Indian Paper Industry Raw Material Scenario, Growth Prospects and Pathways

R. K. Jain, K. Singh and T. K. Roy

ABSTRACT

The paper presents the recent trends in the key parameters of the Indian paper industry with respect to production and Impex of paper, paperboard and newsprint. A study has been presented on the capacity trends in the industry in the recent past including the recently announced greenfield expansions. An attempt has been made to analyze the issues before the industry particularly with reference to raw material and the response of the paper sector in addressing the same

INTRODUCTION

With the emergence of open market economy leading to reduced tariff barriers and the promulgation of free Trade Agreements with thriving neighboring economies, the competitiveness of the Indian paper industry has come to the sharp focus on the fronts of costs and quality. The industry has been in turbulent state since the economy was opened and paper import was allowed under the Open General License scheme.

Faced with the various issues and challenges like, availability of fibrous raw material, technological obsolescence, cost, quality and environment, the industry has taken steady steps to enhance its competitiveness by way of addressing these issues. The demand for paper, paper board and newsprint has been rising in the recent past and the domestic market has been registering a growth rate of around 6% against the world average growth of about 2.8% .

The present paper highlights the status of the Indian paper industry with respect to the key market indicators. Data have been presented for production, import, export, demand and consumption of paper, paper boards and newsprint covering technological status of the Indian paper industry.

Discussions have been incorporated on the basic issues related to raw material scenario keeping in view the present and future demand.

Central Pulp and Paper Research Institute,
P.O.Box No.174, Paper Mill Road,
Near Himmat Nagar,
Saharanpur-247 001 (India)

2.0 STRUCTURE OF THE INDIAN PAPER INDUSTRY

There are around 700 pulp and paper mills in India producing nearly 6.8 million tons of paper, paper board and newsprint out of which 5.8 million tons accounts for the paper and paper board and the remaining is newsprint. The paper mills in the country can be broadly classified in to three categories. Mills that have integrated , largely forest based operations and produce over 100 TPD are classified as large mills. These mills are 33 in number but account for 36% of the total production. Medium size mills having a capacity between 50-100 TPD using agro based fibrous raw materials are 165 in number. These account for 29% of the total production. The mills up to 50 tons consists mostly of the units using waste paper as the fibre base. These mills are 510 in number and account for 35% of the total production. In the past few years, many mills, which were earlier using renewable crop residues as fiber base shifted to using recycled fiber in the face of the CREP norms, which stipulated the use of Chemical Recovery for these units manufacturing paper from the virgin pulp employing agro based fibrous raw material.

3.0 DEMAND AND SUPPLY OF PAPER, PAPERBOARD AND NEWSPRINT

Majority of the paper mills (at least the large, wood based mills) are operating at the optimum capacity levels and have achieved about 100% capacity utilization. With a rise in the demand and no immediate matching rise in capacity, the demand supply gap may be widening. Therefore, majority of the paper mills in India are on a major expansion drive, developing additional capacities to meet out the growing demand.

The demand of paper and paper board has seen a rising trend in the past, which has increased at the rate of 5-6% annually. Of the total demand of paper and paper board, writing and printing grade account for nearly 45%, and the industrial grades for around 49% (25%

TABLE 1
STRUCTURE OF INDIAN PAPER INDUSTRY

	SCALE OF OPERATION, TONS PER DAY	NO. OF MILLS	PRODUCTION SHARE %
LARGE INTEGRATED WOOD BASED	101 – 800 (Avg. 300)	33	36
MEDIUM AGRO BASED	50 – 100 (Avg. 60)	165	29
SMALL WASTE PAPER	5 –50 (Avg. 15)	510	35
TOTAL		708	100

