9/64

25

X

THE FRONTIERS OF SOUTH AMERICA

THE FRONTIERS OF SOUTH AMERICA

DEPARTMENT OF STATE
UNITED STATES OF AMERICA

September 1966

The Frontiers of South America

TABLE OF CONTENTS

Illustrations

The Frontiers of South America

This report is a summary of a preliminary effort to assess the appropriate role of hitherto unused (or under-utilized) land and natural resources in the economic development of South America.

Part One seeks to put the problem in a general economic perspective.

Part Two examines the characteristics and potentialities of the principal underdeveloped regions and the location of major untapped natural resources.

Part Three summarizes the projects under way or under examination.

Part One: The Economic Background

A population density map (Figure 1) reveals South America as a continent whose people still live mainly along the seacoasts or close to them. A vast unpopulated -- or barely populated -- interior beckons and challenges, as it has done for several centuries.

The result is a product of geography and economic history.

The location of mountain ranges and escarpments as well as forbidding tropical lowlands and rain forests (Figure 2 and Figure 3) decreed that men would first exploit the arable land near the coast or accessible to it. The Indian population, it is true, remained withdrawn in the Andean cordilleras and altiplano, maintaining a distinct cultural and social life; although the impact of modern public health measures has created population pressure in the past generation. Moreover, minerals, timber (and, at one time, Amazonian rubber), drew some enterprise to the interior. But the South American interior was -- and by and large remains -- a difficult and expensive frontier to exploit.

The first two major phases of South American economic development reinforced the bias of nature.

South America developed, in the first instance, as a supplier of agricultural products and raw materials to Europe, and then, to the United States. The modern elements in South American life were thus focused around the ports; and a premium attached to agricultural development in regions close to the seacoast or accessible by rail or road.

Over the last 30 years South America experienced its first major phase of industrialization. The initial leading sector in industrial growth has been the production of consumer goods in substitution for imports. The markets for such goods were, naturally, existing centers of population and wealth. Thus, the coastal cities built up to manage South America's


SOUTH AMERICA
POPULATION DENSITY
Figure 1
CARIBBEAN SEA
VENEZUELA
COLOMBIA
ECUADOR
BRITISH GUIANA
SURINAM
FRENCH GUIANA
BRAZIL
BOLIVIA
PARAGUAY
URUGUAY
Brasilia
Rio de Janeiro
Montevideo
PACIFIC OCEAN
ATLANTIC OCEAN
FALKLAND ISLANDS


SOUTH AMERICA
SURFACE CONFIGURATION
CARIBBEAN SEA
VENEZUELA
COLOMBIA
ECUADOR
PERU
BOLIVIA
PARAGUAY
BRAZIL
CHILE
ARGENTINA
URUGUAY
SURINAM
FRENCH GUIANA
PACIFIC OCEAN
ATLANTIC OCEAN
FALKLAND ISLANDS
Figure 2


SOUTH AMERICA
NATURAL VEGETATION
CARIBBEAN SEA
VENEZUELA
COLOMBIA
ECUADOR
PERU
BRAZIL
BOLIVIA
PARAGUAY
CHILE
ARGENTINA
URUGUAY
SURINAM
FRENCH GUIANA
BRITISH GUIANA
PACIFIC OCEAN
ATLANTIC OCEAN
FALKLAND ISLANDS
Figure 3

international commerce became the focus for industrial activity. The coastal bias in South American development was thus reinforced.

This initial industrial phase of South American development was accompanied by a rise to effective political and social power of urban groups. Investment in infrastructure, housing, education, and health was disproportionately concentrated in the coastal cities. With certain notable exceptions -- for example, the building of Brasilia -- the development of the South American interior and, indeed, of agriculture in general, was relatively neglected over the past generation.

South America now stands at a stage where it is appropriate to look afresh at the potentialities of the frontiers for the following reasons:

-- The demand for food (flowing from the expansion of population, incomes, and urbanization) is increasing in the region as a whole faster than food production.

-- The import substitution boom in consumers goods for urban markets has clearly lost its power to carry forward industrialization in most of the South American countries. They must turn now to widening their domestic markets, diversifying their foreign markets, and building an efficient capital goods base for their industrial structures.

