

UNITED NATIONS
ECONOMIC
AND
SOCIAL COUNCIL



SUMMARY OF

E/CN.12/294
6 April 1953

ENGLISH
ORIGINAL: SPANISH

ECONOMIC COMMISSION FOR LATIN AMERICA

Fifth Session
Rio de Janeiro, Brazil
6 April 1953

SECRETARIAT PAPER

A SUMMARY

OF

PRELIMINARY STUDY OF THE POSSIBILITIES FOR THE
DEVELOPMENT OF THE PULP AND PAPER INDUSTRY
IN LATIN AMERICA

BACKGROUND DOCUMENT FOR
ITEM 7 OF PROVISIONAL AGENDA

503.4708

PRELIMINARY STUDY OF THE POSSIBILITIES FOR THE
DEVELOPMENT OF THE PULP AND PAPER INDUSTRY
IN LATIN AMERICA

SUMMARY

I. INTRODUCTION

This report is the result of a preliminary survey of the conditions which Latin America can offer for the development of the pulp and paper industry. Its general aims have been to determine the future demand for pulp and paper in the Region, and then compare it with the production capacity of the mills already installed, and investigate whether the existing resources can, both from technological and economic standpoints, serve as an adequate basis for the development of the production capacity required in the future. Owing to the shortage of available data, most of the figures appearing in the report are estimates subject to wide margins of error. They must only be taken as indications of the size of the factors under consideration. The same lack of information imposes a more superficial treatment of some countries or zones than others. Thus the work is also somewhat in the nature of an account of the existing information, and consequently indicates the chief gaps which will have to be filled in the future, before any definite conclusions can be reached as to the possibilities of industrial expansion in a given country.

This survey will subsequently be supplemented by information derived from the very thorough investigation which is being carried out in certain countries by specialized missions of the United Nations Food and Agriculture Organization, within the Expanded Technical Assistance Programme.

II. THE NEED TO PROMOTE THE DEVELOPMENT OF THE PAPER INDUSTRY
IN LATIN AMERICA

More than 65 per cent of Latin America's paper supply has until now depended upon imported pulp products in the form either of paper or of raw materials for its manufacture. In recent years, at least since 1935, difficulties have considerably increased in supplying the market with foreign products, thus stimulating the paper industries of the

/Region.

Region. More recently, owing to the rise in the relative price of pulp, various mills for this raw material have been established.

While it is true that in recent years the difficulty of obtaining extra-regional pulp products has been aggravated by the lack of foreign exchange from which many Latin-American countries are suffering, the problem mainly originates from the traditional sources of supply. Their production has not been able to keep pace with the increase in the world demand for paper, and the rise in price resulting from the paper shortage itself has considerably reduced the real demand for this product and for the raw materials used in its manufacture.

The effects of this situation have been world-wide, above all for newsprint, the production of which is especially concentrated in what are traditionally regarded as the paper-supplying countries. The newsprint shortage and the disproportionate increase in its cost have depressed the demand, causing reductions in the circulation of daily newspapers and even the closing down of many of the publishing houses which issue them.

For reasons given in the text of the report, three definite statements may be made. In the first place, the consumption increase in Latin America has been abnormally low. Secondly, that its low rate of growth is mainly due to the increasing difficulty of supplying domestic markets with foreign pulp or paper. Thirdly, that this difficulty of supply has its main roots in external factors, originating in the sources of supply, and not in Latin America itself.

There is no sign that the difficulty of providing the region with foreign pulp and paper will disappear even partially. The Scandinavian centres of supply will be unable to increase their production to any marked extent. It is doubtful whether Canada will ever be able to satisfy a high percentage of the increased world demand, since, even with her abundant resources, the industry has had difficulty in pushing forward the economic frontiers of her forested areas, in competition with other forest industries.

According to the estimates made by the United Nations Food and Agriculture Organization and the Economic Commission for Europe, the world consumption of newsprint, excluding that of Latin America, will reach approximately 13 million metric tons annually by 1960, or an increase of

/3 million

3 million tons over the present demand. On the other hand, information compiled by the Newsprint Association of Canada shows that the existing projects for expanding newsprint mills or for building new ones - setting aside those of Latin America - would increase productive capacity by only 2.77 million tons; this assumes that all such projects would be carried out, which is doubtful.

A similar comparison can also be made with future conditions for the supply of pulp for the entire world, excluding Latin America. According to estimates by the United Nations Food and Agriculture Organization and the Economic Commission for Europe, the world demand for pulp should reach a total of 49 million tons annually in 1960, always excluding Latin America. This figure shows an increase of 19 million tons upon the present consumption. It is expected that the productive capacity of the United States will rise to an approximate level of 18.7 million tons in 1955 and that by the same date Canadian capacity will have reached 10 million tons. If investments were to be made on the same scale during the period 1955-60, these two countries together could produce 33 million tons annually in 1960.

