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SUMMARY OF THE PULP AND PAPER SITUATION IN ARGENTINA:
DEVELOPMENT POSSIBILITIES AND ECONOMIC ASPECTS

Santiago de Chile, August 1957

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1. Present situation and trends

(a) Production and consumption

Aggregate current consumption of all types of paper products in Argentina (average for 1955/56) amounts to 416,000 tons divided as follows: newsprint 111,000, writing and printing papers 89,000 and all other types of paper and boards 216,000. Consumption is partly met by local production of 295,000 tons -newsprint 20,000 tons, writing and printing papers 65,000 and all other types 210,000. The balance is covered by imports from Europe and North America.

Domestic production has increased from an average of 94,000 tons in the period 1935-40 to 284,000 and 307,000 tons in the years 1955 and 1956 respectively. Newsprint production, which is included in the above figures, was started in 1953 in Zárate, using 65 per cent ground-wood from salicaceus species and 35 per cent chemical pulp. The rated capacity of the mill is about 25,000 tons per year.

The paper industry is heavily concentrated in and around the capital of Buenos Aires where some 75-80 per cent of the production capacity is located. Other centres of production are in the provinces of Santa Fé and Córdoba. Besides a few modern and efficiently operated mills there are also a number of small units with antiquated machinery using waste paper together with some quantities of imported pulp to produce second class papers and boards.

The paper production is mostly non-integrated and depends to a large extent on imports for its primary fibrous raw material, pulp. In 1955/56 these imports averaged some 30,000 and 130,000 tons of mechanical and chemical pulp, respectively, and the balance of requirements was met by local production of about 17,000 tons of mechanical and 43,000 tons of chemical pulp. Total pulp production in the country is expected to rise within a short period to some 68,000

/tons, once

tons, once the plant at Puerto Piray in Misiones, producing chemical pulp from Araucaria, reaches its rated capacity of 25,000-30,000 tons per year.

The secondary fibrous raw material used by the paper industry - some 100,000 tons - is supplied by the recovery of papers and rags. The percentage of wastepaper recovery has increased from a pre-war figure of less than 20 to a present rate of more than 30 per cent; this figure is high in relation to the comparatively low per capita consumption of paper in the country and is unlikely to be maintained in the future.

The current supply/demand balance of papers and boards is summarized in table 1, which also shows the foreign exchange required to cover the gap between domestic production and consumption.

Table 1
BALANCE OF SUPPLY AND DEMAND OF PULP AND PAPER IN 1955/56

	Import value (dollars per ton)	Con- sumption 1000 tons	Pro- duction 1000 tons	Import 1000 tons	Import value es- timated (mi.US\$)	Import value actual (mi.US\$)
Newsprint	185	111	20	91	16.8	17.2
Writing and printing papers	350	89	65	24	8.4)	11.0
Other papers and boards	250	<u>216</u>	<u>210</u>	<u>6</u>	<u>1.5)</u>	
Total papers and boards		416	295	121	26.7	28.2
Mechanical pulp	115	45	17	28	3.2)	26.1
Chemical pulp	175	<u>173</u>	<u>43</u>	<u>130</u>	<u>22.8)</u>	
Total pulp		218	60	158	26.0	26.1
Wastepaper		105	105	-	-	
Total					52.7	54.3
Fuel and spare parts	-	-	-	-	<u>5.0</u>	
Total					<u>57.7</u>	

Source: United Nations Pulp and Paper Advisory Group for Latin America and Foreign Trade Statistics.

/The heavy

The heavy import dependency, especially in the case of pulp where imports account for more than 70 per cent of consumption and for some 50 per cent of the total fibrous raw material supply, obviously places the country in a precarious position in periods of scarce supply or high prices, on the international market. This was clearly demonstrated in 1952-53 when domestic production fell from the previous high of 231,000 tons in 1951 to 199,000 in 1952 and 175,000 tons in 1953. It is thus evident that, in planning the future development of the industry, priority should be given to the production of pulp.

(b) Projection of demand

It is estimated that the level of consumption indicated in paragraph (a) is lower than that corresponding to the cultural and economic level of the country; this is mainly due to the restrictions imposed on imports during the last few years as a result of the shortage of foreign exchange.

Real demand is therefore likely to be higher than is indicated by actual consumption and will probably increase rapidly during the next decade, as may be seen from table 2, which gives a forecast for the years 1962 and 1967.

Table 2
ESTIMATE OF DEMAND FOR PAPER AND BOARD IN 1962 and 1967
(Thousands of tons)

	Actual consumption 1955/56	1955	Estimated demand	
			1962	1967
Newsprint	111	123	189	257
Writing and printing papers	89	87	136	187
Other papers and Boards	<u>216</u>	<u>236</u>	<u>378</u>	<u>529</u>
Total	416	446	703	973

Source: United Nations Pulp and Paper Advisory Group for Latin America.

/The projection

The projection of demand is based on the following: (a) rate of growth for income in 1956-67: 3 per cent per capita per year; (b) rate of population growth: 2 per cent annually; (c) elasticity coefficients: 1.41, 1.50 and 1.62 for "newsprint", "writing and printing papers" and "other papers and boards" respectively. The base year, or starting point, chosen for the projection was the average level of consumption during the period 1948-52, as these years were considered to be the most representative from the point of view of imports. A projection of "real demand" in 1955 was then made, assuming no increase in per capita income between the base year and 1955; i.e. a constant per capita consumption from 1950 to 1955. ^{1/} Consequently, the expansion of aggregate consumption during that period derives exclusively from the growth of population which, from 1957 onwards, has been calculated at the annual rate of 2 per cent corresponding to the historical rate during the last 20 years. ^{2/}

(c) Foreign exchange required to meet future pulp and paper demand

A comparison of the figures in the forecast of demand with the industry's present capacity gives the volume and value of pulp and paper imports required to cover the deficit anticipated in the next ten years, provided there is no change in current capacity.

^{1/} This estimate of real demand exceeds actual consumption in 1955 by 9 per cent. The disparity is attributed to the import restrictions resulting from the scarcity of foreign exchange in recent years.

^{2/} In the preliminary report on Argentina by the Pulp and Paper Advisory Group, "Acerca de los problemas de la industria de papel y celulosa en Argentina", the annual rate of 1.5 per cent was used; the projected consumption figures in table 2 are thus higher than those of the preliminary report.