-- The impulse to economic integration is gathering strength under a mixture of economic, political, and psychological pressures; and the development of some of the potential new lands requires cooperation among South American countries as well as between them and the international financing community.

-- The growing industrial and technological competence of South America, combined with new technology and capital available from abroad, makes possible now the economic development of some regions hitherto denied by natural barriers, soil limitations, and endemic disease.

In the next phase, South American industrialization must move toward efficiency and maturity; markets must be widened and linked; the race between food production and demand must be won and, indeed, South America should become, again, a new food exporter; its unexploited natural resources must be put to work to provide chemical fertilizers, minerals, and fuel for its own development and to enlarge foreign exchange earnings.

There is, thus, an instinctive and proper feeling that the opening up of hitherto unused land and resources could and should play an important part in this process.

But what part -- and how big a part -- depends on answers to difficult and important economic questions.

The South American interior is not, by any means, a rich, open fertile region like the great plains of North America. Its development has been thus far impeded by real factors:

-- the high cost of access and of transporting its products to market;

-- the high cost of establishing settlements with community facilities and social infrastructure of the kind available in coastal regions;

-- considerable lack of knowledge and technical assistance necessary to bring the soils into efficient use;

-- in some cases, the continued prevalence of uncontrolled disease;

-- in some cases, laws, public policies, and international frictions which inhibit the opening up of new lands and resources.

In short, what must be established is whether investment in the opening up of new land will yield greater benefits with respect to agricultural production and productivity, new resources, and widened markets than investment to these ends in the more developed regions of South America. Moreover, the changes in law, policy and international agreements required for the economic exploitation of unused land and natural resources must be identified.

The answer to these questions must be established region by region and project by project against the background of expanding research and exploration; for, despite the powerful attraction to adventurous minds, of the South American interior, there is a great deal we do not know. Investment decisions must be based on the answers to these questions.

Nevertheless, it is possible to map roughly the potentialities and to suggest where and how to move forward on a rational basis.

Part Two: The Major Underdeveloped Regions and Resources of South America

A. Land

It is useful to set out the major potential unused regions of South America under the following seven headings, moving, more or less, counterclockwise south from the Panama Canal.

1. The Darien Gap
2. The wet tropical lowlands (other than flood plains)
3. The wet tropical flood plains
4. The East Andean Piedmont (upper tropical lowlands)
5. The Campo Cerrado
6. The Gran Chaco and Gran Pantanal
7. The River Plate Drainage System
8. The Sao Paulo-Buenos Aires axis
9. The Guayana complex

The Darien Gap. The missing link in the Pan American Highway system is the 250 mile Darien Gap. It is a tropical jungle region containing a good deal of arable land but cut by rivers and mountain ranges, notably near the Panama-Colombia border. The Darien Sub-committee of the Pan American Highway Congress, together with the U.S. Bureau of Public Roads and corresponding agencies of the Colombian and Panamanian governments, have done extensive surveying of the possible routes.

The case for making the link is the following:

-- It would open considerable areas in Panama for cattle raising and other agricultural uses, as well as creating access to extensive forest resources. It might make accessible some mineral resources.

-- It would help open up the Panamanian hinterland and draw some population away from densely populated areas.

-- It would provide a land link between Central America and the northern part of South America -- an objective with strong psychological and political overtones throughout the region -- and permit truck traffic between Central America and the industrial centers of Colombia.

These positive aspects of the completion of this link of the Pan American Highway must be weighed against the cost and be related to other "Frontier" development projects. It is also important that project planning for this area include adequate disease (e.g., malaria) control measures -- to be effected before construction personnel reach the field.

The wet, tropical lowlands (other than flood plains). The largest undeveloped region of South America consists of the wet tropical lowlands of the Amazon and Orinoco river basins in Brazil and adjacent regions, Venezuela, Colombia, Peru, and Bolivia. This region is characterized by dense forest and grassy savannahs, with heavy rainfall, high temperatures, and soils of extremely low fertility.

Because of their low fertility, these areas remain virtually unused; although cropping is possible on forested lands under shifting cultivation; while cattle grazing is practiced on the savannahs at low carrying capacity.