It is thought that Europe's production will reach 13 million tons during the same period, which with Canada and the United States would give a total of 46.5 million, that is 1.5 million tons less than the estimated demand for the three areas of production mentioned.

Even allowing for wide margins of error in these estimated figures, the unfavourable nature of the comparison between the increase in demand and that of the capacity to be developed is an indication that the world shortage of pulp and paper will probably become more severe, unless a deliberate effort is made to stimulate the establishment of mills in regions other than those which have traditionally supplied the world. Consequently, Latin America must prepare to supply itself with these basic products and even to assist in alleviating the world shortage.

III. TECHNOLOGICAL POSSIBILITIES FOR USING THE FIBROUS RESOURCES OF LATIN AMERICA IN PULP AND PAPER PRODUCTION

Once the urgent necessity for developing Latin American paper industries has been established, and before referring to the abundance of its fibrous resources, it is essential to state that techniques permitting
/the use of

the use of Latin-American fibrous raw materials have already been developed. In addition, the direction recently taken by technological research forecasts a shifting of the world pulp industry towards the tropical and semi-tropical forest areas, such as those which constitute 95 per cent of the Latin-American forests.

When, in the last century, wood began to be used commercially as a fibrous raw material for the pulp and paper industry, the latter only called upon those areas where coniferous trees free from resin grew, such as Scandinavia, Canada, and the Northern United States. The important reason for this limitation lay in the fact that the only economic method for manufacturing pulp, known at that time, was the sulphite process, which could only be applied to non-resinous conifers which were abundant in the regions mentioned above. The sulphate process, which was already known, could be used in the treatment of all kinds of wood, including that of resinous conifers, but its heavy consumption of chemicals placed it in a secondary position in relation to that of the sulphite process.

Later, the perfecting of a system of recovering almost entirely the chemicals used in the sulphate process, enabled economical use to be made of resinous conifers, with operation costs even lower than those of the sulphite process, and better results, as far as the mechanical strength of the pulp is concerned, though not with respect to its colour.

This technological advance extended the frontiers of the utilization of the resources of the countries of supply, and brought about movements of the industry towards those regions in which there were resinous conifers and other woods appropriate to the sulphate treatment. It was in this way that the United States industry shifted towards the south, to be able to draw upon vast new conifer resources, such as the Douglas fir and the southern pine, and plentiful quantities of hardwood species such as birch and beech. It may be said that the greatest expansion of the cellulose industry which has taken place in the last 15 years, particularly in the United States, is due to the introduction of the sulphate process. Although this process yields pulp of great mechanical resistance, its field of application was at first extremely limited, owing to the difficulty of bleaching the product. With the advent of the continuous bleaching system (in 1930), sulphate not only widened its sphere, but has /gradually been

gradually been ousting sulphite, as it produces pulp as white as that resulting from this latter process, and stronger.

The limited capacity of the coniferous forests of the principal countries of supply, operating in conjunction with the increasing world demand for paper, has led to the investigation of other than coniferous resources. Adaptations of the sulphate process have made possible the increasing use of hardwoods from tropical and semi-tropical regions for pulp production.

The technological advance which may be considered as the most important for the extension of the world's supply sources, is the use of tropical and sub-tropical woods in heterogeneous mixtures somewhat similar in composition to those found in the forests where they grow. Among the more interesting research work on this subject is that of a French Government Agency, the Régie Industrielle de la Cellulose Coloniale, both in its Paris Laboratories and at the Pilot Mill of Abidjan, French West Africa, where success had been achieved in experiments for the simultaneous cooking of as many as 20 broad-leaved species.

The results obtained in West Africa are of prime importance to Latin America, since, as noted earlier, more than 95 per cent of this region's forest resources are made up of tropical and semi-tropical broad-leaved species, which generally grow in heterogeneous forest groups. If good results are obtained for the economic production of pulp from mixtures of tropical Latin-American hardwoods it is probable that a new geographical re-location of the paper industries will take place. Thus some areas of the Region, which until today have remained entirely inactive, may be exploited, to the advantage of the whole world.

