ABSTRACTS

One Day Workshop

On

Assessment on Demand and Supply of Timber in India

(September 13, 2021)




ORGANIZED BY

Division of Forestry Statistics
Indian Council of Forestry Research and Education
(An autonomous body under Ministry of Environment, Forest and Climate Change, GOI)
P.O. New Forest , Dehradun , Uttarakhand-248006

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Under the All India Coordinated Research Project
"Assessment of Demand and Supply of Timber, Fuel-wood and Fodder in India"

SPONSORED BY

Ministry of Environment, Forest and Climate Change, GOI

Programme

One day virtual workshop of AICRP#12

Assessment of Demand and Supply of Timber, Fuel-wood and Fodder in India

by

Division of Forestry Statistics, ICFRE, Dehradun

Date: 13 September 2021 **Venue (ICFRE)**: Board Room, ICFRE

Time	Sessions/Topic/Chairman/Speaker
9:00 - 10:00	**Inaugural Program** **(Chair: Sh. Rakesh Kumar Dogra, DDG (Admin), ICFRE)**
09.00-09.05	Welcome Address (Dr. Rajiv Pandey, Head, Division of Forestry Statistics)
09:05 – 09:15	Brief introduction about the Project (Dr. Girish Chandra, NPC)
09:15 – 09:25	Address by Sh. R. K. Bajpai ADG (Admin)
09:25 – 09:35	Address by Sh. Rakesh Kumar Dogra, DDG (Admin), ICFRE
09:35 – 09.40	Vote of Thanks (Sh. Muthuprasad, Sc-B)
09:40 – 10.00	Tea
10.00- 11:30	**Session-I: Information Sources on Timber Demand and Supply in India** **Chair: Sh. S. D. Sharma, DDG (Res.), ICFRE** **Co-Chair: Dr. Vimal Kothiyal, ADG (RP), ICFRE**
10:00 – 10:30	Plywood and Panel Industry – India's Growth Outlook (Dr. C.N. Pandey)
10:30 – 11:00	Wood Production and Availability in India: Bottlenecks in Accurate Assessment (Sh. R. C. Dhiman)
11:00 – 11:30	Experience Sharing on Assessment of Pulpwood Availability in India (Dr. H. D. Kulkarni)
11.30-13.00	**Session-II: Panel Discussion** **Chair: Sh. R. K. Bajpai, ADG (Admin), ICFRE** **Co-Chair: Sh. S. R. Reddy, DCF (Rtd.), FRI** **Discussants:** **(i) Dr. Shailendra Kumar, FRI** **(ii) Dr. Sanjay Singh, ICFRE** **(iii)Dr. Ajay Kumar, RFRI**
	Panelists: Dr. C.N. Pandey Sh. R.C. Dhiman Dr. H. D. Kulkarni Sh. Sunil Pandey Sh. Rajesh Kumar Sh. Raman Nautiyal
13.00 - 14:00	**Lunch**
14.00 – 16.45	**Session-III: Approach and Methodology of Timber Demand and Supply in India** **Chair: Dr. Rajiv Pandey, Head, Division of Forestry Statistics** **Co-Chair: Dr. Shailendra Kumar, FRI**
14.00 – 14:30	Methodology of AICRP 12 (Dr. Girish Chandra)
14.30-15.00	Talk by

	Sh. Rajesh Kumar
15.00-15.30	Estimating demand of round wood from consumption sectors – factors and models (Sh. Raman Nautiyal)
15.30-15.45	Tea
15.45-16.15	Talk by Dr. Girish Kumar Jha
16.15-16.45	Demand and Supply Models Dr. Sivaramane N.
16.45-17.45	**Session-IV: Panel Discussion** **Chair: Dr. C.N. Pandey, Century Plywood Industry (I) Ltd** **Co-Chair: Dr. P. K. Gupta, Head, Forest Product Division, FRI** **Discussants:** **(i) Dr. Jawaid Ashraf, ICFRE** **(ii) Dr. Manish Kumar, ICFRE** **(iii) Sh. Muthuprasad, ICFRE**
	Panelist: Sh. Rajesh Kumar Sh. Raman Nautiyal Dr. Manmohan Yadav Dr. Girish Jha Dr. Sivaramane N Sh. S. R. Reddy
17.45 to 18.00	**Valedictory Ceremony**

