of them are being implemented in isolation.

AVAILABILITY OF FORESTRY DATA:

For planning process especially in case of forestry a network of database at Provincial and Federal level is essential. Reliable statistics as far as socio-economic customs, traditions, role of women and dependence of the people on natural resources for energy consumption is of significant value for implementable project formulation, this is either non existent or very meager. There is a need to collate all available data for the planners to have an overall picture of the situation.

PLANNING:

The forestry projects generally have long gestation periods and their contribution towards environmental improvement and sustainability of agriculture is not comprehended by the planners. Hence allocation of funds to the forestry sector has been considerably lower in all the seven five year plans, vis-a-vis other projects. There is, thus, a need to educate the planners about the importance of forestry in sustainability of agriculture, production of food and industrial raw material; so they can assign due priority in national economic planning and requisite financial allocation.

LAND TENURE:

In Pakistan land holdings are small and, therefore, land tenure problems can be termed as a fundamental barrier to tree growing. Farmers with secure title to land, are willing to make the long-term investment required for tree growing. Marginal farmers who encroach upon state lands and logged forest areas are illegal or semi-legal occupants and faced with a constant threat of expulsion, they cannot be expected to plant trees or play a meaningful role in environmental improvement. This complicates the task of tree planting and land management. Tenant farmers cannot be expected to plant trees unless they are sure that they will ultimately profit from their activity. Tenant farmers and landless laborers make up a large share of the rural populations; many are thus ruled out from individual tree growing. On communal lands, traditional grazing rights may conflict with tree growing as animals are allowed by custom to roam freely over everyone's land during the dry season. This makes the protection of saplings extremely difficult; by fencing off young trees the planters would infringe upon the rights of others. Where nomadic tribesmen pass through at certain times of the year, such problems have assumed considerable severity.

TREE OWNERSHIP:

Even where farmers have full title to their land, the ownership of trees may be in question. In parts of the northern hilly areas such as Murree, Hazara, Malakand and Kashmir, farmers are unwilling to grow certain valuable tree species such as pines etc., because they are on the list of protected species, aimed at ensuring their proper care, but the result is more often the reverse. The land owners consider these trees as a threat that could lead to expropriation of their lands, thus instead of nurturing trees they want their lands devoid of them. To harvest these species, farmers have first to prove their ownership, then go through a laborious routine of obtaining cutting permission.

Small farmers are reluctant to allow/do tree planting on their lands, they fear that this would lead to the government take control of their land thus depriving them of fodder and grazing rights, despite this many are prepared to offer small areas of their land for planting trees, provided they receive an assurance that the Forest Department would not curtail their rights to cut grass/fodder for their livestock. Thus a long legacy of hostile relations between forestry officials and farmers must be overcome, before any worthwhile progress can be made in this direction.

Like most countries of the world the laws concerning forests and trees in Pakistan are directed towards the preservation of trees, leaving little or no allowance for their positive uses, with such laws on the books, it is hard to persuade farmers to practice Social Forestry and/or plant trees.

SHORTAGE OF LAND:

Officials trying to find communal land for tree growing programs are usually told that no land is available, or they are shown barren, waterlogged and saline land where it is difficult to grow anything, much less trees. As foresters often admit, most of the communal lands being planted with trees are either Shamilat or grazing grounds, but in reality they are the areas which have scarcely produced even a blade of grass in years. Establishing a high-performance plantation on such poor land is often difficult, usually near impossible. But when individual farmers want to plant trees on their land, lack of space rarely seems to be a constraint. Farmers almost always find space to plant trees if they want to, even when their landholding are small.

Under most of the current tree growing programs, seedlings are distributed to those farmers who are prepared to plant any number of trees. As there is a ready market for fuelwood and other wood products, farmers can expect to earn a good return from their trees. Under the Forestry Planning

and Development Project, the initial limit of 5,000 tree per farmer has been difficult to maintain as farmers on several instances expressed regret that they had not been given more trees. Of people who had not planted trees, very few mentioned shortage of land as the reason, this problem was more often cited in the Barani (Rain fed) areas than in other areas. However, in canal and/or tube well irrigated areas many farmers say that they can not get enough unutilized land to plant trees even if they chose to do so. Apparently, land scarcities are not a serious barrier to tree planting. And certainly, in more densely populated districts, large areas of unused, high quality land are seldom available for trees.

