ASIA-PACIFIC FORESTRY SECTOR OUTLOOK STUDY

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COUNTRY REPORT - PAKISTAN

by

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TABLE OF CONTENTS

INFORMATION NOTE ON ASIA-PACIFIC FORESTRY SECTOR OUTLOOK STUDY

At its sixteenth session held in Yangon, Myanmar, in January 1996, the Asia-Pacific Forestry Commission, which has membership open to all governments in the Asia-Pacific region, decided to carry out an outlook study for forestry with horizon year 2010. The study is being coordinated by FAO through its regional office in Bangkok and its Headquarters in Rome, but is being implemented in close partnership with governments, many of which have nominated national focal points.

The scope of the study is to look at the main external and sectoral developments in policies, programmes and institutions that will affect the forestry sector and to assess from this the likely direction of its evolution and to present its likely situation in 2010. The study involves assessment of current status but also of trends from the past and the main forces which are shaping those trends and then builds on this to explore future prospects.

Working papers have been contributed or commissioned on a wide range of topics. They fall under the following categories: country profiles, selected in-depth country or sub-regional studies and thematic studies. Working papers are prepared by individual authors or groups of authors on their own professional responsibility; therefore, the opinions expressed in them do not necessarily reflect the views of their employers, the governments of the Asia-Pacific Forestry Commission or of the Food and Agriculture Organization. In preparing the substantive report to be presented at the next session of the Asia-Pacific Forestry Commission early in 1998, material from these working papers will be an important element but will be blended and interpreted alongside a lot of other material.

Working papers are being produced and issued as they arrive. Some effort at uniformity of presentation is being attempted but the contents are only minimally edited for style or clarity. FAO welcomes from readers any information which they feel would be useful to the study on the subject of any of the working papers or on any other subject that has importance for the Asia-Pacific forestry sector. Such material can be mailed to the contacts given below from whom further copies of these working papers, as well as more information on the Asia-Pacific Forestry Sector Study, can be obtained:

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FORESTS OF PAKISTAN

The forests of Pakistan reflect great physiographic, climatic and edaphic contrasts in the country. Pakistan is an oblong stretch of land between the Arabian sea and Karakoram mountains, lying diagonally between 24° N and 37° N latitudes and 61° E and 75° E longitudes, and covering an area of 87.98 million hectares. Topographically, the country has a continuous massive mountainous tract in the north, the west and south-west and a large fertile plain, the Indus plain. The northern mountain system, comprising the Karakoram, the great Himalayas, and the Hindu-Kush, has enormous mass of snow and glaciers and 100 peaks of over 5,400 m. in elevation. K-2 (8,563 m.) is the second highest peak in the world. The mountain system occupies one third of this part of the country. The western mountain ranges, not so high as in the north, comprise the Sufed Koh and the Sulaiman while the south-western ranges forming a high, dry and cold Balochistan plateau. Characteristically, the mountain slopes are steep, even precipitous, making fragile watershed areas and associated forest vegetation extremely important from hydrological point of view. The valleys are narrow. The mountains are continuously undergoing natural process of erosion. The nature of climate with high intensity rainfall in summer and of soil in the northern regions render these mountains prone to landslides.

The Indus plain consists of two features; the alluvial plain and sand-dunal deserts. The country is drained by five rivers; namely, Indus, Jhelum, Chenab, Ravi and Sutlej. Of these Indus arising in snow covered northern mountain ranges flows towards south through the Punjab and Sindh plains into a wide delta before entering Arabian sea. Other rivers join it on the way, together feeding one of the largest irrigation systems in the world. The great river system of Indus in Pakistan derives a part of their water supply from sources which lie in the highlands beyond the Himalayas and the western mountains, and part from countless valleys which lie hidden within the mountain folds. Much of the silt of the alluvial plain is from natural geological erosion of mountains in the north brought down by rivers. Thal desert lies between the rivers Indus and Jhelum, while Cholistan and Thar deserts occur on the south-east of the country.