Even if the problem of producing pulp from the broad-leaved species of Latin America were assumed as solved, another important problem would remain. This would be the production of mechanical pulp, which is the cost reducing ingredient of paper, since it consists merely of groundwood, requiring the simplest possible manufacturing process and affording a generous yield per ton of raw material used. Until today, there has been considerable difficulty in producing mechanical pulp from the majority of the broad-leaved species, mainly due to their hardness and colour. Fortunately, very substantial progress has been made in

/developing new

developing new processes, such as chemigr unwood and cold caustic soda, which can be used with hardwoods to produce pulps equivalent, or almost equivalent, to mechanical pulp. Much research still remains to be carried out in this direction, but the prospects for the production of wood pulp from broad-leaved species are almost as great as those for the production of chemical pulp.

The lack of resources in the paper producing countries also caused another technological advance by widening the field of application of the semi-chemical processes to the treatment of hardwoods. The aim of the research was to obtain the greatest possible yield from the fibrous resources, and at the same time to improve the paper properties of the products. The economic advantages of this progress, considered from the Latin-American point of view, are of greater significance to the applicability of such processes to regional woods and the increase in production per unit of investment cost, than to the preservation of natural resources. As in the case of paper produced from mixed heterogeneous species, it is necessary to stimulate the study of the application of semi-chemical processes to the species of the natural forest of the Region.

Industrial processes enabling, when straw and sugar-cane bagasse to be used economically as raw materials in paper manufacture, open up wide prospects of industrial development for those areas where there are no other fibrous resources.

For Latin America such prospects are of particular interest, not only because they offer an opportunity to make the best use of existing resources, but because owing to the nature of the equipment it is possible to use small mills economically, thus representing a smaller capital outlay per unit of manufactured products. Another advantage which may appear in certain ideally situated locations within the Region is the possibility of obtaining very low costs, due to the primary character of the supplementary materials required for the industrial processes, that is, salt, water, and electric power.

At present the world production of straw pulp is only 1 million tons annually; that is, 3 per cent of the total production of pulp. This figure is surprising, particularly if the high degree of technical progress attained in the production of this type of pulp is taken into account and the abundant existing sources for raw materials.

/The insignificant

The insignificant use which is made of these resources can only be explained as a result of economic criteria, based on local conditions in the countries concerned, as well as a lack of knowledge and technical data on the part of industrialists.

There are various processes for the treatment of straw and of sugar cane bagasse, and in different parts of the world efforts are being made to improve them or to develop new means of converting them into pulp. Such research involves the use of different chemicals and methods of operation, which allow a certain flexibility in the choice of raw materials and other production elements, in accordance with local conditions.

IV. COMPARISON OF THE NEEDS FOR DEVELOPMENT IN LATIN AMERICA WITH THE POSSIBILITIES OFFERED BY ITS FIBRE RESOURCES

In 1950, Latin America consumed about 1,348,000 tons of paper and paperboard, of which 28 per cent, or 375,000 tons, consisted of newsprint. Regional production was able to satisfy only 12 per cent of the demand for newsprint and 70 per cent of the requirements for other types of paper and paperboard (see Table 1). Present installed capacity, calculated on the basis of 1952 data, reaches 40,000 tons annually in the case of newsprint and 741,000 tons for other types of paper and paperboard.

The industry produces almost all the mechanical pulp which it consumes (134,000 tons), but only supplies 40 per cent of the 428,000 tons of chemical pulp which is required annually. Except for small quantities, the remainder of the fibrous raw materials, such as waste paper and rags, come from the domestic markets of each producer country.

As may be seen in Table 2, the industry comprises 190 mills, mainly concentrated in Argentina, Brazil, Chile and Mexico - these countries together possessing 96 per cent of the total capacity. Most of the mills are very small and are actively engaged in producing cardboard from waste products. 31 paper mills produce their own chemical pulp and 30 produce their own mechanical pulp. There are, moreover, especially in the South of Brazil, many mills which produce small quantities of mechanical pulp for sale only.

The studies made for the determination of future demand, including correlations with economic and cultural factors, lead to the conclusion

/that not only

that not only in Latin America, but in the world as a whole, a close relationship exists between per capita income and per capita consumption of paper and paperboard. To estimate the future demand, the normal rate of consumption growth was taken into account, since it was assumed that if Latin America continued to develop its productive capacity for pulp and paper with the same interest which it is at present displayed, the supply difficulties, which in the past have reduced consumption in relation to income, would disappear entirely and the demand would reach its normal rate of increase.

Elsewhere in this study, estimates of the future demand for paper, corresponding to different rates of increase in per capita income, are shown. To make the exposition clear, only one demand figure has been used for the calculations appearing throughout this report. This demand corresponds to an average increase in annual income of 3 per cent, a figure which is probably not exaggerated if the industrialization of Latin America continues to grow at an accelerated rate, in accordance with the plans in each country.

