

## QUANTITATIVE ANALYSIS/ESTIMATION OF WOOD UTILIZATION IN WOOD BASED INDUSTRIES OF PUNJAB AND KHYBER PAKHTUNKHWA

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### ABSTRACT

A survey of wood based industries was conducted in Punjab and Khyber Pakhtunkhwa under the Project, "Provision for Forestry Research Enhancement at Pakistan Forest Institute" funded by the Forestry, Environment and Wildlife Department Khyber Pakhtunkhwa to estimate the quantitative wood consumption and types of wood species utilized by the various wood based industries to help various stake holders and policy makers for sustainable forest management and subsequent provision of woody raw material on sustainable basis to the wood based industries by the respective Forest Departments. 139 various wood based industries i.e. Furniture, Sports, Chipboard, Medium Density Fiber board (MDF), Plywood and Match-manufacturing were surveyed and data was collected on a well structured 15 point pro forma besides exploratory interviews with the experts and cottage units. Results showed that the furniture industry utilized 2,722,643 cft of different wood species annually collectively in Punjab and Khyber Pakhtunkhwa. Chipboard industry had its utilization of various wood species standing at 178,084 tons cumulatively annually in both provinces. Plywood industry consumed 170,133 cft and 1095 tons of wood in Punjab and Khyber Pakhtunkhwa respectively on yearly basis. MDF and Match industries were mainly present in Khyber Pakhtunkhwa while Sports industry was located in Punjab and their respective utilizations of wood were 45,667 tons, 15,805 tons and 8,000 tons respectively per annum.

The major local tree species used in the various industries were Shisham (*Dalbergia sissoo*), Kikar (*Acacia nilotica*), Mulberry (*Morus alba*), Eucalyptus spp., Poplar spp. Frash (*Tamarix aphylla*), Bakain (*Melia azedarach*), Walnut (*Juglans regia*), Simal (*Bombax ceiba*), indigenous and imported Willow (*Salix tetrasperma* and *S. alba*) and Mango (*Mangifera indica*). It is recommended that afforestation/reforestation programs all over the country should ensure a sustainable supply of raw material for the wood based industries.

### INTRODUCTION

Pakistan has limited timber and wood resources. Out of the total land area of 87.98 mha, forests cover only 4.4mha (4.96%). Forests include State-owned forests, communal forests and privately owned forests. State forests cover 1.29 mha while communal and privately-owned forests cover 3.1 mha

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located primarily in the Khyber Pakhtunkhwa and Punjab (GOP 2008).

Notwithstanding the wide range of forests in the country due to variation in climatic and edaphic factors, Pakistan is still a forest poor country with only 0.03 ha of forest area per capita of population which is declining due to population growth (NIPS 2009).

Analysis of sectoral distribution of timber consumption reveals that major consumers were sawmilling (21%), followed by housing sector 19%, crates and box making (13%), miscellaneous wood based industries(10%), truck/bus body building (9%), village carpentry (7%), sports goods (5%) and the rest 16% share went to mining, boat making, plywood, chip/hard board, wood aircraft, railway tracks/carriages, pencil and matchbox industry, non-mechanized enterprises, and shoe lasts and bobbins (Sumia and Shahid, 2012) .

Per capita timber consumption is 0.08 m<sup>3</sup>. Thus total timber consumption is estimated at 13.57 million m<sup>3</sup> in 2011 for population of 170.52 million. Major requirement of timber is being met from farmland trees (91.4%) followed by imports (5.22%) and state forests (3.34%); (GOP 2005).

In irrigated plantation forests, species such as Shisham, Kikar, Eucalyptus, Mulberry, Poplar, Bakain and Simal are grown which provide timber for furniture making, and other wood based industries. Deodar, Patal, Kail, Shisham, Kikar/Babul, Mulberry, etc are the main wood species used for construction and furniture making.

In the face of the above situation, growing industrial needs of woody raw material, sustainable development and lack of updated industrial wood utilization information, unavailability of qualitative and quantitative information regarding industrial wood requirements, supply and consumption of wood resource in wood based industries, it is desirable to conduct this study for policy makers, planners and other concerned stakeholders so that sustainable forest management, production and provision of woody raw material to wood based industries may be possible as the role of wood utilization information is of great importance in forestry sector planning because of close linkages of Forestry with other sectors of the economy and relatively longer planning horizon as the absence of wood utilization information affects the designing and implementation of various policies at different organizational and institutional levels. Notwithstanding the above mentioned factual importance for policy formulation and planning, it is unfortunate that historically, either no or partial efforts have been undertaken in the country for conducting such a research study.