A great variety of parent rock types occur in Pakistan, which exert considerable influence on the properties of the soil. The rocks found in Pakistan can be classified into three major groups, viz. the igneous rocks, the sedimentary rocks and the metamorphic rocks. In the Himalayan regions, the common rock types are metamorphic which are gneisses, schists, slates and phyllites with some quartzite and marble. In the northern part of Indus plain, between Sargodha and Shahkot small outcrops of phyllites and quartzites occur. Granite, syenite, diorite, gabbro, dolerite and peridotite are more common types of igneous rocks, which occur in Dir, Swat, Chitral, Gilgit, Zhob, Chagai, Las Bela and Nagarparker.

FOREST TYPES

The following forest types are found in Pakistan.

***Littoral and Swamp forests*:** These are more or less gregarious forests of low height which occur in the Arabian sea around the coast of Karachi and Pasni in Balochistan. The main species is *Avicennia marina* (99%). Other species like *Rhizophora* have disappeared over a period of

time due to heavy cutting. According to latest estimates, these forest cover an area of 207,000 ha.

***Tropical dry deciduous forests*:** These are forests of low or moderate height consisting almost entirely of deciduous species. Their canopy is typically light though it may appear fairly dense and complete during the short rainy season. This type does not occur extensively in Pakistan but there are limited areas in the Rawalpindi foothills carrying this vegetation type, all much adversely affected by close proximity to habitation or cultivation. It is closely similar both in floristic composition and in structure to that developed freely in the adjoining parts of North West India. The chief tree species are *Lannea* (Kamlai, Kembal) *Bombax ceiba* (Semal), *Sterculia*, *Flacourtia* (Kakoh, Kangu), *Mallotus* (Kamila, Raiuni) and *Acacia catechu* (Kath). Common shrubs are *Adhatoda* (Bankar, Basuti, Bansha), *Gymnosporia* (Putaki) and *Indigofera* (Kathi, Kainthi).

***Tropical thorn forests*:** These are low, open and pronouncedly xerophytic forests in which thorny leguminous species predominate. This type occupies the whole of the Indus plain except the driest parts. The major tree species are *Prosopis cineraria* (Jhand), *Capparis decidua* (Karir, Karil), *Zizyphus mauritiana* (Ber), *Tamarix aphylla* (Farash) and *Salvadora oleoides* (Pilu, wan). Among them are a large number of shrubs of all sizes. The tree forest climax is very frequently degraded to a very open, low thorny scrub of *Euphorbia* (Thor), *Zizyphus* (Ber), etc. owing to the universally heavy incidence of grazing and other biotic factors. Edaphic variants, especially connected with degree of salinity, shallowness over rock, etc., often occur. A characteristic pioneer vegetation is developed on inland sand dunes and the semi-deserts of the areas of least rainfall.

On the basis of climax vegetation, the whole Indus basin plain with the exception of parts of the districts of Sialkot, Gujrat and Jehlum, consists of tropical thorn forests. Prior to development of irrigation, agriculture and urbanization, the area extended from the foothills of the Himalayas and low-hills in the south-west Punjab plains and Balochistan to the Arabian sea. The climax species of these forests are *Salvadora oleoides, Capparis decidua, Tamarix aphylla* and *Prosopis cineraria*, which grow on a wide range of soil textures, from flat deep alluvial soils to heavy clays, loams and sandy loams. The climate varies from semi-arid (250 to 750 mm rainfall) to arid (less than 250 mm rainfall). The summer temperature in this tract is as high as 50^{o}C.

Earlier, these forests merged with riverain forests along the river banks and with scrub forests in the low hills in the north and north-western regions of Pakistan. Together these forests provided an ideal habitat to the wildlife of the area which seasonally migrated according to their needs; during cold winter from the lower hills towards the plains in search of food and shelter, from the flood plains towards the dry areas during floods and towards the rivers during the summer drought. This is no longer the situation. Riverain forests now grow in the forms of disjunct patches over an area of 173,000 ha. Irrigated agriculture is carried over 18.668 million ha. and irrigated tree plantations over an area of 103,000 ha in this tract.