Table 3

IMPORTS REQUIRED TO SATISFY FUTURE PULP AND PAPER DEMAND IF NO
EXPANSION TAKES PLACE IN THE INDUSTRY

	Present capacity (Thousands of tons)	Price per ton (US\$)	1 9 6 2		1 9 6 7	
			Import volume (Thousands of tons)	Import value (Millions of US\$)	Import volume (Thousands of tons)	Import value (Millions of US\$)
Newsprint	20	185	169	31.3	237	43.8
Writing and printing papers	65	350	71	24.9	122	42.7
Other papers and boards	210	250	168	42.0	319	79.8
Mechanical pulp	17	115	28	3.2	28	3.2
Chemical pulp	68 <u>a/</u>	175	100	17.5	100	17.5
Sundries (fuel and spare parts)	-	-	-	<u>5.4</u>	-	<u>5.4</u>
Total	-	-	-	124.3	-	192.4

Source: United Nations Pulp and Paper Advisory Group for Latin America.

a/ Includes capacity of Puerto Piray Plant.

A comparison with table 1 reveals that if demand is completely satisfied, the amount of foreign exchange spent on current imports of these products (approximately 55-60 million dollars, including fuel and spare parts) will have doubled by 1962, and more than trebled by 1967.

The rapid increase in foreign exchange requirements, which, in 1967 will absorb approximately 20 per cent of the country's current foreign exchange earnings, emphasizes the need of a programme to reduce this potential outflow. Such a reduction might be achieved by import substitution based on expanded local production, by recourse to import restrictions, or by a combination of both measures. Since a restriction of paper consumption would hamper the country's economic and cultural development, it is important that efforts should be oriented toward the adoption of an import-substitution programme.

/The formulation

The formulation of such a programme should take into account the present vulnerable position of the industry as regards its raw material supply (see Section 1). In other words, priority should be given to the expansion of pulp production facilities.

Before analysing the development possibilities for the local industry, a brief examination is made in the next section of the country's current resources of fibrous raw materials and those which may be developed during the decade under review.

2. Local raw materials for pulp production

(a) General information

This chapter attempts to assess the possibilities offered by the country's present resources of fibrous raw materials for a development of the pulp and paper industry, and ways and means of increasing these resources within the period 1958-67 through planting or other suitable measures.

The existing supply of conifers is very limited, and although the natural forests and plantations of Paraná pine ^{3/} in Misiones offer favourable prospects, they will only suffice - during the period under consideration - for the plant at Puerto Piray, which is expected to be in full operation very shortly. A larger planting programme would expand supplies, although its results would not be felt until after 1967.

The Paraná delta has 1,500 hectares of pine plantations. ^{4/} It is possible to expand the plantations considerably but only the wood from the first thinnings can be utilized up to 1967. The needs of long-fibred pulp in the local production together with the high yields obtained from these plantations and the suitable location suggest that determined efforts should be made to increase the planting rate considerably.

3/ Araucaria angustifolia.

4/ Mainly Pinus taeda and Pinus elliottii, which are the most suitable species.

The same zone is highly propitious to the broad-leaved temperate species, and there are at present 80,000 to 85,000 hectares planted with poplars, willows and poplar-willows. It has been estimated that a programme might be put into effect to plant these species for the purposes of the pulp and paper industry exclusively. They would enter into production about 1967, and meanwhile the plantations already existing might be utilized together with those which will mature in the next few years. ^{5/}

Additional plantations of salicaceous species covering an estimated area of 30,000-35,000 hectares have been established in other parts of the country, mainly in the provinces of Rio Negro and Mendoza. Since the wood will be required for the production of boxboards and furthermore, the plantations are not well located for the establishment of a pulp industry they have not been taken into account as a potential raw material source for this industry.

There is also the possibility of utilizing other fibrous resources, i.e., agricultural residues such as bagasse and straw, cane, bamboo, etc., but, in view of the technical and economic problems presented by their utilization, it has been decided to consider only the quantities currently absorbed by the pulp industry without making any supplementary forecasts.

(b) Rates of planting and yields

It has been calculated that the plantations of salicaceous species in the Paraná Delta, which extend over some 85,000 hectares, could supply approximately 800,000 m³ of pulpwood in 1962, without affecting the volume of wood destined for the boxboard industry (boxes and crates) and other industrial and domestic uses. In 1967, it will nevertheless be necessary to resort to new plantations which should be initiated at once, as it is expected that the paper and boxboard industries will have considerably expanded their demand for wood from these species by then. ^{6/}

^{5/} See Annex 1.

^{6/} See Annex 1, Table II, which shows the estimated supply/demand situation for salicaceous wood from the Delta.

The situation is less favourable as regards the coniferous species since the plantations and natural forests of Paraná pine in Misiones cannot produce more than 150,000 m³ during the next decade. However, the Delta offers good prospects for a pine-planting programme, which it is anticipated may reach an annual rate of 4,000 hectares. Assuming an average increase of 10 m³ per hectare in the first nine years and a 20 per cent yield from the first thinning, some 70,000 to 75,000 m³ of pulpwood will be obtained from 1967 onwards, in addition to the volume which may be obtained from the 1,500 hectares already planted.

To sum up: the supply of coniferous wood in 1962 will be around 150,000 m³, and will be supplemented in 1967 with the yield from the thinnings of the pine plantations in the delta amounting to approximately 75,000 m³. This will give a total of about 225,000 m³ for that year. In 1962, the plantations of broad-leaved species will be producing approximately 800,000 m³ of wood for pulp only. Assuming that a planting programme of 8,000 hectares per year is initiated in 1958, the yields from existing and new plantations will reach about 2 million m³ in 1967 of which approximately 1 million may be used for the production of pulp and paper. In addition, it may be estimated that some 50,000 m³ of eucalypts pulpwood could be obtained from plantations of this species in the area.

If the long-fibred wood from conifers is set aside for the manufacture of chemical pulp, some 30,000 tons may be produced in 1962 and approximately 45,000 tons in 1967. In the same two years, approximately 100,000 and 170,000 tons respectively of semi-chemical pulp may be produced from the broad-leaved species, while at the same time mechanical pulp also produced from these species may attain 75,000 and 110,000 tons.