SEASONAL COMPETITION FOR LABOR:

Non availability of labor can hamper tree planting activities, especially in arid areas. In irrigated zones, tree growing is comparatively easy, whereas in hilly areas planting is hard work, particularly where the planter must break through rocks so that tree roots can go deep enough. Often the tree planting seasons last only a few weeks each year, and generally overlap with cropping time; understandably, farmers choose to spend that critical period for planting food crops rather than trees. Even when equipment is available, the shortage of time may prevent farmers from taking advantage of it, and outside labor if hired, is usually used for help in cropping, and not for trees at the end of the season.

Most of the people associated with tree planting activity in Pakistan opine that, tree planting always coincides with agricultural activities, and naturally the latter gets priority. Rural women, who are the fuelwood gatherers and users are also deeply involved in other household activities & thus have little time to devote to tree planting. Generally a Pakistani village woman works for 15 to 16 hours per day, at different chores, none of which relate to tree planting.

Tree planting/protection may conflict with opportunities to earn income off the farm, particularly if a large part of

the village work force is employed elsewhere during the slack season. If people stay behind to tend plantations or protect trees against grazing etc., they miss this cash earning opportunity, resulting in low cash reserves for the next cropping season, meaning less food and other necessities of daily use.

National Coordination Committee on Wood Energy Development:

In line with the objectives of the RWEDP, Government of Pakistan set up a National Co-ordination Committee on Wood Energy Development, in the Ministry of Food, Agriculture and Cooperatives in 1988. The terms of reference of this committee are:

- 1) Advise the Government on National Wood Energy Policies and Strategies.
- 2) Coordinate inter-Agency Efforts amongst the Federal and Provincial Government's, Donors and NGOs.
- 3) Examine Project Proposals, assign priorities of R&D and education in wood energy development and arrange necessary funds.
- 4) Develop new institutions and strengthen the existing institutions for monitoring and evaluation at Federal and Provincial levels to support the Committee and other institutions.
- 5) Develop mechanism for transfer of information on regional basis.
- 6) Review progress of national/notable NGOs programs and consider ways and means to promote them further.
- 7) Advise on a sustainable regional cooperation and TCDC exchange of technology and expertise.

The meetings of the National Committee are held regularly to discuss the status of wood energy and need to collect relevant data for future course of action for development of wood production in public and private sectors.

Due to the efforts of the Regional Wood Energy Programme there has been growing awareness and understanding of the fuelwood and related problems. Consequently, large number of social forestry

programs oriented towards fuelwood production have been launched in the country. These programs have brought a positive change in the over all approach to forestry development, management of wood fuel resources and the appropriate use of wood fuels. Despite creating national capabilities in wood energy development through TCDC approach, there is a great scope to improve the functioning of inter-sectorial and interdisciplinary groups in the planning and implementation of wood energy policies and programs.

Pakistan Forest Institute Peshawer, and Punjab Forest Research Institute, Gatwala are engaged in agro-forestry research for identifying high yielding species. Pakistan Council for Appropriate Technology and Pakistan Council of Scientific and Industrial Research have been geared to develop efficient domestic stoves, better charcoal making techniques and biogas plants to conserve wood energy with some reorientation to overcome health hazards.

FUTURE DIRECTIONS AND CONCEPTS:

To overcome the energy crisis in the domestic sector there is a need to involve the farming community to undertake social forestry concepts. For this purpose programs involving cultivation of horticultural crops together with planting of multi-purposes tree species in watershed areas and tree culture in the sub-mountain and plain areas to augment fuelwood production is the need of the time. Planting of trees in the private sector will contribute towards environmental improvement, sustainability of agriculture, forest products and power generation. It will also afford employment opportunities to the rural population especially in the poorer areas.