Sub-tropical broad-leaved evergreen forests: These are xerophtic forests of thorny and small-leafed evergreen species. This type occurs on the foothills and lower slopes of the Himalayas, the Salt Range, Kalachitta and the Sulaiman Range. The typical species are; *Olea cuspidata* (Kau) and *Acacia modesta* (Phulai), the two species occurring mixed or pure, and the shrub *Dodonaea* (Sanatta) which is particularly abundant in the most degraded areas. Total area of these forests is estimated to be 1,191,000 ha.

Sub-tropical pine forests: These are open inflammable pine forests sometimes with, but often without, a dry evergreen shrub layer and little or no underwood. This type consists of Chir pine (*Pinus roxburghii*) forests found between 900 m and 1700 m elevation in the Western Himalaya within the range of the south-west summer monsoon. It is the only pine of these forests though there is a small overlap with *Pinus wallichiana* (Kail, Biar) at the upper limit.

Himalayan moist temperate forests: The evergreen forests of conifers, locally with some admixture of oak and deciduous broad-leaved trees fall in this category. Their undergrowth is rarely dense, and consists of both evergreen and deciduous species. These forests occur between 1500 m and 3000 m elevation in the Western Himalayas except where the rainfall falls below about 1000 mm in the inner ranges, especially in the extreme north-west.

These forests are divided into a lower and an upper zone, in each of which definite species of conifers and/or oaks dominate. In the lower zone, *Cedrus deodara* (Deodar, diar), *Pinus wallichiana, Picea smithiana* and *Abies pindrow* (Partal) are the main conifer species in order of increasing altitude, with *Quercus incana* (rin, rinj) at lower altitudes and *Q. dilatata* above 2130 m. In the upper zone *Abies pindrow* and *Q. semecarpifolia* are the dominant tree species. There may be pockets of deciduous broad-leaved trees, mainly edaphically conditioned, in both the zones. Alder (*Alnus* species) colonizes new gravels and sometimes kail does the same. Degradation forms take the shape of scrub growth and in the higher reaches, parklands and pastures are subjected to heavy grazing.

Himalayan dry temperate forests: These are open evergreen forest with open scrub undergrowth. Both coniferous and broad-leaved species are present. This type occurs on the inner ranges throughout their length and are mainly represented in the north-west. Dry zone deodar, *Pinus gerardiana* (Chalghoza) and/or *Quercus ilex* are the main species. Higher up, blue pine communities occur and in the driest inner tracts, forests of blue pine, *Juniperus macropoda* (Abhal, Shupa, Shur) and some *Picea smithiana* (e.g. in Gilgit) are found locally.

Sub-alpine forests: Evergreen conifers and mainly evergreen broad-leaved trees occur in relatively low open canopy, usually with a deciduous shrubby undergrowth of *Viburnum* (Guch), *Salix* (Willow, Bed), etc. The type occurs throughout the Himalayas from about 3,350 m to the timber limit. *Abies spectabilis* and *Betula utilis* (Birch, Bhuj) are the typical tree species. High level blue pine may occur on landslips and as a secondary sere on burnt areas or abandoned clearings. Rhododendrons (Bras, Chahan) occur in the understorey but do not form extensive communities as they do in the central and eastern Himalaya. Dwarf junipers are often abundant.

Alpine scrub: Under this type are included shrub formations 1 m to 2 m high extending 150 m or more above the sub-alpine forests. The characteristic genera are *Salix, Lonicera* (Phut), *Berberis* (Sumbul, Sumblue), Cotoneaster with *Juniperus* and occasionally *Rhododendron* or *Ephedra* (Asmania).

Present situation: Forest area of Pakistan reported in different official documents has varied over the years with administrative and political changes in country as well as with changes in methods of reporting data. Different government departments have been publishing different forest statistics since 1947 when Pakistan was created as an independent country. Most recently, data of land use including forest area have been reported by Forestry Sector Master Plan (FSMP)

Project in 1993, with the help of Landsat Satellite Thematic Mapper Images at a scale of 1:250,000 covering the whole of Pakistan. This is presented in Table 1.