FIGURE - 1

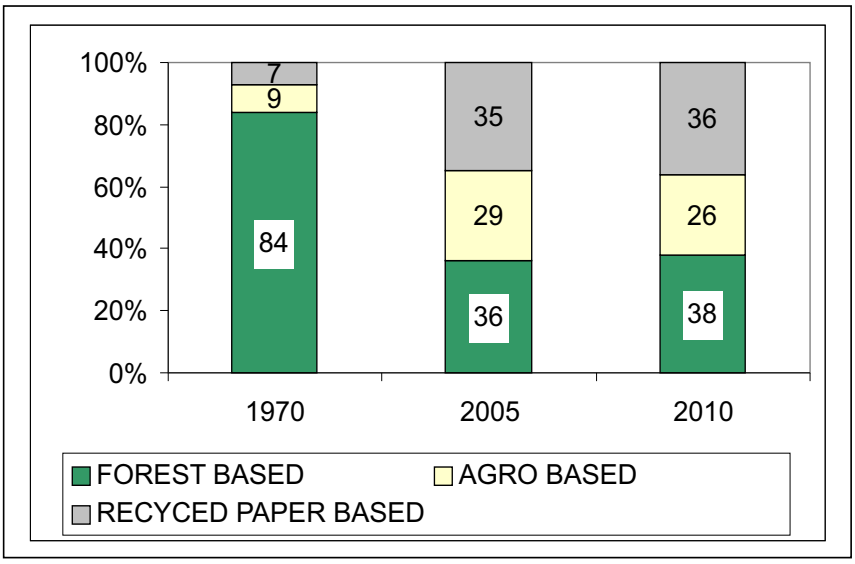


FIGURE - 2

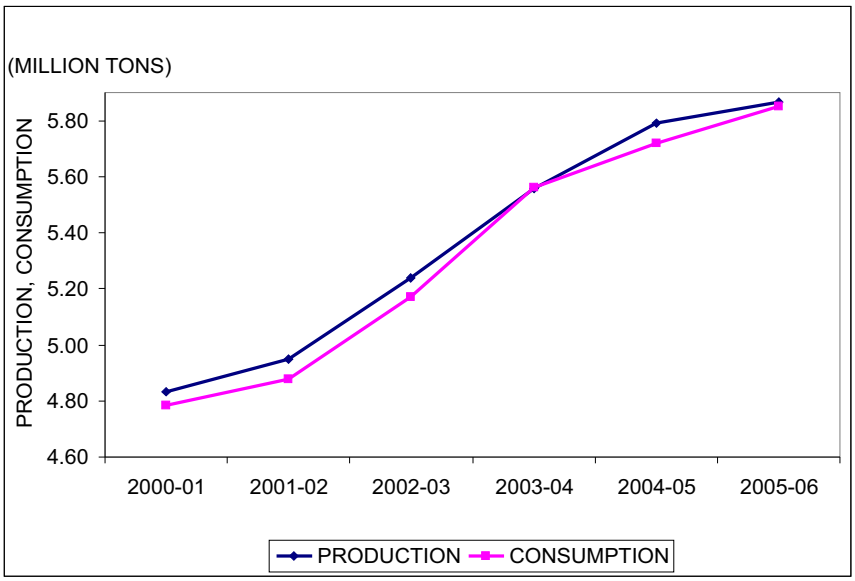
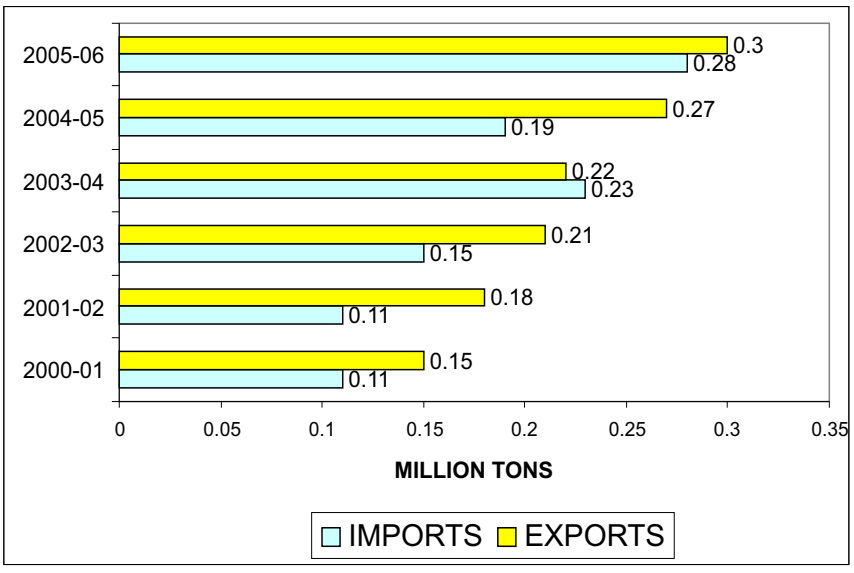


FIGURE - 3



container board and 24% carton board) and the remaining is the demand for other paper including tissue.

This structure is in stark contrast to the one the industry has in the seventies, when over 80% of the mills were based on forest based raw materials. However, in 2005, the share of the forest based mills reduced to 36% primarily due to the non availability of forest based fibrous raw material. However, now, the industry has taken cognizance of the fact that quality raw material is the key to competitiveness in the future. Therefore, many major players have gone in for captive plantations or farm forestry programs. Therefore, it is estimated that the share of forest based raw material in the paper manufacturing will actually increase slightly at the expense of the agro based fibers by 2010.

Encouraged by the growth in paper demand, the industry has embarked upon capacity expansion plans, which also include increasing of the efficiency of the present system, necking to improve its competence, enhancement/replacement of captive pulp capacity, captive power capacity, installation of chemical recovery, replacement of chemical bleaching with ECF and/or TCF sequences in addition to many other cost effective measures.

As per estimates, nearly 2 million tons of additional capacity is likely to be added for manufacturing paper, paperboard and newsprint in with a span of three years through brown field expansion projects, whereas around 1 million ton capacity has been declared by way of green filed projects, likely to be completed in another five years.

3.1 PAPER AND PAPER BOARD

The figure-2 herein presents the growth pattern of production and consumption of paper and paperboard in India for the last five years.

The data goes to indicate that the trend of growth in production maintains an upward trend. Since 2001, the increase in production was driven by market forces which has prompted better utilization of existing capacities. Relatively lower production growth rates are envisaged beyond 2005 since the new capacities/expansions announced by the industry will come on

stream only in three to five years time from now. The imports have actually seen a reduction of about 16% whereas the exports have increased by nearly 20%. Due to this, the overall consumption growth rate has been reduced to a modest 2.7%.

This signals a different picture than the past where the consumption was fast catching up with the production figures. It would be an interesting trend to watch for as the new capacitates come on line in the next three years.

The data goes to indicate that in the year 2004-05, the production growth rate for paper and paper board was a little over 4%. This sluggish demand supply scenario could see some pressure on this segment for some time to come. Since most of the companies are running to capacity, volume growth is expected to come only after two to three years time when the capacity expansions and new projects come on stream.

