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INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT
INTERNATIONAL DEVELOPMENT ASSOCIATION

ECONOMIC GROWTH OF BRAZIL:

PROBLEMS AND PROSPECTS

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HOUSING AND WATER SUPPLY

1. Housing
2. Water Supply

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CURRENCY EQUIVALENTS

Currency Unit	-	Cruzeiro (Symbol Cr.)
U.S. \$1	=	Cr. 2,700
U.S. \$1 million	=	Cr. 2.7 billion
Cr. 1 billion	=	U.S. \$370,370

PART ONE: HOUSING

HOUSING

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I. SUMMARY

1. Rapid population growth and heavy rural-urban migration since 1950 have created pressing needs for housing in urban areas. There is also a large housing deficit in rural areas because of the exceptionally low income levels of most families and a high degree of obsolescence.

2. The national housing deficit is now placed somewhere in the range of 4 to 7 million dwelling units, in comparison with a total housing stock of about 14 million. Nearly a fourth of the deficit is in the rural areas.

3. Brazil's housing agencies estimate that there is an annual need of 552,000 units to keep up with population growth, and another 192,000 units to replace units becoming obsolescent and to make a modest beginning on reduction of the housing deficit.

4. The housing picture has markedly worsened over the past 10-15 years, in large part because housing construction has gradually declined to a virtual halt in the middle and lower income markets. This severe slowdown in construction, in turn, is due to chronic inflation and stiff rent controls.

5. In 1964 the Government framed and vigorously undertook a large-scale housing program, with two fundamental aims: (1) to meet the more crucial needs for shelter in the low and middle-income groups, and (2) to restore private activity in housing to its former levels, or better. The basic elements of this program are:

- a) large-scale provision of mortgage credit on terms tailored to family income levels;
- b) promotion of adequate public and private financing channels;
- c) annual revaluation of outstanding mortgage debt and housing bonds, to compensate for inflation;
- d) elimination of rent controls;
- e) direct assistance to industries causing bottlenecks in the supply of building materials;
- f) basic and applied housing research;
- g) long-term, integrated planning for the housing sector.

6. Under the leadership of the National Housing Bank, launched in 1964, this program has made considerable progress: in two years almost all the necessary organizations have been set up and their procedures developed and tested; public sector capital expenditures for housing (largely financing of housing) rose from very low levels in 1965 to Cr. 157 billion in 1966; completed dwelling units (mostly low-cost) were 36,000 in 1965 and 42,000 in 1966.

7. According to the preliminary estimates prepared by the Planning Ministry, 3.7 million dwelling units should be built in 1967-71. Three-fourths of these are needed to match population growth while the rest are to replace obsolete housing and reduce the very large existing deficit by about 1-1/2 percent a year.

8. It is further estimated by the Planning Ministry and the National Housing Bank that 30 percent of this building program, representing an average of 200,000-250,000 dwelling units annually, needs financing help through public sector housing programs. This results in an investment target of about Cr. 3,000 billion (in 1966 cruzeiros) for the five-year period, or roughly Cr. 600 billion per year.

9. With regard to the absorptive capacity of the Government's housing program, it is unlikely that the 1967 target in public housing will be met: so far, the program is lagging behind. For the remaining four years, there is no solid basis at the present time to judge the feasibility of programmed investments. The organization of the housing agencies is good, but there are serious limiting factors - a shortage of housing technicians and administrators, especially at the middle level of responsibility. On the other hand, there is severe competition for financial resources within the public sector.

10. The Mission understands the urgent need to accelerate housing construction and to increase the role of the public sector in housing, but the general budgetary situation and shortage of investment capital in other sectors suggest that the programmed public investment in housing be scaled down to about one-half of the original target. This would still imply a substantial public investment activity in this sector: some Cr. 1,500 billion for the 1967-1971 period, or an annual rate of Cr. 250-350 billion.

II. BACKGROUND

Recent Developments in Housing

11. Since the end of World War II, Brazil has experienced rapid growth in its urban areas, caused by the net rise in population and the widespread migration from country to city. From 1950 to 1960 the urban population grew 73 percent, and the larger cities are now increasing by 5-7 percent each year. Disrupted by the effects of long-term inflation, especially in respect of the disappearance of credit for housing, and discouraged by rent controls, private builders have concentrated on homes for higher income families and on commercial construction, for the most part ignoring the housing needs of the middle-class market. At the same time, government and semi-public housing programs for assisting low-income groups have, until 1966, been on too small a scale to make an impression on the problem. The resulting shelter deficit, measured by applying reasonable minimum standards to the existing housing stock, is immense: the U.N. recently found that some 8 million dwelling units are substandard. This is roughly half the total housing in Brazil.

12. Currently, the National Housing Bank, using somewhat more flexible criteria than the U.N., states that the deficit is around 4.6 million dwelling units. Even so, this is a third of the housing stock. The Ministry of Planning estimates that over the next 10 years an average of 552,000 new dwelling units are needed annually to house new families in the expanding population. Additionally, for the same period, the Ministry calculates that 192,000 new units are needed each year to reduce the housing deficit and replace that part of the housing stock which becomes obsolescent.

13. Three distinct elements in the housing crisis should be distinguished: the widespread squatter settlements (favelas) in urban areas; the severe housing shortage of middle-income families; and the serious gaps and shortcomings in rural housing.

14. New arrivals to the cities, together with the lowest income families and the unemployed, have clustered in dense settlements, almost entirely built by the families themselves. These favelas take in some 10-15 percent of the people in the larger urban centers. In Rio de Janeiro, for example, there are more than 200 such settlements with a combined population of some 600,000. In many cases they have sprung up on vacant land, private or state, close to or even within the urban center, since mass transportation to low-cost land further out is inadequate and too time-consuming. The housing problem for this group is particularly severe; average family income is so low that effective demand is under the level at which the private sector can supply dwelling units, even extremely low-cost ones. Until incomes can be significantly raised, adequate housing for this group can be provided only through public action facilitating acquisition of land, long-term credit with subsidized interest rates, and self-help housing programs.

15. For the middle-income groups, the problem is primarily the lack of long-term credit designed to fit the family's ability to pay. Given such credit, these groups can enter the housing market, which will respond with appropriately-priced dwelling units.

16. In the case of the rural population, which is about 43 percent of the national total, housing conditions for most families are worse and incomes are lower and more irregular than for urban families.

17. Housing solutions, too, are more difficult in a rural setting because the population is more dispersed and has fewer and usually less efficient institutional resources to serve it, especially (up to the present time) in the field of housing. In particular, programs aimed at promoting home ownership, as are most of the urban ones, may be inappropriate in rural situations where few low-income families own land, or where there are substantial seasonal movements by agricultural workers. Thus, a supplementary program to promote the acquisition of family housing sites may be needed to meet the first problem, and another to assist in the creation of an adequate stock of landlord-sponsored rental housing to meet the second.

18. As a matter of fact, the shortage of rental housing is even more extreme in the cities, due in part to the insignificant annual additions to the stock of housing, but specifically compounded by the rent controls in effect during the 1950's and the early 1960's, which turned capital away from this type of investment.

19. Thus, until the introduction of a new national policy in the fall of 1964, the housing situation continued to deteriorate. In the face of enormous needs, housing production was relatively negligible, for reasons already given. Even the government programs of the 1950's for low-cost housing quickly lost their capital through inflation, and were ended by 1961-62.

20. In 1964, the new government, recognizing the gravity of the housing crisis in both economic and social terms, moved swiftly to establish the organizational and financial bases which could enable the public sector to take effective direct action to increase housing supply and effective demand, and at the same time to stimulate the private sector once again to consider housing as an attractive investment field. From August 1964 to July 1965, several laws were enacted for the promotion, financing and construction of housing and these have been followed up by a number of decrees and enabling resolutions. These measures not only aimed at making housing activity financially attractive to builders and investors, but also created a large new source of housing funds to satisfy at least part of the enormous pent-up need for long-term credit. To improve policy-making and the administration of housing programs, these laws established a National Housing Bank, with broad responsibilities and powers, and authorized the creation of several types of organizations and procedures for promoting and financing housing construction. Thus, after nearly 20 years of disruption, demoralization and sharply decreased

activity, the necessary foundation for getting the housing sector off dead-center was created. Its effects are already noticeable on a considerable scale and on a number of fronts (see Chapter IV), and there seems to be general agreement in the private housing sector and among housing specialists that the various programs now underway have started a significant trend in the right direction, though much remains to be done.

Significance of the Housing Sector

21. No country has yet eliminated all its housing problems even though it may have a high level of per capita income. As would be expected, housing is a more formidable problem in countries which are grappling with fundamental development issues. In these cases its improvement depends more on the progress made toward broad development goals than on specific measures in the housing field itself. Higher average income, better income distribution, and greater efficiency in the industrial, transport and financial sectors have strong positive effects for housing. In contrast, efforts to stimulate housing by actions such as lowering interest rates on mortgage loans, for example, cannot be expected to accomplish much if basic development progress is not being achieved. With respect to the total economy, the scale and impact of housing activity can be so significant that programs for the housing sector should be closely integrated with a nation's general economic and social planning. Finally, the pressing social urgency of housing is often a persuasive argument for giving it high priority in the public investment program.

22. Housing presents two aspects which have substantial importance for Brazil's social and economic situation. First, there is the fact that an enormous housing deficit exists: over one-third of the existing housing stock is seriously sub-standard, while at the same time perhaps only a fifth of the annual requirements for new housing units are being met. Second, the policies and programs put in motion by the government over the past two years, to attack the serious problems in the housing field, have already achieved much and promise to shape a combined public-private housing effort into one of the largest and most significant sector activities in the economy. This will contribute heavily to income generation and expansion of employment, and may be a key element in anti-recession strategies made necessary by the control of inflation. Thus in any analysis of the economy as a whole, and of public investment in particular, housing merits intensive consideration.

III. HOUSING NEEDS

23. For the 5-year period 1967-71, projections by the Office of Applied Economics (EPEA) in the Ministry of Planning, indicate that 3.72 million dwelling units will be needed: 2.76 million in urban areas and 0.96 million in rural areas. About 75 percent of this new housing is necessary to keep up with population growth and family formation, while the rest is to replace units becoming obsolescent during the period and to reduce the existing enormous housing deficit by some 1.5-2.0 percent a year ^{1/} (see Table 1). If these objectives were met Brazil would be adding 8.3 units per thousand population per year, slightly below the average of 10 per thousand suggested for Latin America by the 1962 housing seminar sponsored by the U.N.

24. After reviewing private sector resources and family income distribution data, which exist only in tentative form, the Planning Ministry and the National Housing Bank have concluded that it would be desirable if 30 percent of the housing needs during 1967-71 could be financed by the public sector through various types of housing programs. On the basis of average cost per dwelling unit (as estimated for each income group according to the minimum standards necessary and the family's ability to pay) public financing of 30 percent of the programmed housing needs would require Cr. 3,074 billion for the five-year period. Actually, the resources estimated as available for publicly-administered housing programs in this period total just under Cr. 3,000 billion. The public portion of the program and its proposed financing are discussed in Chapter V below.

Obstacles to Meeting Needs

25. When viewed against the background of the accumulated housing deficit and the surging growth in the formation of new families, the housing requirements calculated by Brazil's own planning and housing experts appear to be reasonable. Yet the fulfillment of those requirements implies profound improvement in the basic factors which have seriously checked housing construction in recent years: rapid inflation, absence of long-term credit, too slow an increase in real incomes, and an insufficient government effort to stimulate housing. Apart from whatever positive impact the new government housing policies and programs can achieve, if the other basic factors do not become significantly more favorable, at a rapid rate, the private sector will not be able to meet the level foreseen by the government agencies. A major aim of the government's housing program, as discussed in the next chapter, is precisely to encourage the private sector to return to its former level of activity in housing, or possibly surpass it, but the effectiveness of the measures proposed to bring this about is not clear at this early stage. If, despite improved savings and lending institutions and annual revaluation of real estate loans, private savings are not sufficiently attracted to housing as an investment and if real incomes and income distribution are not significantly improved, there would be no reason to expect much change in private sector housing activity. A major portion of the housing needs would then remain unfulfilled, and the country's housing position as a whole would worsen, primarily for the low income groups.

^{1/} The present deficit has been officially estimated at about 4.6 million units (see Annex I).

IV. THE NATIONAL HOUSING PROGRAM

Basic Policies and Organization

26. The fundamental aim of Brazil's housing policy, as expressed in the legislation enacted in late 1964, is to stimulate the supply of housing, particularly through assisting:

- (1) the production of building materials;
- (2) the actual construction of housing;
- (3) the marketing of the housing produced.

27. Planning for housing is now done jointly by the Planning Ministry and the National Housing Bank, and the broad outlines of a 10-year program have just been completed. The program is to be revised annually, and the financing plan prepared by the Housing Bank and the Bank of Brazil.

28. Diagnosing the chief barriers as financial, the comprehensive housing program seeks to have the public sector take the initiative in providing financial means and incentives which will not only directly lead to new construction, but will also encourage the private sector eventually to make the major investment in housing and supporting activities. Thus, the basic housing law (Law 4380 of August 1964) establishes a system of monetary correction for housing loans, authorizes a number of long-term housing credit programs, permits the sale of housing bonds, creates a National Housing Bank and associated savings and credit institutions, and provides for research and technical assistance in the housing field. The main thrust of these new housing policies is directed at providing housing for the lower income groups, defined as those families earning less than twice the minimum monthly wage.

29. The National Housing Bank (BNH), launched in late 1964, is the principal instrument for carrying out the national housing plan, but a number of associated promotional and financial bodies have also been created to act as agents for BNH in particular programs serving different income levels, as summarized in Table 2.

30. Since BNH is authorized to lend only for home ownership, the very substantial shortage of rental housing must be overcome through the private sector. This is now beginning to occur, in view of Law 4494 (November 1964), which exempts new construction from the rent controls set up in 1950, and provides that higher rents may be asked for existing rental housing in proportion to increases in the official minimum wage, with rent controls being gradually removed over a 10-year period.

31. The national program's emphasis on home ownership severely limits what can be done to improve rural housing, since few families with urgent housing needs own any land. As a result, 99 percent of BNH's current activities are for housing in urban areas. This problem is being studied by BNH and the housing research agencies, and more effective programs for the rural areas can be anticipated.

32. In addition to bringing about a major step-up in the creation of new housing and inducing the private sector to be at least as active in housing construction and investment as in the past, the national housing program is seen as an important element in the economy as a whole. It is officially estimated that the housing targets now established will create 250,000 new jobs in the construction industry during the next 2-3 years, not including associated employment in the building materials industries. Furthermore, the planned increases in housing investment would generate substantial multiplier effects.

Housing Programs

33. Initiated by the laws enacted in late 1964, Brazil's national housing program required most of 1965 and some of 1966 as a time for planning and organization, and for making policy adjustments before committing resources heavily in a number of bold, new operations. Thus, while only Cr. 18 billion was spent in 1965, the figure jumped to Cr. 157 billion in 1966 and is projected at Cr. 707 billion for 1967 (figures in current cruzeiros). Dwelling unit completions totalled some 36,000 in 1965, and 42,000 in 1966 while completions for 1967 are expected to reach 122,000. Most of these completions were or will be financed through the BNH programs, and primarily consist of low-cost units, as required by the basic housing law (Law 4380).^{1/} It should be pointed out that the role of BNH and associated housing agencies is entirely promotional and financial - all construction is performed by private builders, usually under contract. ^{2/}

34. Most of the government's housing operations now take effect through ten different programs:

1. Building materials industries. BNH is authorized to make loans to building materials industries wherever critical shortages exist, or may soon develop. For 1967-71, Cr. 30-50 billion per year is planned for this purpose. In general, it has been calculated that these industries can meet the total materials demand resulting from the large-scale housing programs now planned, but it is foreseen that there will be some bottlenecks (cement, for example), which will require special attention. BNH foresees a drop of 25-30 percent in unit housing costs by 1976, as a consequence of the improved efficiency which will come about in the materials industries through this aid.

^{1/} Seventy percent of public resources must be directed into housing costing less than 60 times the prevailing minimum monthly wage; no public financing is authorized for housing costing more than 300 times the minimum wage.

^{2/} No data exist for completions by the private sector itself, but in recent years residential building volume has fallen drastically and has been almost wholly for higher-priced units.

2. Prefabricated housing. Particular encouragement is being given to research and development of appropriate low-cost, prefabricated dwelling units, which are seen as a possible way to break through the problem of the enormous accumulated deficit. While this program (Casa Pacote) is especially directed to low-cost housing, attention is also being given to medium-cost units.
3. Completion of stalled construction. Thousands of apartment projects and single family homes have been stopped in recent years because construction funds have run out or sufficient construction loans have not been available. In Rio alone, an estimated 8,000 units are paralyzed. The Impacto program is attempting to remedy this through making direct loans to builders, of up to 25 percent of the total cost, in those projects where 50 percent or more of the total investment has already been committed. In 1966, over 9700 dwelling units were assisted in this way, and for 1967 the target figure is 23,000. About 5 percent of BNH's total resources have gone into this program over the past 27 months.
4. Private savings for housing. Through several channels, efforts are being made to strengthen or create financial agencies which will attract substantial private savings to be used for housing credit:
 - (a) The Public Housing Banks (Caixas Economicas) make loans for middle-income housing, and also engage in personal and chattel mortgage lending. There are 22 such federal banks (one for each State), with 450 affiliates, responsible to the Ministry of Finance. There are also 3 state banks, with some 1000 affiliates, responsible to the respective Secretaries of Finance in Minas Gerais, Sao Paulo and Rio Grande do Sul. Law 4380 made these banks financial agents of BNH, to serve income groups III and IV under housing policies established by BNH. They receive no government budget funds, operating entirely on money received from depositors or administering loan funds channeled to them by BNH. During 1965 and 1966, their commitments averaged nearly Cr. 40 billion annually. Their resources for the 1967-71 period are estimated at some Cr. 60 billion per year.
 - (b) The Housing Credit Societies (Sociedades de Credito Imobiliario) are a new institution authorized by Law 4380, which limits the number of such agencies to 28. To date, 26 have applied for a charter from the Central Bank, which has already granted 15. These credit agencies will obtain funds by selling housing bonds (Letras Imobiliarias) which are regularly adjusted for inflation and carry a 2 percent rate of return guaranteed by the Central Bank. By the end of 1967 it is expected that these SCI's will be selling Cr. 10 billion per month, the proceeds of which will be loaned to the construction industry.