The mean estimates for future consumption of paper, chemical pulp and mechanical pulp appear in Table 3. If they are compared with statistics for installed capacity, it is evident that for the Latin-American industry to be able to supply all its needs an increase in its paper manufacturing capacity of 916,000 tons up to 1955,^{1/} of 1,340,000 tons until 1960 and of 2,648,000 tons until 1965 would be required (see Table 4). Simultaneously, the capacity for producing chemical pulp would have to increase by 600,000 tons up to 1955, 923,000 to 1960 and 1,375,000 to 1965. To mechanical pulp capacity it would be necessary to add 467,000 tons to 1955, 730,000 to 1960 and 1,691,000 tons up to 1965.

The enlargement of the industry to cover the entire requirements of the Latin-American market would require, in approximate figures, more than two-and-a-half million tons of lumber annually by 1955 and more than 5 million tons by 1965 (see Table 5). The potential resources of Latin America are considerably in excess of these requirements and allow for an export industry which could substantially assist in supplying other parts of the world.

^{1/} Productive capacity figures in this Summary, expressed in tons alone, should be considered as tons of production annually.

/Although the

Although the data included in this survey refer only to particular areas of certain Latin-American countries, the potential aggregate, at a very conservative estimate, would be sufficient to produce more than 3.5 million tons of fibrous material (see Table 6). This would serve to satisfy the domestic requirements of Latin America and even leave a surplus which might be used to produce, exclusively for export, about 1.5 million tons of chemical pulp annually or some 3 million tons of newsprint (see Table 7).

For the paper industry to develop sufficiently to cover the entire needs of Latin America, it would be necessary, between now and the year 1965, to establish more than 50 large^{1/} pulp and paper mills in the most suitable sites in regard to markets and raw materials. A programme of this nature would involve investments of more than 700 million dollars. It would also require the installation of about 3.5 million kilowatts of electric power capacity and an availability of fuel and other basic materials to amounts exceeding 160,000 tons of coal each year, 140,000 tons of sodium chloride and 110,000 tons of lime. It would also be necessary to ensure an abundant water supply and considerable efforts would have to be made in building many kilometres of roads and railways to obtain ready access to the forests and to transport finished products.

The size of the industrial development expressed by the above figures justifies a careful study of the available resources, of the financing possibilities and of the prospects provided by probable future technological advances.

V. GENERAL CONCLUSIONS

1. The rate of growth of paper consumption in Latin America has been slower than might be expected from the development of its per capita income level. The principal cause for this anomaly has been the progressive inability of the world's traditional production centres to meet the universal demand.

^{1/} Mills with an annual productive capacity for 50,000 tons of paper, plus the essential capacity for chemical and mechanical pulp.

2. There is no reason to suppose that the great paper producing centres of the world will, in the future, be able to increase their production to a degree capable of wiping out the supply difficulties experienced both in Latin America and the rest of the world. This implies that Latin America will have to make a deliberate effort to enlarge its production of pulp and paper. The aim should be to create sources of supply which will allow future consumption to remain in its appropriate proportion to the level of real income, in other words in sound relationship to industrialization and educational and cultural progress.

3. Latin America in general, and most of its individual countries, have sufficient fibrous resources not only to meet their domestic consumption requirements but also to contribute, through exports, to the reduction of the world shortage of paper and raw materials for paper. The Region's most important resources are the tropical and semi-tropical forests of hardwoods. But even the coniferous forests, constituting only 5 per cent of the Latin-American forest area, could, with adequate forest management, prove sufficient to meet the entire needs of the Region.

4. Apart from the forest resources which exist in Latin America, it is possible to create others, almost anywhere, by means of afforestation of suitable species. This solution allows the establishment of natural resources in locations previously selected for their accessibility and proximity to paper markets. The experience gained by some countries, such as Argentina, Brazil and Chile, where extensive afforestation has been carried out, ought to be made known to the rest of Latin America by means of publications or the visits of technicians. It is interesting to learn of the work carried out by Brazil in the planting of eucalyptus, as these species can be used not only to form new sources of pulping raw materials but also to create supplies of lumber for fuel close to urban centres, thus assisting to avoid the destruction of a large number of natural forests. It is also of interest to know that Argentina has succeeded in gathering much knowledge of the planting of salicaceous, such as willows and poplars. Such species are of very rapid growth and may be used to produce mechanical pulp. Similarly, it should be noticed that considerable experience has been acquired in Chile of plantations of *pinus radiata*,

/a species

a species which can probably be acclimatized to various areas of Latin America as well as it has done in the Chilean zone.

5. Recently, the most important technological advance, as far as paper is concerned, has been the discovery of several processes which enable wood from tropical forests to be used in producing chemical pulp and pulps similar to the mechanical pulp. Since these new processes have been developed outside Latin America, it is required to carry out research and experiments in order to adapt them to Latin-American resources or to test the universality of their application.