The total area of forests in Pakistan according to the following table is 4.224 million ha which is 4.8% of the total land area. However, it may be mentioned here that the farmland trees and linear planting along roadsides, canalsides and railwaysides covering an estimated area of 466,000 ha and 16,000 ha respectively do not constitute forests within the context of legal, ecological or silvicultural/management definition of forests. The situation is also similar, but to a lesser extent, in the case of miscellaneous plantations over an area of 155,000 ha. If the area of these three categories of plantations is excluded from total forest area of 4.224 million ha, then the latter is reduced to 3.587 million ha. which is approximately 4.1% of the total area.

Table 1 - Forestry Sector Master Plan (FSMP) Estimates of Land Use Based on Satellite Imagery Interpretation (000ha)

Forest Cover/Land Use Class	Ajk	Balochistan	Northern Areas	Nwfp	Punjab	Sindh	Total	
							Area	%
Forest/trees								
Conifer	16	42	660	940	30		1,913	
Scrub	1	504		539	132		1,191	
Riverain		20		13	27	112	173	
Mangrove		2				205	207	
Irrig.plantation	7	1			79	23	103	
Farmland trees		23	6	70	306	54	466	
Linear planting	10			2	14		16	
Misc. Planting	241			120	20	5	155	
Total	275	592	666	1,684	608	399	4,224	4.8
Agricultural								
Irrigated	6	1,177	44	993	10,743	5,705	18,668	
Rainfed	36	3	4	553	1,316		1,912	
Total	42	1,180	48	1,546	12,059	5,705	20,580	23.4
Rangelands								
Degraded	731	11,674	896	4,106	4,466	2,809	24,682	
Non-degraded		892		519	1,293	68	2,772	
Alpine	79		705	269			1,053	
Total	810	12,566	1,601	4,894	5,759	2,877	28,507	32.4
Barren land			27					
Snow/glacier							27	
Rock, gravel		17,516		138	337	523	18,514	
Desertic		2,802			1,324	3,759	7,885	
Tidal flats		54				413	467	
Total		20,372	27	138	1,661	4,695	26,893	30.6
Water bodies								
Riverbed				48	400	155	603	
Lake		5	1	1	1	41	49	
Dam,reservoir	19	1		15	49	54	138	
Swamp					27	96	123	
Total	19	6	1	64	477	346	913	1.0
Urban		3		4	62	69	138	0.2
Unclassified								
Above 3,650 m	184		3161	1792			5137	
Below 3,650 m			1536	52			1588	
Total	184		4697	1844			6725	7.6
All Land Classes	1,330	34,719	7,040	10,174	20,626	14,091	87980	100.0

(Source: FSMP data base); %'ges by editor.

On the basis of forest area given in Table 1, the percentage forest cover for each province/territory is as under.

Province/territory	Percent geographic area covered by forest	Percent of total forest area
Azad Jammu and Kashmir	20.7	6.5
Balochistan	1.7	14.0
Northern Areas	9.5	15.7
N.W.F.P.	16.6	40.0
Punjab	2.9	14.4
Sindh	2.8	9.4

All the forested area in the country does not have dense tree cover. The FSMP Project gives the following estimates of density of forest/tree area from interpretation of satellite imagery for coniferous forests (coniferous/ scrub for Northern Areas), scrub forests, riverain forests, for Azad Jammu and Kashmir (AJK), Balochistan and NWFP (and not Punjab and Sindh), mangrove forests and irrigated plantations. Government records for riverain net forest areas in the Punjab and Sindh were also used by the FSMP.

Table 2 - FSMP Estimates of Forest Cover/Tree Area '000 ha

Forest Cover/Land Use Class	Ajk	Balochistan	Northern Areas	Nwfp	Punjab	Sindh	Total	
							Area	%
Forest/Trees [1/]								
Dense	17		46	75			138	
Sparse	224	42	614	865	30		1,775	
Sub-Total	241	42	660	940	30		1,913	45.3
Scrub Forests	16	504		539	132		1,191	28.2
Riverain Forests								
Dense	1			2	27	85	115	
Spare		20		11		27	58	
Sub-Total	1	20		13	27	112	173	4.1
Mangrove Forests								
Medium		2				85	87	
Sparse						120	120	
Sub-Total		2				205	207	4.9
Irrig.Plantations								
Dense					48	7	55	
Sparse		1			31	16	48	
Sub-Total		1			79	23	103	2.4
Farmland Trees	7	23	6	70	306	54	466	11.0
Linear Planting				2	14		16	0.4
Misc. Planting	10			120	20	5	155	3.7
Total Area	275	592	666	1,484	608	399	4,224	100.0
Geographic Area	1,330	34,719	7,040	10,174	20,626	14,091	87,980	
% Tree cover	20.7	1.7	9.5	16.6	2.9	2.8	4.8	

(Source: FSMP data base); %'ges by editor.