- (c) The Savings and Loan Associations (Associacoes de Poupanca e Emprestimo) are also authorized by Law 4380, but actual operations await the issuance of regulations by the National Monetary Council. The total number will probably be limited to 50, and resources will come from deposits rather than the sale of housing bonds. Financing groups throughout the country have made application to the Central Bank and to BNH to establish APE's in their respective areas.
5. Housing for lowest-income groups. BNH's largest single effort has been directed to the COHAB program, designed to promote and finance low-cost housing for the lowest income families, acting through housing companies (Companhias de Habitacao) in which state, municipal, and even regional, government plays a major role. Some 29 of these companies are already functioning in 15 states, while 16 more await state legislative approval. To be approved for loans, dwelling units cannot cost more than 75 times the minimum monthly wage. Their full cost is financed by BNH, for 12-25 years and at subsidized interest rates of 4-6 percent, substantially below the market level of 10-12 percent. However, the states contribute an average of 20 percent of the total investment - most of their share being in the form of donated land and improvements. Administration of the financing for each homeowner, including collection of monthly payments, is done by the COHAB's themselves. Roughly 30 percent of BNH's resources have been allocated to this program thus far, resulting in some 23,000 completions for the two years 1965-1966. For 1967, 88,500 completions are programmed.
6. Housing for union members. By the establishment of housing cooperatives (Cooperativas Habitacionais) in union memberships, BNH seeks to encourage and to help finance low-cost and moderate-cost housing for families whose incomes are somewhat higher than those qualifying for COHAB assistance. Unit cost may not exceed 100 times the minimum wage. Lending terms are more favorable than in the open market, with loan periods of 8-20 years and interest rates from 6-8 percent. The aim is to have 100 such cooperatives (COOPHABs) throughout the country, each with an average of 1,000 members; 28 now exist in 6 states and the total is rapidly increasing. Thus far, BNH has directed about 20 percent of its resources to this program, which has resulted in about 9,000 completions in 1965-66. For 1967, 15,000 completions are programmed for the existing COOPHABs. A target of 100,000 dwelling units over the next 4 years has also been established.
7. Housing for company employees. Here the objective is to supplement company financing of employee homeownership, up to 50 percent of the cost, thus permitting a significant expansion in company programs for employee housing. This activity is absorbing about 6 percent of BNH resources, with 1,900 units completed in 1966 and 6,250 programmed for 1967.

8. Housing for public employees. BNH is authorized to work with organizations representing public and military personnel, to provide appropriate financing as a supplement to their own resources. This is a relatively minor program outside the mainstream of the major housing problem.
9. Mortgage discounting operations. Assistance for low-cost housing has been the mainstay of BNH's activities since beginning operations over two years ago, as required by law, and housing officials believe this will continue to be the case for some time to come, due to strong social and political factors. Nevertheless, BNH is mounting a large mortgage discounting program aimed at builders of both low and medium-cost housing. This operation was launched just at the end of 1966, and will grow as BNH resources become significantly enlarged through the start-up of the Fondo de Garantia do Tempo e Servico collections (administered by BNH and largely available to it for housing programs - cf. Chapter V). BNH will buy mortgages from builders and savings institutions, probably at an initial discount of 10-50 percent, with an average of 20 percent. Preliminary reactions are favorable: some 40 applications a day are coming in for mortgage credit, which BNH estimates as indicating a mortgage market for about 100,000 new units within the next 12 months. The size of this operation will depend on available BNH resources beyond those required for the on-going programs already outlined above, but Cr. 100 billion have been assigned to the program for 1967, enough for some 15,000 mortgage purchases.

As its mortgage operations gather momentum, BNH plans to expand its mortgage guarantee program, which has already been tested on several projects. This would result in lending institutions holding a higher proportion of outstanding mortgages, rather than selling them to BNH, and the program is aimed at giving significant encouragement to the channeling of more private savings into housing investments.

Beginning in 1968, BNH also plans to start selling mortgage bonds (Cedulas Hipotecarias) in both the domestic and foreign markets. These bonds will, of course, carry BNH's guarantee.

10. Technical assistance. The principal housing research organization is the Centro Nacional de Pesquisas Habitacionais (CENPHA), established in late 1966, which functions jointly with the Catholic Pontifical University in Rio de Janeiro. CENPHA also undertakes to train the technicians needed for future housing operations. Research and development in the urban and regional planning field, and in architecture, is done through the Servicio Federal de Habitacao e Urbanismo (SERFHAU), which is financed by BNH and works closely with it. Considerable assistance is provided the building materials

industries through coordinating centers in several of the larger states, Centros de Coordenacao Industrial para o Plano Habitacional (CIPHAB), which try to match construction needs and available supplies in those areas. Substantial technical aid is available to the COOPHABS through private institutes, encouraged by BNH, known as INOCOOP's (Institutos de Orientacao as Cooperativas). These not only help the cooperatives establish a housing program, but assist in specific project planning and preparation, and in obtaining BNH financing.

V. HOUSING INVESTMENT: 1967-71

Proposed Investment Program

35. The housing section of the provisional Ten-Year Plan, prepared by the Planning Ministry's Office of Applied Economics (EPEA) in consultation with BNH, proposes a marked acceleration in housing investment for the period 1967-71, starting out at 3.5 percent of GNP in 1967 and ending up at 4.2 percent by 1976. The average for the 5-year period beginning in 1967 is 3.7 percent of GDP. ^{1/} This is about 60 percent higher than the level of total housing investment since 1960, estimated at about 2-2.5 percent of GDP.

36. The proposed public sector investment of Cr. 3,074 billion would account for about 30 percent of the total housing estimated to be required during 1967-71, both in numbers of units and in financial terms (see Table 3). It would include all the government investment necessary to carry forward the various types of housing programs described in Chapter IV.

37. The investment program proposed by BNH itself is slightly smaller than the EPEA one: Cr. 2,952 billion, rather than Cr. 3,074 billion. Table 4 presents the yearly totals and the number of units programmed. The BNH estimate for the number of units is substantially larger (1,398,000 vs. 1,094,000) because a lower average value per dwelling unit was used. In financial terms, however, it can be said that both EPEA and BNH are proposing the expenditure of some Cr. 3,000 billion for the 1967-71 period, to finance a considerable expansion of the present program structure.

38. In the opinion of the Mission, the programs now being supervised and aided by BNH are well conceived and -- on an expanded basis -- may indeed be the best approach to fulfillment of the government's two fundamental objectives: creation of the maximum number of dwelling units possible during the period (especially for the lowest income groups), and the strongest possible stimulation to the private sector to engage in more and more housing construction and investment. Among Brazil's housing experts and industry leaders there appears to be substantial agreement on this, both as to program aims and methods. This is not to say that adjustments, possibly even some fundamental changes, may not be indicated year by year as experience and changing circumstances interact to suggest ways of improving the program. But it does seem to the Mission that a good start has been made in analyzing the nation's housing problems and that constructive and practicable ways of attacking these problems have been

^{1/} These percentages are based on gross investment, including cost of land and basic improvements.

adopted. The fundamental question concerns the rates at which public resources should and can be assigned to the housing sector, in view of pressing investment needs in other sectors and the resources potentially available.

39. In most developing countries, when housing is considered along with other sectors, it is usually given relatively low priority in respect of public investment. This has been the typical situation in Latin America, which cannot be better described than by the following comment:

"Despite the pressing housing needs of large masses of population in Latin America, there is still considerable divergence of opinion concerning the role of housing in social and economic development, and this type of investment is often accorded secondary importance. Directly productive undertakings and infrastructure, especially where a relatively quick and high return is expected, usually take precedence over long-term housing investments, which are considered to yield lower and less tangible economic benefits, despite their effects on the rate of savings, employment and industrial production. Housing, and particularly housing for low-income groups, has not kept pace with Latin American economic development, and the quantitative and qualitative aspects of the problem have become progressively more acute in most countries of the region." ^{1/}

40. As a result of this generally accepted way of looking at housing needs in comparison with the needs of other sectors, public investment in housing has lagged, relatively, and housing conditions have worsened. In countries where national housing programs have been adopted in recent years (viz., Chile, Colombia, Costa Rica), the situation is somewhat better, and Brazil seems determined to take this path also.

41. Unfortunately, not enough is yet known about the long-term return on housing investment, not only in terms of the macroeconomic effects on employment and industrial activity, but also in terms of increases in productivity per man-hour, due to the significantly higher levels of health and morale resulting from improved environmental conditions. Two pilot studies recently made in Latin America by teams from the University of California indicate that better housing is primarily responsible for unusually large gains in worker productivity: as much as 30 percent. If more extensive research can corroborate this tentative finding, calculations of long-term benefits from housing investment would probably lead to housing being given much higher priority, relative to other sectors, than it now receives.

^{1/} Socio-Economic Progress in Latin America (Social Progress Trust Fund, Sixth Annual Report, 1966) Inter-American Development Bank, February 1967, p. 9.

42. In any case, it seems undeniable that Brazil's housing sector should show annual investment levels very much higher than the inadequate ones for 1966 and earlier years. The Mission is of the opinion that the investment program summarized in Table 4 is reasonable when viewed in the context of Brazil's pressing needs for housing. The two questions that present themselves in connection with such a large investment increase are the sector's "absorptive capacity" (primarily the capability of the government housing agencies to mount programs on the scale programmed) and the availability of financing.

43. While there is considerable evidence that the various programs are being pushed by BNH and its associated agencies at a rapidly accelerating pace, it is unlikely that the 1967 investment target (Cr. 505 billion in 1966 prices) will be achieved. ^{1/} For the remaining four years, there is no solid basis at the present time to judge the feasibility of programmed investments. The organization of the government housing agencies is good, there is competency of agency leadership and staffing, and there is also effective functioning of the private construction industry and both public and private financing channels. There are serious limiting factors, however: a shortage of housing technicians and administrators, especially at the middle levels of responsibility, although this problem is recognized and strong efforts are being made to train people for these key positions. Another major limiting factor is, of course, the financial resources available for housing investment by the public sector.

Resources for Housing

44. To finance the program summarized in Tables 3 and 4, which is of the order of Cr. 3,000 billion according to both the EPEA and BNH projections, EPEA has estimated that resources will become available as shown in Table 5.

45. The revenue items which are applicable to financing the actively promoted government housing programs are those for BNH (Cr. 2,551 billion) and the external loans (Cr. 104 billion), totalling Cr. 2,655 billion. The remaining items are for government employee housing or privately-sponsored housing financed through the Caixas Economicas.

46. BNH's own estimate of resources for government-promoted housing programs is Cr. 2,953 billion, about 11 percent higher than the EPEA figure, as follows:

^{1/} BNH reports that investment expenditures totalled Cr. 40 billion in the first quarter of 1967 (equivalent to only Cr. 160 billion annual rate) but that the spending rate is scheduled to rise very sharply thereafter.

Resources (BNH Estimate)

<u>Source</u>	<u>Billions of 1966 Cruzeiros</u>
FGTS	2,427
Sales of housing bonds, earnings on BNH investments, service charges and miscellaneous	417
External loans	<u>109</u>
TOTAL	2,953

47. The larger forecast by BNH is mostly attributable to the higher estimate of resources available from the collections for the severance pay fund, the Fundo de Garantia do Tempo de Servico (FGTS). BNH estimates Cr. 2,427 billion as compared with the EPEA figure of Cr. 1,983 billion.

48. In late 1966, a new severance pay system was established as an alternative to the one formerly handled by the employers themselves. It was decided that the amounts accumulated for this fund, with due provision for the protection of employee interests, should be used for public investments, chiefly the financing of housing. There is as yet no basis in experience for judging very precisely the amounts that would be available to BNH each year. As matters now stand, BNH is authorized to administer collection of the 8 percent payroll charge 1/ (paid by the employer), which is applicable to very nearly the same seven million workers now covered by social security. After setting aside a contingency fund (presently fixed at 20 percent of collections), BNH assumes that it will use up to 75 percent of the remainder for financing its housing programs and that the other 25 percent would be made available for investment in other sectors, or in treasury bonds. The 75-25 allocation is a somewhat arbitrary one. In fact, the Mission has assumed that the entire 80 percent is available for investment. 2/

49. Since most of the resources are estimated to come from the FGTS collections, the capability of financing the planned program fundamentally depends on whether the actual amounts available to BNH will come up to the estimates. FGTS collections, which only began in February of 1967, should reasonably hit a level of Cr. 70-80 billion a month by the end of the year. Thereafter, it is assumed that they will rise by the same proportion as

1/ Which is collected by BNH whether or not the employee opts for the new system. If he stays with the old system, his employer is responsible for the accounting on his severance pay, but the contributions still become part of the FGTS.

2/ The BNH must pay 5 percent interest on all FGTS funds, whether or not they are invested.

the increase in wage rates and employment. 1/ This implies total collection of some Cr. 4 trillion through 1971, of which Cr. 2,500 billion are expected to be used by BNH for financing of housing programs. However, the amount channelled to housing could be quite larger, reaching Cr. 3.2 trillion, if the BNH concentrates there all the funds it has at its disposal for investment.

50. Requirements for current expenditures are running at some 4-5 percent of budgeted 1967 revenues for BNH and its associated agencies, which means that almost all the revenues can be assigned to capital (i.e., financing) outlays.

51. The conclusion to be drawn is that it seems probable that the programmed housing investments could be financed by the existing revenue provisions. However, even if resources were sufficient to meet the requirements of the proposed program for 1967-71, the overall budget situation is such that -- in the Mission's view -- a very substantial cutback in housing investment is essential if other sectors are to receive an appropriate share of total resources available to the public sector, while at the same time disruptive budget deficits are to be avoided. 2/

Recommended Level of Investment

52. As discussed in the Main Report, the general shortage of resources for public investment programs during 1967-71 leads the Mission to recommend the following amounts for housing for the 5-year period:

<u>Year</u>	<u>Investment Level</u> (In billions of 1966 cruzeiros)
1967	237
1968	247
1969	287
1970	316
1971	<u>348</u>
Total	1,435

53. The figure for 1967 represents an increase of 50 percent over the Cr. 158 billion level attained in 1966, while for succeeding years investment in housing would rise by 10 percent per year. Admittedly, the

1/ The Mission assumes a 3 percent annual increase in employment in 1968-1971 and a 17 percent increase in wage rates in 1968, 5 percent in 1969, and 2 percent thereafter.

2/ The problem of assigning appropriate investment amounts to the various sectors is discussed in the Main Report.

5-year total of Cr. 1,435 billion falls short of the program proposed. Yet it may in fact turn out to be fairly realistic: it would still represent a very high level of government activity in this sector.

STATISTICAL APPENDIX TO HOUSING

Table

- 1 Estimated Housing Needs, By Income Group and Urban-Rural: 1967-71
- 2 Organization of Financing Under the National Housing Plan
- 3 Housing Program for 1967-71 (EPEA Estimates)
- 4 Housing Program for 1967-71 (BNH Estimates)
- 5 Forecasted Resources for Housing: 1967-71 (EPEA Estimate)

Table 1: ESTIMATED HOUSING NEEDS, BY INCOME GROUP AND URBAN RURAL: 1967-71

(Thousands of dwelling units)

Income Group, in 000 of 1966 Cr./mo. <u>1/</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>Total</u>
I. Up to 84	195.20	202.34	209.60	217.08	224.74	1,048.96
urban	84.44	87.30	90.28	93.37	96.59	451.98
rural	110.76	115.04	119.32	123.71	128.15	596.98
II. From 84 to 252	321.57	331.74	342.04	352.76	363.86	1,711.97
urban	265.84	274.07	282.38	291.02	300.09	1,413.40
rural	55.73	57.67	59.66	61.74	63.77	298.57
III. From 252 to 672	138.30	142.53	146.73	151.24	155.70	734.50
urban	127.96	131.85	135.68	139.82	143.91	679.22
rural	10.34	10.68	11.05	11.42	11.79	55.28
IV. 672 and over	42.33	34.59	44.83	46.22	47.50	224.47
urban	40.76	41.98	43.16	44.49	45.71	216.10
rural	1.57	1.61	1.67	1.73	1.79	8.37
TOTAL	697.40	720.20	743.20	767.30	791.80	3,719.90
urban	519.00	535.20	551.50	568.70	586.30	2,760.70
rural	178.40	185.00	191.70	198.60	205.50	959.20

1/ The four income groups are defined in terms of multiples of the official minimum wage (MW), as follows:

- I - up to 1 MW
- II - 1 to 3 MW
- III - 3 to 8 MW
- IV - 8 MW and over.

The current minimum wage (March 1967) has been set at Cr. 105,000 per month.

Source: Ten-year Plan, Housing, Tables 19-21.

Table 2: ORGANIZATION OF FINANCING UNDER THE NATIONAL HOUSING PLAN

<u>Family Income Level (in multiples of minimum wage *)</u>	<u>Housing and Financing Organizations</u>	<u>Source of Funds</u>	<u>Cost of dwelling unit (in multiples of min.wage (MW))</u>	<u>Average Size of Loan (% of cost)</u>	<u>Range of Interest Rates (%)</u>	<u>Loan Repayment Period (years)</u>
<u>0.5 - 2.0</u>	<u>Housing Companies (COHABS)</u> for promoting and financing low-cost housing. States, municipalities or regional agencies are major stockholders, and must contribute land and improvements.	BNH and local govts.	20 - 75	100	4 - 6	12 - 25
<u>1.5 - 5.0</u>	<u>Housing Cooperatives (COOPHAB's)</u> , private agencies organized within labor unions, to promote and finance housing for union members.	BNH & purchasers of homes.	47.5 - 120	75	6 - 8	8 - 20
<u>2.0 - 20.0</u>	<u>Company Housing Foundations (Fundacoes Empresas)</u> , private agencies through which BNH assists business in promoting and financing up to 50 percent of the cost of housing for company employees.	BNH; companies; & purchasers of homes	20 - 75	50	4 - 6	5 - 15
<u>2.0 - 22.0</u>	<u>Public Savings Banks (Caixas Economicas)</u> which lend the bulk of their deposits to housing. Several are under state auspices but most are federally controlled.	Depositors	60 - 400	75	8 - 10	5 - 15
<u>4.5 - 32.0</u>	<u>Housing Bond Societies (Sociedade de Credito Imobiliario)</u> , private savings banks for housing (in process of formation).	Depositors; purchasers of homes; possibly BNH	60 - 500	60	10 - 12	3 - 9
<u>5.0 - 20.0</u>	<u>Savings and Loan Associations. (Associacoes para Poupanca e Emprestimo)</u> , being set up as conventional savings and loan operations under private management.	Depositors.	60 - 500	60	8 - 10	5 - 15

* As of March 1967, the minimum wage was set at Cr. 105,000, in current cruzeiros.