In the very long run, it is possible that sophisticated fertilizer application and suitable soil conservation practices might render these regions productive. Moreover, permanent tree crops, like rubber, are possible where drainage problems permit. But, for the foreseeable future, unless new minerals or other natural resources are discovered, systematic economic development of this vast region does not appear to be of high priority. Population maps of South America are likely to continue to exhibit a vast empty area for many decades, unless there is an economically desirable way of damming the rivers to convert the Amazon Basin into a vast lake.

Wet, tropical lowlands (flood plains). The Amazon River flood plains have an area of 25,000 square miles; and the flood plains of tributary streams may add another area of similar size. The Brazilian Ministry of Agriculture is conducting exploration and research to establish whether these regions are capable of economic exploitation. The replenishment of soil nutrients through flooding suggests that rice might be economically produced in these areas and water buffalo might be grazed on pastures resistant to periodic flooding. Although a few areas of higher level ground in the zone are being successfully cultivated, much further research is required to establish whether the agricultural output from this region would justify the expensive measures of water control required.

The East Andean Piedmont. This relatively promising region consists of an interrupted strip of valleys and rolling hills in a narrow belt running along the eastern foothills of the Andes from Venezuela, through Colombia, Ecuador, Peru, and Bolivia. It is more than 3,000 miles in length; 10-50 miles in width; and contains perhaps 3 million acres of arable land.

The following table roughly indicates the relative expansion in arable land involved for each of the four countries.

Arable Land and Potential Expansion in Andean Piedmont
(1,000 acres)

	Current	Andean Piedmont	Total
Colombia	12,100	750	12,850
Ecuador	2,800	150	2,950
Peru	3,300	1,200	4,500
Bolivia	7,700	900	8,600

Most of this land is forest or woodland, but there are some savannahs. On the whole, this area has adequate but moderate rainfall; better drainage and better soil fertility than the wet, tropical lowlands which adjoin it to the south and to the east.

This is the terrain which the Carretera Marginal de la Selva is designed to traverse. The needed access roads are being built; settlers are moving in; but the high cost of transporting its commercial products to market remain -- and will remain -- a problem to be solved in the future by a mixture of road

and air transport plus more efficient linking to the Amazon ports leading to the Atlantic.

The region is a good potential source of meat, dairy products, tropical foods, tobacco, tea, and other cash crops. A high premium will attach to processing in the region to reduce transport costs to markets.

The Campo Cerrado. A broad belt of rolling lands runs south of the Amazon Basin, from the Mato Grosso to the Sao Francisco River. This vast area is covered by scrub or low forest interspersed with savannahs and includes at least 400 million acres, a large part of which is topographically and climatically suited for cultivation. The low fertility of the soil will require, however, correction for nutrient deficiencies. Research (including that conducted systematically by the I.R.I. Research Institute) indicates that highly acceptable yields are possible for corn, beans, sorghum, soybeans, forage, and fiber crops, as well as cattle. At the present time, while the population is pushing into this area, it remains very lightly settled. Massive settlement, however, must be accompanied by a sophisticated use of technical knowledge, including fertilizer application. The existing (and expandable region from Sao Paulo to Porto Alegre is evidently capable of further fruitful development and should enjoy higher priority in Brazilian agricultural development in the years immediately ahead. Like the Andean piedmont, this is another major region for systematic future agricultural development in South America.

The Gran Chaco and Gran Pantanal. This area includes Central and Northwestern Paraguay, Northeastern Argentina, Eastern Bolivia and the drainage system of the Paraguay River in Brazil. The Chaco is divided from the Pantanal roughly by the Paraguay River. The main difference between the two areas is drainage. Much of the Pantanal is flooded from November to April, while the Chaco is well drained and has less rainfall. Both areas have a pronounced dry season between May and September. Due to its size (perhaps 400,000 square miles) the area is important for future development, but will be costly to develop. The Pantanal will require extensive drainage works, dikes and roads. The Chaco needs irrigation, in part, before it can be intensively used. Extensive use in grain farming and improved forage production is possible without irrigation.