Traditionally, there have been two distinct features of impex scenario of paper and paper board in India. One the impex has always been at a very small volume and two, both the figures are in comparative range virtually every year. (figure-3)

3.2 NEWSPRINT

Despite increase in number of indigenous producers of newsprint (which are 77 as registered under the schedule I per the Newsprint Control Order, 1962, with an installed capacity of about 1.5 million tons) nearly 40% of the demand is met by imports. Nearly 38% of the installed capacity for newsprint lies in the southern part of India, while a near matching 32% lies in the west. The north accounts for 21% of the capacity. (Figure- 4)

FIGURE - 4
GEOGRAPHIC SPREAD OF NEWSPRINT CAPACITIES IN INDIA

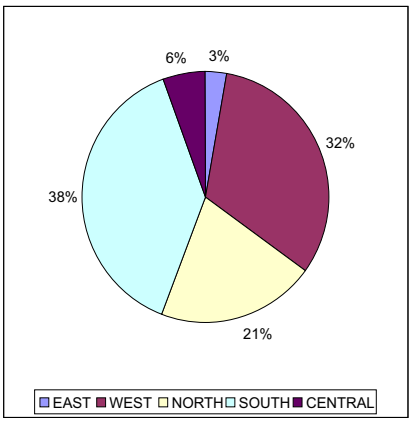
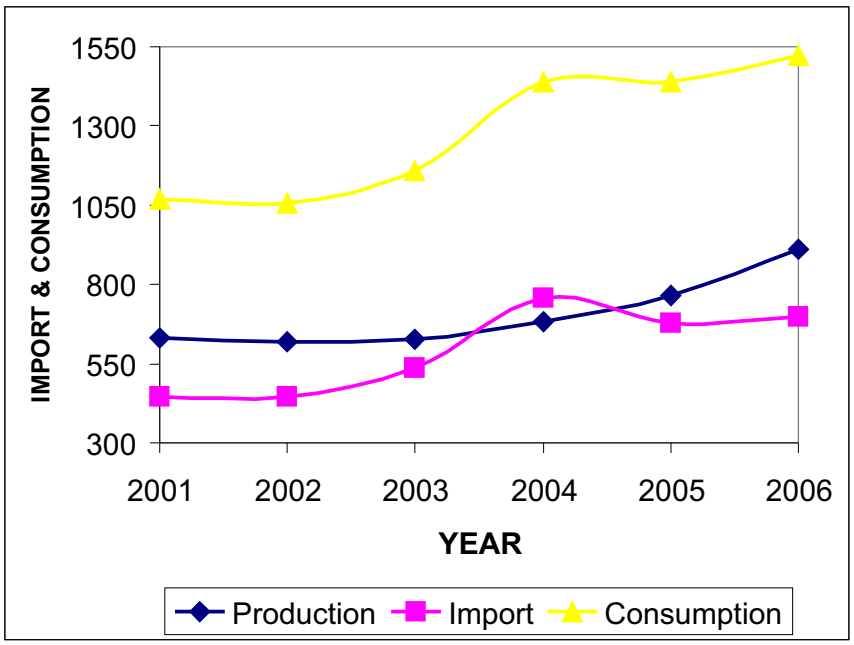


FIGURE - 5



The production of newsprint rose to a level of 900 thousand tons in 2005-06 (figure 5), registering a healthy growth of 19%, up from 11.7% during the last fiscal. In another significant movement, the imports of newsprints have declined by a little over 10% . This has been primarily due to the increase in the production of newsprint which has seen a spurt because of increasing realizations by way of hardening prices. Further, though the amount of newsprint exported is very small, still it is interesting to observe that the export volumes have more than doubled in the past year. Thus, whereas the export volume of newsprint is 0.005 million tons in the year 2004-05, it increased to 0.01 million tons in the year 2005-06.

The consumption levels of newsprint have been more or less the same at 1.44 million tons. This segment has seen a turn of fortunes in the recent past fuelled mainly by the increasing international prices of newsprint, which have now crossed $ 650 mark. However, the domestic industry has to address the question of quality and economics of scale to compete with newsprint imports. The sector has to address the problem of raw material by going in for captive plantations in the country and aboard. To this effect, many newsprint mills are looking at plans to have a swing capacity to make other products in lean periods.

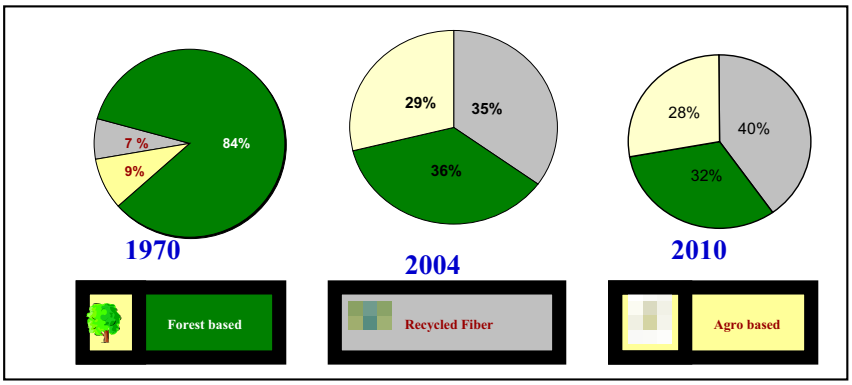
4.0 FIBROUS RAW MATERIAL IN INDIAN PAPER INDUSTRY

The Indian paper industry uses a diverse mix of fibrous raw material primarily forest based agro residues including bagasse, straw and waste paper. Though agroresidues are available in plenty, however associated problems like complexity during processing of these fibres, quality of the end product and environmental issues are the major concern to encourage use of this potentially available renewable raw material.