Source: BNH.

Table 3: HOUSING PROGRAM FOR 1967-71 (EPEA ESTIMATES)

(In Billions of 1966 cruzeiros)

(1) Year	(2) GDP	(3) Number of Housing Units /1	(4) Total Investment Required /2	(5) Percent of GDP (4)+(2)	(6) Public Sector Investment			
					Financial		Number of Units	
					(Cr.)	(% of Total)	(No.)	(% of Total)
1967	48,987	697,000	1,715	3.5	459	27	120,000	17
1968	52,281	720,000	1,877	3.6	535	29	200,000	28
1969	55,233	743,000	2,033	3.7	606	30	225,000	30
1970	59,832	767,000	2,256	3.8	691	31	257,000	34
1971	63,531	792,000	2,452	3.9	783	32	292,000	37
TOTALS	279,864	3,719,000	10,333	3.7	3,074	30	1,094,000	29

/1 Combined public and private sector.

/2 Including cost of land and basic improvements.

Source: Columns (1) through (5) adapted from Tables 43, 44 and 63 of Ten-Year Plan, Housing, Ministry of Planning; Column (6) adapted from 5-year investment estimates by EPEA.

Table 4: HOUSING PROGRAM FOR 1967-71 (BNH ESTIMATES) /1

(In billions of 1966 cruzeiros)

Year	Total Investment Required /2	Investments by BNH and Associated Agencies		Number of Units
		(Cr.)	(% of Total)	
1965	-	22 /3	-	28,000
1966	-	74 /3	-	32,000
1967	1,715	505	29.5	220,000
1968	1,877	509	27.2	223,000
1969	2,033	573	28.2	265,000
1970	2,256	644	29.5	315,000
1971	2,452	721	29.3	375,000
TOTALS 1967-71	10,333	2,952	28.7	1,398,000

/1 1965 and 1966 are shown for comparative purposes.

/2 Column (4) from Table 3.

/3 BNH investment only.

Source: BNH.

Table 5: FORECASTED RESOURCES FOR HOUSING: 1967-71 (EPEA ESTIMATE)

(In billions of 1966 cruzeiros)

Source	Forecasted Resources EPEA Estimate
Federal budget allocations <u>/1</u>	187
Non-budget revenues	2,551
BNH, from FGTS <u>/2</u>	1,983
BNH, from other sources <u>/3</u>	568
Own resources	407
Public housing banks (Caixas Economicas)	327
Public employee organizations (IPASE)	80
External loans <u>/4</u>	<u>104</u>
TOTAL	3,249

/1 To various ministries and agencies, to finance housing for government and military personnel.

/2 Estimated portion available to BNH from collections for the national severance pay fund (Fundo de Garantia do Tempo e Servico), a new source of BNH funds initiated in early 1967.

/3 Sales of housing bonds, interest on loans, return of principal, and miscellaneous.

/4 Of which the equivalent of about Cr. 76 billion is already committed.

Source: Planning Ministry, preliminary estimates of resources and investments.

The Existing Deficiency in Housing

1. It is a general working proposition in the housing field that a housing deficiency exists whenever a significant number of dwelling units in the housing stock do not come up to certain requirements accepted as minimum ones in the context of the cultural stage reached by the community in question. Such requirements take account of structural conditions, living space per occupant, and services necessary to basic health and comfort. Invariably, deficiencies thus measured are larger than the gap between total demand and supply in the market.

2. At the time of the 1960 census, Brazil's housing stock was 13.5 million dwelling units, in which lived 69.2 million persons out of a total population of 70.1 million. Most of the other .9 million had such sub-standard shelter it could not be considered as housing, or else were in some form of institution.

3. The census office has estimated that only 9.7 million units of the housing stock could be classified as normal (acceptable) housing, the remaining 3.8 million (28 percent) consisting of extremely poor, improvised construction, generally self-built. Actually, the census experts believe the figure for acceptable housing is too high, because of misinterpretation of field instructions on the part of census-takers, so the total for sub-standard units is most probably understated. Furthermore, when the other tests for minimum living space and necessary services are applied, the Ministry of Planning estimates that sub-standard housing amounted to at least 7 million units (over 50 percent of the housing stock), with 35 million occupants (50 percent of the 1960 population). Of course, some of the deficiencies which would cause a dwelling unit to be classified as sub-standard, such as lack of water supply or basic sanitation, are not so much a responsibility of the housing sector as of the public agencies responsible for environmental conditions and specific services. On the other hand, it is highly probable that units which lack major services also have structural or space deficiencies which would make them sub-standard anyway, although no data exists by which this can be verified.

4. Various attempts have been made to measure the extent of the very poorest level of housing in the larger cities; this would include all favela-type structures but not the better sub-standard housing. For example, the Getulio Vargas Foundation found the following conditions in five cities, for 1961-62:

<u>City</u>	<u>1960 Population</u>	<u>Percent of Dwelling Units in Low- est Range of Sub-standard Scale</u>
Rio de Janeiro	3,223,000	14
Sao Paulo	3,165,000	7
Curitiba	345,000	12
Belo Horizonte	643,000	38
Belem	360,000	26

5. Other estimates for Recife, Salvador and Fortaleza, cities of 400-800,000 population, indicate that they have about a third of their housing units in this low category.

6. Recently, BNH has prepared its own estimate of the housing deficit, coming up with an overall figure of 4.6 million dwelling units. Whatever the most justifiable figure may be, it is undoubtedly of a magnitude which confronts Brazil with a monumental task if the deficit is to be significantly reduced, or eliminated, within an acceptable period of time.

PART TWO: WATER SUPPLY AND SEWERAGE

WATER SUPPLY AND SEWERAGE

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I. THE CURRENT SITUATION

A. Introduction

1. From an analysis of available statistics, it appears that the environmental sanitary situation in most areas in Brazil is considerably below the standards reached by more developed countries in respect to desirable provision of water supply and sanitary facilities to all of the population. The problems of providing an adequate water supply and the effective disposal of sewage vary widely from city to city and they are being solved with widely varying degrees of success. Although considerable effort has been made in the recent past to accelerate progress, the magnitude of the problem awaiting accomplishment yet, dwarfs the achievements made so far. The task facing Brazil calls for massive investments over a long period.

Surface Features, Water Resources and Geographic Regions

2. Brazil occupies nearly half of the continent of South America and has boundaries with all South American countries except Chile and Ecuador. The topography of the country consists mainly of hilly uplands, plateaus and low mountains. The upper Amazon Basin and part of the upper Paraguay Basin form the major areas of plain in the country. There is no true coastal plain. One of the major topographical features is the Great Escarpment -- the eastern margin of the Brazilian highland which descends abruptly to the Atlantic Ocean. In the southern part, the Escarpment is unbroken by rivers but to the north a number of rivers have cut across it. The Brazilian coast which extends over 4,600 miles has several harbors and most of the major cities are located along the coast.

3. The Brazilian highlands are drained by three major river systems. These are the great Amazon river with its major tributaries in the North, the Paraguay-Parana system in the South and the Sao Francisco river and its tributaries in the East.

4. Most of Brazil receives moderate rainfall, between 40" and 60" per annum. The rains come in summer from December to April, and the winters are generally dry. The upper Amazon Basin and the sea-facing slopes of the Great Escarpment in Sao Paulo State receive heavy rains. Over most of the country, there are definite wet and dry seasons, though their duration and intensity vary considerably from one area to another. Even in the Amazon valley, it rains much more during one season of the year than in the others. This marked seasonality creates problems for domestic water supply. In the country in general, except for the area subject to droughts in the North-eastern region, water quantity is not the problem. The problem is one of collection, purification and delivery to the people.

Population

5. Although Brazil's population has increased rapidly in the past 100 years, the total population is still small compared to the vast extent of the country. Population projections made by demographers indicate that the total population of the country would increase from an estimated mid-year population of about 81 million in mid-1965 to 93-94 million in 1970; 107-108 million in 1975, and about 123 million in 1980 (see Annex 1). The main characteristic in the population growth is the evolution of the urban population in the country since 1950. The urban population accounted for about 50 percent of the total population in 1965 in contrast to about 46 percent in 1960, 36 percent in 1950 and 31 percent in 1940. During the decade 1950-60, urban population increased at the rate of 5.5 percent per annum in comparison with 1.3 percent in rural areas, and about 3 percent for the country as a whole. There are doubts regarding the size of urban population compared to rural, depending on the definition of cities; but there is no doubt that rate of growth of urban population, on whatever definition, has been very high: during the 1950's population living in cities of over 100,000 inhabitants rose at 7 percent per annum.

Population to be Served by Water and Sewerage Systems

6. In Brazil, public water supplies exist mainly in communities having more than 5,000 inhabitants. According to the 1960 census there were about 25 to 26 million inhabitants in some 783 urban centers each having more than 5,000 people. Of these urban dwellers, according to one estimate, only 53.5 percent lived in homes connected to public water supplies. An undetermined but small number benefit from public water taps. The remainder are driven to the necessity of using traditional sources which are often unsafe and inadequate. Similar statistics are not available for sewerage but it is evident that a considerably smaller percentage of the population is provided with sewer services. There are no reliable estimates of the rural population provided with safe water supplies. The rural population is scattered over vast areas and the problem defies easy solution.

7. In this context, it is useful to examine the progress made towards achieving the goals set by the charter of Punta del Este which is to supply potable water and make provision for sewage disposal for at least 70 percent of the urban population and 50 percent of the rural population during the present decade, as a minimum. In Brazil, at present less than 50 percent of the urban population is estimated to be served by public water supplies and only about 30 percent is estimated to have the benefit of sewerage services. The total urban population of the country is expected to increase from about 43 million in 1966 to about 52 million by 1970. This would mean that between 1966 and 1970 the urban population remaining unserved by water and sewer services would be of the order of 30 and 40 million respectively.

8. A program to provide these services to 70 percent of the urban population by 1970 in order to achieve the Punta del Este goals would not only call for substantial investments, but also for engineering and manpower resources that cannot be provided within the short period. Apart from this, the provision of these services to 50 percent of the rural population (about 20 million) during the same period has also to be considered. In addition to the large population to be covered, a large number of communities would also be involved. Therefore, the conclusion is inescapable that the Punta del Este goals cannot be achieved by 1970.

9. A study of the population distribution in the different regions over the past several decades indicates a continuing shift of population from the Northeast to the South (see Annex 2). While these trends are likely to continue in the near future, the three regions of relatively concentrated settlement will be the Northeast, East and South. The tendency towards large urban agglomerations is most evident in the estates of the East and South which had 87 of the 103 towns of the country with more than 20,000 population, 34 of the 38 with more than 50,000, and 19 of the 31 cities with 100,000 inhabitants or more (1960 census). In the state of Sao Paulo alone, 7 cities have more than 100,000 inhabitants, 15 have more than 50,000, and 50 more than 20,000 inhabitants.

10. Such a rapid urbanization forms part and parcel of the economic development that has taken place in the area. The resulting urban population growth has created the water supply and sewerage problems and demands their solution in order to sustain that growth. In these areas the two main problems concerning water and sewerage are that the rate of expansion of the distribution and collection systems have not kept pace with the population growth, and a large segment of the new population and areas are not provided with any service at all. As a result, precarious environmental conditions exist in some cities demanding urgent attention.

Public Health Aspects of Water Supply and Sewerage

11. The incidence and prevalence of certain of the communicable diseases are frequently used as indices of the general status of environmental sanitation conditions. High infant mortality rates and deaths due to diarrheal diseases are indicative of the serious health problems caused by deficiencies in water and sanitation services.

12. In Brazil, up-to-date health statistics for the entire country are not available. For the country as a whole, the following were the approximate indicators of health for the year 1964:

Life expectancy at birth - 54.8 years;

General mortality - 13 per thousand population;

Infant mortality - 112 per thousand live births;

Death due to communicable diseases - 506 per hundred thousand;

Death due to diarrhea in infants up to 5 years - 1,245 per hundred thousand.

13. The mortality rates vary from region to region with the maximum in the Northeast. An examination of the various communicable diseases indicates that their prevalence in the Northeastern states is higher than in the others. The 1964 data available for capital cities of states in the country shows that deaths due to infectious diarrheal diseases ranged from 41.8 to over 200 per 100,000 inhabitants in half a dozen cities, to a maximum of 673 per 100,000 in Natal in the Northeastern region. The available statistics for the previous years also show consistently high rates of mortality. Such endemic conditions can commonly be due to use of grossly unsafe water from scattered localized sources, as a result of lack of accessibility by urban population to the safer public supply. Any dramatic reduction in the deaths due to diarrheal diseases can be achieved only by a safe water supply of sufficient quantity and direct service into the home. The implications of the above figures are that the disease prevalence is so widespread that an all-out effort is needed.

14. Apart from the diarrheal and enteric diseases, schistosomiasis (a disease transmitted by fresh water snail) is endemic in a wide coastal belt extending from Bahia to Rio Grande do Norte. It has also penetrated areas of Minas Gerais and Espirito Santo. Schistosomiasis may cause years of severe debility to the infected person. Direct mortality from the disease is low but predisposition of chronic cases to attack by other diseases is great. A safe water supply and satisfactory disposal of human and animal wastes are the main safeguards against the spread of the disease. Water management, improved agricultural practices to avoid excessive and wasteful usage of water are other control measures that could be adopted. In the endemic areas, some water supply and sanitation schemes have been constructed in the past but a rigorous water supply and sanitation program exclusively devoted to these areas does not exist and there are no indications of any such future program. Since the disease is prevalent in a number of states and the rural population is particularly vulnerable to it, the communities in the infested areas would deserve special priority in the provision of water supply and sanitation facilities under any water supply and sanitation program supported and financed by the federal government.

15. Among the other communicable diseases, filariasis (a disease transmitted by mosquitos) is significant from the point of view of sewerage and drainage. Belem (Para) and Recife (Pernambuco) are the two major foci for the spread of the disease. Both these densely populated cities with their vast surrounding areas, subjected to flooding and without adequate sanitation facilities offer very favorable conditions for endemicity. To a lesser degree, the disease is said to be prevalent in the cities of Soure, Vigia and Cameta, all in the state of Para; Castro Alvis in Bahia; and Florianopolis in Santa Catarina. The cities of Manaus (Amazonas), Maceio

(Alagoas), Salvador (Bahia) and Porto Alegre (Rio Grande do Sul) are also stated to be affected. The only satisfactory method of control available is by providing adequate sewerage and drainage arrangements in these areas. On this basis, the infected cities would merit special priority in the provision of sewerage and drainage.

B. Organization and Management

16. Brazil is a federation made up of 22 states, 3 federal territories and a federal district in which the capital city of Brasilia is located. The states and territories are divided into 3,962 "municipios" (municipalities). The municipality comprises both the rural area and the urban communities within its territory. It may be divided into districts, but these are purely administrative sub-divisions without any autonomy. The Brazilian Constitution provides that the responsibility for supplying water and sewer services rests with the local governments. The municipality is the only unit of local government in Brazil, and it is autonomous politically and administratively. As important as is the municipality's enjoyment of broad powers and legal rights, is its capacity to exercise them. Few cities had adequate organizations and finances necessary to take care of their water supply and sewerage problems. Their dependence to a very large extent on federal and state budget allocations for capital construction and in many instances even for operation and maintenance of completed works, has led to the growth of federal and state organizations with a wide variety of functions to perform.

Federal Agencies

17. SESP: An autonomous organization called the Special Service of Public Health (SESP) created in 1942 by the Brazilian government was one of the first organizations at the federal level to be engaged in water supply and sanitation activities in the country. This organization started with the goal of improving environmental conditions primarily in the Amazon Valley but soon its activities in the water and sanitation field were extended to other river valleys and parts of the country. From 1942 to 1958 this organization planned, designed and constructed, and in some instances operated approximately 131 public water supply systems serving some 500,000 people in all, mainly through public fountains or standpipes. The great majority of the water systems were installed in communities with population of less than 2,500, although a few systems were constructed in bigger communities.

18. In 1960 SESP was transformed into a foundation called Fundacao Servico Especial de Saude Publica (FSESP). Since then, the engineering wing of the foundation has shown a tendency to function like a public works agency and has been involved in water works construction for larger communities also. The foundation has regional offices in North, Northeast and South and in some of the states.

19. It undertakes to study water supply and sewerage projects, finance and supervise construction of works and operate and maintain completed projects. The foundation gets an annual budget allocation through the Ministry of Health and also funds from other regional organizations of the government for constructing specific projects. FSESP also cooperates with other federal and local authorities in implementing certain projects. For example, in the Sao Luis (capital of Maranhao State) water supply scheme, FSESP is financing only the construction of the treatment works and other federal and state agencies are financing other components of the scheme. So far, all FSESP contributions to capital constructions are in the form of outright grants.

20. FSESP gives the highest priority for the completion of works already on hand and those left uncompleted by other agencies. As a next priority, areas of high population concentration are selected. In the projects financed by FSESP, it recommends to the Mayor of the city the creation of a suitable agency -- Autarquia Municipais para Administracao de Servicos De Abastecimento de Agua (SAAE) to operate and maintain the system. However, FSESP does not require the setting up of the autonomous authority as a prerequisite for its participation in the financing of the project.

21. If the recommendation is accepted by the city and an autonomous authority is created, then FSESP enters into a formal agreement with the authority for operating and maintaining the works. For this service it charges the authority a fee equivalent to 10 percent of the gross income from the water revenues. In these cases FSESP provides only the supervisory and key personnel. It is a moot point, if a national agency like FSESP should get involved in operational responsibilities of water supply projects in communities scattered over the vast country.

22. FSESP has in all 130 engineers, of whom 25 are at the headquarters in Rio de Janeiro. The 1967 budget of FSESP includes for investments in water supply and sewerage projects a sum of Cr. 6 billion from ordinary budget and Cr. 8.795 billion under a revolving fund established by Law No. 4366 in 1964. The revolving fund, however, is not yet in operation. The allocations were smaller in the previous years. Up to January 1967, FSESP had either participated in or directly executed some 132 water supply systems in the country. In some 37 water supply systems, autonomous authorities (SAAE) have been created and are operated under the guidance and supervision of FSESP. These are all water supply systems of small communities mostly in North and Northeastern regions of the country (see Annex 3). A program for the construction of water supply projects for some 200 communities in the population range of 5,000-20,000 has been taken up in 1967, utilizing a loan provided by the Inter-American Development Bank.