These supplies of pulp, jointly with the volume currently produced from agricultural residues and wastepaper, will be sufficient to produce 350,000 tons of paper and board in 1962, and approximately 500,000 tons in 1967.

It should be emphasized that the raw material availabilities and industrial expansion possibilities indicated above for the year 1967 pre-suppose the establishment of new plantations from the year 1958 and onwards at the rate of 8,000 hectares annually of salicaceous species

/and 4,000

and 4,000 hectares, of pines. In the event that no further planting is undertaken the raw material availability in the year 1967 will be reduced by some 800,000 m³ of salicaceous wood and 75,000 m³ of pine pulpwood - a reduction in potential supplies which will eliminate the possibility of a large-scale expansion of the industry as indicated in the next section. The need to continue with financial support for the planting programme for the Delta should therefore be stressed.

Another aspect of the wood supply problem which requires careful consideration and investigation relates to the difficulties which may arise from the wide distribution of plantation ownership in the Delta and the small average size of the holdings. An efficient organization of pulpwood purchases and transport is thus needed to ensure a continuous supply to the industry. This problem may prove difficult to solve in a satisfactory way and the need for the industry to control a major part of its wood supply through the establishment of new plantations or other measures should be emphasized. Without this control a situation is likely to arise with market speculations and fluctuating pulpwood prices which may prove financially disastrous to the industry.

3. Development possibilities for the industry

Based on the estimate of raw material availability a programme of maximum possible development of the pulp and paper industry has been worked out for the years 1962 and 1967. In formulating this programme two important factors were taken into account:

(a) Non-integrated paper production, apart from increasing the industry's vulnerability, has also a relatively low foreign exchange recovery factor; i.e. the foreign exchange saved by the installation of this industry is limited. ^{7/}

^{7/} The foreign exchange recovery factor (defined as the number of years needed by a new project to recover the foreign exchange required for its installation) is approximately 2 $\frac{1}{2}$ years, whereas in the case of pulp it is only 1 year, and for integrated paper production - except newsprint - 1 year and 2 months.

/(b) The

(b) The integrated production of newsprint is technically one of the most difficult and least profitable operations, especially when based on non-coniferous wood. The foreign exchange savings achieved by this industry are also limited. ^{8/}

Consideration was also given to some of the already existing projects with the relevant modifications commented on below.

In the case of newsprint, only one project for 50,000 tons capacity was included, and it was assumed that the present capacity of 20,000 tons would be converted to produce kraft and wrapping papers. It has also been assumed that practically the entire demand for writing and printing papers will be satisfied, except for a small proportion for special types of paper, the domestic production of which cannot be justified at the present time. The current capacity for the item "Other papers and boards" will rise from 210,000 tons (average for 1955/56) to 295,000 in 1962 and 415,000 in 1967. The net increases of 85,000 and 205,000 tons include only 20,000 tons of kraft paper to be produced by the equipment currently used for newsprint. The remainder of the increments will be comprised by various types of paper and board -excluding kraft- since in this case, as in that of newsprint, it has been thought preferable to forecast a moderate import substitution programme in view of the limited coniferous resources and the difficulties, both economic and technical, of manufacturing these products from broadleaved woods. Projects for non-integrated production have also been omitted for the reasons set forth in point 3 of chapter I.

In accordance with the above considerations, the development possibilities for paper and board production were established as indicated in table 4.

^{8/} The foreign exchange recovery factor is approximately 2 years.

Table 4

DEVELOPMENT POSSIBILITY FOR PAPER AND BOARD PRODUCTION
1962 AND 1967

(Thousands of tons capacity)

	Present capacity 1955/56	Capacity in 1962	Capacity in 1967
Newsprint	20 a/	50	50
Writing and printing papers	65	115	155
Other paper and board	210	295	415
Total	295	460	620

Source: United Nations Pulp and Paper Advisory Group for Latin America.

a/ Present capacity will be converted to production of kraft paper.

In consequence, the approximate structure of consumption in 1962 and 1967, with an indication of the requisite volume of imports to satisfy projected demand, will be as follows (see table 5).

Table 5

ESTIMATED STRUCTURE OF PAPER AND BOARD CONSUMPTION IN 1962 AND 1967

(Thousands of tons)

	1 9 6 2			1 9 6 7		
	Consumption	Production	Imports	Consumption	Production	Imports
Newsprint	189	50	139	257	50	207
Writing and printing papers	136	115	21	187	155	32
Other papers and boards	378	295	83	529	415	114
Total	703	460	243	973	620	353

Source: United Nations Pulp and Paper Advisory Group for Latin America.

/Based on

Based on the suitability of locally available raw materials, the following expansion possibility for the pulp industry has been envisaged (see table 6). In outlining this, a maximum degree of integration with projected and existing paper industries has been taken into account.

Table 6
DEVELOPMENT POSSIBILITY FOR PULP PRODUCTION
(Thousands of tons)

	Present capacity 1955/56	Total capacity	
		1962	1967
<u>Chemical pulp</u>			
From coniferous species	30	30	45
From Broad-leaved species	-	-	10
From others	<u>38</u>	<u>38</u>	<u>31</u> a/
Total	68	68	86
<u>Semi-chemical pulp</u>			
From broad-leaved species	1	100	170
<u>Mechanical pulp</u>			
From coniferous species	-	-	-
From broad-leaved species	<u>17</u>	<u>75</u>	<u>110</u>
Total	86	243	366

Source: United Nations Pulp and Paper Advisory Group for Latin America.

a/ It is estimated that the existing capacity will be reduced by 7,000 tons because of uneconomical operation.

The programme given in table 6 denotes only one of the possible alternatives; this may be varied - although within certain limits - as to the proportions of the different types of pulp utilized.

As national production based on the outlined programme is not sufficient to meet all the industry's requirements, the following imports will be necessary to satisfy pulp demand.

Table 7

ESTIMATED CONSUMPTION STRUCTURE FOR PULP AND OTHER FIBROUS MATERIALS
1962 AND 1967

(Thousands of tons)

	1955/56			1962			1967		
	Con- sump- tion	Pro- duc- tion	Im- ports	Con- sump- tion	Pro- duc- tion	Im- ports	Con- sump- tion	Pro- duc- tion	Im- ports
Chemical pulp	173	43	130	169	68	101	172	86	86
Semi-chemical pulp	1	1	-	99	99	-	171	171	-
Mechanical pulp	45	17	28	80	75	5	114	109	5
Total pulp	219	61	158	348	242	106	457	366	91
Wastepaper a/	105	105	-	180	180	-	263	263	-
Total fibrous material	324	166	158	528	422	106	720	629	91

Source: United Nations Pulp and Paper Advisory Group for Latin America.

a/ Wastepaper recovery has been estimated at approximately 26 per cent of aggregate consumption of paper and board for each of the years under consideration.