The operations of the paper industry depend on the sustained availability of quality fibrous raw material-a fact that goes in stark contrast with ecological conservation. The natural forests in India have long been declared as protected and only controlled felling is allowed. As a result, of date, the forest based raw material can not be sourced for sustained pulp and paper operations in India.

However, demand and market forces have lead to the increase in installed capacity of individual units in the country. This has necessitated a critical review of the raw material base available to the Industry to meet out the

FIGURE - 6
TRENDS IN THE USE OF RAW MATERIALS



fiber demand. To that effect, there are three major path ways to source the fiber base through captive plantations/social forestry programs, non wood based raw material and recycled paper.

4.1 WOOD BASED FIBER SOURCES

The total land mass of the Indian peninsula adds up to 328.8 million hectares out of which 47% is used for the agricultural purposes. Nearly 30% of the land is uncultivated, barren and non-agricultural land. Forests and woodlands occupy 20% of the landmass out of which 38.6 million hectares is dense forest with a crown density of more than 40%. The rest of the area amounting to about 31 million hectares is considered as degraded forestland. The pulp and paper industry uses only 3-4% of the total wood i.e. nearly 6 million tons, 6.5% of the wood is consumed by sawn wood/ply wood industry whereas major portion i.e. 90% of the wood is consumed to meet out the fuel requirement.

In the south and east of the country, the forests are tropical rain forests whereas in the Himalayan region, there are dry alpine forests. These forest have been classified in to 16 broad types and 251 sub-types based on climatic and other conditions.

Plantations account for 50% of the forest area; most of them consist of hardwood species. However, only small portions of the plantations are used as a source for pulpwood. The major competing use for native and plantation grown trees is the use of wood as a fuel in the rural parts of the country.

As per the existing forest policy, the paper industry can not use wood from any of the national forest reserves. This leaves the paper industry with little choice for sourcing of wood based raw materials. More and more mills are using recycled fiber for the manufacture of paper. In the seventies, 84% of the mills were using wood based raw material. However, with the stringent regulations on the felling of trees in the forest area, the industry took to the use of non wood based raw materials. Currently, nearly 30% of raw material was coming from annually renewable materials and about 35% was being contributed by the recycled fiber. It is estimated that by 2010, the use of waste paper will rise by about 5% (figure-6)

With regard to the wood based raw materials, currently the paper industry meets its demand from the government sources and through the farmers. Industry has also been successful in raising wood in marginal land held by the farmers and this may not be adequate to ensure sustain supply to coup up with the future growth of the industry. Taking into account, the increased uses possible from agro based and waste paper, the paper industry which presently consumes nearly 6.0 million tons per annum will require nearly 9.0 million tones of wood per annum by the year 2010 and this demand is likely to be increased to around 13.2 million tons by the year 2020. India has about 100 million hectares of waste land and about 32 million hectares of degraded forest lands and even if a small portion of this i.e. about 1 million hectare is allocated to the industry, it should be able to meet its requirement for the future. The industry has also approached the government to look for possibilities of allotting degraded forests/waste lands near the mills or nearby forests on long lease for plantation.

4.2 BAMBOO

India is next only to China in the production of Bamboo. As per one data, 125 species in 23 genera have been recorded, which are distributed over 10.03 million hectare from sea level to 3,700 meters above sea level. It accounts for 12.8% of country's forest area. The distribution is, however, not uniform, the rich areas being confined to north east, Shivalik hills of Uttar Pradesh, Bastar region of Madhya Pradesh, Western Ghats in South India and Andaman Islands. The north-east is the richest source accounting for about 50% of extant growing stock. Out of the available species, 12 have been investigated for pulp and paper production and 2 for panels (mat board). *Dendrocalamus strictus* is the most widely used species for pulp and paper, and followed by *Bambusa bambos* and *Melocanna baccifera* accounts for 83% of all bamboos used for pulping. *Ochlandra travancorica* and *Bambusa bambos* are used for mat board.

The world market for bamboo is valued at US $ 10 billion of which China's share alone is to the tune of 50%. Market for bamboo is expected to reach about US $ 20 billion by 2015. The size of the Indian bamboo industry is estimated to be about Rs.6505 crores, which may grow to Rs.26,000.00 crores by 2015.

The domestic bamboo sector is faced with many constraints, such as:

- o Lack of scientific methods for propagation and cultivation.
- o Lack of post harvest treatment and technology for product development.
- o Inadequate trained manpower.
- o Inadequate infrastructure for large scale harvesting in the event of gregarious flowering.

The government has planned a coverage of 2 million heactare under bamboo during the 10th Plan involving an investment of Rs. 2608 crores. The estimated fund requirement for the 10th Plan is Rs.2608.00 crores covering Rs.2000.00 crores for raising new bamboo plantations in 2 million hectare, Rs. 208.00 crores for

technology development, Rs.275.00 crores for handicrafts development, Rs.125.00 crores for trade and market development. Being essentially a forest based material, bamboo, although a non wood fibre source, is included with wood, in all Indian studies relating to raw material for pulp and paper. In the national statistics, it is often difficult to separate the contribution and role of wood and bamboo fibres.