23. DNERu: Another agency of the Health Ministry called DNERu (Departamento Nacional de Endemias Rurais) also finances water supply construction. This agency operates primarily in the rural area in communities of less than 5,000 people and in areas with specific health problems such as

schistosomiasis. However, beginning from 1966, the department's activities in water supply were restricted to the completion of projects on hand and no new project was taken up for construction. DNERu has some 23 water supply projects under execution at present of which 20 are expected to be completed in 1967 and the others in 1968. It is noted that only six of these projects are for the smaller communities of less than 5,000 population and in the others the population varies from 7,000 to 70,000. Prior to 1966 the total annual investment made by this department in water supply and sanitation projects was less than Cr. 1 billion per year. In 1966 the expenditure incurred was Cr. 4.2 billion. The 1967 budget allocation is Cr. 5.15 billion.

24. Both FSESP and DNERu have prepared tentative programs for the future and these are included in the Health Ministry's proposed program for the years 1967-71. Projects for the provision of water supply in some cities are included in the lists of both agencies, indicating that there is inadequate coordination between these two agencies even though they are under the same Ministry. Also, the two agencies seem to implement projects in both small and medium-sized communities. The need for two separate agencies under the Health Ministry is not clear and would certainly bear a review at this stage whatever might have been the reasons for their creation earlier.

25. DNOS: At the federal level, by far the most important organization in this sector is the DNOS (Departamento Nacional de Obras de Saneamento). DNOS was established by Law No. 4089 on July 13, 1962 as an autonomous unit (autarquia) under the Ministry of Transport and Public Works (MVOP). Simultaneously a National Fund for Sanitation Works (FNOS) was also created by the same law and the sources of finance were indicated. Important among these, was the earmarking of 2 percent of the total receipt of the federal government (receita orçamentaria da uniao) for water supply and sewerage projects. The DNOS budget for water supply and sewerage projects is derived both from the FNOS and the ordinary budget appropriations of the Transport and Public Works Ministry (MVOP).

26. DNOS has responsibility for public works construction in the areas of water supply, sewerage and water pollution control, drainage and erosion control in urban and rural areas; multi-purpose dams and other related activities. The governing council (Conselho Deliberativo) of DNOS approves its budget and indicates the amounts to be spent on various categories of projects. The Council is under a president appointed by the government and has as members representatives from Ministries of government, organizations of local bodies and BNDE (National Development Bank). The executive branch of DNOS is under a Director General who is also appointed by the government. The capital expenditure incurred by DNOS during 1966 was about Cr. 17.5 billion. The 1967 budget has a total provision of about Cr. 37 billion. Administrative overhead costs of the DNOS are met by separate appropriations. DNOS has regional and some state offices through which it operates. The country is divided into 15 districts for this purpose and each district is under the charge of a senior engineer with subordinate staff, all of whom are on the DNOS payroll.

27. DNOS currently has two types of programs in water supply and sewerage. Its regular program is one of financing through grants the construction of water supply and sewerage schemes in different parts of the country. This is done through its regional offices to which allocations for specific projects are provided each year. Generally the projects are prepared by the DNOS engineers and constructed under their supervision by contractors. DNOS does not undertake operation and maintenance of completed projects. These are handed over to the local authorities for operation. As water supply and sewerage projects form only part of the functions of the DNOS, it does not maintain a specially trained staff exclusively for these projects. Its participation only in certain aspects of the projects has also the effect of denying the staff the opportunity to acquire adequate experience in all aspects of these projects.

28. GEF: The other type of activity of DNOS is the loan program started in April 1965 under an agreement with the US AID by which the Brazilian Government established a revolving loan fund to finance water and sewerage systems in the country. Contributions to the fund are from US AID loans and annual budget allocations made by Government of Brazil (DNOS). To administer the fund a new special agency called the Executive Group of National Fund to Finance Water and Sewerage Systems (GEF) was created in August 1965 as a part of DNOS. The group is under an executive council which is the final approving authority for loans. The chairman of the council is appointed by the Federal Government. The council has members drawn from other federal agencies and a representative from US AID. The details of the organization are given in Annex 4. The municipalities seeking loan funds from GEF engage approved consulting engineers to prepare the feasibility reports on projects for submission to GEF along with the loan application. The GEF technical group reviews the engineering aspects, financing plan and adequacy of the water rates proposed. This review is not a detailed one. However, GEF has had to call for additional data on almost all the projects submitted to them so far. For this purpose, GEF is authorized to contact the consulting engineer directly. Upon engineering approval and satisfactory completion of other requirements which are examined by the legal and accounting sections of GEF, the loan application is put up to the Executive Council for approval. When approved, a contract is prepared between GEF and the municipality and the latter is authorized to enter into contract negotiations for preparation of detailed designs, plans, specifications and construction supervision. GEF approves such contracts and becomes a party to the agreement between the consultant and the municipality and assumes overall supervisory responsibility. So far 17 loan agreements have been made and 10 projects are under construction. The number of projects approved, population served, estimated costs, etc., and the list of projects under consideration are given in Annexes 5 and 6.

29. The DNOS also has responsibility for administering another revolving fund called FRAE (Fundo Rotativo de Aguas e Esgotos) created in November 1966. This fund set up under a federal law is expected to finance

not only projects for urban and rural water supply and sanitary sewerage but also rural irrigation systems. The regulations which would indicate the details of operation of the fund have not yet been issued. In any case the need for a second revolving fund at the federal level for water and sewerage projects is not apparent.

30. In the wake of the current tendency to get away from grants to urban water supply and sewerage projects, DNOS can only have a declining role to play as a grant-in-aid agency in this sector in the future. On the other hand, GEF -- the special group under DNOS which deals exclusively with the water and sewerage loan program -- has an increasing and significant role to perform in the coming years. With increased financial support, the loan program is bound to gather momentum and the administrative agency will need to be expanded suitably and the procedures streamlined to ensure quicker implementation of the program.

31. DNOCS: (Departamento Nacional de Obras Contra as Secas) which is also under the Ministry of Transport and Public Works functions in the drought affected areas of the Northeastern region, and provides water sources such as wells and storage reservoirs. The department has long experience in drilling wells in the region and many of these wells serve as sources of water supply for small communities. The role of this department in the domestic water supply field is a restricted one both in terms of type of project undertaken and area of operations. DNOCS has a provision of about Cr. 7 billion in the 1967 budget for capital investments in water supply projects.

Regional Agencies

32. Among the other agencies of the Federal Government involved in this sector are the regional organizations like SUDENE (Superintendencia do Desenvolvimento do Nordeste) and CVSF (San Francisco Valley Commission) of the Ministry of Regional Entities (MECOR). The Amazon Valley Development Agency (SPVEA/SUDAM) also participates in financing construction of water supply projects in its region by placing funds at the disposal of agencies like FSESP and DNOS for implementation of specific projects.

33. SUDENE: The SUDENE was created by the Brazilian government in the year 1959 to accelerate development in the Northeastern part of Brazil. The area of operation of SUDENE extends over about 1.6 million sq. km. (600,000 sq. miles) and includes the states of Maranhao, Piaui, Ceara, Rio Grande do Norte, Paraiba, Pernambuco, Alagoas, Sergipe, Bahia, a small portion of the state of Minas Gerais and the federal territory of Fernando do Noronha. The estimated population in the area is 26.5 million (1966).

34. The coastal areas of this region have satisfactory rainfall, but the interior is subject to periodic droughts. In the field of water supply and sewerage, SUDENE has been operating primarily as a financing organization

through its Department of Basic Sanitation. It gives grants for construction of water supply and sewerage works from its annual capital budget. It does not take responsibility for the operation of the completed project. In 1963 SUDENE established a company called "CAENE" (Companhia de Aguas e Esgotos do Nordeste) to operate completed waterworks and for the construction of new water and sewerage works, where required, in the municipalities situated in the Northeast region.

35. CAENE: CAENE is a mixed capital company (Sociedade de economia mista) in which SUDENE holds the majority of shares. It functions as a subsidiary of SUDENE. The company enters into agreements with SUDENE or with other organizations with the approval of SUDENE for construction of projects. The projects are either built by CAENE or constructed by agreement or contract by autonomous agencies in the cities involved. If the city desires to entrust the operation of the system to CAENE then it will pass a law authorizing CAENE to take responsibility for operation and maintenance of completed works and to charge and collect water revenues. One hundred and eleven cities have passed such laws and CAENE has the contract (contrato da concessao) to operate in 88 cities so far. During its three years of existence, CAENE's program of work was confined to the study of 12 water supply and 8 sewerage projects in 5 states, participation in construction of projects in some 30 cities in collaboration with DNOCS and FSESP, and operation (including billing and collection of revenues) of 39 completed water supply projects serving a total population of about 309,000. CAENE utilizes services of consultants for project preparation. Its own design section which is very small is used for analysis of projects received and minor design work. In the projects under CAENE operation, an attempt is made to cover operational costs from water revenues. CAENE is yet to acquire adequate staff and get organized to discharge its functions effectively.

36. CONESP: Another similar subsidiary of SUDENE is CONESP (Companhia Nordestina De Sondagens e Perfuracoes) which was created in September 1963 for the development and execution of well-drilling programs in the region. The program is for the supply of water to human and cattle population, particularly in the difficult and scarcity areas. Since other agencies like DNOCS are also operating well-drilling programs in the same region, and there is little coordination of efforts, the programs are stated to result in gross under-utilization and wasteful transportation of equipment from place to place. The general impression is that there is a surplus of drilling equipment, in particular, in this region.

37. CVSF: The CVSF was created in 1946 for a period of 20 years with responsibility for social and economic development in the San Francisco river valley. Major activities of this commission are in the field of energy, water supply and sanitation. The San Francisco Valley covers the six states of Pernambuco, Alagoas, Sergipe, Bahia, Minas Gerais and Goias. The commission's area of responsibility is defined by law. It is about

700,000 sq. km. and includes some 400 municipalities in the six states. The commission establishes guidelines, policies and priorities and provides funds for selected water supply projects in the valley but does not undertake responsibility for construction, supervision or operation and maintenance of projects. So far, CVSF has participated in 73 water supply schemes which are functioning and in several others which are under construction or in which construction has been stopped for one reason or another. Besides the CVSF, the FSESP, DNERu, DNOS, DNOCS, SUDENE and the municipalities also implement water supply and sanitation projects in this region.

38. The various federal organizations mentioned above are the major ones involved in water supply construction at the time of review. Often, more than one of these organizations participates in the construction of a project. Although a number of agencies are involved, the financial assistance provided by each agency is so small when compared to the total needs of the project that a number of these projects have been under construction for years. In others, construction has been stopped due to lack of funds from the participating agencies. In some areas, wells have been drilled but were not provided with pumps in time to utilize the wells. With a number of agencies operating in an uncoordinated manner, it is not surprising that many projects are left undone and others repeated.

39. The disadvantages of having a number of federal agencies dealing with water and sewerage programs is generally recognized and the consensus seems to be towards bringing all these activities under the aegis of one coordinating authority at the federal level for resource allocation and policy determination. It is clear even from a preliminary review of the work and functions of the various organizations and departments at the federal and regional levels, that there is considerable duplication of efforts as a result of a number of agencies involved in this sector. A detailed scrutiny of each organization would indicate the administrative overhead charges incurred by each in relation to actual investments made and the savings that could be effected by consolidating the activities in this sector under one coordinating authority at the federal level. Obviously, the reduction of the number of agencies dealing with this sector at the federal level would lead to savings in administrative costs and better direction and control over capital investments. It would also lead to the better utilization of the available experienced personnel.

Role of Federal Government

40. The role of the federal government in this sector can only be to stimulate local development through skillful use of loans and grants and to provide leadership and guidance since it is the municipality that is responsible for providing water and sewerage services. For it to fulfill this role effectively, the federal government must know the nature and magnitude of the problem awaiting accomplishment in different parts of the country. This information is necessary to place the problems in proper perspective,

to formulate a suitable financing policy to be pursued in future and for determining priorities for investment. An adequate organization at the federal level is also necessary to collect and collate the information, administer federal aid programs, systematically evaluate the programs under implementation and to estimate future needs for funds.

State Agencies

41. At the state level also, a wide variety of organizations are involved in the sector. Until recently, the departments of water and sewerage at the state level used to be one of the financing and constructing agencies and in some cases it also operated and maintained completed projects in the state. Based on the funds available from state appropriations, the municipalities were provided with items of construction such as reservoirs, treatment plants, etc., but a total functioning system was rarely given. At the local level the municipal department had responsibility for the water supply system; often these arrangements were unsatisfactory and inadequate. Generally this situation continues in states of the Northern region.

42. In most of the states in the Northeastern region, autonomous agencies have been established in the capital cities for water supply and sewerage. These agencies construct and operate the utilities. Outside the capital cities, municipal autonomous agencies exist in a number of places and these operate the water and sewerage services.

43. Among the states of the Eastern region, Minas Gerais and Guanabara have established autonomous companies at the state level and in the others the old procedures continue. In the central western region, an autonomous authority has been set up in Mato Grosso. Similar authorities exist in the states of Parana and Rio Grande do Sul in the Southern region. In general, the autonomous agencies at the state and local levels have common characteristics and functions. The law under which the company is constituted generally permits the company to operate for a profit and to fix tariffs for the various services rendered and to adjust the tariffs periodically so that it is possible to amortize the initial capital invested, pay for the costs of operation and maintenance and accumulate a reserve fund for financing the expansion of these services. These companies have also the advantage of being able to recruit trained staff and pay adequate emoluments. Some of the state and local organizations are described in Annex 7.

Manpower Resources

44. The number of engineers and auxiliary personnel engaged in water supply and sanitation activities in the country is not known. Apparently there are available in the country engineers trained in sanitary engineering, as no shortage in this category is reported. Some of the universities also offer post-graduate training in sanitary engineering. The professional engineering services are basically good. Many of the engineers at the

federal and state levels and in the consulting engineering profession have had foreign training. Most of the technical problems in the field of water supply and sewerage can be handled adequately by the Brazilians. External technical assistance may be required in the large metropolitan areas. A number of consulting engineering firms exist in the country and others are being organized. The established firms are able to prepare feasibility reports and provide detailed engineering for the projects in the medium size cities. These firms are being utilized by GEF for preparation of projects under the loan program. While there seems to be no shortage of consulting engineers, it is recognized that the service must expand to cope with anticipated growth of projects under the future loan program.

45. The main shortage of personnel is at the operating level in water supply and sewerage. The municipalities are unable to attract and retain qualified personnel at this level and frequently operation and maintenance of systems are in jeopardy. Most of the organizations involved in this sector at the federal, regional and state levels have instituted training programs as part of their routine activities to give inservice training to their personnel. Special emphasis is also given to the management aspects and rate studies. The Brazilian Institute of Municipal Administration (IBAM) assists in this respect by organizing special courses for waterworks managers and through studies of problems relating to administration, tax structure, etc., of the municipalities.

Project Implementation, Operation and Maintenance

46. With the advent of the Inter-American Development Bank's loans for the water supply and sewerage projects and the loan fund program with the US AID participation, project preparation has received greater emphasis and attention than ever before. Most of the projects for these loans have been prepared by local consultants, and foreign consultants have been used only in major projects such as the sewerage studies of Rio de Janeiro and Sao Paulo. However, the lack of well prepared feasibility studies continues to be a problem for the loan fund program. GEF is assisting the municipalities and their consultants in the preparation of these projects.

47. Bidding and contracting for construction and supply of materials are prescribed by law and are generally similar to US practice for pre-qualification, advertising, bidding, evaluation of bids and awarding of contracts. Fairly uniform procedures exist throughout the country. Delays in payment to the contractor seem to be abnormally long and have resulted in some instances in the contractor not being able to meet his obligations, and in turn to delays in completion of work. The loan fund operations are expected to streamline these procedures and reduce delays at various stages. Because of the difficulty in transportation of heavy materials and equipment, the supplier is asked to quote the price for delivery of pipes, etc. at site and as such the transportation, insurance and administration become the supplier's problem.

48. It is in the operation and maintenance phase that maximum shortcomings are noticed. In most of the completed plants operation is below accepted standards and maintenance goes by default. This is particularly severe in the case of water treatment plants and distribution systems.

II. INVESTMENT PROGRAMS AND POLICIES

A. EPEA Program

General

49. For the first time in Brazil an attempt has been made by the government (EPEA in the Ministry of Planning) to prepare a program for water supply and sewerage projects in the country as a whole. The Ten-Year Plan for Economic and Social Development, to be referred to as the EPEA program, published in March 1967 by the Ministry of Planning and Economic Coordination contains, inter alia, an investment program for the Saneamento sector. This sector is divided into two categories: (i) water supply and sewerage projects which come under the heading "Saneamento Basico" (basic sanitation) and (ii) miscellaneous subjects such as land drainage, flood control, erosion control, etc., which are grouped under the heading of "Saneamento Geral" (general sanitation). Another document dealing with projects in this sector is the Five-Year Plan of action of the Ministry of Health published in late 1966. This document deals only with projects under the Ministry's purview and includes a list of projects proposed to be taken up, estimated cost, population likely to be benefited, annual resources required for each project, etc. Other federal agencies involved in this sector such as DNOS, GEF, SUDENE, and several state agencies also have made preliminary studies of water and sewerage needs in their respective areas of operation. However, these preliminary studies do not seem to have been adopted by EPEA. Also, the EPEA program has been confined to urban water supply and sewerage projects.