It may be seen from table 7 that the essence of the pulp production programme consists in replacing chemical by semi-chemical pulp from broad-leaved species (mainly salicaceae and eucalypts). Experience from the pulping of broad-leaved species - and specifically woods of low density such as poplar, aspen and salicaceous species - has shown that when modern semi-chemical methods are used (neutral sulphite semi-chemical, cold caustic soda, et cetera) pulps can be produced which may replace at least part of the coniferous pulps currently used in the manufacture of most paper qualities. The heavy substitution programme indicated above may result in a partial lowering of the quality of some paper products. It is believed, however, that such reduction in quality will be possible without seriously affecting their suitability for the market.

The pulp production programme will depend on the following supplies of pulpwood in 1962 and 1967 (see table 8), in addition to the comparatively small quantities of agricultural residues (mainly straw and bagasse) at present used by the industry.

Table 8
PULPWOOD REQUIREMENTS IN 1962 AND 1967
(Thousands of m³ of solid wood without bark)^{a/}

	1 9 6 2			1 9 6 7		
	Conife- rous species	Broad- leaved species	Total	Conife- rous species	Broad- leaved species	Total
Chemical pulp	150	-	150	225	50 ^{b/}	275
Semi-chemical pulp	-	400	400	-	680	680
Mechanical pulp	-	225	225	-	330	330
Total	150	625	775	225	1,060	1,285

Source: United Nations Pulp and Paper Advisory Group for Latin America.

a/ The conversion factors used were as follows:

1 ton of chemical pulp = 5m³ of wood from coniferous or broad-leaved species (eucalypts).

1 ton of semi-chemical pulp = 4m³ of wood from broad-leaved species

1 ton of mechanical pulp = 3m³ of wood from broad-leaved species.

b/ Based on eucalypts.

A comparison of the volumes cited in table 8 with the yields from fibrous resources (wood) given in the preceding chapter shows that the programme to expand national pulp production is feasible as far as its raw material requirements are concerned.

4. Economic aspects of the development possibilities

In the last chapter an outline was given of a specific development prospect for the country's pulp and paper industry, intended mainly to reduce as far as possible the immense outflow of foreign exchange that will be required during the following decade if projected demand is to be covered.

This chapter deals with the economic repercussions of such a programme and indicates the investment to be effected in foreign and local currency and the final result of the programme, or, in other words, the foreign exchange that it will save. This is compared with the situation if no programme of any kind is put into effect.

/(a) Changes in

(a) Changes in the degree of self-sufficiency

Prior to analysing the economic aspects of the integrated development programme for paper and pulp, it might be of interest to determine the changes in the industry's degree of self-sufficiency which will result from adopting such a programme.

This may be expressed either on a tonnage or value basis. The latter method is preferable as it takes into account quality changes in the import-production pattern. Table 9 shows the degree of self-sufficiency expressed in terms of values.

Table 9
DEGREE OF SELF-SUFFICIENCY RESULTING FROM THE DEVELOPMENT PROGRAMME
1957-67
(Percentages)

	Based on values		
	1955/56	1962	1967
Newsprint	18	27	19
Writing and printing papers	76	84	83
Other papers and boards	97	78	78
Total: Papers and boards	74	70	68
Chemical and mechanical pulp	25	53	64
Total: paper and pulp including fuels and spares	46	53	56

Source: United Nations Pulp and Paper Advisory Group for Latin America.

It may be seen from this table that the self-sufficiency coefficient will decline slightly for paper and increase considerably for pulp, bearing out the fact that the main aim of the substitution programme is the establishment of integrated industries. The degree of self-sufficiency corresponding to total paper and pulp will raise the present coefficient of 46 per cent (1955/56) to 56 per cent by 1967.

/(b) Investment

(b) Investment requirements

Table 10 shows the combined development prospect for pulp and paper in the periods 1957-62 and 1963-67 outlined in the previous section.

Table 10
INTEGRATED DEVELOPMENT PROGRAMME FOR PULP AND PAPER
(Thousands of tons)

	<u>Capacity increase</u>	
	<u>1957-62</u>	<u>1963-67</u>
<u>Paper and board</u>		
Newsprint	50	..
Writing and printing papers	50	40
Other papers and boards	<u>65</u>	<u>120</u>
	<u>165</u>	<u>160</u>
<u>Pulp</u>		
Chemical	-	25
Semi-chemical	100	70
Mechanical	<u>58</u>	<u>35</u>
	<u>158</u>	<u>130</u>

Source: United Nations Pulp and Paper Advisory Group for Latin America.

The programme envisaged in table 10 implies a total investment of approximately 75 million dollars during 1957-62, and 65 million during 1963-67. It may be estimated that about 70 per cent of these two totals represent foreign exchange, i.e. that 53 and 45 million dollars respectively will be required. A detailed breakdown follows in table 11.

/Table 11

TOTAL FOREIGN EXCHANGE INVESTMENTS REQUIRED FOR THE PULP
AND PAPER DEVELOPMENT PROGRAMME

(Millions of dollars)

	<u>1957-62</u>		<u>1963-67</u>		<u>1957-67</u>	
	Total invest- ment in foreign exchange	Invest- ment in foreign exchange	Total invest- ment	Invest- ment in foreign exchange	Total invest- ment	Invest- ment in foreign exchange
Newsprint	22.0	15.0	-	-	22.0	15.0
Other papers and boards (integrated production)	48.0	34.5	63.5	44.0	111.5	78.5
Pulp (non-integra- ted production)	5.0	3.5	1.5	1.0	6.5	4.5
Total	75.0	53.0	65.0	45.0	140.0	98.0

Source: United Nations Pulp and Paper Advisory Group for Latin America.