Bamboo yield in the natural forests is as low as 0.40 tonnes per hectare per annum. It is, however, known that yield in rain fed areas can be increased 4 to 5 times in five years if protection from grazing is ensured and proper management practices (soil working, fertilization and thinning) are adopted. The estimated current growing stock is 150 million tonnes, of which Dendrocalamus strictus accounts for 53%. The annual harvest is estimated to be about 4 million tonnes, out of which about 50% is used in rural construction, scaffolding, handicrafts, etc.

Table 2 - Utilization of bamboo in total paper production

Year	% of bamboo by air dry weight in total fibre weight
1936	49
52	74
58	74
70	56
75	54
79	53
80	29
88	28
90	27
95	22
2000	<10

When it was established in 1922-24 that bamboo was an eminently suitable material for pulp and paper production, a new dimension was added to its utilization. Bamboo soon became the dominant fibre source and accounted for about 75% of fibre sources for pulp and paper in the fifties. As supplies remained stagnant at about 1.5 million tonnes (green weight) per annum and capacity enlarged to meet increasing demand, search for alternate sources were intensified, which resulted in the utilization of hardwoods in early seventies. The trend may be seen in Table 2.

The use of Bamboo as a raw material source declined from the 1980's, although there was a marginal increase in the supplies (1.7-1.8 million tons, green weight). This may have been due to the fact that the supply of bamboo available was inadequate to cater to the capacity.

Bamboo is a better fiber source as compared to the other noon woods. The shortcomings in the utilization of non wood fibre sources do not apply to bamboo in that magnitude. Unlike straws, it is available through out the year though the growth is concentrated in certain catchment areas only, the only constraints being bulk and the resultant high cost of transport. This apart, bamboo is almost similar to the traditional raw material wood and in pulping characteristics, it is even better than hardwood. Only constraint is bulk and resultant higher cost of transport. In view of emphasis given to raising bamboo plantation and success achieved in mass propagation techniques, it is expected that availability of bamboo will increase in future. But there is little hope of supplies to pulp paper and panels industries increasing correspondingly, in view of following reasons:

- Being essentially a forest based material, supplies are subject to Govt. regulations as in the case of wood;
- Competition is severe. Cottage industries (like incense sticks) and handicrafts are already facing problems due to inadequate supplies;
- On account of widening gap between demand and supply, there has been a sharp increase in price. Paper, pulp and panels industries can ill afford the much increased price;
- It is characterized by a wide range of production, processing and marketing systems. A thorough understanding of the production to consumption systems is necessary to initiate development interventions to optimize its role in industrial uses;
- Bamboo has not been favored by farmers in the bipartite or tripartite tie up arrangements the industries have been forging with them although it is fast growing, because of the difficulties encountered in protection from cattle and the fear of long term commitment of land.

TABLE - 3
ANNUAL POTENTIAL OF AGRO BASED FIBERS IN INDIA

Agro residue	Availability Million Tons
Wheat Straw	22
Rice Straw	15
Bagasse	12
Jute, Mesta, Kenaf	2
Total	51

TABLE- 4
Distribution of Sugar Cane in Different Sectors

Particular	*Cane Sugar*
Production, million tonnes/ annum	280
Supply to sugar mills, %	50
Seeds, %	12
Unrefined sugar industry, %	30
Household, %	8

4.3 AGRO BASED RAW MATERIALS

India is a source of rich non wood fibre resources, in respect of diversity and abundance. The non woods vary from essentially forest based sources like bamboo to agricultural residues chiefly bagasse, rice and wheat straws. As per one estimate, India is world's largest

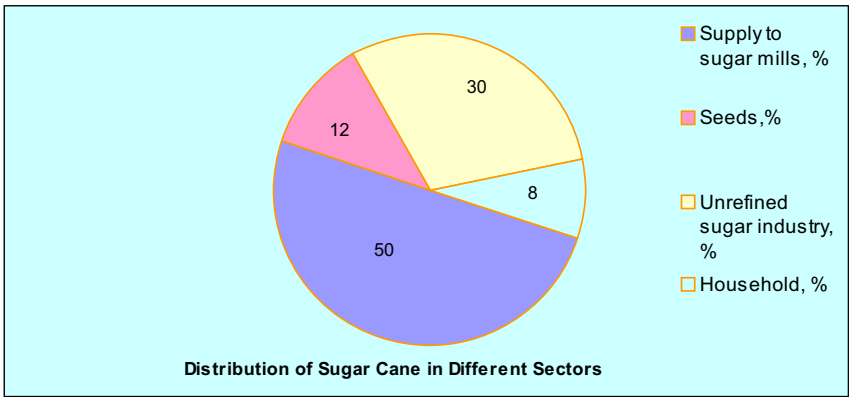
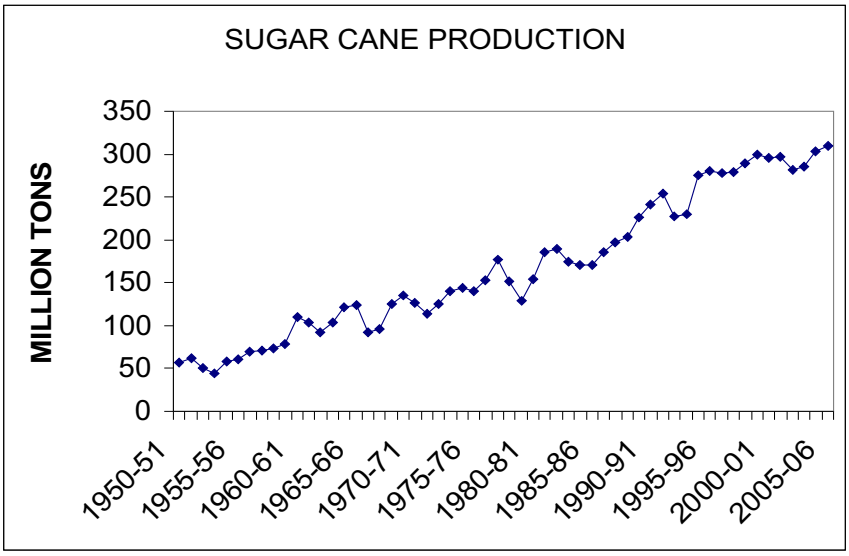