The main objectives of the study were to provide updated information on wood consumption/requirements in wood based industries of Khyber

Pakhtunkhwa and Punjab and estimate the total quantity and type of wood used in wood based industries of Khyber Pakhtunkhwa and Punjab. This study was conducted under the project "Provision for Forestry Research Enhancement at Pakistan Forest Institute (PFI), Peshawar" funded by the Khyber Pakhtunkhwa Department of Forestry, Environment and Wildlife.

## METHODOLOGY

The research objectives have been achieved through multi-pronged methodology, i.e. exploratory interviews with the sector experts/exporters related to wood utilization, interviews with the cottage type wood industry and quantitative survey of large wood based industrial units on a well-structured, 15-point questionnaire/pro forma and the data were collected with the focus on the following areas mainly:

- 1) Type of business
- 2) Type of raw material/s used on annual basis.
- 3) Quantity of raw material utilized on annual basis.
- 4) Proportions of raw material/s utilized
- 5) Machinery and technological status
- 6) Problem/s of industry

As part of study design, some 54 exploratory interviews were carried out with the stakeholders belonging to the sectors concerned. Similarly, 43 household interviews or interviews with the cottage units, wood market agents and saw millers were also conducted to collect the data regarding wood type, proportion of wood utilization by type and average wood utilization by a cottage unit on daily basis. Number of units was also counted for calculation of total utilization of wood on annual basis. The total wood utilization on annual basis was then calculated by multiplying number of units with wood consumption on daily basis for 300 working days per year i.e.

Total Utilization/Year = No. of units x Mean wood consumption/day x 300 days

This was done in areas like Chiniot, Gujrat, Mardan and Kohat/Bannu where the cottage wood industry was concentrated.

A total of 139 wood based manufacturing units were surveyed for data collection through a well-structured questionnaire/pro forma. Similarly, the wood consumption/day or year and proportion (%) of various species data were collected and the total utilization was calculated by applying the above formula where needed, and the proportion (%) of various wood species was calculated by taking average i.e.

Proportionate Utilization (%) of a Specific Wood Species = Total % of that species utilized in surveyed industries divided by the No. of surveyed industries  
The break-up of the interviews and surveys is as under.

Table 1: Break-up of Interviews and Surveys conducted in Punjab and Khyber Pakhtunkhwa

Sector	Province	No. of exploratory Interviews with experts	No. of interviews with cottage units	No. of quantitative surveys of manufacturing units on pro forma
Furniture	Punjab	07	23	92
	Khyber Pakhtunkhwa	25	20	25
Chipboard, Plywood, MDF	Punjab	08	---	08
	Khyber Pakhtunkhwa	07	---	07
Match production	Khyber Pakhtunkhwa	04	---	04
Sports	Punjab	03	---	03

## RESULTS AND DISCUSSION

### Wood utilization in Punjab furniture industry

In Punjab, the furniture industry is mainly concentrated in Lahore, Gujrat, Chiniot and Jhang cities. Furniture units in Lahore manufactured as well as marketed their products. These units purchased a part of furniture from other cities like Chiniot, Sahiwal and Gujrat etc. as 'Kora' i.e. raw furniture articles/items and then assembled, decorated and finished the products for selling and also manufactured their own furniture. A total of 80 furniture making industrial units were surveyed for wood utilization data collection.

The total annual wood utilization in Lahore division was 176,880 cft out of which 107,721 cft utilization was Shisham wood, 36,198 cft Eucalyptus, 13,850 cft Bakain, 10,826 cft Kikar, 1,985 cft Kail, 250 cft Deodar, and 5,895 cft miscellaneous species wood.

In Gujrat city, according to the estimates provided by different sources, furniture manufacturing cluster comprised of about 350 units. These units could be categorized into micro, small and medium sized units. Out of the total number of units, 10 were medium, 40 small and 300 micro-sized units. The number 300 included all the units that were either directly or indirectly involved in furniture manufacturing. These units were vertically integrated and involved in different stages of furniture manufacturing. Some of these units had also organized

themselves in specialized products manufacturing, i.e. one unit was producing only one kind of products not all kinds of products (e.g. a unit producing chairs would only produce chairs). The units were selling their products in semi-finished and finished form in Gujrat as well as in other cities.