50. EPEA has considered the problem of water supply and sewerage under three categories, namely large, medium and small cities, and has reported that the position in 1966-67 was as follows:

Table I. Urban Water Supply and Sewerage

<u>Category</u>	<u>Total Population</u>	<u>% of Population not</u>	
	<u>in 1967</u>	<u>Served by</u>	
	<u>Millions</u>	<u>Water</u>	<u>Sewerage</u>
a) Large cities (Over 300,000 inhabitants)	13.5	40	50
b) Medium cities (20,000 to 300,000 inhabitants)	20.7	60	70
c) Small cities (Less than 20,000 inhabitants)	10.8	80	80

It is not clear if the percentage of population unserved refers to those not having water and sewerage connections to their homes or to the population not having access to these public utilities. The population unserved by water appears to have been overestimated and the percentage of population without sewerage understated. The EPEA document also refers to the large number of federal agencies which are involved in water and sewerage programs and points out the need for coordination of these activities under one federal agency. In regard to financing policies, EPEA recommends a loan and not a grant program for all the projects except those of small cities for which grants may be needed and 10 percent of the total resources available has been considered as sufficient for grants. The total resources for the sector at federal, state and municipal levels have been estimated, and the following investment program has been proposed:

Table II. EPEA Program for Investment in "Saneamento" - 1967-71
(Cr. Billions of 1966)

<u>Source of Funds</u>	<u>Program</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>Total</u>
Federal Budget	Water and Sewerage	70	80	91	103	106	450
	General Sanitation	<u>39</u>	<u>44</u>	<u>50</u>	<u>56</u>	<u>58</u>	<u>247</u>
	Total "Saneamento"	109	124	141	159	164	697
States' Budgets	Water and Sewerage	68	76	83	91	100	418
	General Sanitation	<u>18</u>	<u>19</u>	<u>21</u>	<u>23</u>	<u>25</u>	<u>106</u>
	Total "Saneamento"	86	95	104	114	125	524
Municipalities' Budgets	Water and Sewerage	68	75	82	90	99	414
Reinvestment Fund	Water and Sewerage	-	-	-	-	25	25
External Assistance	Water and Sewerage	30	60	81	84	90	345
	TOTAL						
	Water and Sewerage	236	291	337	368	420	1,652
	TOTAL						
	General Sanitation	<u>57</u>	<u>63</u>	<u>71</u>	<u>79</u>	<u>83</u>	<u>353</u>
	TOTAL "Saneamento"	293	354	408	447	503	2,005

Federal Program

51. The federal program was prepared by EPEA on the basis of provisions made in 1967 budget for this sector with an average annual increase of about 10 percent in federal allocations assumed for the subsequent years. Since the program is not based on individual project requirements or priorities, it can be evaluated only from the point of view of the capacity of the federal agencies to utilize the allocations. The expenditures incurred in this sector by the federal agencies during 1964-66 were as follows:

Table III. Investments in "Saneamento" by Federal Agencies
(In Cr. Billions of 1966)

		<u>1964</u>	<u>1965</u>	<u>1966</u>
DNOS	Water Supply	12.66	21.80	16.86
	Sewerage	0.47	0.67	0.60
DNERu	Water Supply	1.78	1.31	5.00
FSESP	Water Supply	2.11	1.67	7.27
CVSF	Water Supply	3.64	4.49	5.65
SUDENE	Water Supply	<u>8.95</u>	<u>14.54</u>	<u>15.80</u>
		29.61	44.48	51.18
National Water Fund Disbursement				
	US AID/DNOS/GEF	-	-	2.00
IDB loans disbursed for water				
	supply projects in SUDENE area	<u>1.69</u>	<u>11.12</u>	<u>6.91</u>
Total expenditure on water and				
	sewerage projects	31.30	55.60	60.09
Expenditure on "general sani-				
	tation" as reported by DNOS	<u>31.08</u>	<u>44.42</u>	<u>49.26</u>
Total expenditure in "Saneamento"				
		62.38	100.02	109.35

Source: Agencies' data.

52. Investments in water supply and sewerage projects almost doubled from 1964 to 1966, primarily as a result of increased activity on the part of DNOS, FSESP and SUDENE. This trend will continue because of the IDB loans made to FSESP and SUDENE and the US AID support to the National Loan Fund for water and sewerage projects. These loans call for matching counterpart funds which will have to be provided initially by the federal government. Utilization of the IDB loan to FSESP for water supply projects in 200 small communities in the country is likely to begin in 1967. Likewise disbursement of a new IDB loan to three projects in the SUDENE area would commence in 1967 and the disbursements for projects in SUDENE area already under construction would continue. If assistance to the projects in the SUDENE area for which IDB loans have been sought and the proposed US AID contribution to the National Loan Fund are taken into consideration, the external resources available to the federal government can be estimated as follows:

Table IV

(In Billions 1966 Cr.)

	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>	<u>1971</u>
US AID	-	11	11	11	-
IDB	<u>13</u>	<u>17</u>	<u>30</u>	<u>28</u>	<u>26</u>
Total	13	28	41	39	26

53. If the likely external resources shown in Table IV are considered along with federal budget provisions suggested by EPEA, the investment plan at the federal level for water supply and sewerage projects would be as follows:

Table V

(In Billions of 1966 Cr.)

<u>Source</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>	<u>1971</u>
Federal Budget	70.0	80.0	91.0	103.0	106.0
External Assistance	<u>13.0</u>	<u>28.0</u>	<u>41.0</u>	<u>39.0</u>	<u>26.0</u>
Total	83.0	108.0	132.0	142.0	132.0

Taking into consideration factors such as availability of trained personnel, time required for project preparation, number of projects involved, availability of suitable contractors for project construction, etc., it is

doubtful that the rate of expenditure proposed by EPEA could be accomplished. More realistically, total federal expenditures per year for water supply and sewerage projects could be of the order of Cr. 90 to 100 billion. On this basis the allocation from the federal budget for the years 1968 to 1971 could be scaled down to the 1967 level if external resources as forecasted are available.

54. Annual expenditures for "general sanitation" of about Cr. 30 billion seem to have been incurred in the period 1964-66, if the expenditure on barrages for hydroelectric power plants included in the figures reported in Table III (Cr. 6 billion in 1965 and Cr. 16 billion in 1966) are not considered. On this basis, the proposed federal program for general sanitation of Cr. 39 billion in 1967, with an increase of about 10 percent per annum through 1971 seems reasonable. (See Table II.) The federal program in "Saneamento" for 1967-71 therefore could be recast as shown in Table VII.

State Program

55. EPEA has assumed that about 6 percent of the total investment budget of the states could be considered as available for investments in "Saneamento" and that 80 percent of such investments would be on water and sewerage projects. On this basis EPEA estimates investments financed by states' budgets in water and sewerage projects during 1967 at Cr. 68 billion (at 1966 prices). Adding disbursements of external funds already committed, the total for that year would amount to Cr. 80 billion. This is most likely on the low side, since the 1967 capital investment program for water and sewerage in the Sao Paulo metropolitan area alone is about Cr. 72 billion according to the state budget (Cr. 60 billion at 1966 prices). A realistic estimate of the requirements and of the resources that are likely to be available at the state level can be made only by a study of the problem in each state as the magnitude of the problem and pattern of financing varies from one to another. A beginning in this direction has been made in the Northeast region where FSESP is carrying out a survey of the existing water supply and sewerage situation. The water and sewerage companies such as CORSAN, COMAG and SANEPAR are also preparing three- or four-year investment plans for their areas of operation, and estimates of requirements of funds should be available soon. A rapid survey of the situation in each state should be made to assess the magnitude of the problem and the funds needed.

Municipal Program

56. EPEA has assumed that 20 percent of the total municipal investment would be available for water and sewerage projects. The basis for such an assumption is not clear as at present the municipal contribution for project construction generally varies from 0-33 1/3 percent, depending on the financing agency. A global estimate of the total municipal resources that might be available for this sector is not of much value in the absence of a definite policy in regard to municipal participation in financing of

these projects. As a first step the financing policies to be pursued in future at the federal, state and local levels should be decided and announced early in order to facilitate mobilization of local resources for these projects.

Reinvestment Fund

57. EPEA has also suggested the levying of a surtax on the population benefited by the projects for a specified period in order to accumulate funds for reinvestment and has estimated that a sum of Cr. 25 billion would be available from this source in the year 1971. Details of this new proposal have not been made available. At this stage this source of finance may be ignored as even more basic policies in regard to financing capital investments in this sector are not clear. The National Loan Fund for water and sewerage is bound to receive repayments on the loans during the next five years but at the current rate of loan utilization which is slow, repayments are not likely to yield significant amounts for reinvestment. Likewise, although the autonomous water authorities and companies created in recent years are expected to charge adequate rates to generate surplus cash for reinvestment, as the idea is relatively new, funds of any consequence are not likely to be available from this source except in a few individual cases.

External Resources

58. EPEA estimates of external resources that might be available for water and sewerage projects in the country have been based on assumed inflow of external aid for these projects without reference to the undisbursed balance on existing IDB loans, and the other loans that are presently under construction. Also, EPEA has not indicated the amounts that are likely to be utilized at various levels. According to present indications, only the following external resources are likely to be available for water and sewerage projects in the immediate future. A substantial portion of these resources (about 74 percent) would be channeled through federal agencies DNOS, FSESP and SUDENE as the borrower.

Table VI

<u>Source</u>	<u>Amount In 1966 Cr. Billions</u>
i) Possible US AID loan of US \$15 million to the National Loan Fund for water and sewerage projects	33.0
ii) Loan request by SUDENE to the IDB for Cr. 55 billion for water and sewerage projects in the Northeastern states estimated to cost Cr. 92 billion.	55.0
iii) Undisbursed amounts under existing IDB loans approx. US \$54.3 million.	<u>119.5</u>
Total	207.5

This would leave a gap of about Cr. 137 billion (345-208) in the EPEA estimate (Table II) which will have to be found from other external sources. It is the large metropolitan areas like Sao Paulo and Rio de Janeiro that offer the greatest challenge and opportunity to external lending agencies. It is estimated that at present only about three million people in the Sao Paulo metropolitan area are served by water supply systems and that less than two million people are connected to the sewerage system. The problems of water supply and sewerage of the Sao Paulo metropolitan area are complex and massive investments are called for. The water supply problems of the Sao Paulo area are under study and no long-range comprehensive plan has been prepared. The comprehensive project is likely to cost about US \$400 million, and works for a value of about US \$30 million might be taken up before 1971. In regard to sewerage, the US AID financed study has recently been completed and the feasibility report is expected shortly. The study area comprises the municipality of Sao Paulo and five other neighboring communities covering an area of about 150,000 hectares. A population of ten million is expected in the area by 1980 and 13 million by the year 2000. The proposed project would include branch and trunk sewers to serve 80 percent of the population in the area, sewage treatment plants, pumping stations, pumping mains and accessories. The first stage of the proposed project envisages collection of sewage from 80 percent of the population in the study area by 1980 and conveying it to Billings Reservoir after primary treatment. The first stage is estimated to cost approximately US \$325 million. The first five years of construction under the first stage is expected to call for an investment of about \$125 million. This project would be ready shortly for financing.

59. In the case of Rio de Janeiro, although major improvements to the water supply system have been made recently, the local authorities would like to have a further loan to complete the eighth stage of the project which involves the extension of the new tunnel up to the reservoir in the center of the city. This stage is estimated to cost about \$15 million. The detailed design for the project is being done. Rio de Janeiro sewerage system is also under construction and is partly financed by an Inter-American Bank loan. However, a number of major construction works are not covered by the present project. The Guanabara bay which possesses aesthetic, recreational, commercial and industrial values for the city of Rio de Janeiro and the area in general, is presently subject to gross pollution by untreated domestic sewage and industrial wastes. It is estimated that the needs during the next 15 years would be of the order of \$110 million, and about US \$21 million might be needed up to 1971. The master plan for sewerage in the city exists and the local authority needs external finance to implement the plan.

60. Likewise, sewerage projects in other large capital cities of Porto Alegre, Belo Horizonte and Salvador are under study and would be ready for financing in the near future. These are projects which could utilize external assistance, but no firm estimates are presently available. Under external funds for the states in the Mission's estimates, the possible new external loans for Sao Paulo and Rio de Janeiro water and sewerage systems have been included. It is likely, however, that the programs for the states and possibly for the municipalities understate the real requirements.

B. Summary

61. Table VII compares the EPEA program with the Mission's estimates.

Table VII. Saneamento (Water Supply, Sewerage and General Sanitation)
(In billions of Cruzeiros, at 1966 prices)

	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>	<u>1971</u>
<u>EPEA Program /a</u>					
Federal - Budget	109	124	141	159	164
- External Funds - Existing	13	17	16	11	15
- Probable New	-	11	25	28	11
	122	152	182	198	190
States - Budget	86	95	104	114	125
- Reinvestment Fund	-	-	-	-	25
- External Funds - Existing	12	25	13	7	-
- Required New	5	7	27	38	64
	103	127	144	159	214
Municipalities - Budget	68	75	82	90	99
Total 1967-1971					<u>2,005</u>
<u>Mission's Estimates</u>					
Federal - Budget	109	114	120	126	128
- External Funds	13	28	41	39	26
	122	142	161	165	154
States - Budget /b	86	95	104	114	125
- External Funds - Existing	12	25	13	7	-
- Probable New	-	-	33	40	71
	98	120	150	161	196
Municipalities /b	68	75	82	90	99
Total 1967-1971					<u>1,883</u>

/a The EPEA estimates for external assistance (Table II) have been allocated in this table, by the Mission to federal and state programs.

/b In the absence of detailed information from states and municipalities, EPEA estimates have been shown in the Mission's estimates also.

62. In regard to the physical targets to be achieved, the EPEA proposal envisages the following:

Table VIII. Population (in millions) Proposed to be Served

	<u>1967-71</u>		<u>1971-76</u>	
	<u>Water</u>	<u>Sewerage</u>	<u>Water</u>	<u>Sewerage</u>
Large Cities	2.9	2.3	5.1	3.9
Medium Cities	4.4	5.0	7.8	8.1
Small Cities	1.9	2.4	3.3	3.9

These estimates have been based on assumed per-capita costs for projects in the three categories of cities and not on the costs of individual projects. The required improvements to water and sewerage systems in Sao Paulo and Rio de Janeiro alone would account for the population proposed by the EPEA program to be served between 1967-71. During this period, investments in water and sewerage projects would be needed in other major cities also. In a number of state capitals, there are projects under construction financed by IDB loans which will take care of the requirements of the next decade. It should be possible to review the existing situation and plan for the requirements of each major city for the next ten years. In the case of medium cities, the EPEA proposal seems to be overly optimistic on sewerage projects. When the resources are limited and a large population remains unserved by water systems, the first priority should be for water projects. The needs of each state should be assessed and relative priorities among projects should be determined. Only in respect of the small cities, in view of the large number of communities involved, approximate estimates based on population covered might have to be adopted. It should then be possible to prepare a realistic program for the future on the basis of a rapid survey of the situation as suggested above.

III. FINANCING OF WATER SUPPLY AND SANITATION PROJECTS

63. The funds for capital investment in this sector are derived from federal budget allocations, state and local resources and international loans and grants. Historically, assistance from the Federal Government for municipal water works has been mostly in the form of outright grants for construction purposes. However, a new concept of long-term loans is developing: since 1965 federal loans^{1/} for water supply construction have been available. At the state and local levels different approaches to the financing of capital investments are being tried in different parts of the country. State banks also have made a few loans for waterworks improvements to some of the cities with better management but, by and large, lack of good management and low water rates have not attracted private sector investment to these projects.

A. Foreign Assistance

64. IDB Loans. Between November 1961 and December 1966 the Inter-American Development Bank has approved 12 loans for a total value of about \$111 million (a portion of the loan amount is in cruzeiros under some of these loans). Eleven of these loans are for extension and improvement of water supply systems in 14 cities, and extension and improvement of sewerage systems in 6 cities. One loan approved in July 1966 is for the construction of water supply systems in 200 small communities in different parts of the country. The total estimated cost of all these projects is approximately \$228 million. An estimated population of 12.5 million would benefit by these projects (see Annex 8).

65. US AID. In the past construction grants provided by the US Government have been utilized on many projects for small communities, particularly in the Amazon Valley and Northeastern region. During the years 1965 and 1966 loans totaling Cr. 24 billion were made by AID to the National Loan Fund for water supply projects. These loans are repayable over a period of 40 years, with a grace period of 10 years, and an annual service charge of 1 percent during the grace period and 2.5 percent subsequently on the declining balance of the loan. In addition, two equipment loans of \$2.5 million and \$2.6 million respectively to SURSAN and CEDAG have been made recently, and a feasibility study for the sewerage project for the Sao Paulo metropolitan area has been financed by US AID.

^{1/} National Loan Fund administered by GEF, a special agency in DNOS.

B. Water and Sewerage Rates

66. The concept of beneficiary paying for the services through adequate water and sewerage rates is also new to Brazil. User charges for water and sewerage are levied and collected generally with varying degrees of success. In the past throughout the country these charges were low and were not sufficient even to meet the operating costs and the shortfall was made good by contributions from general revenues of the state or the municipality as the case may be. A gradual change in this situation is evident in the larger cities as seen from the substantial increase in water rates in Sao Paulo from a reported Cr. 2.5 per cubic meter in 1962 to Cr. 84 per cubic meter in 1966 for minimum domestic consumption (approximately a five-fold increase in terms of real costs). A similar increase in water rates in Rio de Janeiro was made effective during the same period. In other areas the autonomous water and sewerage authorities have increased water rates. In general, a basic water rate for a minimum monthly domestic consumption of 15 cubic meters and a minimum monthly charge are fixed. Consumption in excess of the minimum is charged for at a higher rate on an ascending scale. Separate basic rates higher than the rate for domestic consumption are charged for the supply to commercial and industrial consumers. In a number of areas in the country, the basic rate is tied to the legal minimum wage applicable in the area (e.g., .0007 a minimum salary per cubic meter in Rio de Janeiro city for domestic consumption). In this manner the basic rate is automatically adjusted with the increases in the minimum wage. The basic rate per cubic meter of water for minimum domestic consumption during the year 1967, would be as follows in some of the major cities; Curitiba: Cr. 60/m³ (8 U.S. cents/1000 gallons); Rio de Janeiro: Cr. 73.5/m³ (10 U.S. cents/1000 gallons); Sao Paulo: Cr. 105/m³ (14 U.S. cents/1000 gallons); Porto Alegre: Cr. 125/m³ (17 U.S. cents/1000 gallons) FSESP estimates that in the water supply systems for medium and small cities operated under their control, the average minimum monthly water charge is about 4% of the minimum monthly local wage. While operating data is insufficient, it is likely that the rates adopted are inadequate to cover even operating costs. The general impression is that rate increases would be needed in most projects to place them on a self supporting basis. In a few projects rates have been based on a detailed analysis of the costs involved, but even in these cases the rates rarely cover costs in full if an adequate return on capital and provision for planned replacement are included.

67. All the water supply and sewerage construction in the federal district is financed by direct federal allocations made in the annual budgets.