River Plate Drainage System. This is a large area which is composed of the complex of the Paraguay, Parana and Uruguay Rivers and their tributaries. It extends south from the Mato Grosso province in Brazil through Central and Eastern Paraguay, the broader areas of Brazil and Uruguay along the Uruguay River and into Northeastern Argentina (provinces of Entre Rios, Corrientes). These waters flow into the Argentine delta area where the Uruguay and Paraguay Rivers converge to become the River Plate estuary. These rivers flow through the swamplands of the Pantanal. Not infrequently the rivers of this system reach a flood stage at which they inundate vast areas and cause grave economic damage. This occurred in the Spring of 1966 in Entre Rios in Argentina.

Parts of the river system are being studied to determine navigation potential, particularly the Paraguay River which runs through Asuncion to

the Delta. It could be a major transportation artery from the Brazil-Paraguay-Bolivia interior. The U.N. is financing a survey of southeastern Paraguay which will include the Paraguay and Parana Rivers.

Power surveys have been completed and hydroelectric facilities are being constructed on Brazilian rivers which feed this system. Development of these power sites in Brazil will have an important effect on the downstream waters in Paraguay and Argentina. The Salto Grande hydro-electric project at Concordia, Argentina which will supply power to Argentina and Uruguay is ready for financing.

There is a growing recognition that the power, navigation and water resources of the rivers should be studied systematically and with the view that the region forms an economic unit. Study of the river system in its totality will require cooperation and agreement among the five countries involved. The development of the river system could be the basis for a multi-national agreement and the establishment of a coordinating development agency.

The Rio-Sao Paulo-Buenos Aires Axis. Looking ahead to the economic integration of Latin America, the strengthening of transport links between Buenos Aires and the industrial triangle of Brazil (Sao Paulo, Rio, Minas Gerais) makes sense. It is not too far fetched to regard that region as constituting in the future of South America a potential metropolitan strip something like that between Chicago and New York in the United States. It contains the richest agricultural area of Brazil as well as Uruguay -- a country which could find its destiny as an agricultural, commercial, and industrial component of this larger complex.

One project which would probably be justified within the decade and which would dramatize and accelerate this linkage would be a bridge over the River Plate estuary (or over the Parana delta). The configuration of waterways around Buenos Aires makes awkward road communications between that center and the region to the north. Improved ferry service across the estuary is now contemplated; but a bridge link might have major direct and indirect effects on the development of the whole southeastern sector of the continent.

The Guayana. One of the more important developments going forward in South America is the creation in Venezuela of the industrial complex at Santo Tome de Guayana, located in the mineral rich area at the conjunction of the Caroni and Orinoco Rivers. Santo Tome de Guayana was a village of 4,000 in 1950; it is expected to reach a multiple of the 1966 population of 100,000 by 1975. It already includes, in addition to hydroelectric facilities, a steel mill. A joint venture with Reynolds Aluminum Company is expected for the construction of a bauxite reducing plant. Both U.S. Steel and Bethlehem Steel conduct iron operations under concession agreements. The emergence of this industrial center suggests the possibility of linkage with Guyana whose interior is being explored.

In broadbrush terms, then, the potential areas for further land development in South America consist of a set of possibilities for moving towards the interior in specific directions: south from the Panama Canal; east across the Andes into the long piedmont stripe west into Campo Cerrado.

In addition, the irrigation, flood control, navigation and hydroelectric potential of the River Plate valley system remain to be exploited; the great urban centers of the southeast to be better linked; and the Amazon flood plains and Guayana to be rationally developed. All these areas will require substantial expenditure of capital for transport; infrastructure; and, in some cases, for significantly increased chemical fertilizer application and water control works. They would still leave the great tropical lowland regions of the Amazon and Orinoco Rivers relatively untouched.

B. Chemical Fertilizers

Latin American chemical fertilizer production relates to the development of frontier regions in two respects. First, some of the presently known chemical fertilizer resources are located in interior or otherwise undeveloped regions. Their exploitation will involve transport and other infrastructure investment; and they should serve to generate centers for wider industrial and agricultural development. Second, some of the frontier lands will require for their effective exploitation the application of substantial chemical fertilizers; for example, the Campo Cerrado.

The expansion in Latin American agricultural production over recent decades has not kept up with the increasing regional demand for food. That expansion has been based mainly on the opening up of new acreage. Between 1934-48 and 1950, for example, there was only a 5% increase in grain yields in Latin America as a whole.