Rapporteurs – Dr. Sanjay Singh (Sc-D), Dr. Jawaid Ashraf (Sc-B), Dr. Manish Kumar (Sc-B), Sh. Muthuprasad (Sc-B)

Assistance: Sh. Atul K. Saini, Ms. Ankita Negi

PROJECT TEAM

Sr. No.	Name
1	Dr. Rajiv Pandey, Scientist-E, ICFRE
2	Dr. Sanjay Singh, Scientist-D, ICFRE
3	Sh. Kamal Pandey, Deputy Director, FSI
4	Dr. S.C. Biswas, Scientist-D, TFRI
5	Dr. Girish Chandra, Scientist-C, ICFRE
6	Dr. Rao Shaeb Latpate, Asstt. Prof., Pune Univ.
7	Dr. Ritesh Tailor, Scientist-C, IWST
8	Dr. Shailendra Kumar, Scientist-C, FRI
9	Sh. Ajay Kumar, Scientist-C, RFRI
10	Dr. Jawaid Ashraf, Scientist-B, ICFRE
11	Dr. Manish Kumar, Scientist-B, ICFRE
12	Shri. Muthuprasad T., Scientist –B, ICFRE
13	Dr. S.K. Rajput, CTO, AFRI, from Aug 2020
14	Smt. Bharati Patel, Scientist-B, IFB, Hyderabad
15	Sh. A. Kishore, CTO, IFB, Hyderabad

CONTENTS

ABSTRACTS

Assessment of Demand and Supply of Timber, Fuel-Wood and Fodder in India
(AICRP – 12)

1. Background

The All India Coordinated Research project (AICRP-12) entitled "Assessment of demand and supply of timber, fuel-wood and fodder in India" is being implemented by the Division of Forestry Statistics (DFS), ICFRE with the financial support by Ministry of Environment, Forest and Climate Change (MoEFCC), GoI under the CAMPA scheme. AICRP-12 is executed through seven ICFRE institutes. The aim of the project is to assess the total demand and supply of timber, fuel-wood, fodder in India. Demand for timber arises in direct form (for direct use) and indirect form (when products are sold after adding value of the timber). The various sectors where leverage on timber demand is comparatively higher are household sector, industrial sector, service sector and trade sector. The trade sector includes the export and import of timber at national (from one state to another state) and international (from India to other country) level. The project aims to estimate demand and supply of timber in the country in present scenario to help in policy making at various levels.

2. Objectives of the project

The broad objectives of the project are given below:

- To estimate the current demand and supply of timber, fuel-wood and fodder in India.
- To identify the determinant and functional form of demand and supply of timber, fuel-wood
- Long-term impact of substitution on out-turn and for the demand of all three components.
- Estimation of unrecorded removal of timber, fuel-wood and fodder and the extent of stall feeding and grazing in forest areas (forest policy).

3. Objectives of the workshop

The main objective of the workshop is to review the present methodology and approach and find the best possible ways in order to get the precise estimates of demand and supply of timber of India.