Fig - 7

FIGURE - 8



producer of bagasse and second largest producer of bamboo, next only to China. Historically, the utilization of non wood fibres for manufacturing paper started in 1880 when 5 small mills were established with grass and jute sticks as major raw material. However, the utilization of this abundant availability has been hampered in the pulp and paper sector due to various factors. Some of these factors are:

a) Sustained and uninterrupted availability of supply
b) Quality of the raw material as required for making quality paper.
c) Uneconomical storage and transport of the non woods.
d) Major competitive uses of the non woods

However, the industry has taken some advantage of this availability, with about a third of the production being attributed to non wood based mills.

Agro based raw materials are widely used in the Indian paper industry. The agricultural waste based sector is of the opinion that future of the Indian paper lies in more intensive utilization of this abundantly available resource. There is sufficient quantity of agricultural residues available in the country. (table-3). As of date, these materials are also being used by other sectors, lowering their availability for use in the pulp and paper sector. Wheat straw has traditionally being use as cattle feed as well as for construction of hut roofs in rural India. The competition from bagasse comes from the sugar mills which use it as a fuel for cogeneration. The use of jute, kenaf and mesta is limited because of location disadvantages and technological problems associated with manufacture of pulp using these materials.

4.3.1 BAGASSE

Bagasse, a residue obtained after crushing of sugar cane in sugar industry has emerged as one of the important fiber base for the Indian paper industry. Of all the agricultural based residues used by the paper industry, the share of bagasse is the maximum. Bagasse is the industrial waste, which originates from the processing of sugar cane for the manufacturing of sugar, gur (jaggery) and khandsari (unrefined sugar). Bagasse is recovered from all these processes, but the gur and khandsari sectors typically use almost the entire quantity of bagasse as captive fuel. Therefore, the possibility of sourcing bagasse from these two sub-sectors is negligible.

The sugar industry produces some surplus bagasse, which is being utilized by the paper industry particularly for the production of newsprint, cream wove and maplitho grades.

India is the world's largest producer of sugar cane with about a present total production of 280-million tonnes/ annum. **Table- 4** shows the distribution of the supply of sugar cane for various uses. Bagasse obtained from the sugar mill is known as the **`mill wet bagasse'** and is approximately about 1/3rd of the total sugar cane crushed.

Cultivation of sugar cane and hence the availability of bagasse is concentrated in the states of Andhra Pradesh, Bihar, Gujarat, Haryana, Karnataka, Maharashtra, Punjab, Tamilnadu and Uttar Pradesh.

Among various non-wood plant fiber sources, bagasse occupies a commanding position. Bagasse has proved itself to be the most promising alternative for hardwoods.

Sugar cane is one of the major cash crops in India. As per the data available, the sugar cane growth has seen a gross upwards trend. The total production of sugar cane has touched nearly 300 million tons (Figure 8). A large segment of the sugar cane produced in the country is utilized for the making of sugar. Competing use for the same comes from the unorganized sector making country sugar and jaggery. As per FAO estimates, nearly 89% of the total production of sugar cane will be crushed for making sugar and the rest 11% will be employed as seed, cattle feed and human consumption. Since 30% of the cane crushed for sugar will

TABLE - 5
AVAILABILITY OF BAGASSE

	(all figures in million tons)			
Particulars	1994-95	2000-01	2004-05	2010-11
Sugar production	14.6	18.5	13.50	20
Cane crushed	146	200	135	200
Bagasse yield	43.8	60	40.5	60
(% availability for paper making)	7	10	12	13
Quantity - do-	3.1	6	4.86	7.8
Paper production	0.62	1.2	0.972	1.56

Source: FAO, CPPRI Data Projection

TABLE - 6

COUNTRY	PER CAPITA CONSUMPTION, KG	RECOVERY RATE, %
USA	354	45.5
GERMANY	215	73.3
U.K.	215	40.6
FRANCE	153	51.3
JAPAN	243	56.3
SWEDEN	257	63
CHINA	30	31
INDIA	6	20

end up as bagasse, this translates to a current availability of nearly 90 million tons. The table hereunder (Table-5) shows the past and possible future contribution of bagasse as a raw material to paper making. The 2010-11 figure has been based on the time series CARG of production of sugar observed from 1988 onwards.

From the table it is indicated that out of the 1.8 million tons of paper produced from agro based sector in the year 2005-06, 5% could be contributed by bagasse alone, requiring about 5 million tons of the material as such.