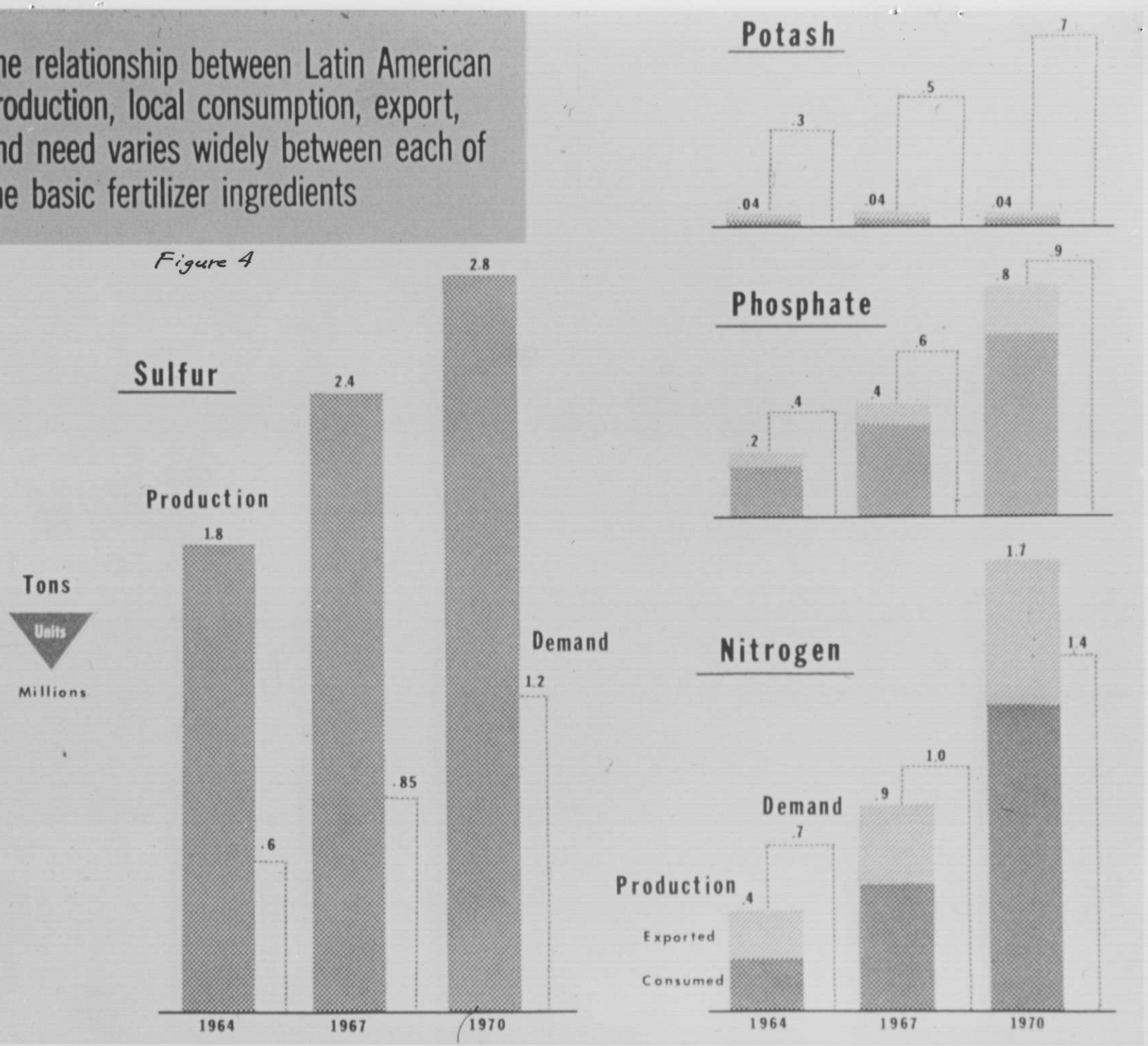
In the last few years attention to agricultural yields has been increasing in Latin America, as has been the consumption of chemical fertilizers. Nevertheless, it is clear that victory in the race between Latin American demand for food and population increase will have to be based on greater attention to agricultural yields in the generation ahead than in the past. As in Africa (but not in Asia) there is still unused arable land to be exploited in Latin America. But the mere opening up of land will not suffice.