Gujrat furniture industry cluster consisted of 40 small sized units. These units manufactured the furniture themselves as well as depended on the micro sized units for their manufacturing requirements. In the second case these units bought the semi-finished furniture from micro sized units and then finished these products. These units had their own show rooms to display their finished products. Most of the sales of small-sized units were domestic but a few of them were also exporting products. These units had workers ranging from 15 to 50 in number depending upon the amount of work. These units sometimes also hired workers on contract basis in case of more orders.

Gujrat cluster consisted of 10 medium-sized units. These units could be called as the market leaders because of their level of achievement. Most of these units were operating at least for the last 30 to 40 years and had developed a lot over time. These units were self-sufficient because they had solved most of their problems and issues related to production. These units had workers ranging from 50 to 100 in number depending on the work load.

Shisham 45%, imported wood 24% (including Mahogany, Ash, Burma Teak etc.), Kikar 14%, Walnut 10%, and Deodar 2% were the major timber species used in manufacturing furniture.

The total annual utilization of wood in Gujrat furniture industry was 419,750 cft, out of that 164,250 cft of wood was utilized by micro units, while 146,000 cft and 109,500 cft of wood was consumed by small and medium sized furniture manufacturing units respectively. In addition to this, man-made/ready woody material (Furniture articles) of approximately 250,000 cft of wood was also utilized.

In Chiniot there were about 3,400 furniture manufacturing units. The furniture industry was cottage type and on an average a unit usually consumed approximately 1.5 cft of wood/day which implies that annually about 1,530,000 cft of wood was consumed by the industry in Chiniot.

The main wood species used in the Chiniot furniture industry were Shisham and Kikar. Out of total wood utilized, 75-80% was Shisham, 15-20% Kikar and 5-10% other species. Out of total Shisham wood utilized, 75-80% was Pillar Pawa (wood consisting mainly of sap wood) and 20-25% was pure Shisham.

The total annual wood utilization in Jhang district was 71,175 cft with major species being Kikar and Shisham with utilization % standing at 56% and 35% respectively.

Table 2: Consumption of wood by locality, number of units and major species in the furniture industry in Punjab

Locality	No. of units (approx.)	Estimated Annual Wood utilization (cft)	Major timber species
Lahore	80	176,880	Shisham, Eucalyptus, Bakain etc.
Gujrat	350	419,750	Shisham, Imported timber, Kikar, Walnut, etc
Chiniot	3400	1,530,000	Shisham, Kikar, etc.
Jhang	-	71,175	Shisham, Kikar, etc.

### Wood utilization in Khyber Pakhtukhwa furniture industry

As far as the furniture industry of Peshawar is concerned, it utilized approximately 78350 cft of wood on annual basis. Major species used were Shisham, Kikar, Mulberry and Poplar, which accounted for 47%, 21%, 14% and 10% utilization respectively. 08% of the total utilization was of other minor species.

Main furniture industry in Mardan and Charsadda was cottage type. About 300 units were present in the area. On an average 2-3 cft of wood was utilized by each cottage unit per day. Roundabout, 275,150 cft of wood was being utilized by the furniture industry in Mardan and Charsadda annually. Shisham, Kikar, Mulberry and other species were mainly utilized in the industry. 42%, 22%, 13% and 23% utilization was accounted for by Shisham, Kikar, Mulberry and other species respectively.

Approximately 33,338 cft of wood was utilized annually in D.I Khan and Karak. Furniture manufacturing was being carried out on a very small scale. Of the total utilized wood, Shisham's and Kikar's shares were 54% and 37% respectively, while 9% of the total wood utilization was accounted for by other species.

In Kohat and Bannu, cottage type small items manufacturing units were present. In Kohat 90 such units were present while Bannu had 08 sawmills and 50 cottage units. On average, 300 cft of wood was utilized by a unit annually in Kohat, while a saw mill and a unit utilized 40 cft and 01 cft of wood respectively

on daily basis. A total of 138,000 cft of wood was used in Kohat and Bannu cottage industry. Types of species used were Shisham, Kikar, Mulberry, Ber & Poplar. Utilization of Shisham and Kikar was 30% each, while Mulberry, Ber and Poplar accounted for 15%, 5% and 20% utilization respectively. Kikar was utilized in bulk in Bannu while Shisham in Kohat.