4. Methodology:

4.1 Demand of timber: Timber is major forest products that are always in high demand, regardless of the economic status of the users. Timber is always in high demand for the purpose of heating, cooking, furniture, decorative article, poles, fixtures, agriculture implement, import and export etc. The sources of demand for timber are assessed at four main levels: household, industry, service sectors and trade (exports). A layout of the study is given in the form of flowchart (Figure1). The various broad sectors of demand for timber are discussed below:

Household: Timber is used for various purposes in households. The primary usage of timber is for fuel and other usages are furniture, farming implements, fencing, hut and living place for domestic animals etc**.** The study area of the project is the rural areas of the country. The study is based not only in primary data but also in secondary data which was extracted either direct oral interview from the respondents or e-sources. Data related to timber demand in households is collected through primary survey from households at village level by using well structured pretested questionnaire which was developed by project teams of ICFRE and other coordinated institutes. Multistage Stratified Random

Sampling is used for the estimation of total demand of timber in India. Strata will be forest types and the stratum in different stage are district, forest fringe villages (within 3 km) and then sampling unit is households. We can consider the 14 broad categories of forest types as per FSI classification. Thereafter, Forest fringe villages within 3 km considered as rural areas and forest fringe village outside 3 km presumed that it comes under urban areas. Our study pertains with both the village areas in the selected district from the different forest types of the country for the estimation of timber demand.

Industries: The industry is defined as the sector of economic activity in which a person works (NSO). To assess the timber demand in industries sector, we can categorize industries into two parts: organized (which was registered in government records) and unorganized (non-registered) industries. But the main concerned of the study is organized sector only. All organized manufacturing units are covered under annual survey of industries ASI). ASI consists of industries on the basis of manufacturing product. For our study, we considered 16 categories of wood-based industries as per ASI Frame 2018-19. But for our simplification, we broadly categorize into 5 categories, namely, Sawmill, Panel, Pulp and Paper, Solid-wood and other wood-based industries. Others wood article industries includes textile, warehousing, sports, musical, furniture, mining, handicraft and ships and building material industries.

Data for industrial survey is collected through both primary as well as secondary survey. In a primary survey data is compiled through interviewing the respondents (industry owner) by using well-structured pre tested questionnaire developed by project team of ICFRE and other coordinated institutes. On the other hand, secondary data related to production of timber (quantity and price) is collected through e- sources such as Annual Report of State Forest Department (SFD), Forest Development Corporation (FDC) and Statistical Handbook of States.

Stratified random sampling is used for the estimation of timber demand in Industries. In an industrial stratification categories of industries is strata and sampling unit will be industrial unit from each type of industries, namely, micro (0-9), small (10-49), medium (50-250) and large (more than 250) based on manpower engaged as per the data available by the Annual survey of industries (ASI) frame 2017-18.

Trade (Export): The study in trade sector is based only on secondary data which was extracted from Directorate General of Commercial Intelligence and Statistics (DGCI&S), Kolkata. The DGCI&S, Kolkata, under the Ministry of Commerce, Government of India, is the pioneer official organization for collection, compilation and dissemination of India's Trade Statistics and Commercial Information. The time series data is compiled for estimating the total quantity of demand and supply of wood-based product across India and their value (price). The data was compiled in the form of chapters as per DGCIS data followed ITC coding system of Harmonized system, 1996 on the basis of manufacturing of wood based product. The eight chapters included in the study are **Chapter 44** (Wood and articles of wood; wood charcoal), **Chapter 45**(Cork and Articles of Cork), **Chapter 47 (**Pulp of wood or of other fibrous cellulosic material; recovered (waste and scrap) paper or paper board), **Chapter 48** (Paper and Paperboard; Articles of Paper Pulp, of Paper or of Paperboard), **Chapter 49** (Printed books, Newspaper, pictures and other products of the printing) industry; manuscripts, typescripts and plans., **Chapter 94** (Furniture; Bedding, Mattresses, Mattress supports, cushions and similar stuffed furnishing; lamps and lighting fittings, not elsewhere specified or included; illuminated signs, illuminated name plates and the like; prefabricated building), **Chapter 95 (**Toys, Games and sports requisites; Parts and accessories thereof)and **Chapter 96** (Miscellaneous manufactured articles).