6. Sugar cane bagasse also offers a substantial source of fibrous raw material for those countries which do not have sufficient forests at their disposal. The technical and economic problem of bagasse conversion into chemical pulp may be considered as definitely solved, except for a few details such as the economic elimination and subsequent use of the pith, which has a detrimental effect upon the quality of the paper produced. Sugar cane bagasse as a raw material for pulp has a higher value than its use as a fuel; however, this value depends on the technical condition of the equipment used and on the local possibilities of obtaining cheap fuel.

7. In countries where forest resources exist in abundance, these should be given a priority above other raw materials for producing pulp and paper. This is principally because the establishment of large mills in itself represents a guarantee that the forests will be preserved and enriched, an opposite position to the destruction of existing resources which has characterized the exploitation of lumber in Latin America.

8. Since industrial processes for producing chemical pulp from straw have obtained a high technical level and the resulting product may be used to manufacture high-quality grades of paper, it is hoped that this raw material will in due course be more extensively employed in those countries where insufficient wood for pulp production exists, but where conversely, sugar cane can be collected at a reasonable, and more or less stable, cost.

9. Since most Latin-American forests comprise a mixture of species, among which are to be found some of great value for other uses than the production of pulp and paper, it is of prime importance to study the

/possibilities

possibilities of creating industries integrated with those for paper and which will allow a rational utilization of the forests and a reduction in the cost of pulp products. It is perhaps unnecessary to underline that the most vital aspect of such a study would be an examination of the possibilities of being able to allow upon permanent markets for such integrated industries.

10. In connection with the above paragraph, it is important to promote a systematic study of the types of wood which the forests can provide, in order to determine to what use they can best be applied. Since the essential capital outlay for the establishment of laboratories to undertake this kind of research is considerable, it is to be recommended that several neighbouring countries should co-operate in their organization. Such co-operation is similar to that proposed below for experiments in the treatment of different woods to obtain a chemical and mechanical pulps.

11. Any project to exploit existing forest resources must be on a sustained-yield basis, and must be accompanied by a plan for the management, preservation and enrichment of the forest zones.

12. Bearing in mind that Latin America is a region suffering from a lack of capital resources for commercial undertakings and where investments in pulp and paper must compete, both in profitability and in their power to extend economic development, with many other industries and projects, it is of prime importance to make a detailed survey of the Region's problems as a whole and to attempt to establish a plan for long-term projects according to the aptitude of various zones for producing pulp and paper under the best economic conditions. There are a number of factors to be taken into account in determining such aptitude, namely; the availability of a large domestic market; the availabilities of water, power, fuels and cheap chemicals; the accessibility of the forest resources; the possibility of exporting finished products to other countries within and outside the Region; the necessity for protecting the forests through the establishment of large-scale enterprises which would necessarily preserve the resources; the applicability of the resources to the manufacture of different grades of paper; and finally, most important of all, the influence which the development of a given project might have upon the economic system of an individual country.

/13. Although

13. Although fibrous resources exist in abundance in almost all the countries of the Region, the supply of chemical pulp and of paper with a high rate of consumption should be planned by groups of countries with complementary economic systems, and not by each country individually, which has occurred up to the present. The chief reasons for this co-ordinated planning are:

a) Most Latin-American countries have markets too small to allow for the establishment of industries of the most economical size.

b) For reasons of accessibility, of the existence of other auxiliary raw materials, and of the availability of cheap water and electric power resources, some countries are better equipped economically, for the production of pulp and paper.

c) Even in the case of groups of countries which are individually large consumers of paper, technological differences in their resources may determine the practical convenience of establishing mills to specialize in certain types of products and of organizing reciprocal trade in such products among the countries of the group.

14. Any blueprint for industrial development requires specialized research into the composition and density of the forests, as well as the possibilities for the economic conversion of the forest resources into chemical, mechanical or semi-chemical pulps for different grades of paper and cardboard. It would thus be desirable to organize international bodies which could carry out such work on behalf of any one of the countries at considerably lower cost than if every individual country established its own specialized agency. It would also be possible to carry out on a co-operative scale surveys of regional or world markets without which plans for the development of the industry could not be made.

15. Apart from research related to specific projects, it is also necessary to promote the establishment of systematic research aimed at obtaining equipment and production processes better adapted to Latin-American conditions not only regarding a more rational use of existing natural resources, but also to reduce the investment required per unit of output and to reduce the size or capacity which the mills should have to operate on an economic basis.