Table 3: Consumption of wood by locality, number of units and major species in the furniture industry in Khyber Pakhtunkhwa

Locality	No. of cottage units (approx.)	Estimated Annual Wood utilization (cft)	Major timber species
Peshawar	-	78,350	Shisham, Kikar, Mulberry, etc.
Mardan/Charsadda	300	275,150	Shisham, Kikar, Mulberry, etc.
D.I.Khan/Karak	-	33,338	Shisham, Kikar, etc.
Bannu/Kohat	148	138,000	Shisham, Kikar, etc.

#### Wood consumption by chipboard and plywood industry in Punjab

The main chipboard manufacturing industry in Punjab was 'Pakistan Chipboard', Jhelum. Besides this, 5 units of Chipboard/Particle board were present in Multan, namely, Shaheen Chipboard, United Chipboard, Kohinoor Chipboard, Noor Chipboard and Timberland Chipboard.

In Multan, the type of wood species used for chipboard manufacturing were Mango, Frash, Poplar and Eucalyptus. As far as the quantitative utilization of wood is concerned, on average 19,200 tons of wood was utilized by each unit in Multan and Mango wood accounted for about 95% of total utilization.

In Jhelum, Pakistan Chipboard was the major producer of chipboard on national level. Total wood utilization by this industry was 14,600 tons/year. Frash accounted for 75% of total wood utilization, while the share of Poplar, Mango and Eucalyptus was 8%, 8% and 9% respectively.

The total wood utilization by the plywood industry in Punjab was 170,133 cft. By type of wood, Simal wood's utilization was the highest, that is, 63%, while Shisham and other wood species accounted for 26% and 11% respectively.

#### Wood consumption by chipboard, medium-density fibreboard (MDF) and plywood industry in Khyber Pakhtunkhwa

Chipboard industry in Peshawar utilized approximately 28,164 tons of

wood per year (excluding ZRK industry data due to unavailability of up-to-date data with the industry). Types of wood species utilized were Poplar, Lachi (Eucalyptus) and Frash. Poplar and Lachi each accounted for 40%, while utilization of Frash was 20%. Two MDF industry units were also surveyed in Peshawar. These units utilized about 45,667 tons of wood per annum and the major utilized species was Poplar. Major wood-based industry present in Hazara Division was Chipboard and Plywood manufacturing industry which is located in Hattar industrial state. As far as the Chipboard industry is concerned, 03 manufacturing units located in Hattar were surveyed for data collection. A total of 39,320 tons of wood was utilized by the industry annually. Major wood species used were Eucalyptus with utilization contribution of about 80% and other species, like Frash, Simal and Mulberry which accounted for about 20% utilization. A Plywood manufacturing unit was present in Hattar and accounted for approximately 1,095 tons of wood consumed annually and the only utilized wood species was Simal.

### **Wood consumption in match industry in Khyber Pakhtunkhwa**

Match industry was mainly located in Peshawar utilizing about 15,805 tons of wood annually and Poplar was the only species used in the industry.

### **Wood utilization in sports industry of Punjab**

There were about 100 wood based sports manufacturing units working in Sialkot. Out of these 100 units, 10 large, 20 medium and 70 small wood sports manufacturing units were present in the city.

Out of 10 large scale sport manufacturing units, 03 were surveyed for wood utilization data collection. Approximately 800 tons of various wood species were utilized on annual basis by a large scale manufacturing unit. The overall utilization of wood thus stood at 8,000 tons/year by large scale sports manufacturing brands.

In terms of production, a firm generally manufactured 20,000-25,000 (export quality) hard ball bats, 40,000-50,000 ordinary cricket bats, 8,000-10,000 international quality hockey sticks (export quality) and 25,000-30,000 ordinary hockey sticks annually.

The major wood species utilized in the sports industry were indigenous such as Poplar and Willow and imported namely English Willow, Poplar and indigenous Willow were used for making low quality cricket bats and hockey sticks, while English Willow was used for manufacturing good quality cricket bats.



As far as the percentage utilization of species is concerned, 60-70% utilized wood was Poplar while indigenous Willow and English Willow accounted for 15-20% each.