Assuming that the programme will be initiated in 1958, it will be necessary to invest 53 million dollars during 1958-60, at the annual rate of 17.7 million, in order that the additional productive capacity foreseen for 1957-62 should be fully implemented at the end of this period. ^{2/}

As the requisite investment for obtaining the increase in productive capacity anticipated for the period 1957-62 will have been completed by 1960, the second investment programme - amounting to 45 million dollars - required to fulfil the target set should begin in 1961. It has been assumed that this sum will be distributed at the annual rate of 9 million dollars during the five years from 1961 to 1965.

(c) Foreign exchange savings

The economic effects of this programme of maximum development are assessed below by comparing the results of the programme with the situation if no import substitution policy is effected. The latter, in so far as foreign exchange expenditure is concerned, has been described in Chapter I, point 3.

^{2/} It is estimated that the construction periods for new plants will be two to three years.

Table 12 lists total import requirements of paper, pulp, fuel and spare parts in 1962 and 1967 in the two cases referred to above.

Table 12
IMPORT REQUIREMENTS OF PULP, PAPER, FUEL AND SPARE PARTS IN
1962 AND 1967
(Volume and value)

	1 9 6 2					1 9 6 7			
	Im- port value (dol- lars per ton)	Without a development programme		With a development programme		Without a development programme		With a development programme	
		Thou- sands of tons	(Mil- lions of dol- lars)	Thou- sands of tons	(Mil- lions of dol- lars)	Thou- sands of tons	(Mil- lions of dol- lars)	Thou- sands of tons	(Mil- lions of dol- lars)
Newsprint	185	169	31.3	139	25.7	237	43.8	207	38.3
Writing and printing paper	350	71	24.9	26	9.1	122	42.7	32	11.2
Other papers and boards	250	168	42.0	83	20.8	319	79.8	114	28.5
Mechanical pulp	115	28	3.2	5	0.6	28	3.2	5	0.6
Chemical pulp	175	100	17.5	101	17.7	100	17.5	86	15.1
Fuel <u>a/</u>	25	125	3.1	210	5.3	125	3.1	290	7.3
Spare parts	-	-	2.3	-	5.0	-	2.3	-	6.9
			124.3		84.2		192.4		107.9
Foreign exchange savings				40.1				84.3	
Investment requirements				53.0				98.0	
Foreign exchange recovery factor				1.321				1.162	

Source: United Nations Pulp and Paper Advisory Group for Latin America.

a/ Estimated fuel consumption:

Newsprint	450	kilogrammes per ton (incl. electric energy prod.)							
Other papers and board	375	"	"	"	"	"	"	"	"
Pulp (average)	150	"	"	"	"	"	"	"	"

/The foreign

The foreign exchange recovery factor obtained by putting the programme in question into effect is satisfactory in comparison with that of most of the other basic industries, such as, for example, the iron and steel industry. In fact, a similar calculation for the proposed steel mill at San Nicolás, Argentina, envisaged a saving of foreign exchange more or less equivalent to the cost of four years of imports.

Table 13 compares the results of adoption and non-adoption of a development programme, in so far as foreign exchange is concerned.

Table 13
TOTAL FOREIGN EXCHANGE REQUIREMENTS WITH OR WITHOUT A DEVELOPMENT PROGRAMME FOR PULP AND PAPER PRODUCTION
(Millions of dollars)

Year	I m p o r t r e q u i r e m e n t s									Differen ce (Fo- reign ex- change savings)
	Without development programme				With development programme					
	Pulp	Paper	Others	Total	Pulp	Paper	Others	Invest ment re- quired	Total	
1957	20.7	48.9	5.6	75.2	20.7	48.9	5.6	-	75.2	-
1958	20.7	57.4	5.6	83.7	20.7	57.4	5.6	17.6	101.3	-17.6
1959	20.7	66.6	5.6	92.9	20.7	66.6	5.6	17.7	110.6	-17.7
1960	20.7	76.1	5.6	102.4	20.7	54.8	7.2	17.7	100.4	2.0
1961	20.7	86.7	5.6	113.0	19.6	54.7	8.8	9.0	92.1	20.9
1962	20.7	98.1	5.6	124.4	18.3	55.6	10.2	9.0	93.2	31.2
1963	20.7	110.0	5.6	136.3	17.5	58.5	11.1	9.0	96.1	40.2
1964	20.7	122.8	5.6	149.1	17.2	61.9	11.5	9.0	100.0	49.1
1965	20.7	136.2	5.6	162.5	16.6	66.2	12.7	9.0	104.5	58.0
1966	20.7	150.8	5.6	177.1	16.3	71.7	13.5	-	101.5	75.6
1967	20.7	166.3	5.6	192.6	15.7	78.0	14.2	-	107.9	84.7

Source: United Nations Pulp and Paper Advisory Group for Latin America.

/If the

If the programme of maximum development just described is put into force, 1958 and 1959 will show negative foreign exchange savings; i.e., expenditure will be higher than in the alternative hypothesis. This is quite explicable in view of the time that must elapse between the construction of a plant and the start of operations. The increase in net foreign exchange expenditure forecast for 1958 and 1959 may prove too high for the country considering the heavy investment needs also in other fields and it might therefore be necessary to implement the programme at a slower rate for a few years or, in the event of its immediate and full initiation, to impose certain temporary restrictions on imports. It should be remembered, however, that the latter measure - even though transitory - may seriously hinder the country's economic and cultural development.

From 1960 onwards, net foreign exchange savings as a result of the development programme will become positive and gradually reach very high levels during 1963-68, as may be seen from Figure I.

If demand for paper and board is to be completely satisfied, it is clear that the development programme under consideration will save an appreciable amount of foreign exchange in comparison with the situation if no expansion of the industry takes place. However, in order to understand the scope of the paper and pulp problem and the measures required for implementing the development programme, it must be remembered that foreign exchange expenditure during its first year (1958) - always assuming that demand is entirely covered - will be approximately 80 per cent more than average real expenditure in 1955/56, and, towards the last years of the programme, will rise to almost 90 per cent.