4.3.2 STRAWS

The paper mill in India utilize rice and wheat straw in small and medium size mills producing mainly writing printing and packing grades of paper. In spite of abundant availability of rice straw (over 50 million tons) and of wheat straw (120 million tons) the surplus available quantity is hardly 30%. There are various problems associated with the use of these straw as a source of fiber for paper making. These are mainly

- Scattered nature of the resource thereby increasing the cost of collection and transportation
- Bulky nature of the commodity posing difficulties in handling and transportation.
- Seasonal availability necessitating ample and elaborate space for storage at mill site.
- Poor strength and drainage properties of the straw pulp
- High silica content and
- Uncertainty of the availability.

4.4 RECYCLED WASTE PAPER

The use of waste paper has made significant progress in last few years. While in 1970, the production of paper based on waste paper was merely 5%, amounting to 37000 tons only, which was increased to 6.5 lakh tons in 1994-05, contributing to 26% of the total production. This share of waste paper in 2005-06 has further increased to nearly 2 million tons, contributing to 34% of the total production, being produced from nearly 510 number of small, medium and large paper mills with an installed capacity of 58.3 lakh tons. The outlook for the use of recycled paper in the industry is bright despite the fact that the rate of recovery is low and the fiber quality is poor. This necessitates the incorporation of the imported waste paper of long fiber origin to achieve satisfactory quality. The recycled waste paper based mills therefore have been continuously urging the government to extend certain incentives and concessions like.

- Abolition of customs duty on waste paper
- Abolition of sales tax on sale of waste paper
- Zero customs duty for equipment and machines for recycling waste paper and 100% depreciation for the same.

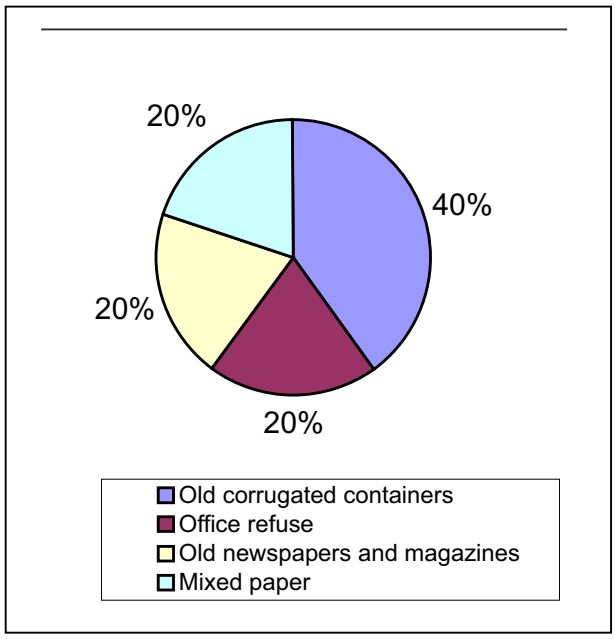
Most of paper is recovered, but, due to alternative uses the availability of the recovered waste paper to the paper industry is below 20% which is rather low as compared to the other countries like USA (45.5%), China (31%), Germany (73.3%), France, (53.3%), Japan (56%) and Sweden (63%). (Table 6).

Waste paper recovery and trading are still unorganized in India and low rate of recovery is attributed to

- unorganized collection of the waste paper, which is confined only to major towns, and that too only to a limited extent.
- Segregation is not carried out at the selection, resulting in contamination
- Absence of facilities for collection, sorting and bailing.

The collection is being carried out by individual wheelers, and the system of sorting is unsophisticated. The Indian recovery is not keeping pace with recycled paper utilization, resulting in increase in Imports. Multiple use of paper products (as wrapping papers, packaging applications, etc.) is common in India, and often these end uses pay better price for waste paper than paper industry. The main grades of waste paper available for recycling are old corrugated containers, office refuse, old newspapers/magazine waste and mixed waste paper. Figure 9 gives the distribution of the variety wise availability of waste paper in India.

FIGURE - 9
AVAILABILITY OF WASTE PAPER



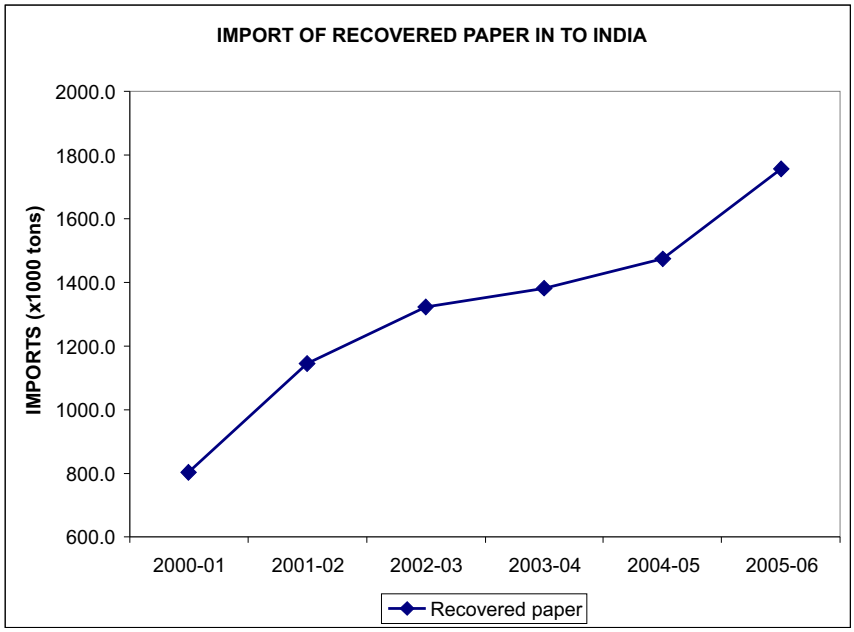


FIGURE - 10

4.4.1 IMPORT OF RECOVERED PAPER

The capacity expansions in the Indian paper industry are planned not only on virgin fiber based but incorporates the recycled fiber base to a greater extent. In view of the limited availability of the domestic recycled waste paper, the Indian waste paper industry has to depend mainly on imported recycled fiber base, and therefore the import of waste paper has increased in the recent years at accelerated rate as shown in Figure 10 below, whihc shows that the import of waste paper, which was about 800 thousand tons in 2000-01 has more than doubled in last five years, touching nearly 1800 thousand tons.