C. Regional Financing Patterns

North

68. In the Northern region of the country, some federal grants channeled through the regional agency for Amazon Valley development are utilized for construction in this sector. Water systems in 30 cities in the region have been constructed either directly by FSESP or with its assistance, and DNOS also has contributed toward capital construction of a few systems. There is no estimate of the actual investment in the sector from the state and local resources, but these are likely to be very small. For example, the financing plan for the water supply and sewerage projects for the city of Belem estimated to cost about US \$4.8 million, indicates that 6 percent of the cost would be met by the state of Para, 26 percent by the Amazon Valley development authority, 16 percent by DNOS and 52 percent by the Inter-American Bank loan. Thus the project is financed by a 48 percent grant and 52 percent loan without any local contribution. Eight other cities in the region (one with a population of over 20,000 and 7 smaller communities) have been provisionally included under another IDB loan for water supply in 200 communities. Here again the pattern of financing does not envisage any significant participation by the state or cities. The IDB loans, however, require that water and sewerage rates should be adequate to cover operating costs and financial charges. In this region water supply systems for 25 cities (20 in the state of Para and 5 in the state of Amazonas) are stated to be functioning with organizations (SAAE's) under the supervision of FSESP, and in these cities water rates might be expected to cover at least operational costs.

Northeast

69. In the Northeastern region, federal grants for water supply construction are primarily channeled through SUDENE. In addition, DNOCS, DNOS, FSESP, DENRU and CVSF also participate in financing project construction in the states of this region. The actual investments made by the state governments and municipalities in this region are not known. An analysis of the financing pattern adopted for the major projects in the region indicates that state and local contributions cover only a small percentage of the cost of the projects. Water supply projects are under implementation in the capital cities of the nine states in the region as well as in Campina Grande utilizing IDB loans. The financing plan for six of these projects indicates a local contribution of 4 percent of the project cost in the case of Maceio and no local contribution at all in the others. The state contribution in the case of Recife and Maceio projects are about 24 percent and 30 percent respectively, and are apparently much less in the other cases as the federal and state grants put together vary between 27 percent and 48 percent. In all these cases, however, the loans are to be repayed from the revenues collected from the consumers. Therefore, although the initial local contribution was little or nothing, ultimately the consumers do contribute a portion of the capital cost inasmuch as the loan repayment is to be made from the revenues collected from them.

70. According to the 1960 census, there were only some 30 cities in the region each having over 20,000 inhabitants which accounted for roughly half the total urban population. Of these, as stated earlier, water supply systems have been constructed in 10 of the larger cities and a few more are likely to be covered under another IDB loan for 200 water supply systems. In the latter case, the financing plan envisages a contribution of only 0.6 percent of the cost from state and local resources. Another IDB loan has been requested for taking up projects in the other larger cities in the region. The project report assumes that 60 percent of the cost would be covered by external loans and the balance would be provided by the national agencies working in this sector in the SUDENE region. Any significant local or state contribution is unlikely for these and other smaller projects in the region. This is evident from the fact that there are some 400 cities in the region in which construction on water supply systems has been paralyzed due to want of funds, in some cases for over 10 years.

71. The Northeastern region as the most economically backward part of the country, has been receiving considerable federal and international assistance in this sector. Side by side efforts have been made in some of the states and in major cities to set up autonomous authorities or companies to take charge of the water supply and sewerage systems and to operate and maintain them on a self-supporting basis. Increasing evidence of this approach is noticed from the number of cities in the region that have enacted laws authorizing CAENE to operate the water supply systems. In the state of Bahia the new state agency for water supply and sewerage SESEB requires an effective minimum participation of 20 percent in the total cost of the project by the municipality as a condition for it to finance the rest of the cost of the project. In general, although local participation in capital investments is not likely to be significant for some years in the region as a whole, the use of water rates as a revenue raising device is gaining ground.

Southeast

72. Sao Paulo: The financial participation of the state in water and sewerage projects is at a maximum in the state of Sao Paulo. In the Sao Paulo metropolitan area particularly, all capital investment in this sector comes from state resources. Even operation and maintenance are partly subsidized by the state. There is no valid reason for this approach. In the other municipalities of the state, limited local contribution seems to have been received for project construction. Five of the 17 projects approved under the national loan fund are in this state. In these, the local contribution is 33 1/3 percent of the project cost. In the past a number of municipalities used to borrow from the State Savings Bank (Caixa Economica do Estado de Sao Paulo) but in recent years this source of finance has not been available for water supply projects.

73. Guanabara: In Guanabara, the state makes contributions for increasing the capital of the newly-created water company CEDAG. Already considerable state investments and IDB loans have helped to finance construction of water and sewerage systems in Rio de Janeiro city. CEDAG is expected to meet the financial charges on the IDB loans from its water revenues.

74. Minas Gerais: In Minas Gerais since the setting up of the water and sewerage company, COMAG, the state government does not seem to give direct grants to the municipalities for these projects. COMAG builds the systems in the cities, operates them for a period of 20 years and charges water rates to cover the costs, but the company does not lend money to the municipalities for the construction of projects. The company does not require any local participation in financing of the project. COMAG is set up as a public sector company in which there is provision for participation by the private sector. According to the law the private participant is assured of a 6 percent dividend on his share capital. The company is expected to meet all the costs from its revenues and pay the dividend. However, the state government undertakes to pay the dividend if the company is unable to do so. At present, the company is virtually owned by the state and it would be a long time before private capital is attracted. The state increases the capital of the company every year by transferring funds from its resources, and this will have to continue for many years to enable the company to expand its activities. Only a few water supply systems of small cities are under the purview of the company and it has acquired little operating experience. In the case of Belo Horizonte, the capital of the state, a water supply project estimated to cost about US \$25 million is under construction. An IDB loan covers about 48 percent of the cost. The DNOS contribution is about 42 percent; and the balance would be the municipality's share. In three of the larger towns in the state, projects have been approved under the national loan fund under which the cities are required to contribute one-third of the total cost of the project. In a number of smaller communities in the state all the other federal and regional agencies are financing projects, and in these, virtually there is no state and local contribution to capital investments. In six cities FSESP has responsibility for operation of the systems through SAAEs, and apparently the rates would cover operating costs in these cases. Thus one sees a variety of approaches to financing of projects in this state.

South

75. In the southern states of Parana and Rio Grande do Sul, federal grants to water supply projects seem to play a minor role only. In this area there is evidence of active local participation in the financing of projects, particularly in the state of Parana.

76. Parana: Since the creation of the company SANEPAR, most of the available resources are channeled through it. SANEPAR derives its resources from state allocations and transference of funds from other agencies. SANEPAR lends up to 50 percent of the cost of the project to

the municipality at an interest rate of 12 percent per annum. The amortization period is 20 years. The municipality finds its share of the cost of the project from its own revenue resources and such federal grants as it is able to get. In order to meet its obligation the municipality creates a sanitation fund made up of a share of the municipal revenues and a betterment levy collected from the consumers. Parana is the only state in which a loan program of this type is in operation. SANEPAR began its lending operations in September 1964, with a loan of Cr. 108 million for a water supply project. During the year 1965 it gave 17 loans amounting to Cr. 2.75 billion and in 1966, 22 loans for a total value of Cr. 6.64 billion. GEF has made a loan to SANEPAR which would be re-lent to the individual municipalities by SANEPAR. This loan for Cr. 5 billion would be matched by Cr. 10 billion from the state and municipalities.

77. Rio Grande do Sul: In the Porto Alegre water supply and sewerage improvement project estimated to cost about US \$7 million, the participation was 3 percent by DNOS, about 7 percent by the state, about 45 percent from local resources and the balance from an IDB loan. Water supply and sewerage projects in most of the cities in Rio Grande do Sul come under the purview of the new company CORSAN which receives financial support from the state government in the form of initial capital. All future investments in these cities would be through this company and direct state investment in individual projects would be very little as such investments would be limited to a few already under construction. The company adopts a uniform water rate for all of its systems and follows a policy of reinvesting a fixed percentage (about 28 percent) of its total water revenues in new construction. However, this source of funds is far too inadequate to meet the investment needs of the fast-growing urban population in the state. The company would have to look for investment capital elsewhere.

D. General Discussion

78. National Loan Fund: In general, the grant-in-aid program has been one of small grants to a large number of cities. None of these grants individually or collectively provides enough funds for quick and efficient completion of each project. The need for a more realistic method of financing has been recognized in the more advanced urban areas in the country. At the federal level, a beginning has been made in this direction with the creation of the National Loan Fund for water projects. Its operations provide for the channeling of the Government's funds into a federal revolving fund to be used for giving loans for new, enlargement or improvement schemes for water and sewerage in the cities. It also provides for the maintaining of an administrative agency with qualified personnel to administer the loan fund at the national level on a sound business basis. One of the main aims of this endeavor is the establishment and development of suitable agencies at the state level to assist the municipalities in the field of water supply and sewerage without assuming operational responsibility. Simultaneously the municipalities are to be encouraged to take over the responsibility for operating and maintaining the facilities and to meet their financial obligations. As stated

earlier, a similar loan fund mechanism has been created in the state of Parana, and SANEPAR has been entrusted with the responsibility of administering this fund. The National Loan Fund has so far received U.S. Government loans amounting to Cr. 24 billion and Brazilian Government contributions of Cr. 9 billion. A further U.S. Government loan of US \$15 million is anticipated. As a condition of the loan, matching contribution to the fund would be expected from the Brazilian Government.

79. At the end of December 1966, the National Loan Fund had approved loans to SANEPAR and to 16 cities totaling Cr. 32 billion. In addition, 20 cities have applied for loans totaling to Cr. 36 billion out of which 12 applications for a total amount of Cr. 26 billion are ready to be signed. All the loans approved and those under consideration are for water supply projects. There is a time lag of three months to one year between the signing of the loan and actual use of funds. Up to the end of December 1966 a total of about Cr. 2 billion had been released to three cities.

80. The following conditions for lending from the National Fund are enforced (i) one-third of the total cost of the project must be borne directly by the municipality and must be available before the loan is paid to the borrower; (ii) the municipality must guarantee the loan through a lien on the tax funds returned to the municipality by the federal government and must enact legislation giving the water department administrative and financial autonomy; (iii) rates must be established so as to assure funds for both fixed and operating costs; the rate would be adjusted automatically with the minimum wage; (iv) the loans are interest free; however, the loan contract requires a maintenance of monetary value in the amount to be repaid which would be automatically adjusted with any change in the minimum wage; (v) a 2 percent annual service charge on the loan is payable on the declining balance from the date of signing of the loan agreement; (vi) the period of grace would be two years beginning with the date of transference of the first loan installment for construction purposes to the city.

81. The loan fund is proposed to be used generally in the cities with population over 20,000 and the very large cities are also to be excluded. A number of cities have taken special measures to have projects prepared and to generate funds to meet a third of the cost of the project. However, this requirement has been the most difficult to satisfy as the main problem is not one of servicing the debt but that of raising initial capital. It is not therefore clear why interest-free loans are given while adhering to a rigid requirement of one-third local contribution. The proposed method for the maintenance of the monetary value of the loan to be repaid is also open to discussion. In general, however, the loan program indicates a progressive step towards solving the water supply and sewerage problems in the country. Judging from the number of projects submitted for approval, the loan program seems to have enthusiastic support from the cities. The progress achieved during the next two or three years will set the pattern for future development. It would depend on the financial resources made available to the loan fund and the response of GEF in processing loan applications as well as assisting in project implementation.

82. An important aspect of the loan program is its emphasis on local participation and the development of municipal responsibility for water and sewerage facilities that will place these services on a self-sustaining basis. While this approach is in keeping with the municipality's constitutional responsibility for these public utility services, it is necessary to enable the local body to exercise these functions effectively. The municipal revenue is made up of municipal taxes, fees and charges, shared taxes (taxes collected by state or federal governments and returned in part to the municipality) and revenues from the sale or rental of municipal property. It is through the shared taxes that every municipality is assured of the minimum revenue needed for administration. How far the recent taxation measures and changes introduced under the new constitution would affect municipal autonomy and revenues is not known. Among the local development works, water supply and sewerage projects call for substantial capital and investments initially and further capital investments at periodic intervals for expansion of the system as the city grows and for renewals and replacements. With all the fiscal support so far received for these projects from federal and state governments, hardly 50 percent of the population is served by water supplies even in cities provided with water supply systems. The position in regard to sewerage is worse. On the other hand, the need for investment capital at the municipal level is continuously increasing because of rapid urbanization and population growth. It is in this context that the loan program offers a new and imaginative approach to fiscal support for these projects through the maximum utilization of local resources and by development of the principle of financial reimbursability and self support of projects. The program deserves greater support by the expansion of the availability of national and international loans.

83. Although the principle of financial reimbursability and self support of projects is accepted in many areas of the country, federal grants through DNOS, FSESP, etc. are available to projects of any size. This results in conflicts at the state level especially when the state financing agency proposes a loan program. In view of these conflicting methods of approach, it is necessary that an early decision is taken in regard to the utilization of federal grants.

84. It is recognized that federal and state grants for water supply projects would be necessary in the rural areas and in special cases. Since no reliable data exists on the rural water supply situation in the country, it is difficult to estimate the requirements. The Planning Ministry in their proposed ten-year plan have suggested that 10 percent of the total investment in the sector may be set apart for grants. A beginning could be made on this basis but the type of projects eligible for grants should be clearly specified by the authority in charge of the program. In all other cases, it would seem that the federal government could exercise their function of stimulating development in this sector by channeling their allotments through the loan fund at the federal

level and by contributing to the capital of the financing agencies set up in the states. Until a policy decision is taken, dependence on federal grants as the major source of capital will continue and to that extent all other efforts at mobilization of local resources will suffer.

IV. MATERIALS AND EQUIPMENT

85. Materials and equipment generally needed in water supply and sewerage projects are all manufactured in various parts of Brazil and are readily available.

Cast Iron Pipe

86. There are two main manufacturers of cast iron pipes in the country. One of these is located in the state of Minas Gerais near the capital city of Belo Horizonte. This company produces about 30,000 tons of cast iron pressure pipes per year, and has a total production capacity of about 60,000 tons per year for all kinds of pipes and specials. The other manufacturer has two factories, one of which is near Rio de Janeiro and the other is in Sao Paulo having a total production capacity of 70,000 tons per annum. An expansion program to increase the production capacity to 100,000 tons is underway and ductile iron pipes are also to be manufactured. Pipes in the range of 50 mm to 600 mm in diameter are generally manufactured by these companies along with all the specials, valves and other accessories needed in water supply and sewerage projects. The two companies are able to meet the present demand for cast iron pipes in the country. The general impression is that these locally produced pipes might not be internationally competitive in price. According to one estimate, the difference in price may be up to 30 percent.

Other Pipes

87. Steel pipes are manufactured within Brazil and there seems to be no problem about their ready availability. Asbestos cement pressure pipes are manufactured in Sao Paulo, Rio de Janeiro and other parts of the country. Part of the asbestos used in the manufacture is imported. Up to the 150 mm size, the asbestos pipes are very competitive in price to cast iron pipes. In the larger diameters, the price differential is not great. Polyethylene and polyvinyl chloride pipes are also manufactured.

Water Meters

88. There are five major water meter manufacturing companies located in Sao Paulo, Rio de Janeiro and Belo Horizonte. Operational problems have been experienced with some of these meters and steps have been taken to improve the quality. There does not appear to be any shortage of water meters at present.

Other Equipment

89. Pumps, motors, electrical and mechanical equipment needed in water supply and sewerage projects are manufactured in the country and are readily available. Chlorinating

equipment is proposed to be manufactured in Sao Paulo. Well-drilling equipment seems to be available within the country in sufficient number.

90. In general, the supply of equipment and material is not a bottleneck in the water supply and sanitation program at present. It is recognized, however, if the present rate of construction is accelerated the position may become less favorable. However, the manufacturing concerns who are now operating only one shift a day could easily increase their output to satisfy the needs if they have an assurance of greater demand. The complaint from the manufacturers is that in the absence of a clearly defined program they are unable to plan expansion of production to meet the anticipated demands.

Foreign Exchange Requirements

91. Most of the projects could be constructed with indigenously manufactured equipment. Only the highly sophisticated equipment required in exceptional cases has to be imported. Therefore, in the water supply and sewerage projects the actual foreign exchange component would generally be of the order of 5 percent only. However, if international competitive bidding is applied for materials and equipment, the percentage would be substantially higher, probably of the order of 30 percent.

V. CONCLUSIONS AND RECOMMENDATIONS

92. A survey of the existing situation in this sector indicates that in the majority of the 31 large cities of 100,000 or more inhabitants (1960 census), water supply projects to meet the requirements of the next 10 to 15 years are under implementation with national and international financial resources. In a few of these cities, limited sewerage systems also exist and some improvements and extensions are being carried out. None of these cities has a complete sewerage system and a large task awaits accomplishment. Among these, the largest single problem is that of the Sao Paulo metropolitan area. Under any water supply and sewerage program, the problem of Sao Paulo would merit the highest priority in view of its magnitude, complexity and the population affected. A comprehensive water supply and sewerage project for the Sao Paulo metropolitan area would call for massive capital investments that are difficult to raise within the country for this purpose. However, as the potential for repayment of loans exists, a viable project to meet the requirements of international lending agencies could be prepared.

93. Among the towns with less than 100,000 inhabitants, a number of water supply projects have been started but not completed. A large majority of the towns of this size are in need of water supply improvements. Projects are ready for a number of cases, and are under preparation in many others. Sewerage projects for most of these towns are yet to be studied. In the coming years the demand for implementation of projects would be a maximum in this category of cities and towns. Some of the large cities in this group also might be able to utilize international loans on conventional terms. In respect of some 200 smaller cities in this group, financing arrangements involving international assistance have already been made. Other cities and towns will have to depend upon national resources.

94. The position in regard to the rural population served by public water supply systems is not clear. The scattered nature of the rural population agglomerations and the absence of any specific program directed towards the rural phase of the problem in the entire country would indicate that the population served is very small.

95. With the rapid urbanization taking place in the country, the unserved population is steadily increasing. At the present rate of construction, it is not possible to achieve the goals of the Punta del Este charter, i.e., providing safe water supply and satisfactory sewerage disposal arrangements for 70 percent of the urban population and 50 percent of the rural population by 1970.

96. Federal assistance to water and sewerage projects in the country is mainly in the form of grants. The indiscriminate use of grants for projects of all sizes ranging from those of large capital cities of states to very small towns with rural characteristics can hardly be justified when a number of cities have demonstrated their ability and willingness to implement projects with local resources supplemented by federal loans. The creation of the loan fund for financing water and sewerage projects in the country is a step in the right direction and the loan program should be implemented more vigorously. There is an increasing awareness in the country, as seen from the number of new financing arrangements recently introduced at the state and local levels, that water and sewerage projects can and should be promoted on a self-sustaining basis. The grant-in-aid policy pursued by the federal government is in fact inconsistent with the financing policies adopted by some of the states. A more imaginative use of the federal funds is called for to promote the development of these essential public utility services in the country. An early announcement of policy in this regard would help future progress in this sector.