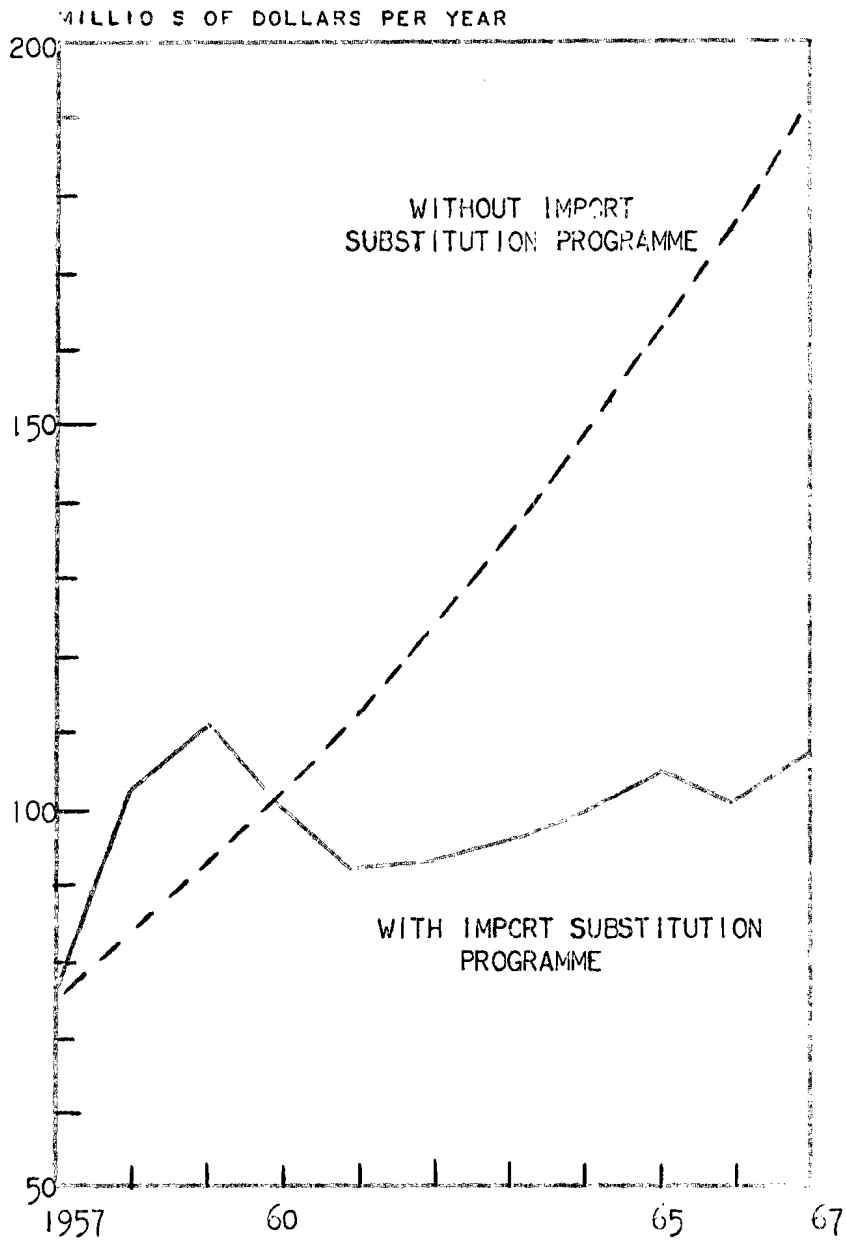
These large foreign exchange requirements are mainly due to the substantial imports of newsprint which will be necessary in view of the very moderate degree of import substitution to be expected for this product for the reasons explained previously. The projected share of newsprint imports in over-all foreign exchange expenditure has been estimated at an average figure of 30-35 per cent for 1957-67.

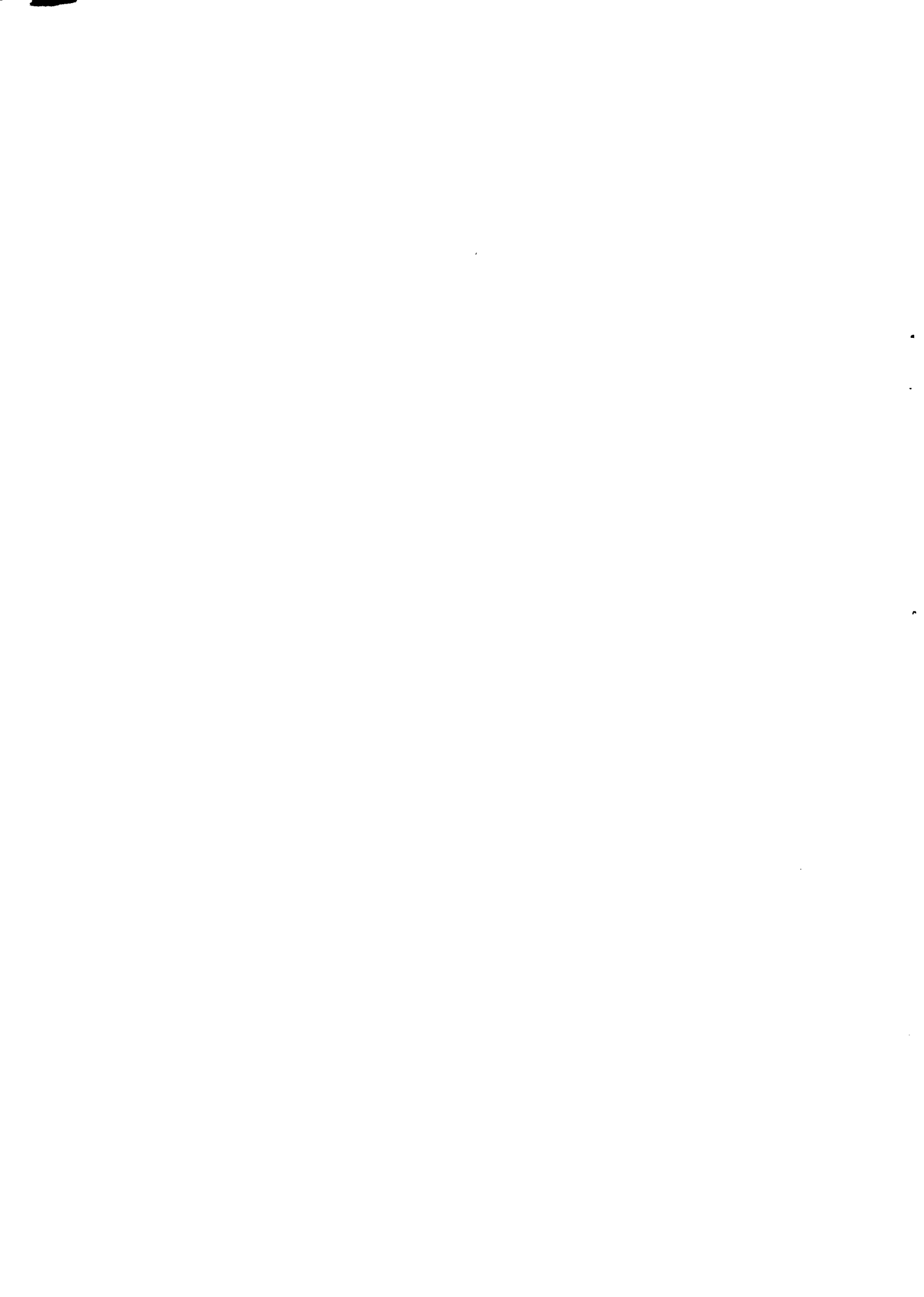
The preliminary report ^{10/} has already pointed out the desirability of a regular and stable supply of newsprint for the country. The report