1/ For Northern Areas, this category includes scrub.

GROWING STOCK

Reliable and complete inventory of forest growing stock are not available nationally. Forest Department Working Plans cover approximately 50% of coniferous forest area and contain estimates of volume, but many of these are based on outdated inventories. Coniferous forests of NWFP, Punjab and AJK have more complete inventories than other forests. The FSMP compiled data for 1.3 million ha area of 29 working plans in NWFP, 3 in Punjab and 4 in AJK, and 3 working schemes in Northern Areas. The growing stock of coniferous forests covered by these plans/schemes was 185 million m3 or an average of 145 m3 per ha. Applying the average standing volume per ha. for each province, gives the following total coniferous growing stock.

	Coniferous growing stock 000 m^3
AJK	40,729
Northern Areas	59,400
NWFP	124,080
Punjab	7,380
Total	**231,589**

The species composition of the growing stock of coniferous forests was also determined from 29 working plans of NWFP which is given below. The percentages are not for individual trees of these species, but for forest types dominated by one or two species.

Forest Types	**Percent of Growing stock**
Spruce/Fir	39
Kail (*Pinus wallichiana*)	23
Deodar (*Cedrus deodara*)	18
Fir *(Abies pindrow)*	8
Spruce *(Picea smithiana*)	6
Chir *(Pinus roxburghii*)	4
Broad leaved	1
Scrub	1

	Growing Stock of Trees on Farms, 000 m^3
AJK	2,060
Balochistan	3,430
Northern Areas	1,592
NWFP	8,570
Punjab	46,100
Sindh	8,540
Total	**70,292**

Species composition of this growing stock was estimated to be:

	Percent of Growing stock
Shisham (*Dalbergia sissoo*)	22
Kikar/Babul *(Acacia nilotica*)	14
Chir pine (*Pinus roxburghii*)	8
Mango (*Mangifera indica*)	4
Mulberry (*Morus alba*)	3
Poplar (*Populus sp*.)	3
Eucalyptus	1
Other species	45

Estimates of growing stock of scrub, riverain and mangrove forests, and of irrigated, linear and other plantations are not known.

Trees on farms

Nationally, Pakistan has a growing stock of trees on farms totalling 70.29 million m^3. If added to growing stock in forests the total becomes 301.89 million m^3; farm trees account for 23% of this total. In Punjab, however, farm trees have 86% of the provincial growing stock - the highest in the country.

The growing stock of trees on farms when averaged over area of total agricultural land from Table 1 (20.58 million ha) gives a total stock of about 3.42 m^3/ha as a national average.

(Editor).

SUPPLY AND DEMAND OF WOOD

Timber Consumption: According to Forestry Sector Master Plan 1992, per capita timber consumption is 0.026 m^3 and therefore, the estimated total timber consumption for population of 124.66 million in 1992-93 is 3.253 million m^3. The contribution of state controlled forest to this consumption according to office records of all Forest Departments in 0.470 million m^3 (14.4%); imports of wood and wood products is 1.280 million m^3 (39.3%) costing to Rs.4704.3 million, most of which is in the form of pulp and paper (92%) and farmlands provide the balance 1.503 million m^3 (46.2%) of timber.