4.2. Supply of Timber: The supply sources of timber are forests and non-forest area. Plantation, Farm-forestry and Community Forest land and Tree outside Forest (ToF) on private land comes under non-forest area. The supply of wood could transform from traditional sources, namely forests, to plantations and agro-forestry and imports in an increasingly liberalized global economy. Nowadays, Tree ToF on private land contributes maximum percentage on timber / fuelwood supply. The supply of wood from industrial sector is based on both primary and secondary survey. Two organizations CSO and NSO have valuable information on wood consumption. The CSO conducts ASI on annual basis wherein all manufacturing industries are surveyed on census or sample basis and data consumed by industrial unit is captured. The regular timber consists of Poplar, Eucalyptus, Leucaena, Casuerina while conventional timber comprises Mango, Shisham, Teak etc. Data from ToF on private land is based on primary survey and secondary data of FSI. FSI model classified timber into two categories i.e. regular timber and conventional timber. In trade (import) sector of timber supply methodology is same as timber demand. The data for timber supply is extracted from State Forest Department (SFD) by using developed questionnaire.

Long term projection of demand and supply of these three components is essential for business propositions, policy making and estimating relational parameters of forest degradation. Empirical models for these projections go a long way to reduce the need for estimating the mathematical forms and focus on recalibrating through parameters estimation. By go through different literature review, it might be possible that Econometric (Regression model) model is

used for the study. On the other hand, ARIMA model is used for the import of wood-based product.

The abstracts sent by the experts for the workshop are being published by ICFRE for the benefit of the researchers in the field of forestry and environment. This collection will be of immense use as statisticians and other researchers who have used these techniques innovatively have contributed to the knowledge base of quantitative techniques. I urge the researchers to use this publication and further develop the techniques to provide answers to the research questions and problems faced by the forestry and environmental sector.

Plywood and Panel Industry – India's Growth Outlook

C.N. Pandey and Keshav Bhajanka

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Panel industry comprises plywood, Particleboard, medium density fiber board (MDF), and constitutes an important sector of wood based industry. Indian Plywood & Panel Industry consists of around 3,300 units (small, medium and large units) largely, ~80%, in unorganized sector and has 6-7% CAGR and supports around 1 million livelihoods with a market size of app. Rs. 25,000 Crores. Century Ply boards India Ltd. and Greenly Industries Ltd. are the two pan India companies dominating the organized market with more than 50% share. There are about 30 particle board industries in the country mostly in unorganized sector except few, and use plantation timber lops and tops, wood wastes and agro residue as the basic raw material with an annual production of about 1 million cum. The MDF industry sector has installed capacity of about 1.4 million cum and production is 1.15 million cum (80% of installed capacity). Indian MDF industry has a market size of nearly 1,600 crores. In the past five years, the industry grew at a CAGR of 20%. It can be seen that the share of Imports in Total Turnover is still quite high, more so in PB and MDF. This is because imported panel products are available at a cheaper rate than locally manufactured PB and MDF India produces a meagre 4% of World's Plywood. And its share in the production of PB and MDF are not even worth mentioning – less than 1% of World's production. Today, entire wood procured by plywood and panel industries is derived either from Agro-Forestry tree grown on farmer's land or plantation tree grown outside the forest (TOF). The extent of TOF in the country has been assessed 29.38 m ha which is 8.94% of the total geographical area of the country as per IFSR 2019. The average growing stock per hectare of TOF extent for the country has been estimated 55.89 cum. Although, accurate information on potential annual yield of timber from TOF is not available at State or national level. With Growing stock of 1642.29 million cum and potential annual yield of 85.16 million cum. Thus,industry needs to be supported in a big way, not only by promoting Agro-Forestry to ensure availability of its wood requirements on a sustainable basis, but also by relaxing / liberalizing the Licensing / Permits requirements for transportation and processing of Agro-Forestry Timber. If encouraged properly, the demand and production of panel products will increase at a much faster pace, which in turn will increase the demand for agro-forestry wood. The entire chain – farmers involved in agro-forestry, workers employed in mfg. units, common man – who is the main consumer – housing & furniture products, and the governments who can earn higher revenues on increased production, save foreign exchange due to reduction in imports, earn foreign exchange due to increase in exports. Everyone single person / entity in the chain will be benefited