10/ "Acerca de los problemas de la industria de papel y celulosa en Argentina", op.cit.

COMPARISON BETWEEN FOREIGN EXCHANGE EXPENDITURE WITH
OR WITHOUT AN IMPORT SUBSTITUTION PROGRAMME

NATURAL SCALE





recommends that Chile be taken into account as a potential supply source, since this country has abundant and suitable raw material for the production of newsprint in its Pinus radiata plantations and such a solution is desirable for both countries for reasons of geographical proximity, complementarity of the economies and so forth. 11/

11/ More details on Chile's potential export possibilities are to be found in Chile: potential pulp and paper exporter, (E/CN.12/424), prepared by the United Nations Pulp and Paper Advisory Group for Latin America.

A N N E X 1

ESTIMATE OF YIELDS FROM THE PLANTATIONS OF SALICACEOUS SPECIES IN THE PARANA DELTA

The various sources of available information show considerable discrepancies in estimating the total area planted with salicaceous species in the Parana Delta as well as their potential annual yields. In some of the sources, when taken separately, the estimates are even of a contradictory nature. In view of this diversity of information it was considered necessary to make new estimates of the present and future availabilities of wood in order to determine the development possibilities for the pulp and paper industry.

1. Total area of salicaceous plantations in the Delta

The various estimates of the total area planted fluctuate between 70 thousand and 100 thousand hectares, the lower figure corresponding to the censuses in the provinces of Entre Rios and Buenos Aires for the years 1955 and 1954, respectively. For several reasons it seems likely that the area recorded in the census is too small. ^{1/} However, in order to make a conservative estimate it was decided to use the census data as the basis for calculating future yields, that is, for 1955 the total planted area in the Delta was taken as being 75 thousand hectares.

2. Age distribution of the plantations

This is naturally of great importance in order to calculate annual yields. In the case of the Entre Rios Delta, information was available from the census, which indicates a global figure for plantations prior to 1945, and annual figures for the period 1945-55; as the census for the province of Buenos Aires gives no information on the age distribution, reliance was placed on the information from the private Argentine enterprise "Bosques". In both cases, for calculating purposes, it is assumed that planting began in 1938.

1/ Conferencia Regional del Alamo para America Latina. /3. Rate of

3. Rate of plantation

A rate of 6 thousand hectare in 1956, 4 thousand in 1957 and 8 thousand as from 1958 was assumed. The last represents a 20 per cent increase over the average for recent years (1951-55).

4. Rotation periods

No exact data were available concerning the age nor the areas felled year by year until the present time. Current practice is to clear-cut at the age of 6 to 8 years; on this basis a 7-year rotation period has been assumed for the first felling, in the period 1945-67; for the second, 7 years until 1958 and 8 years as from 1960, whereas the third felling would also take place at 8 years, from its commencement in 1960.^{2/} This increase in the cutting cycle from 7 to 8 years is desirable in order to improve the economic yield (see below).

5. Yield per hectare

In this case also very varied information was available indicating annual yields as ranging from 10 to 30 cubic metres per hectare. For the purpose of this report it was decided to make new calculations, based on the data for growth of the poplar willow species included in the Report of the Regional Conference on Poplar for Latin America 1956, p. 55.^{3/} With the resultant base areas and heights, a survival of 1,000 trees per hectare, a minimum diameter of 3 inches, and assuming a perfect

Table I
PARANA DELTA (ARGENTINA)
YIELD IN CUBIC METRES PER HECTARE PLANTED WITH SALICACEOUS SPECIES
(Cubic metres)

Plantation age (years)	Yield per hectare		Average annual growth	
	theoretical	real	theoretical	real
4	15.1	13.59	3.78	3.40
5	45.1	40.59	9.02	8.12
6	85.9	77.31	14.32	12.89
7	116.8	105.12	16.69	15.02
8	142.0	127.80	17.75	15.98
9	164.3	147.87	18.26	16.43
10	188.7	169.83	18.87	16.98

^{2/} Not only willow, but also the poplar and hybrids sprout twice from the stump, without need of replanting.

^{3/} Conferencia Regional del Alamo para América Latina.

/conical shape

conical shape of the trees, the following series of volumetric yield were obtained. ^{4/}

On the basis of these yield estimates, plus the age distributions of the plantations and the areas planted, the total annual yields were calculated (see table II). The total yields so calculated include three factors which permit this estimate to be termed conservative: (a) the areas planted are probably larger than indicated in the census, (b) a survival of 1,000 trees (60 per cent) has been assumed whereas actual survival, as expressed in the Report of the Comisión Argentina del Alamo, is 1,100 trees in the case of poplar and even more in the case of the willow, and (c) only 90 per cent of the theoretical yields were taken into account. It may be assumed that this procedure represents an under-estimate of some 25 to 30 per cent, large enough to compensate for any possible reductions in yield as the result of various kinds of damage such as floods, pests, et cetera. Briefly then, the yields used were the following:

7-year rotation: 105 cubic metres per hectare

8-year rotation: 128 cubic metres per hectare

Based on the rotation periods indicated in Section 4, more than half of the plantations would actually be felled on an 8-year rotation towards the end of the coming decade, as against a present average estimated at 7 years. Assuming an interest rate of 15 per cent, the maximum economic return would be obtained between the 9th and 10th years since the annual wood increment in these years ranges around 15 per cent. This indicates the desirability of converting the plantations to a rotation of 9 to 10 years, in order to obtain the maximum economic return. The net surpluses (7 to 8 year-old trees that are not felled) to be produced within a few years should therefore be converted to a 10-year cutting cycle.