97. In some of the states, autonomous authorities or companies have been established to help finance water and sewerage projects. The main attraction of this approach is the acceptance of the principle of financial reimbursability and self support of projects. This is a healthy development and has the advantage of removing from the state and central governments the habit of grants-in-aid and gradually reducing the onus of providing funds for them. All the states should be encouraged to follow this approach. Although the concept of paying for water and sewerage services seems to be gaining ground in the country and water and sewerage revenues are collected in a number of cities, the rates in general appear to be inadequate to meet even the operating costs. A review of the water and sewerage rates under each project should be made and the rates increased sufficiently to place the projects on a self-supporting basis.

98. Numerous agencies with overlapping jurisdictions and functions are engaged in the implementation of water supply and sewerage projects. The fragmentation of available resources by the various agencies leads to inefficient utilization of resources, delays in project implementation and increased cost of projects. At the federal level, there is an urgent need to consolidate the activities of the several agencies to ensure a more rational utilization of financial and manpower resources. A reform in this respect is long overdue.

99. At present, some of the federal agencies not only assume responsibility for construction of projects, but also for operation and maintenance. Every effort should be made to decentralize these functions and to shift the responsibility to the municipality where it rightly belongs.

100. Most of the materials and equipment needed in the water and sewerage projects are manufactured in Brazil and are readily available. Further increase in production to meet anticipated demands in future seems possible without much difficulty. In general, the foreign exchange requirements for the water and sewerage projects is low, being restricted to the cost of specialized equipment not manufactured in the country. However, domestic equipment is not competitive for some items and the import proportion may reach 30 percent if international competitive bidding is applied.

101. A noticeable feature of the water supply and sewerage program is the emphasis given to the training of personnel, particularly at the operating level. Sustained efforts in this behalf are called for over a number of years and necessary financial support for this purpose should be given.

102. A number of studies have been made and statistical data has been collected about the existing situation by the different agencies. It should be possible to consolidate the information available from these sources (supplemented to the extent necessary by rapid surveys) and formulate future plans on more realistic data than has been done so far. Because of the different stages of economic development of the states in the country, the future needs and programs therefor should be prepared for each state.

103. In the present decade, water and sewerage projects in the country have received considerable attention and a number of projects are under implementation. Rapid institutional changes have occurred in the past three years and a new approach to the financing of these projects through loans and self help in the place of grants is gradually emerging. Water projects naturally receive priority and there would be a time lag of a few years before sewerage facilities are also provided. With proper stimulation from the federal and state governments through adequate fiscal support, the loan programs could expand rapidly and it should be possible to provide water supply to 80 percent and sewerage to 50 percent of the urban population by 1976.

BRAZIL - Population Projections Up to 1980

(Mid-year in Millions)

<u>1950</u>	<u>1955</u>	<u>1960</u>	<u>1965</u>	<u>1970</u>	<u>1975</u>	<u>1980</u>
52.2	60.5	70.1	81.1	93.3	107.2	123.0

Source: EPEA: Demografia Diagnostico Preliminar.

BRAZIL: Regional Distribution of Population
(In thousands)

	<u>North</u>		<u>Northeast</u>		<u>East</u>		<u>South</u>		<u>Central-West</u>	
	<u>Abso- lute</u>	<u>%</u>								
1872	332.9	3.35	4,638.6	46.71	4,016.9	40.45	721.3	7.26	220.8	2.22
1890	476.4	3.32	6,002.0	41.87	6,104.4	42.59	1,430.7	9.98	320.4	2.23
1940	1,462.4	3.55	14,434.1	35.00	18,345.8	44.49	5,735.3	13.91	1,258.7	3.05
1950	1,844.6	3.55	17,973.4	34.60	22,548.5	43.41	7,840.9	15.10	1,737.0	3.34
1960	2,600.1	3.66	22,430.3	31.61	31,056.4	43.76	11,873.5	16.73	3,006.9	4.24

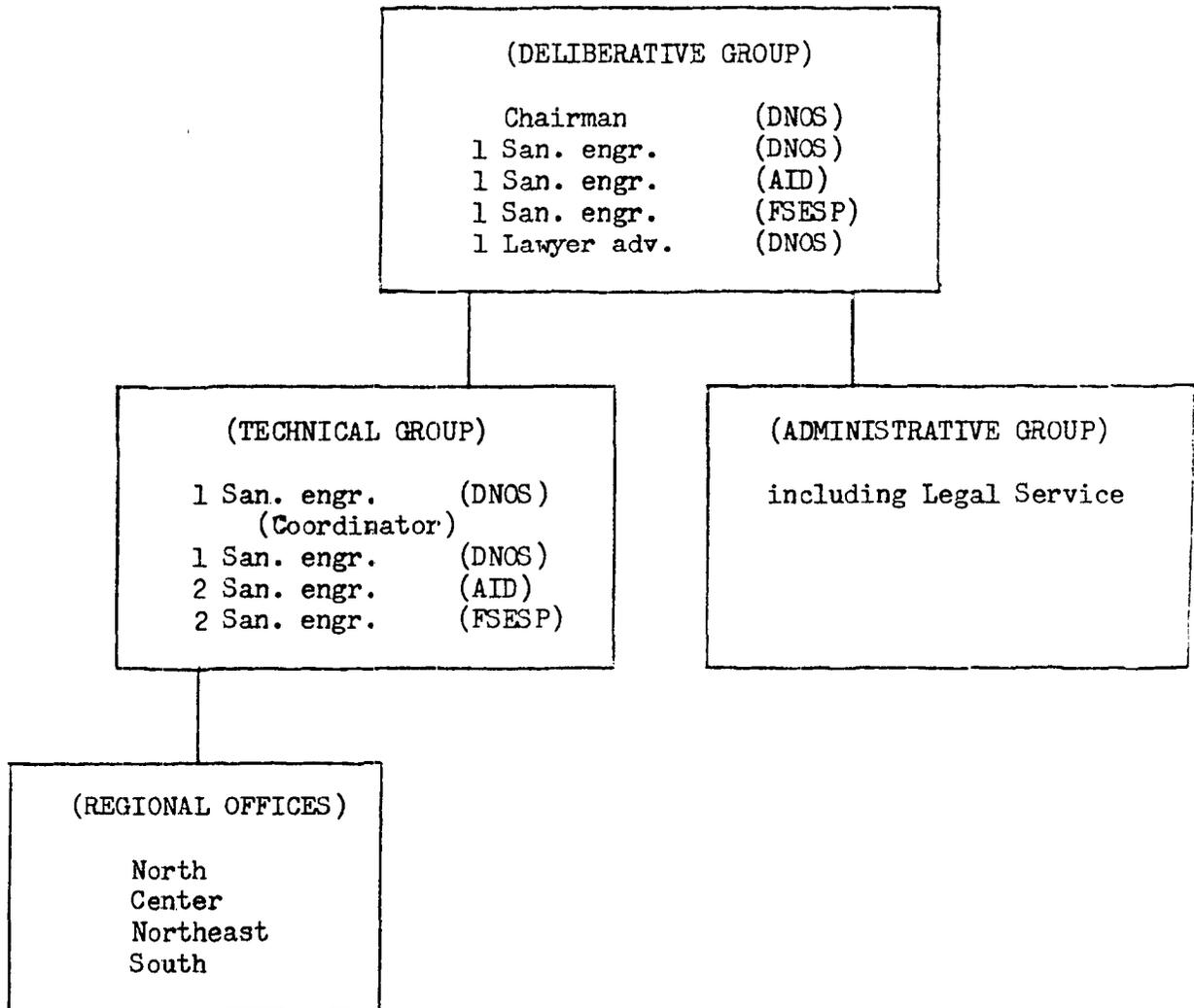
Source: IBGE data.

Number of Cities with Water Supply Systems
in Operation with FSESP Assistance

<u>States</u>	<u>Number</u>
Amazonas	5
Para	20
Maranhao	6
Piaui	2
Ceara	10
Paraiba	2
Pernambuco	6
Alagoas	4
Sergipe	2
Bahia	11
Espirito Santo	8
Rio de Janeiro	1
Minas Gerais	6
Mato Grosso	2
Santa Catarina	<u>2</u>
TOTAL	<u><u>87</u></u>

GEF*

LOAN BOARD



Projects* Approved Under National Loan Fund - GEF

City - State	Pop.Served (Est. 1965)	Loan	City Counter- Part	Total Construc- tion Cost
Joinville - SC	65,000	1,480,000,000	740,000,000	2,220,000,000
Nova Friburgo - RJ	60,000	1,184,000,000	592,000,000	1,776,000,000
Ponta Grossa - PR	99,000	1,766,700,000	870,215,000	2,636,915,000
Limeira - SP	60,000	1,200,000,000	600,000,000	1,800,000,000
Governador Valadares- MG	100,000	696,000,000	340,000,000	1,036,000,000
Ribeirao Preto - SP	154,000	600,000,000	300,000,000	900,000,000
Bauru - SP	105,000	2,665,500,000	1,332,000,000	3,997,500,000
Campo Limpo - SP	5,987	488,000,000	244,000,000	732,000,000
Itabuna - Ba	78,914	1,960,000,000	980,000,000	2,940,000,000
Pelotas - RS	155,248	1,780,210,648	890,105,325	2,670,315,973
Territorio Federal do Amapa - AP	40,400	2,000,000,000	1,000,000,000	3,000,000,000
Companhia de Sanea- mento do Parana - SANEPAR	1,000,000	5,000,000,000	10,000,000,000	15,000,000,000
Juiz de Fora - MG	157,500	3,260,000,000	1,640,000,000	4,900,000,000
Sorocaba - SP	150,000	2,748,666,000	1,374,334,000	4,123,000,000
Valenca - RJ	25,540	390,000,000	195,000,000	585,000,000
Uberaba - MG	78,866	2,242,720,000	1,121,360,000	3,364,080,000
Blumenau - SC	62,354	2,540,000,000	1,270,000,000	3,810,000,000
	2,397,809	Cr.32,001,796,648	Cr.23,489,014,325	Cr.55,490,810,973

*All water supply projects

Projects Pending Approval - National Loan Fund - GEF

City - State	Loan in Cr. 1,000	Project Cost in Cr. 1,000	Population (Estimated 1965)
Sao Carlos - SP	1,460,000	2,200,000	62,000
Campinas - SP	7,000,000	10,500,000	192,000
Americana - SP	1,660,000	2,500,000	40,000
Aracatuba - SP	3,000,000	4,500,000	65,000
Corumba - Mt	1,370,000	2,060,000	49,000
Anapolis - Go	2,000,000	3,000,000	48,000
Tres Pontas - MG	474,516	711,774	13,000
Cassia - MG	240,000	350,000	8,956
Caruaru - Pe	4,400,000	6,700,000	70,400
Santa Rita - Pb	886,800	1,330,000	25,000
Olinda - Pe	1,234,000	1,851,000	118,455
Juazeiro do Norte - Pe	1,200,000	2,248,160	65,000
Campo Grande - Mt	2,000,000	3,000,000	120,000
Caxias do Sul - RS	4,000,000	12,000,000	80,000
Rio Grande - RS	1,400,000	4,200,000	83,000
Rezende - Rj	500,000	1,500,000	39,000
Franca - SP	2,000,000	3,000,000	60,000
Tres Lagoas - Mt	400,000	600,000	14,000
Brusque - SC	222,642	333,963	18,700
Rio do Sul - SC	700,000	1,050,000	17,500
	<u>36,147,958</u>	<u>63,634,897</u>	<u>1,189,011</u>
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State and Municipal Organizations for Water and SewerageI. Sao Paulo

1. In the state of Sao Paulo, water and sewerage services come under the purview of the Secretary for Works and Public Services. Three of the five departments under the Secretary, viz, DAEE, DAE and DOS deal with water and sewerage projects. The DAEE is the Water Resources and Energy Department and its principal responsibility includes planning and controlling the use of water resources in the state. This department is at present studying the Upper Tiete River Basin in collaboration with the other departments in the state. A regional plan is to be prepared for every river basin in the state, with a view to exercising some control on river pollution and to ensure the optimum utilization of water resources in the state.

2. The DAE (Departamento de Aguas e Esgotos Sanitarios) is mainly in charge of water and sewerage services in the Sao Paulo Municipality. It is an 'autarquia' but it has no legal autonomy. The DAE is under the charge of a Director General who has 21 divisions and sections under him. There is little delegation of authority to the various divisions and sections, and the Director General deals with these divisions directly. Coordination between the divisions and sections is not adequate. The DAE employs some 190 engineers and has a total staff of about 6,000. The 1967 budget of the department is about Cr. 131 billion, 66 percent of which is estimated to be the likely capital expenditure during the year.

3. The DAE prepares preliminary plans and estimates for water supply and sewage projects for the Sao Paulo Metropolitan Area, supervises construction of these works and is in charge of the distribution of water to the municipality of Sao Paulo. At present the DAE sells water in bulk to the seven cities of Santo Andre, Sao Bernardo, Sao Caetano, Carapicueiba, Barueri, Guaruinhos and Osasco in the metropolitan area, and has agreed to sell water to one or two others. As yet, the metropolitan area has not been defined by law and the number of communities that are likely to be included in the metropolitan area is not known.

4. At present the DAE is in charge of operation and maintenance of water and sewerage works in the metropolitan area. An estimated 3 million population is stated to be served by the water supply systems and there are about 600,000 connections in all, most of which are metered. However, very few of the meters are stated to be in good working condition. Recently the state legislature has approved a new water rate law based on the minimum wage applicable in the state. A population of about 1.8 to 1.9 million is estimated to be connected to the sewerage system and the wastes from the rest of the population find their way to the water courses in the area.

5. The DAE also collects the water and sewerage revenues in Sao Paulo city. The revenues are collected once in two months. Since 1962 there has been a public education campaign on rates but collections are still poor and the delinquent accounts are estimated to be at least 25 percent. Revenue has been increasing steadily from 1963 but still does not cover the entire operation and maintenance cost of the water and sewer systems.
6. From time to time the question of setting up of an independent authority for taking charge of the water supply and sewerage systems in the Sao Paulo metropolitan area has been discussed but these have not resulted in anything tangible so far. The need for reorganizing the DAE is well recognized and some concrete action in the near future may be expected. The state government might have to employ consultants to advise on the type of organization needed, financial planning, rate structure, etc.
7. The DOS (Departamento de Obras Sanitarias) is under the direction of the Secretary of Works and is not an autarquia. The department's activities may be classified under two broad categories: (1) areas where it is directly in charge or is responsible for water supply and sewerage; and (2) areas where it assists municipalities in implementing water and sewer projects. A few cities near Sao Paulo come under the first category. In the cities of Santos and Cubatao which have a total population of 300,000 the water works are managed by an agency called SASC (Servico de Agua de Santos e Cubatao). Sewerage, sewage disposal and drainage in the city of Santos and the adjacent city of Sao Vicente are the responsibility of another agency called R.S.S. (Reparticao de Saneamento de Santos). It is felt that the Santos-Cubatao area might need a single authority in future and the organizational needs of the area are to be studied.
8. The second category covers technical assistance to some 500 municipalities in the state. At present urban population in these municipalities is estimated to be about 5.2 million out of which about 60 percent is estimated to be provided with water but these supplies are intermittent and large investments will be needed for improving them.
9. The DOS has a staff of about 80 engineers and 400 others. The organization of the DOS is also under review and an autonomous body may be set up in the future. The DOS used to have a division to deal with rural water supply problems but this has ceased to function. A small and weak section of sanitary engineering in the Ministry of Health is now supposed to deal with rural water supply and to exercise control over quality of water in the state.
10. The federal agencies DNOS and FSESP have in the past spent limited amounts on construction of water projects in the state. FSESP does not have a program in this state now.

11. Guanabara. Guanabara is a city state in which Rio de Janeiro (1960 population: 3.2 million) is situated. Water and sewerage services in this city have undergone a number of reorganizations during this century. In 1957 the Superintendency of Urban Development and Sanitation (SURSAN) was created. It is comprised of the Urban Development Department, Water Department and Sewerage Department. In 1965 the Water Department was transformed into a company called CEDAG (Companhia Estadual de Aguas Da Guanabara) with an initial capital of one billion cruzeiros. The law requires the state of Guanabara to have a controlling interest in the company. CEDAG at present is almost completely owned by the state government. It began functioning in 1966. The president of the company is appointed by the state for a four-year term of office. The company has the following four departments each of which is under a director: (i) planning and works; (ii) operation and maintenance; (iii) auxiliary activities including administration, and (iv) commercial and financial activities. The directors of the four departments, the president of the company, a representative of the employees and a representative of the opposition party in the state Assembly constitute the governing council of the company. The company has been given responsibility for the planning, construction, operation and maintenance of water supply systems in the state of Guanabara. The company has also the authority to collect water revenues from the consumers. The water rate is related to the minimum wage in the state and is fixed by law.

12. After CEDAG was established the primary responsibility of SURSAN is for sewerage and sewage disposal. In 1959 a commission for planning sanitary sewers called COPES was established as a special planning commission within SURSAN to direct and coordinate various studies and investigations, as well as to develop a master sewerage plan for the state of Guanabara.

13. Water and sewerage rates used to be collected by the state of Guanabara but from the current year, CEDAG will collect both. The sewer rate is based on water consumption and is in fact an exact duplication of the water charges. The proposal is to issue separate bills for water and sewerage. The bills are collected on a quarterly basis and deposited in a separate account in the Bank of Guanabara. CEDAG expects a revenue of about US \$13 million from water rates during the year 1967. CEDAG has been in operation for about a year only and has yet to tackle the major problems of the distribution system in the city of Rio de Janeiro. The distribution system has many major leaks and is in need of urgent attention. The unaccounted for water, which seems to be mostly due to leakages in this case, is estimated to be at least 30 percent of the total supply. Although the water receives conventional treatment in rapid sand filters and is disinfected with chlorine, its quality at the consumer's end cannot be assured because of the defects in the distribution system and the use of storage reservoirs in the buildings. The use of such storage reservoirs and internal pumping arrangements in the buildings would not be necessary in majority of the cases if a secure supply of water under reasonable pressure were available. Federal organizations like FSESP and DNOS have no program for water supply and sewerage in this state.