Wood Production and Availability in India: Bottlenecks in Accurate Assessment

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India has had a very good, simple, systematic and well-defined system for accounting wood production from government forests and its supply to different stakeholders and end users. There have been fairly and reasonable estimates of wood production and its usage till the government forests were the main source of wood production and supply. With gradual decline in its supply from government forests, emergence of farm land-use as main source for its production, emergence of wood based industry as one of the key players in promoting plantation, production forestry getting shadowed by conservation forestry post-1988 Indian Forest policy and maintaining the same status quo in the new draft forest policy; the old system of forest departments for inventorying, wood estimation, harvesting, trade, marketing and documentation has lost its practical significance. Bulk of wood production is now happening outside government forest where there is no such reliable system. The Forest Survey of India (FSI), in its reports quoted a gradual but significant increase in potential wood production from Trees Outside Forests (TOFs) i.e., 44 Mm^3/annum in 2011, 69 Mm^3/annum in 2015, 75 Mm^3/annum in 2017, and 85.16 Mm^3/annum in its 2019 assessments. Wood demand is estimated to vary from 60 Mm^3/annum to 152 M m^3/annum. However, it is believed that forests are currently meeting around 4% of total wood demand, imports around 6% and rest is from ToFs. 2.89% geographical area having just 1642.27 Mm^3 growing stock in TOFs is the main contributor of wood supplies, whereas, 21.67% geographical area having 4272.72 Mm^3 growing stock is meeting just 4% of wood demand. FSI makes these estimates through interpretation of satellite imagery which is reported to have a certain degree of accuracy/ inaccuracy due to complex technical factors. The potential volume is estimated by applying regression equations developed for trees mainly from forest land which may or may not be accurate for their applicability and accurate predictability to farm land plantations. Further, the inventory and assessment is made for trees above 10 cm DBH, whereas, many of plantations especially for biomass based industrial wood usage like MDF, particle board, paper pulp etc. are harvested before attaining this dimension. Many of such plantations which get harvested before trees attaining this dimension, thus, remained unaccounted in the FSI reports and hence the potential yields reported by FSI are less than the actual harvests. The presentation discusses in details these and other bottlenecks responsible for variation in actual and potential wood harvests from both forests and non-forest areas.

Experience Sharing on Assessment of Pulpwood Availability in India

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Pulp and paper industry requires constant information at least on quarterly basis on pulpwood availability. This information is required for budgeting the procurement of wood either from the nearby places or from faraway places which directly impacts the production cost of pulp. The raw material and plantation departments of the paper companies engage in surveying the pulpwood plantations at 3 years interval and prepare the pulpwood availability scenario for 5 and 10 years period. In the first instance, the data on plantations is derived on number of plants distributed to the growers as the list is maintained by the paper mills. The plantation inventory such as area covered, species planted, spacing and growth rate etc., was derived from such list and ground trothing of 2 to 5 per cent of plantation was done to validate the data. However, from 2010, the paper companies developed software for capturing the plantation data and started inventorization as this data is required for Sustainability reporting and FSC Forest Management certification. Wood based paper mills have promoted nearly 12 lac ha plantations for the past 10 year's period with annual rate of 1.2 lac ha planting. Now, 50000 to 60000 ha pulpwood plantations are raised annually. This reduction in plantation target is due to closure of few mills. This paper discusses the methods employed, the shortcomings came in the way and the answers found for inventorization of plantation data which is answering the present needs but there is lot of scope for improvement and it should be done at national level.