Increased agricultural yields require increased application of fertilizers, pesticides, and improved seeds. It has recently been estimated, for example, that Latin American expenditures on such items, which were about $600 million in 1960, must rise to $2.7 billion per annum in 1980 if minimum food requirements are to be met in the region. It has been estimated that $1.7 billion (of the $2.7 billion annual expenditure in 1980) could be manufactured from Latin American resources. To generate this increase in Latin American production of agricultural imputs, an investment of perhaps $3 billion will be required. The substantial Latin American import requirements for 1980 stem from the fact it lacks known phosphate and potash resources in sufficient quantity to meet this expanded demand -- as is detailed in Figure 4.

Chemical fertilizer production is, of course, not enough to being about an increase in yields. It must be made available to farmers at reasonable prices in an environment that also includes fair and reliable prices for their products, relevant technical assistance, credit, and incentive goods. Nevertheless (along with pesticides and good seeds), chemical fertilizers are a critical factor. Major known undeveloped potentialities for fertilizer inputs are the gas fields of Venezuela, Bolivia (Sucre area), and Chile (Tierra del Fuego).

The relationship between Latin American production, local consumption, export, and need varies widely between each of the basic fertilizer ingredients

Figure 4



C. Minerals

The geological resources of South America have been incompletely explored. The principal unexplored area believed to contain major mineral resources is the Andes.

Considerable work in mapping and resource exploration is underway in South America, under auspices of national and international agencies and of private companies. It is desirable, in view of the scale of the problem and its time urgency that attention be given to adaptation of the most advanced forms of resources surveying and mapping -- using aerial photography and other remote sensor techniques.

Part Three: Some Projects Under Way or Under Examination

Against this background, it is useful to examine the extent to which these potentialities are now being developed or under serious examination. Work is going forward in South America on, broadly, rational lines; that is, it is precisely in the more promising regions that projects are being constructed, feasibility studies made, and research conducted. (See Figure 6.) An aspect of development potential is provided by Figure 5 which shows directions for possible future population settlement in frontier areas.

Specifically, the problems of closing the Darien Gap are being systematically surveyed.

-- A preliminary study for the Colombia Government of the Atrato-San Juan waterway is underway; and the UN is now awaiting a formal proposal from the Government of Colombia for financing a feasibility study of a multiple-purpose project.

-- Work and systematic consultation have been organized among the governments of Colombia, Ecuador, Bolivia with respect to the Carretera Marginal de la Selva.

-- Extensive research and colonization efforts (planned and unplanned) are going forward with respect to the exploitation of the Campo Cerrado region of Brazil and Paraguay;

-- and the Guayana region is an active account in terms of the creation of a new, vital industrial center in Venezuela as well as study and exploration in Guayana.


SOUTH AMERICA
CARIBBEAN SEA
VENEZUELA
GUYANA
SURINAM
FRENCH GUIANA
COLOMBIA
ECUADOR
PERU
BRAZIL
BOLIVIA
PARAGUAY
CHILE
ARGENTINA
URUGUAY
Montevideo
PACIFIC OCEAN
ATLANTIC OCEAN
FALKLAND ISLANDS
Probable Areas of Attraction
DENSELY POPULATED AREAS WITH LITTLE LAND REMAINING FOR SETTLEMENT
MODERATELY DENSE TO DENSELY POPULATED AREAS IN WHICH SOME LAND REMAINS FOR SETTLEMENT
SPARSE TO MODERATELY POPULATED AREAS IN WHICH NEW SETTLEMENT IS OCCURING
SPARSELY POPULATED AREAS WITH LITTLE POTENTIAL FOR SETTLEMENT
ROUTES INTO NEW AREAS