Table 1 Latin America: Relationship between Products, Imports
and Consumption of Paper and Paperboard
1950

(Provisional Table with figures subject to revision)

	Production		Imports		Consumption	
	Tons	%	Tons	%	Tons	%
Argentina	211,407	52	195,325	48	406,732	23.77
Bolivia	518	12	3,754	88	4,272	1.41
Brazil	247,895	78	70,394	22	318,289	6.33
Chile	44,829	67	21,821	33	66,650	11.47
Colombia			61,720	100	61,720	5.48
Costa Rica			3,342	100	3,342	4.20
Cuba	34,349	25	102,550	75	136,899	25.95
Dominican Rep.	196	3	5,895	97	6,091	2.88
Ecuador	367	3	11,039	97	11,406	3.57
El Salvador			3,872	100	3,872	2.08
Guatemala			5,846	100	5,846	2.08
Haiti			2,144	100	2,144	0.62
Honduras			1,766	100	1,766	1.15
Mexico	131,464	75	44,093	25	175,557	6.92
Nicaragua			1,894	100	1,894	1.80
Panama			6,463	100	6,463	8.07
Paraguay			1,766	100	1,766	1.26
Peru	16,546	57	12,473	43	29,019	3.48
Uruguay	30,000	55	24,143	45	54,143	22.73
Venezuela	7,710	15	42,680	85	50,398	10.72
Latin America	725,289	54	622,930	46	1,348,269	8.83

Source: Economic Commission for Latin America and United Nations Food and Agriculture Organization.

Notes: In 1950, Brazil, Chile and Mexico produced a total of 45,716 tons of newsprint, or 12 per cent of the Region's consumption. These were the only countries producing newsprint. The production of other papers and paperboard met 70 per cent of Latin America's consumption.

Table 2 Latin America: Geographical Distribution and Installed Capacity of the Paper, Chemical Pulp for Paper and Mechanical Pulp Industries.

(Provisional Table)
(Capacity in thousands of tons annually)

Countries	Number of Mills					Capacity of the Paper Industry b/			Capacity of the Chemical Pulp Industry			Capacity of the Mechanical Pulp Industry		
	Paper only	Paper & Chem. Pulp	Paper & Mech. Pulp	Paper, Chem. & Mech. Pulp	Mech. Pulp only	Total Capacity	No. of Mills	Av. Capacity per mill	Total Capacity	No. of Mills	Av. Capacity per mill	Total Capacity	No. of Mills	Av. Capacity per mill
Argentina	41	6	3	-	2	270.0	50	5.4	43.0	6	7.2	31.0	5	2.8
Bolivia	1	-	-	-	-	0.6	1	0.6	-	-	-	-	-	-
Brazil	38	5	8	10	66	266.5	61	4.4	73.5	15	4.9	124.9	83	1.5
Chile	24	-	1	1	-	67.9	26	2.7	6.0	1	6.0	23.0	2	11.5
Colombia	1	1	-	-	-	24.0	1	24.0	-	-	-	-	-	-
Costa Rica	-	1	-	-	-	3.0	1	3.0	?	1	?	-	-	-
Cuba	2	-	-	-	-	45.0	2	22.5	-	-	-	-	-	-
Dominican Rep.	1	-	-	-	-	0.4	1	0.4	-	-	-	-	-	-
Ecuador	1	-	-	-	-	0.6	1	0.6	-	-	-	-	-	-
El Salvador	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Guatemala	1	-	-	-	-	?	1	?	-	-	-	-	-	-
Haiti	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Honduras	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mexico	15	3	6	1	-	240.0	25	10.0	93.0	4	28.0	63.0	7	9.0
Nicaragua	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Panamá	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Paraguay	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Peru	4	2	-	-	-	25.0	6	4.2	13.0	2	6.5	-	-	-
Uruguay	10	1	-	-	-	37.5	11	3.7	9.0	1	9.0	-	-	-
Venezuela	2	-	-	-	-	8.0	2	4.0	-	-	-	-	-	-
Totals	141	19	18	12	66	988.5	189	5.2	238.1	31	7.7	241.9	97	2.5

Source: Economic Commission for Latin America and United Nations Food and Agriculture Organization.

a/ Data on installed capacity comes from information obtained early in 1953.

b/ Installed Capacity to produce newsprint stands at 48,000 tons annually.