## CONCLUSION

- Data analysis indicated that Furniture industry in Punjab utilized approximately 2,197,805 cft of wood per year. 6% of the total utilized wood was imported while Shisham, Kikar, Eucalyptus, Bakain, Walnut, Deodar and other wood species contributed 54%, 23%, 5%, 2%, 2.5%, 0.5% and 7% of the total utilization respectively.
- Similarly, approximately 524,838 cft of wood was utilized in the Furniture industry of Khyber Pakhtunkhwa annually. Major wood species used in the industry were Shisham, Kikar, Mulberry and other wood species accounting for 38%, 33%, 7% and 22% utilization respectively.
- As far as the Chipboard industry is concerned, it utilized approximately 110,600 tons and 67,484 tons of wood (excluding ZRK industry) annually in Punjab and Khyber Pakhtunkhwa respectively. The major wood species utilized in Punjab were Mango which accounted for 51% of utilization, Frash 38% of total utilization, and Eucalyptus and Poplar both contributed more or less 11% collectively.
- Similarly, in Khyber Pakhtunkhwa Chipboard industry total consumption of wood stood at 67,484 tons/year with the major utilized wood species utilized being Eucalyptus, Poplar, Frash, and other wood species and their % utilization stood at 60%, 20%, 10% and 10% respectively.
- As far as the Plywood industry is concerned, Punjab industry utilized approximately 170,133 cft wood annually with the major utilized species being Simal, Shisham and other species contributing 63%, 26% and 11% of the total utilization respectively. In Khyber Pakhtunkhwa, approximately 1,095 tons of wood was utilized annually and the only species used was Simal.
- MDF (Medium Density Fiberboard) industry was mainly located in Khyber Pakhtunkhwa and utilized approximately 45,677 tons of wood annually and the only utilized species was Poplar (excluding ZRK industry data).
- Match industry was also present in Khyber Pakhtunkhwa and approximately 15,805 tons of Poplar wood was used annually by the industry.

- Sports industry was mainly located in Sialkot city of Punjab and it utilized about 8,000 tons of wood annually. Among the major utilized wood species Poplar and Willow were indigenous with % utilization of 66% and 17% respectively, while English willow was imported with its utilization standing at almost 17% of the total utilization.

## RECOMMENDATIONS

A holistic approach is the need of time to flourish and excel the wood based industry of Pakistan and emerge on the global outlook as a healthy competitive market. Some of the most important elements of that approach are the following.

- **Sustainable Raw Material Supply**

Determined and comprehensive planning, policies and strategies are required to be implemented in Forestry sector by taking all the stakeholders (Provincial Forest Departments, Wood based industries and Pakistan Forest Institute--- a prime organization of research in the various fields of Forestry) on board to create and develop a mechanism for provision of sustainable source of wood raw materials with clearly stated shared responsibilities of every stakeholder. Forestry/reforestation programs should ensure a stable source of low cost raw materials, and to the extent possible maintain or improve ecological conditions, enhance the community income and employment; etc. Enforcement of the rule of law and eradication of illegal cutting and trade of timber by respective Forest Departments can also be helpful in this context.

- **Product Quality and Human Resource**

The quality of wood based products is determined by careful processing of raw materials, production technologies and manufacturing processes. Owing to lack of skills and facilities, as well as the lack of quality standards and agencies conducting inspections, quality is bound to suffer. Again there must be a mechanism in place by the Government of Pakistan and Provincial governments with the on board consensus of various stakeholders concerned and well defined mandate of each stakeholder for enhancing technical capabilities of the human resource of the wood based industries, specifying and observing production quality standards and monitoring and certification of the quality of products by an inspection agency, like, Pakistan Forest Institute. Public support to vocational training for workers in factories is recommendable, in order to reduce direct training expenses of enterprises, and to allow managers to professionally grow their businesses.

- **Market Information and Activities**

Access to information on market characteristics (for example trends in distribution, retail success stories, and new furniture marketing concepts) and market access (tariff and non-tariff barriers) is often too difficult. It would thus be useful to centralize this information for regular distribution at the industrial association level.

The wood based industry should focus on marketing activities in key markets (the United States, Japan, the European Union, and the Gulf). A concerted action should include exhibitions; websites; international trade fairs; in-depth market analyses, etc. Special encouragement may be warranted for importers and retailers groups to visit Pakistani factories or permanent exhibition halls.

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