6. Requirements for salicaceous wood

In order to calculate total requirements for salicaceous wood from the Delta, it is necessary (a) to project the demand for box-board production; (b) to determine the industrial yield from round-wood used by that industry, and (c) to determine the present consumption as a basis for projecting demand.

^{4/} The accuracy of estimates based on the conical shape was checked with actual measurements of poplar plantations in Chile.

(a) Projection of demand for boxboards. Since most of the boxboards are used to pack fruit, the future increase in the demand for boxboards was correlated with the growth in fruit production, as calculated by ECLA in its study on Argentina. According to this estimate, fruit production would increase in 1962 and 1967 by 37 and 62 per cent respectively over the 1955 figures, these percentages being then applied to the current demand for boxboards as well as to that for other uses, except, of course, pulp and paper.

(b) Industrial yield. Estimates of industrial yield vary from 40 to over 60 per cent. Once again, in view of the discrepancy between the various sources, it was decided to take the most conservative estimate, 40 per cent, of the present yield, but anticipating that the industrial yield would reach 50 per cent in the year 1962 through improvement of the saw-milling operations.

(c) Starting point for the projections. Most sources agree in allowing to the Delta a present production and consumption of 100 million board feet for containers (boxes and crates). In addition, the Argentine Poplar Commission has estimated that demand for other uses, except pulp, amounts to 80 thousand cubic metres (presumably this refers to roundwood).

In the present study these estimates have been accepted and the starting point for the projection was a 1955 demand for 590 thousand cubic metres (r) for the boxboard industry (100 million board feet of sawnwood with an industrial yield of 40 per cent) plus 80 thousand cubic metres (r) for other uses, that is a total of 670 thousand cubic metres (r) excluding the requirements of the pulp industry. In 1962, the total would be raised to 757 thousand cubic metres (r) composed of 647 thousand cubic metres for boxes (137 million feet with 50 per cent industrial yield) and 110 thousand cubic metres for other uses. In 1967, the figures would be 895 thousand cubic metres (r), consisting of 765 thousand for boxes (162 million feet with 50 per cent of industrial yield) and 130 thousand for other uses.

/As for

As for the 25 to 30 thousand hectares planted with salicaceous species in the rest of the country (1955/56), it is estimated that their output would, without difficulty, meet the demand for boxboards to the extent (around 40 per cent) that it has done up to the present time.

The volumes that ought to be produced outside the Delta, in 1962 and 1967, would be 400 and 475 thousand cubic metres (r) respectively, for use in boxes.

Conclusion

The calculations of potential yields from the Delta plantations and requirements of salicaceous wood for boxboards and other uses leave a considerable margin for the pulp and paper industry, a margin making it possible to carry out an expansion programme such as that included in section 4 of this report. Although there would be "deficits" in supply of some size for certain years, the "surpluses" in other years would be more than sufficient to offset these. Moreover, the possibility could also be considered of using some quantities of slabs and edgings from the boxboard production to supplement the roundwood supplies for the pulp mills.

Sources:

1. Inventario Forestal del Delta 1955. Provincia de Entre Rios, information from the Dirección de Forestación y Bosques, Buenos Aires.
2. Inventario Forestal 1954. Provincia de Buenos Aires, information from the División de Estadística y Registros, Depto. de Economía Forestal y Contralor.
3. Eduardo F. di Lella and José Jorge M. García: Producción y comercialización de maderas de salicáceas en el Delta del Paraná, Buenos Aires 1956.
4. Private information supplied by the Argentine enterprise "Bosques".
5. Informe de la Conferencia Regional del Alamo para América Latina, Buenos Aires 1956.

6. Resultados obtenidos en el Grupo Forestal constituido con motivo del convenio entre el Gobierno Argentino y la CEPAL, Buenos Aires 1957.
7. "Forestry measures undertaken by the Argentine Government to increase pulp and paper production", Pulp and Paper Prospects in Latin America, United Nations Publication, Sales N° 1955. II.G.4., pp. 229-235.
8. "Other Latin American forest resources as sources of raw materials for pulp and paper" (secretariat paper) Pulp and Paper Prospects in Latin America, op. cit. pp. 211-218.

SALICACEOUS WOOD AVAILABILITIES IN THE PARANA DELTA (ARGENTINA)

Table II

Year	Area planted in the year (hectares)		1st cut year (hectares)	2nd cut year until 1958 8th year from 1960 (hectares)	3rd and final cutting year (hectares)	Production			Requirements		Net surplus (1,000 m3)	
	Provincia of Entre Rios	Provincia of Buenos Aires				1st cutting 105 m3	2nd and 3rd cutting 128 m3	Boxboard industry	Pulp industry	Other uses		Total
1938	389	1,595	1,984									
1939	389	1,595	1,984									
1940	389	1,595	1,984									
1941	389	1,595	1,984									
1942	389	1,595	1,984									
1943	389	1,595	1,984									
1944	389	2,080	2,469									
1945	1,378	1,664	3,042									
1946	1,585	2,288	3,873	1,984								
1947	1,591	2,704	4,295	1,984								
1948	1,794	2,912	4,706	1,984								
1949	2,072	2,912	4,984	1,984								
1950	2,998	3,328	6,326	1,984								
1951	3,350	3,328	6,678	2,469								
1952	3,214	4,160	7,374	3,042								
1953	3,240	3,744	6,984	3,873								
1954	1,957	2,912	4,869	4,295								
1955	3,776	3,399	7,175	4,706								
1956	80,708		6,000	4,984								
1957	84,708		4,000	6,326								
1958	92,708		8,000	6,678								
1959	100,708		8,000	7,374								
1960	108,708		8,000	6,984								
1961	116,708		8,000	4,869								
1962	124,708		8,000	7,175								
1963	132,708		8,000	6,000								
1964	140,708		8,000	4,000								
1965	148,708		8,000	8,000								
1966	156,708		8,000	8,000								
1967	164,708		8,000	8,000								

a/ Age distribution of the plantations from the official census. b/ Age distribution according to inform. from Bosques