The use of waste paper as an input for pulp and paper is now gaining world wide importance in view of environmental constraints and concerns, even legislative interventions have been initiated for utilization of recycled waste paper. In some countries like USA, it is stipulated that 40% of the paper produced should be from recycled fiber.

5.0 FIBROUS RAW MATERIAL CURRENT SCENARIO IN INDIAN PAPER INDUSTRY

Responding to the challenges posed by a liberalized system of international trade, the major players have taken up aggressive initiatives through various steps. Hindustan Paper Corporation, a major player in the public sector has chalked out deals with the local farm communities for plantation of bamboo, particularly in the tea gardens, with a buy back procedure to ensure the supply of raw material in the future. Similarly, the Mysore Paper Mills Ltd., a large player is actively pursuing plantation program using identified fast growing and better quality species. Tamilnadu Newsprints and Paper Ltd., another major in the public sector has developed "paper cane" from a wild sugar cane variety. Likewise, other players such as APPM and West Coast have also taken up programs related to farm forestry.

Further, in a recent move, the government of India has also announced a move for consideration of putting up a multi stake holder partnership in the plantation sector, which would allow private firms to invest in plantations in the degraded forests and waste lands. If implemented, this proposal will go a long way in solving the raw material crises of the paper industry.

The Indian industry has also begun looking beyond the shores to address the smooth availability of raw material for its proposed growth. BILT, the leading manufacturer of pulp and paper, has acquired the Malaysia based Sabah Forest Industries in a US$ 261 million deal. This deal would assure the availability of high class raw material and pulp for the future.

Vietnam Paper Company (VPC) a state owned enterprise has initiated moves to approach the Indian paper industry to invest in plantations in Vietnam. VPC has decided to harvest trees on nearly 135,000 hectares of land in the central northern region of the country with a view to provide a supply base of good quality forest based raw material for Indian and South Asian pulp mills. Vietnam currently also is a hot destination for raw material with a total available resource area of 105,000 hectares with an average yield of

$80m^3$/hectares/7 years.

Likewise, the Australian government has come forward to market its fibre resources to the Indian paper industry. In a recent move, its federal forest ministry has identified India along with other South Asian countries as possible growth drivers for the Australian wood based plantation industry .

Further in a recent move, a number of leading Indian Pulp and Paper firms (JK Paper Mills Ltd., Andhra Pradesh Paper Mills Ltd., Orient Paper Mills Ltd., Ballarpur Industries Limited and ITC Limited) and some non paper firms (Anmol Polymers Pvt. Ltd.) plan to source dry raw bamboo and eucalyptus forest material from Land and Sea Development Ethiopia PLC (LSDE). Under a five year, USD 136 million contract LSDE will sell and deliver dry raw bamboo and eucalyptus forest material to its Indian customers. The imports of the products in to India is likely to start with in the year.

6.0 CONCLUSION

Where as the raw material problem has been addressed in real earnest in the recent past, there is still a long way to go as regards the forest policy in the country. To be cost competitive, the Indian paper industry will need to consolidate in size even further, which will only heighten the need of additional quality fibrous raw materials in bulk. The tendency of outsourcing of raw material or pulp from captive production from overseas undermines the interest of the indigenous society at large as the benefits to the local public that would have been accrued due the operations up to the pulping stage will be lost. Moreover, farm forestry or community farm projects are small in size for the expected demand leading to logistic problems to the large units even today. Therefore, efforts are needed to develop the presently available waste lands to be the wood banks for the Indian paper industry so as to tide over the inevitable high demand of quality raw material in the times to come. The industry feels that the need of the hour is the formulation of policy to promote plantation on degraded forest land/wasteland so as to address the problem of availability of quality raw material paper making in India.

ACKNOWLEDGMENT

The authors would like to place on record the support extended by Shri Krishna Rawat, Senior Research Assistant, for collection of data from primary and secondary sources, data processing and software management during preparation of the paper.

REFERENCE

The future of non wood and recycled fiber, Outlook 2010, http://www.fao.org/DOCREP/W7703E/ w7703e07.htm

Indian Paper Market: Potential Constrained by Demographics and Policies, Rod Young, International Forest Products Transportation Association, (IFPTA) Transport Symposium 16 (Antwerp 2005)

Industry and Trade Summary, Wood Pulp and Waste Paper, USITC Publication 3490, February 2002 (Office of Industries, U.S. International Trade Commission, Washington, DC 20436.

Non Wood And Recycled Fibre Utilization: Current Situation, http://www.fao.org/docrep/W7703E/w7703e06.htm#2.2%20recycled%20fibre.

Revitalisation of Sugar Industry, http://www.coopsugar.org/

Statistics of the Indian Paper Industry, Volume I, CPPRI Publication, (2005).