/Table 3

Table 3 Latin America: Estimates for the Mean Future Demand for Paper,
Chemical Pulp for Paper and Mechanical Pulp
(thousands of metric tons annually)

	Years	Per capita demand for paper (Kg.)	Total demand for paper	Total demand for mechanical pulp c/	Total demand for chemical pulp c/
<u>Newsprint</u>	1950 a/	2.46	375	345	49
	1955 b/	3.86	648	596	84
	1960	4.78	886	815	115
	1965	5.93	1,212	1,115	158
<u>Other papers and paperboards:</u>	1950 a/	6.38	973	119 d/	601 d/
	1955 b/	7.49	1,257	113	754
	1960	9.41	1,743	157	1,046
	1965	11.86	2,425	218	1,455
<u>Total:</u>	1950 a/	8.84	1,348	464	650
	1955 b/	11.35	1,905	709	838
	1960	14.19	2,629	972	1,161
	1965	17.79	3,637	1,333	1,613

Source: Economic Commission for Latin America and United Nations Food and Agriculture Organization.

- a/ The total and per capita demand for paper for 1950 are taken from an Annex to the complete Study.
- b/ The estimates of demand for 1955, 1960 and 1965 were obtained by correlating on a world scale the per capita consumption of paper and Latin-American per capita income. The complete process and its results may be found in an annex to the complete document. For the sake of simplicity, only the figures for an average rate of growth of per capita income equal to 3 per cent were used here.
- c/ For calculating total demand for mechanical and chemical pulp, the following conversion average factors were used, which were approved for use by FAO at two international conferences on forestry statistics, held in Washington and Rome, 1947.

Mechanical pulp: newsprint	x 0.92	- Chemical Pulp: newsprint	x 0.13
other papers	x 0.09	other papers	x 0.68
paperboard	x 0.07	paperboard	x 0.32

As "other papers" and "paperboard" are combined in the Table, the following averages of the corresponding factors were used for this overall figure, weighted with Latin-American consumption figures

Mechanical pulp:	other papers and paperboards	x 0.09
Chemical pulp:	other papers and paperboards	x 0.60

- d/ Estimates based on data from the industry.

Table 4 Latin America: Average Development Requirements for the Paper, Chemical Pulp for Paper and Mechanical Pulp Industry

	Present Demand a/	Installed Capacity b/	Essential present increases	Essential future increases		
				Total to 1955	Total to 1960	Total to 1965
<u>Newsprint</u>						
Latin-American	46					
Imported	329					
<u>Total for newsprint</u>	375	48	327	600	838	1,164
Other papers and paperboards:						
Latin-American	679					
Imported	294					
<u>Total other papers and paperboards</u>	973	941	32	316	802	1,484
<u>Total for paper and paperboard</u>	1,348	989	359	916	1,640	2,648
<u>Chemical pulp:</u>						
Consumption of domestic pulp	171					
Consumption of pulp imported as a raw material ^{c/}	257					
To replace the raw material contained in imported paper	222					
<u>Total chemical pulp for paper</u>	650	238	412	600	923	1,375
<u>Mechanical pulp:</u>						
Consumption of domestic pulp	117					
Consumption of imported pulp ^{c/}	17					
To replace raw material contained in imported paper	330					
<u>Total mechanical pulp</u>	464	242	222	467	730	1,091

Source: Economic Commission for Latin America and United Nations Food and Agriculture Organization.

a/ Figures based on data for 1950.

b/ Provisional figures based on information gathered during 1952.

c/ Data obtained in the course of the study, supplemented by information from Wood Pulp Statistics, United States Pulp Producers Association, Inc., August 1951.

Table 5 Latin America: Amount of Wood Required Annually to Meet
the Needs of the Paper Industry a/

(provisional table)

(thousands of metric tons annually)

	<u>1952</u>	<u>1955</u>	<u>1960</u>	<u>1965</u>
<u>For existing industry</u>				
Chemical pulp	528	528	528	528
Mechanical pulp	269	269	269	269
Total	797	797	797	797
<u>For the increases in capacity required</u> <u>to satisfy the domestic market</u>				
Chemical pulp	915	1,332	2,049	3,053
Mechanical pulp	246	518	810	1,211
Total	1,161	1,850	2,859	4,264
<u>Grand total</u>	1,958	2,647	3,656	5,061

Source: Economic Commission for Latin America and United Nations Food
and Agriculture Organization

a/ This table is based on data for installed capacity and necessary
increased in capacity shown in Table 4. The amounts of wood were
calculated at the rate of 2.22 tons per ton of chemical pulp, and
1.11 tons per ton of mechanical pulp.