14. Rio Grande do Sul. The population of the state is reported to have increased by about 60 percent during the decade 1950 to 1960 but the provision of water and sewerage services did not keep pace with this growth. Realizing that the traditional approach with state subsidies for water works construction was not making any impact on the problem, the state government established an autonomous company at the state level to promote water supply and sewerage projects on a self-supporting basis. The company called CORSAN (Companhia Rio-grandense de Saneamento) was created by a state law in December 1965 with an initial capital of Cr. 15 billion. The law also required a minimum state subscription of 51 percent toward the capital. The company came into being in 1966 and it is getting organized to take over responsibility for water supply and sewerage in most parts of the state. Porto Alegre which is the capital city of the state has a separate organization of its own. The six cities of Pelotas, Riogrande, Sao Leopoldo, Caxias do Sul, Bage and Santano do Livramento also have their own independent organizations. Some 103 cities in the state come under the purview of CORSAN. These are essentially small cities and towns. In these cities, CORSAN is responsible for the planning and execution of new works, along with improvements and extensions to existing water and sewerage installations. It has authority to operate the systems, fix water and sewerage rates in order to amortize investments, pay for operation and maintenance costs and to constitute a reserve fund for financing the expansion of services. The company is authorized to enter into necessary agreements or contracts for achieving its objectives.

15. The company is administered by a president and three directors, all of whom are appointed for a four-year term of office. CORSAN prescribes a uniform rate for water throughout its area of operation. It is estimated that there are some 200,000 connections in the cities under purview of CORSAN. Hardly 20,000 connections were reportedly metered when CORSAN began its operations and in one year the company increased the metered connections to 80,000 and also increased the water rates. This is a significant achievement made by the company in its very first year of operations. CORSAN expects to invest about Cr. 7 billion in various projects during the year 1967. The population of the state is expected to increase to about 7.24 million (4.2 million urban) by 1971. A survey is being made to determine the total needs of the state excluding Porto Alegre and the six cities which are not under the purview of CORSAN.

16. The water supply and sewerage for the city of Porto Alegre which has a present population of 800,000 is under the charge of the Departamento Municipal de Agua e Esgotos (DEMAE). The DEMAE was created as an autonomous authority in 1963 by a municipal law which specifies its functions and responsibilities. The law also specifies the criteria for calculating the water rates for different levels of consumption as a proportion of the basic rate; likewise, the basis for calculating the sewerage rates is also indicated. The basic rate is fixed every year by the municipality and the details are worked out by the DEMAE in accordance with the law. The present arrangement makes it possible for DEMAE to forecast their revenues and to plan for the investment. The estimated revenue for 1967 is Cr. 9.64 billion from sale of water and Cr. 2.12 billion for sewer services. The capital budget of DEMAE for 1967 is about Cr. 16 billion.

17. It is estimated that 680,000 people out of a total of 800,000 in Porto Alegre are served by the present water supply system. The project which is currently under construction with an Inter-American Bank loan is expected to cater to a total population of about 1.25 million. The position in regard to sewerage, however, is quite different. The existing system with the proposed minor improvements would cover only about 25 percent of the present population. A preliminary study of the sewerage needs of the city has been made but a detailed scheme has not yet been prepared.

18. The projects in this state are somewhat cheaper than in the other states because of slightly lower labor costs and the availability of almost all the materials and equipment needed for these projects from within the state. The federal organization involved in this sector other than DNOS have no programs in this state.

19. Parana. This is the first state to establish a company at the state level for planning and construction of water supply and sewerage schemes financed by state loans to municipalities. This company called SANEPAR was created in 1963 by a state law with a capital of Cr. 100 million. Approximately 98 percent of the capital belongs to the state government and state-owned companies, and the rest comes from private parties. Prior to the formation of the company, a department of the state (DAE) was in charge of the water supply and sewerage schemes. Investment funds were derived from state resources and small amounts collected from rates. These were hardly sufficient to take up 20 water supply schemes in the state up to 1963. There were no programs or priorities and water rates were very low. Capital construction was financed from grants and hardly 10 percent of the municipalities benefited. One of the problems was the rapid increase in the number of cities in the state from 80 in 1950 to 162 in 1960 and 279 in 1966. Such a rapid creation of new urban nuclei called for a parallel augmentation of water supply construction. The state government changed the policy in 1963 and established a state loan fund called FAE (Fundo de Agua e Esgotos) for financing these projects and created SANEPAR to administer it. The company gives loans to the municipality to cover 50 percent of the project cost provided the municipality agrees to create an autonomous municipal authority or a company to administer the water supply system for the city. The company also requires the creation of a municipal fund for sanitation to pay part of the construction costs. The municipality guarantees the loan and continues to shoulder the responsibility for repayment even though an autonomous authority is created. The main reason for the creation of the autonomous authority is to enable the organization to charge adequate water and sewer rates without political interference. SANEPAR either builds the facilities through its own staff or supervises construction done under contract. It has so far entered into 41 contracts in the state, nine of which have been completed and are under operation. SANEPAR has a total staff of 70, of whom 18 are engineers. The staff is located at Curitiba, the capital of the state. SANEPAR does not undertake operation and maintenance of water works. Even in the nine water works built by SANEPAR, problems of operation exist. SANEPAR proposes to assist in the

improvement of operation and maintenance by arranging a number of training courses for operators. Another proposal envisages the establishment of a state control organization with powers to inspect water and sewerage systems and to interfere if necessary, to ensure proper operation and maintenance. The proposed organization would also have responsibility for control of river pollution in the state. In 1966, the capital investments made by SANEPAR from its funds was about Cr. 4 billion. In addition, allocations made by other agencies like CODEPAR (company for economic development in Parana), DNOS, CPCAM (Coal Commission), SPVERFSP (Southwest Frontier Commission) and PETROBRAS (Government oil company) to SANEPAR for investments in water projects amounted to about Cr. 1.38 billion.

20. The same law that created SANEPAR provided for the changing of the structure of the DAE in the state which was formerly responsible for water supply and sewerage projects. At present, DAE operates and maintains all the old water works in the state, including that of Curitiba which accounts for about 70 percent of its total work load. The Curitiba system is expected to be handed over to the municipality for operation and maintenance this year. Eight other systems have been handed over already to the municipalities. A part of the Curitiba water supply project is financed by DNOS grants and in 1967 DNOS has allocated about Cr. 2.08 billion for construction grants to water supply and sewerage projects in Parana state. FSESP has no program in this state.

21. Santa Catarina. There is no state-wide company such as CORSAN but some notable achievements have been made at the municipal level. The city of Joinville (population 65,000) has created an autonomous authority called Servico Autonomo Municipal de Agua e Esgoto (SAMAE). A new water supply project has been completed recently with a loan received from the National Loan Fund for Water. The SAMAE has prescribed the water rates at a sufficient level to repay the loan and meet other obligations. The water supply project for the city of Blumenau (population 62,000) also approved under the National Loan Fund program is under construction and projects for two other cities are awaiting approval under the program. Autonomous water authorities will be created in all these cases. Most of the other communities in this state depend upon the DNOS and FSESP for construction grants and on FSESP for assistance in operation and maintenance of completed projects.

22. Minas Gerais. In the state of Minas Gerais a state-wide water company called COMAG was formed in 1963 with the objective of planning projects for execution in the entire state in the field of drinking water and sanitary sewerage. The company is regulated by laws applicable to private companies in the state. Its staff is subject to labor laws and the company operates for a profit. The state is required by law to have a minimum of 51 percent of the shares in the company. Presently the state is the major owner of the company having over 90 percent of the shares. The main reason for the setting up of the company was a change of policy and a desire to place water supply and sewerage schemes on a self-supporting basis. Prior to 1963 water supply schemes were built to

a limited extent with state resources and were given as a free gift to the local bodies. These systems quickly went out of order due to poor maintenance. Administrative and technical talent at the municipal level were inadequate for taking care of these projects. COMAG is set up to fill this gap and provide the necessary administrative and technical help to the municipalities. COMAG builds the systems for the municipalities and enters into contract with the local authority for operating the system. The company performs these functions either directly through its staff or through local subsidiaries utilizing the technical and administrative talent of COMAG. At present, COMAG has projects in 9 municipalities and operates 5 waterworks.

23. According to the 1960 census, the total population of the state was 10 million and the urban population was about 4.5 million, and there are 722 municipalities in the state (about 18 percent of all the municipalities in the country). There are some 26 towns in the population range of 20,000 to 40,000 and 18 towns having a population in excess of 40,000 in each. A number of these towns have intermittent systems of doubtful quality. COMAG proposes to utilize federal loan funds in the larger towns and to use these projects as focal points for furthering the idea of self-supporting projects. In this manner the company plans to expand its activities gradually without sacrificing efficiency. As far as possible, COMAG also proposes to work with other federal agencies that may be investing in the sector so that the resources are pooled and applied for common purposes on a more efficient basis than at present. In the selection of the projects also, COMAG gives high priority to completion of projects on which construction has been started by other federal agencies. COMAG is considering an investment program of the order of Cr. 42 billion in the next 3 years beginning with Cr. 6 billion in 1967. The total investment made by COMAG up to 1966 was only Cr. 3.74 billion. The law authorizes COMAG to fix water rates and to collect water revenues. COMAG has prepared a detailed schedule for calculating water rates for different categories of consumers.

24. Belo Horizonte the capital city of the state, does not come under the purview of COMAG. A new department, DEMAE (Departamento Municipal de Aguas e Esgotos) created about a year ago is responsible for water supply and sewerage systems in this city. DEMAE is an 'autarquia' with technical, administrative and financial autonomy. It is directed and administered by a Director General who is a civil or sanitary engineer appointed for a period of four years. A Municipal Water and Sewer Council appointed by the Mayor oversees the work of DEMAE and decides policy. A water supply project for the city partly financed by the Inter-American Bank is under construction. When completed, this project would be able to supply water to about 75 percent of the anticipated population in 1975. There is no major water supply construction immediately in view. A combined sewerage system built some 60 years ago when the city was founded is benefiting the central congested part of the city. These sewers now function as separate sewers and are thus able to take the overload. A detailed study of the sewerage needs is proposed to be made in order to prepare a suitable project.

25. The DEMAE operates and maintains the water supply system and collects water charges. The rates have to be approved by the governing council. There are some 60,000 house connections and some 300 public faucets and fountains in the city. Although a majority of the house connections are metered, a large number of the meters are defective. The meters are, therefore, not read and the consumers are charged on a flat rate basis. The present rates do not pay the direct operating costs of the water and sewerage systems. The present collection is stated to be about 80 percent of billings. DEMAE is collecting detailed statistics on the water and sewerage systems in order to bring the financial and physical records up to date. Qualified engineers and other staff have been recently recruited and efforts are being made to improve financial and technical management. The distribution system in the city is in need of urgent improvements as about 40 percent of the total supply is estimated to be lost through leaks in the system. The DEMAE budget for 1967 is about Cr. 6.7 billion, out of which about Cr. 4.3 billion is allotted for new capital investment. A similar amount was spent during 1966 and about 24 km. of distribution mains and 22 km. of sewers were laid.

26. Brasilia. The Department of Water and Sewers (DAE) is in charge of this sector in the federal territory. This department is under the Mayor of the city and the Secretary of Public Works. The DAE is also responsible for construction and maintenance of storm drains in the federal district. It designs, builds, operates, maintains, charges and collects fees for services rendered. All civil construction is done by contract but sewer laying and distribution systems are done by DAE.

27. The capital city of Brasilia (population 150,000) has both water and sewerage systems in operation. Water consumption is high (800 liters per capita per day on the average) because of heavy irrigation. Although the water supply system is new, losses in the distribution system are heavy. Some of the storage reservoirs are also stated to leak and one of the bigger reservoirs is being rebuilt. Since there are no meters or other devices for measuring the flow of water from storage reservoirs, accurate data on losses is not available. However, the DAE estimates that it is accounting for only about 40 percent of the total supply. Apparently the initial construction of the system was defective. The present organization is trying to rectify the situation and is actively pursuing a program for charging and collecting water revenues. The main problem of the organization is one of getting adequate staff to operate and maintain the facilities. For the year 1967, the DAE gets an allocation of Cr. 6.8 billion from the federal budget for capital investments in water and sewerage projects. Water supply systems exist in 3 smaller communities in the federal district and new systems are under construction in 2 others. Sewerage projects are also under construction in 2 of these communities. All these projects in the federal district are financed directly through federal grants.

28. Bahia. There are two main agencies in the fields of water supply and sewerage in the state of Bahia, (viz.) SAER, (Superintendente de Aguas e Esgotos do Reconcavo) and SESEB (Superintendencia de Aguas e Esgotos do Reconcova). SAER deals with Salvador city and 3 minor municipalities -- Candeias, Cama cari and San Francisco do Conde in an area called the Reconcavo. A state law defines the Reconcavo area and the municipalities

included in it. SAER is an 'autarquia' under the 'secretaria' of urban services. It was created in 1962 to satisfy the requirements of the Inter-American Bank which participated in the financing of the Salvador City water supply project. Prior to 1962 the Department of Water and Sewerage of Bahia state was in charge of water supply in Salvador also. The water supply project for Salvador City has just been completed. The present population of the city is estimated to be about 800,000 and SAER believes that about 700,000 people are served by the city water supply. There are some 47,000 connections to the water supply system and in many cases one connection serves a number of families. The consumers are billed by SAER every month, but delays in payment up to six months are allowed. The present monthly collection is about Cr.0.5 billion. Adjustments in the water rates have been recommended recently by a committee which examined this question. The revised rates are expected to cover all the costs involved. Apart from revenues received from water and sewerage rates, SAER also gets a share of the royalty received by the state from Petrobras. The city has virtually no sewerage system. A Brazilian consulting engineering firm is studying the problem and a preliminary project report is expected to be ready by the end of the year. In the three municipalities of the Reconcavo, mentioned earlier, each of which has a population of about 100,000, there is no public water supply system yet. SAER will have to prepare projects for these municipalities. SAER is also in charge of collection of water and sewerage revenues from the population served.

29. The other agency in the state SESEB was created as an 'autarquia' in April 1966. Prior to that, DESEB (Departamento de Engenharia Sanitaria do Estado da Bahia) was in charge of water and sewerage works in the state. SESEB is under the purview of the 'secretaria' of Urban Affairs and is under state supervision. The organization derives its finances from the allocations made by the state, royalty from Petrobras and the fees, retained out of water revenues collected in the cities where SESEB has responsibility for operation. The regulations for the day-to-day work of SESEB have not been published yet. The laws under which SESEB has been created authorizes it to enter into contract with municipalities to construct, operate and maintain water and sewerage works in the state of Bahia. The law also gives authority to SESEB to prescribe water rates and indicates specifically the parameters to be used in determining the rates (viz) that the rate shall provide for recovery of the investment, administration, operation and maintenance expenditures and reserves for renewals, replacements and expansion. The law also requires an effective municipal contribution of a minimum 20 percent of the total capital investment needed for the project. There is no obligation on the part of any municipality to enter into a contract with SESEB, as it can take up work on its own and even get state funds as special grant or get funds from other sources. Out of the 336 cities in the state, SESEB now operates systems in 25 and construction is in progress in 25 others. It proposes to expand its role by creating regional centers with suitable organization. Until recently, this organization did not have a staff to perform its functions. When the new organization SAER was formed in 1962, it attracted most of the engineers from DESEB and reduced its staff to three engineers. Since then the organization has been recovering and SESEB has now 18 engineers on its staff and has prepared a number of projects.

30. In this state, there are few big cities other than Salvador. It is estimated that hardly 10 percent of the cities in the state have a population of more than 10,000. Projects for a number of these communities have been financed by DNOS, DNOCS, FSESP, DNERu, CVSF and SUDENE. Forty such projects have been completed and 49 others are under construction. FSESP operates 10 water supply systems in this state.

INTER-AMERICAN DEVELOPMENT BANK

LOANS FOR ENVIRONMENTAL SANITATION PROJECTS
(Up to December 31, 1966)

<u>Loan No.</u>	<u>Date of Approval</u>	<u>Borrower</u>	<u>Purpose of Loan</u>	<u>Cost of Program</u>	<u>IDB Loan</u>	
					<u>Amount</u> (In US \$)	<u>Disbursed</u>
13-TF	Nov.1961	Superintendencia de Aguas e Esgotos de Reconcavo - SAER-BAHIA	Extension & improvement to water supply system in city Salvador	8,127,000	4,120,000	4,120,000
22-TF	Mar.1962	Banco del Estado de Guanabara	Extension and improvement of the water supply system of Guanabara	27,884,000	12,500,000	12,500,000
18-SF	Mar.1962	Banco del Estado de Guanabara	- ditto -	25,653,000	11,500,280	11,323,961
23-TF	Mar.1962	Banco del Estado de Guanabara	Extension and improvement of the sewerage system of Guanabara	22,437,000	11,000,000	8,324,981
30-TF	Apr.1962	Banco do Nordeste do Brazil	Extension and improvement of water supply and sewerage in Recife, Maceio and Natal; improvement of water supply in Teresina, Sao Luis & Campina Grande	18,535,000	12,990,000	9,204,496
68-TF	Nov.1963	Department of Water & Sewerage - PARA	Extension and improvement of the water supply and sewerage systems of the city of Belem	4,829,000	2,500,000	1,430,858
36-SF	Dec.1963	Municipal Dept. of Water & Sewerage Porto Alegre	Extension and improvement of water supply & sewerage of the city of Porto Alegre	6,973,500	3,150,000	1,283,214
51-SF	Dec.1964	Superintendencia de Urbanizacao e Saneamento (SURSAN)	Continuation of project of improvement of water supply of the state of Guanabara	21,400,000	7,000,000	4,112,654
109-OC	Dec.1964	(SURSAN)	- ditto -	-	5,000,000	4,600,502
82-SF	Dec.1965	Republic of Brazil	Construction & Extension of the systems of water supply in 200 communities & completing the water supply system of Salvador, Bahia	29,300,000	15,000,000	-
123-SF	Nov.1966	Banco do Nordeste do Brazil	Extension and improvement of water supply system for Joao Pessoa, Aracaju and Fortaleza	28,900,000	14,450,000	-
127-SF	Dec.1966	Municipal Dept. of Water & Sewerage Belo Horizonte	Extension and improvement of water supply system of Belo Horizonte	25,200,000	12,000,000	-
				<u>219,238,500</u>	<u>111,210,280</u>	<u>56,900,666</u>