Fuelwood Consumption: The FSMP per capita also gives per capita fuelwood consumption of 0.208 m^3 and total fuelwood consumption in 1992-93 was thus estimated at 25.95 million m^3 for both industrial and domestic purposes. Of this total 23.355 million m^3 (90%) is contributed by farmlands and waste lands and the rest 2.595 million m^3 (10%) is supplied by state controlled forests in the form of recorded and un-recorded removals. On the other hand, the Household Energy Strategy Study of 1993 finds that the annual fuelwood production is 32.33 million m^3 and annual consumption is 46.148 million m^3. The fuelwood gap for Pakistan is estimated at 13.82 million m^3. This gap is very close to that estimated by Forestry Sector Master Plan of 15.1 million m^3. Other studies have also given somewhat similar

estimates. Current consumption of wood as well as its estimated demand are given in Table 3 and 4 respectively.

Table 3 - Consumption of wood in Pakistan, 1992-93

Item	Thousand cubic metres	
	Volume	%
Construction	974	28.1
Furniture	394	11.4
Village carpentry	306	8.8
Mining timber	291	8.4
Industrial fuelwood	204	5.9
Matches	193	5.5
Trucks and buses	167	4.8
Particle board	103	3.0
Sports goods	51	1.5
Plywood	25	0.7
Fibre board	21	0.6
Boats	14	0.4
Crates and boxes	704	0.3
Trains	6	0.2
Railway ties	7	0.2
Total	3,460	100.0
Population (million)	124.66	-
Per capita use (m^3)	0.028	-

Source: Forestry Sector Master Plan, 1992.
Includes Industrial Fuelwood of 0.204 million m^3.

Table 4. Estimated demand for industrial wood-based products by end-use (Thousand cubic metres)

	1993	1998	2003	2008	2013	2018
Construction	995	1,159	1,351	1,574	1,834	2,139
Crates and boxes	720	876	1,066	1,297	1,578	1,920
Furniture	403	508	639	804	1,012	1,272
Village carpentry	313	351	391	433	476	519
Mining timber	297	375	476	599	756	958
Matches	197	273	377	521	720	996
Trains	6	6	6	6	6	6
Trucks and buses	171	213	266	332	414	517
Boats	14	14	14	14	14	14
Particle board	105	156	231	343	509	754
Sports goods	52	77	113	166	244	358
Plywood	26	28	31	34	38	42
Fibreboard	22	22	22	22	22	22
Railway ties	7	7	6	5	5	4
Industrial fuelwood	208	233	266	306	356	422
Total	3,536	4,298	5,255	6,456	7,985	9,943
Population (millions)	126.8	147.7	172.1	200.4	233.5	272.0
Per capita use (m^3)	0.028	0.029	0.031	0.032	0.034	0.037

Source: Forestry Sector Master Plan, 1992.

Future changes in demand profile			
from Table 4, the breakdown of demand shows some contrasts for certain products as partly illustrated below (Editor):			
End use	% demand		
	1993	2003	2013
Construction	28.1	25.7	21.5
Crates & boxes	20.4	20.3	19.3
Furniture	11.4	12.1	12.8
Matches	5.6	7.2	10.0
Trucks and buses	4.8	5.1	5.2
Particleboard	3.0	5.0	7.6
Other	26.7	24.6	23.6
Total	100.0	100.0	100.0

List of Working Papers already printed

APFSOS/WP/01	Regional Study - The South Pacific
APFSOS/WP/02	Pacific Rim Demand and Supply Situation, Trends and Prospects: Implications for Forest Products Trade in the Asia-Pacific Region
APFSOS/WP/03	The Implications of the GATT Uruguay Round and other Trade Arrangements for the Asia-Pacific Forest Products Trade
APFSOS/WP/04	Status, Trends and Future Scenarios for Forest Conservation including Protected Areas in the Asia-Pacific Region
APFSOS/WP/05	In-Depth Country Study - New Zealand
APFSOS/WP/06	In-Depth Country Study - Republic of Korea
APFSOS/WP/07	Country Report - Malaysia
APFSOS/WP/08	Country Report - Union of Myanmar
APFSOS/WP/09	Challenges and Opportunities: Policy options for the forestry sector in the Asia-Pacific Region
APFSOS/WP/10	Sources of Non-wood Fibre for Paper, Board and Panels Production: Status, Trends and Prospects for India
APFSOS/WP/11	Country Report - Pakistan