Figure 5

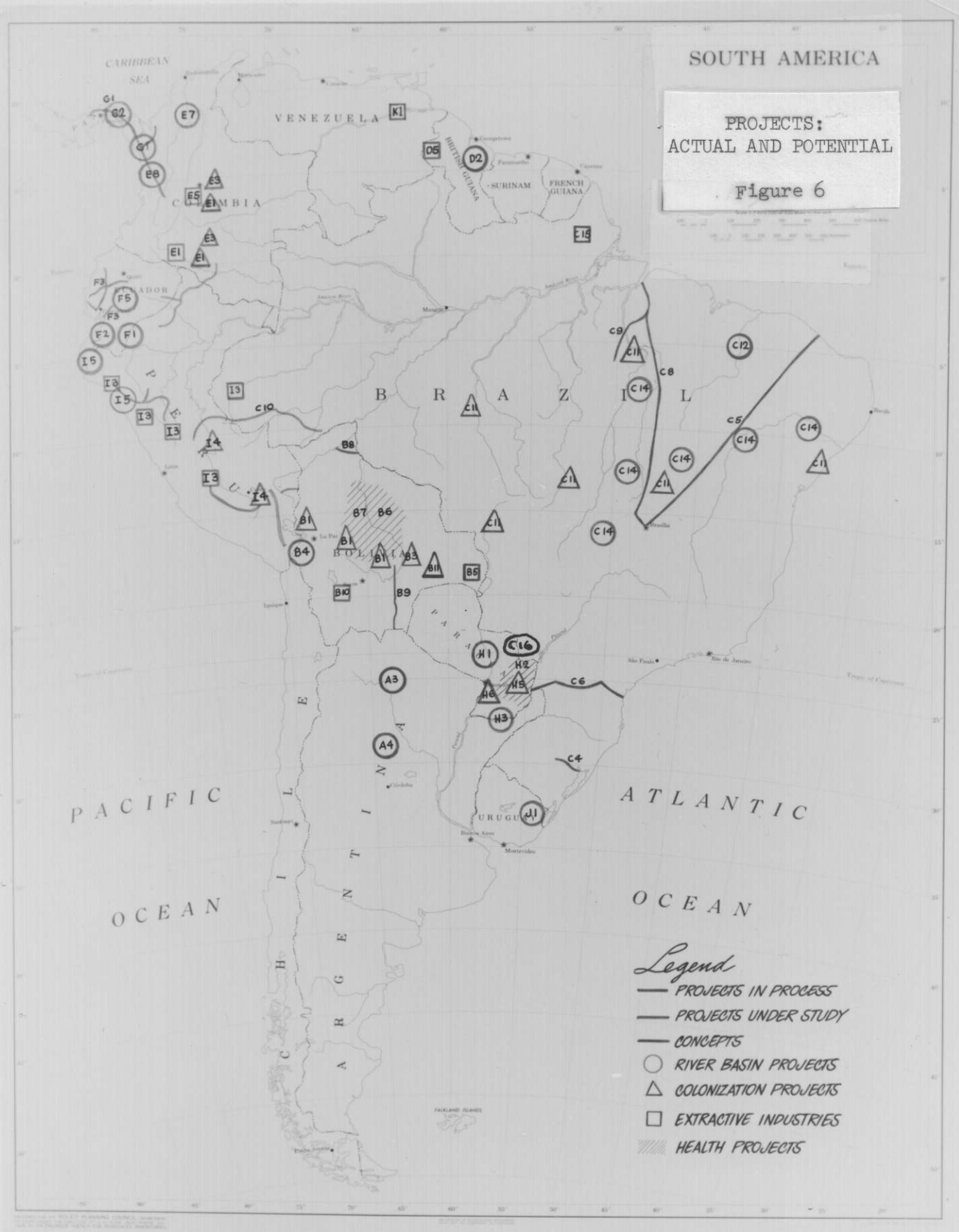
APPENDIX

Selected List of Projects: Actual and Potential

*See Figure 6.

*See Figure 6.

*See Figure 6.


SOUTH AMERICA
PROJECTS:
ACTUAL AND POTENTIAL
Figure 6
CARIBBEAN SEA
VENEZUELA
COLOMBIA
ECUADOR
PERU
BRAZIL
BOLIVIA
PARAGUAY
URUGUAY
SURINAM
FRENCH GUIANA
BRITISH GUIANA
PACIFIC OCEAN
ATLANTIC OCEAN
ARGENTINA
CHILE
Legend
PROJECTS IN PROCESS
PROJECTS UNDER STUDY
CONCEPTS
RIVER BASIN PROJECTS
COLONIZATION PROJECTS
EXTRACTIVE INDUSTRIES
HEALTH PROJECTS