Estimating Demand of Roundwood from Consumption Sectors-Factors and Models

Raman Nautiyal

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Round wood is an important component of timber-based industry like plywood, veneers, furniture, construction, handicrafts and pulp & paper. There is a wide variety of species suitable to each of the use mentioned. The data regarding the utilization of timber on these industries is often scant apart from the fact that a good quantity of timber is also sourced from sources that are left unrecorded. Added to this is the fact that a large number of firms comprising the industry are in an informal sector thus left out of the usual surveys carried out by various organizations. This poses a challenge to estimate not only demand but supply as well. Species-wise production of forest tree species is also not available. Thus, it makes mandatory to rely upon various models of demand and supply to carry out a proper demand-supply analysis. One of the most important parameter is the correction factor that can be used to adjust the volume of round timber used in various products. It is estimated that 85 per cent of veneers is yielded from round timber and 2.5 kilogram of round wood yields 1 kilogram of pulp. Similar correction factors need to be determined for other sectors also that can help in estimating the consumption, supply, and, subsequently demand. Demand side needs to be looked into through growth of the various sectors. The consumption of wood in wood-based paper shows a declining trend as the number of firms has been consistently declining from 2010 onwards from around 30 to 18. The demand is now being fulfilled by paper manufactured from recycled fibres, which are primarily responsible for near exponential growth of the paper industry. A major part of pulp is imported. The demand of timber by construction industry shows a slight decline as most of the products used by this sector are manufactured from plywood and fiber board or alternate raw material like plastic, UPVC, aluminium, iron and steel, etc. Estimating demand necessitates the use of models calibrated by primary data. It is also necessary to determine the price elasticity of demand as there are several cost-effective alternatives to timber available which ensure existence of elasticity. Two main types of data that estimate elasticities include family budget and market statistics in form of time series. There are several models which have their own pros and cons. Main ones like Leontif's method and Pigou's method may be tested and used to estimate elasticities. Apart from this, it is also important to study the utility function of household budgets to study the priority of household budget and adjust the demand of timber accordingly.

Demand and Supply Models

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Demand and supply are foundations in economics. The law of demand states that, if all other factors remain equal, the higher the price of a good, the less people will demand that good. The factors affecting the demand are Own Price, Price of substitutes, Price of compliments, Income / expenditure and Taste & preferences. Similarly, it demonstrates the quantities that will be sold at a certain price and the factors affecting supply are Own Price, Price of substitutes, Price of compliments, Cost of Production, Monsoon and Policy, technology and management plays a major role. Demand is estimated in different ways. In industry or project, it is estimated as market size, expressed as quantity or value. There are different approaches, one is to estimate the quantity demanded / supply and other is to identify the factors affecting and their effect. To estimate the trend, time series models has advantages like capturing seasonality and forecasting using single series of the variable. However, models such as multiple linear regression and structural equation models are used widely to estimate primarily the effect of select factors on the demand/supply and they help in simulating policy options. Some of the popularly used demand/ supply models are Multiple linear regression, log linear model, semi log model, augmented distributed lag models, SURE model, Profit function, import demand model and time series models.

Resource Persons / Experts	Local organizing Committee
Sh. S.D. Sharma	Sh. R.K. Dogra, DDG (Admin)
Dr. C.N. Pandey	Sh. R.K. Bajpai, ADG (Admin)
Sh. R.C. Dhiman	Dr. Rajiv Pandey, Scientist E
Sh. Sunil Pandey	Dr. Sanjay Singh, Scientist -D
Dr. H.D. Kulkarni	Dr. Girish Chandra, Scientist-C, NPC
Dr. Vimal Kothiyal	Dr. Shailendra Kumar, Scientist -C
Dr. P.K. Gupta	Dr. Manish Kumar, Scientist –B
Sh. Rajesh Kumar	Dr. Jawaid Ashraf, Scientist-B
Sh. Raman Nautiyal	Sh. Muthurasad T., Scientist –B
Dr. Manmohan Yadav	
Dr. Girish Jha	
Dr. Sivaramane N.	
Sh. S.R. Reddy	

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