For implementation of future programs to raise energy plantations, the Government of Pakistan in accordance with the Forest Policy 1991 and National Conservation Study has laid special emphasis for promoting social forestry. For this purpose following specific areas are required to be assigned due recognition:

INSTITUTIONAL SET UP:

The existing forest administrative structure are traditional, there is no separate wing within the Forest Departments responsible for undertaking programming, data collection, planning and implementation of the social forestry. No actions are taken for inter-agency cooperation and coordination at the provincial or federal level. This can be overcome by closer cooperation and sharing of data as envisaged in the establishment of a data-base cell in the provinces working on a national network.

It is, therefore, imperative to expand the scope of forest inventories to produce a database which will have a high degree of flexibility. The inventories should be responsive to a great variety of user needs and applications addressing climate change, bio-diversity, biomass, ecological zone influences, wildlife habitat, desertification and so forth.

OUT-REACH:

The Forestry Departments lack proper out-reach service for successful implementation of social forestry programs. For participatory involvement at community level, Forestry Planning and Development Project, Malakand Social Forestry Project and Agha Khan Rural Support Programme provide a lead for development of extension service. Under Forestry Planning and Development Project institution of NGOs is being strengthened. The Regional Wood Energy Development Programme can provide training to staff, change agents and in NGOs in extension techniques and feed-back mechanism.

TECHNOLOGY TRANSFER:

Current fuel wood consumption is expected to grow from 20 million M³ to 30 million M³ by the year 2000 due to population increase. In view of limited energy sources both commercial and non-commercial, it becomes imperative to minimize loss of energy in cooking and rural industrial applications. Pakistan Council for Appropriate Technology, National Institute of Power, National Institute of Silicon Technology and Pakistan

Council for Scientific and Industrial Research are continuing their efforts in improving cook stoves, solar water heaters, ovens and water desalination, mini/micro hydro power plants, silicon cells and solar water pumping.

MANPOWER REQUIREMENTS:

In order to implement social forestry programs in the country trained manpower is important. There are high expectations from Regional Wood Energy Development Programme for manpower training, study tours and information flow in accordance with the new concepts in wood energy development. It is an established fact that information plays a key role at various stages of wood energy development. Although, attention is being paid by RWEDP in processing of information and wood energy planning to design projects through books, articles etc.; the need is being felt to equip the institutions and departments with computers and software package. It will enable the participating countries in the programme to quick access to the information available elsewhere.

POLICY AND LEGAL REFORMS:

The existence of energy problem, the priority given to it, and the readiness to adapt to it is largely defined by the people themselves. The policy and intervention it requires high decentralization of actions. In line with this the Government of Pakistan has announced National Forest Policy in 1991 which emphasizes on strengthening and expansion of social forestry in the country. The strategy to implement this objective is as follows:

- Effective steps to make available planting stock to the farmers through "Kissan nurseries" raised by the farmers.
- An effort to rehabilitate degraded, salt infested, waterlogged marginal lands both in public and private sector through short-term leases/mutual agreements.
- Streamlining of pricing and marketing structure ensuring reasonable returns to the tree farmers and private entrepreneur. Additionally, new and uses of various tree

species would be found to ensure sustained market of otherwise poor species.

- Women will be encouraged to adopt forestry as a profession and involved in all appropriate activities associated with social forestry programme.

There are number of legal restrictions and imposition of taxes for movement of wood from one part of the country to another. It is viewed as a dis-incentive for the farmers to grow trees and market the wood to fetch better price. These issues are being looked into by the Provincial Governments for uniform application of the rules and regulations suited to the farming community.

FINANCIAL SUPPORT:

Regional Wood Energy Development Programme will remain main source of support for developing countries because of the growing concern on global CO₂ situation. Biomass production in the developing countries is expected to receive increased attention. It is, therefore, essential that under Tropical Forestry Action Plan, international community should promote concerted action to assist developing countries in energy development in which biomass energy continues to play an important role. It will help develop sustainable wood energy systems for both developed and developing nations for local community needs and alleviate global environmental problems simultaneously.

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