Table 6 Latin America: Potential of selected Latin-American Sources
of Fibrous Raw Material

(provisional table)

(Thousands of tons of resources per year)

Country	Zone	Potentials which could be estimated numerically						Total
		Coni- ferous	Euca- lyptus	Hard- woods	Wheat Straw	Bag- asse	Sub- total	
Argentina:								1,932
	Misiones	78					78	
	Wheat area				1,786		1,786	
	Tucuman					68	68	
Bolivia								
Brazil:								1,706
	Amazonia			67			67	
	Sao Paulo		484				484	
	Paraná	702					702	
	Sta. Catarina	306					306	
	Rio Grande do Sul	147					147	
	Pernambuco							
British Guiana								
Chile:								2,821
	Concepcion	2,171 ^{c/}					2,171	
	Valdivia			650			650	
Colombia				400				400
Costa Rica								
Cuba:								488
	Camaguey					80	80	
	Oriente					75	75	
	Cienfuegos					293	293 ^{b/}	
Dominican Republic								
Ecuador				400				400
El Salvador								
French Guiana								
Guatemala				110				110
Haiti								
Honduras								
Mexico:								675
	Chihuahua	150					150	
	Durango	125					125	
	Michoacán	75					75	
	Yucatan			325			325	
Nicaragua								
Panama								
Paraguay				30				30
Peru								
Surinam								
Uruguay								
Venezuela								
Totals		3,754	484	1,982	1,786	516	-	8,522

Source: Economic Commission for Latin America and United Nations Food and Agriculture Organization

a/ Only the fibre in cane bagasse

b/ In this area only, total utilization of bagasse was considered for making chemical pulp

c/ Estimated potential for 1965

/Table 6

Table 6 Latin America: Potential of some Latin-American Sources
(Continued A) of Fibrous Raw Material
(Provisional table)

Country	Zone	Other large potentials, the extent of which was not estimated	
		Coniferous	Hardwoods
Argentina:			
	Misiones		species found with pine
	Wheat Area		
	Tucuman		
Bolivia			more than requirements
Brazil:			
	Amazonia		practically unlimited
	Sao Paulo		
	Paraná	other forests not considered	species found with pine
	Sta. Catarina	other forests not considered	species found with pine
	Rio Grande do Sul	other forests not considered	species found with pine
	Pernambuco		
British Guiana			extensive natural forests
Chile:			
	Concepción		
	Valdivia		
Colombia			extensive forests in other zones
Costa Rica			extensive natural forests
Cuba:			
	Camagüey		
	Oriente		
	Cienfuegos		other rice natural forests
Dominican Republic			
Ecuador			
El Salvador			
French Guiana			extensive natural forests
Guatemala		very plentiful coniferous forests	other extensive natural forests
Haiti			
Honduras		more than requirements	more than requirements
Mexico:		forests in other States	forests in other States
	Chihuahua	other coniferous forests	
	Durango	other coniferous forests	
	Michoacán		
	Yucatán		other forests not considered
Nicaragua			extensive natural forests
Panama			
Paraguay			extensive natural forests
Peru			species other than "cético"
Surinam			extensive natural forests
Uruguay			
Venezuela			

Table 6 Latin America: Potential of some Latin-American Sources of
(Continued B) Fibrous Raw Material

(provisional table)

<u>Country</u>	<u>Zone</u>	<u>Other large potentials, the extent of</u> <u>which was not estimated</u> <u>Non-forestry resources</u>
Argentina:		Cafia de Castilla and tacuara cane straw from other cereals
	Misiones	
	Wheat area	
	Tucuman	
Bolivia		
Brazil:		
	Amazonia	
	Sao Paulo	cane bagasse
	Parana	
	Sta. Catarina	
	Rio Grande do Sul	
	Pernambuco	very plentiful bagasse
British Guiana		
Chile:		
	Concepcion	
	Valdivia	
Colombia		cane bagasse
Costa Rica		residues of baco
Cuba:		
	Camaguey	
	Oriente	
	Cienfuegos	
Dominican Republic		
Ecuador		
El Salvador		
French Guiana		
Guatemala		
Haiti		cane bagasse
Honduras		canes and bamboos
Mexico:		cane bagasse
	Chihuahua	
	Durango	
	Michoacan	
	Yucatan	
Nicaragua		
Panama		
Paraguay		
Peru		cane bagasse
Surinam		
Uruguay		wheat straw
Venezuela		cane bagasse

Table 7 Latin America Comparison between Potential Represented by
some Sources of Fibrous Raw Materials, and
Future Requirements of the Region

	<u>1960</u>	<u>1965</u>
Potential of some sources of raw material for pulp and paper <u>a/</u>	7,666	8,522
Equivalent in paper of average composition	5,500	6,140
Consumption of paper in Latin America <u>b/</u>	2,629	3,637
Surplus in tons of paper of average composition	2,871	2,503
Surplus expressed in chemical pulp only	1,790	1,500
Surplus expressed in newsprint only	3,060	2,660

Source: Economic Commission for Latin America and United Nations Food
 and Agriculture Organization.

a/ See Table 6.

b/ See Table 3.