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BRAZIL
STAFF APPRAISAL REPORT
NORTHEAST WATER SUPPLY AND SEWERAGE PROJECT

January 17, 1979

Projects Department
Latin America and the Caribbean Regional Office

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CURRENCY EQUIVALENTS

Currency unit	=	Cruzeiro
US\$1.00	=	Cr\$16.25 (January 1978)
UPC1.00	=	Cr\$227.15 (January 1978)
UPC1.00	=	US\$14.68 (January 1978)

MEASURES

1 mm	=	millimeter	=	0.04 inches
1 cm	=	centimeter	=	0.39 inches
1 m	=	meter	=	3.28 feet
1 km	=	kilometer	=	0.62 miles
1 l ₃	=	liter	=	0.26 US gallons
1 m ₃	=	cubic meter	=	264 US gallons
1 m ³ /sec	=	cubic meter per second	=	22.82 MGD = million US gallons per day

ABBREVIATIONS AND ACRONYMS

ABES	=	National Association of Sanitary Engineers
BNH	=	National Housing Bank
CAGECE	=	Water Supply and Sewerage Company of Ceara
COMPESA	=	Sanitation Company for Pernambuco
EMBASA	=	Water and Sanitation Company of Bahia
FAE	=	Water and Sewerage Funds
FGTS	=	Employee Indemnity Fund
FSESP	=	Special Public Health Service Foundation
FINEST	=	Credit Lines for Sanitation Sector
IDB	=	Interamerican Development Bank
OT	=	Technical Supervision Agency (BNH)
PAHO	=	Pan-American Health Organization
PLANASA	=	National Sanitation Plan
ORTN	=	National Treasury Securities
SATECIA	=	Technical Assistance Program for Institutional Development of the State Water Companies
S/SFS	=	Superintendency of Sanitation Financing System
SUDENE	=	Superintendency for Development of the Northeast
SWC	=	State Water Company
UPC	=	Standard Capital Unit (BNH)
USAID	=	United States Agency for International Development

FISCAL YEAR

January 1 - December 31

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BRAZIL

NORTHEAST WATER SUPPLY AND SEWERAGE PROJECT

STAFF APPRAISAL REPORT

I. GENERAL

1.01 The Government of Brazil has requested Bank financing for the expansion and improvement of water supply and sewerage systems in the three northeast States of Bahia, Ceara and Pernambuco. The Bank has been assisting the water supply and sewerage sector in Brazil since 1971 through the financing of five projects. The water supply and sewerage systems for which Bank financing would be provided under the proposed loan have a total cost of US\$303 million, of which the proposed Bank loan of US\$100 million would cover the foreign exchange cost. The loan would be made to the National Housing Bank (BNH). The executing entities would be the State Water Companies (SWCs) of Bahia, Ceara and Pernambuco (EMBASA, CAGECE and COMPESA, respectively), which are public agencies owned by their respective state governments, and responsible for the implementation of the National Sanitation Plan (PLANASA) in their respective states. The works to be financed are scheduled for construction and completion in the four-year period 1979-1982 inclusive.

II. THE SECTOR

Country Background

2.01 Brazil has an area of 8.5 million km² and is divided into 23 states, four territories and one federal district. The population of Brazil at the end of 1977 was estimated to be 113.2 million and growing at 2.8% per annum. 1/ Of this total, 69.5 million, or 61.4%, is classified as urban population, 2/ which is growing at an estimated rate of 4.1% per annum. By 1984, two-thirds of Brazil's population is expected to be living in urban centers. While the overall population density is only 13 inhabitants per km², the distribution of population throughout the country is uneven with a high proportion concentrated along the East Coast, in particular the four southeastern states which include the large urban centers of Rio de Janeiro and Sao Paulo and account for 42.1% of Brazil's population. This concentration has been partially due to migration from the north and northeast regions.

Service Levels

2.02 At present about three-fourths of the urban population has access to public water supply and about 35% is served by public sewerage.

1/ Source of Population Statistics: Anuario Estatístico do Brasil.

2/ Brazilian official definition of "urban population" is based on administrative status (a county seat, "sede do municipio," is an urban place) rather than minimum population size.

There are, however, regional imbalances; water supply service levels in the lesser developed states in the interior and northeast are below 50% with many communities not supplied at all. In rural areas, there are only limited sanitation facilities, with less than 5% of the households having water connections. Only 2% of the rural households have septic tanks, 23% latrines and three-fourths have no satisfactory excreta disposal facilities. The urban poor group (para 8.09) is the most severely affected by the lack of services. Many of the urban poor are recent migrants who squat on the periphery of metropolitan areas where the land is still to be serviced, or in centrally located but often precarious old squatter settlements. Statistics on mortality and morbidity rates from waterborne diseases are not complete, but the figures available indicate one of the highest infant mortality rates in Latin America and a high incidence of deaths due to waterborne diseases. Infant mortality in the country reaches 70 per 1,000 live births and life expectancy is 61 years ^{1/}. These indices are, respectively, well above and below the ones for countries with similar income levels, and compare with about 60 per 1,000 live births for infant mortality and 60.5 years of life expectancy for Latin America.

Sector Development

2.03 Prior to 1971 expansion of urban infrastructure, particularly water supply and sewerage facilities, had not kept pace with Brazil's overall development. The resulting inadequacy of services had been due primarily to institutional problems and the method of financing water and sewerage systems. Responsibility for these services had been vested in the municipalities, which was the level of government which was weakest in organizational, technical and financial capacity. Thus, in 1970, less than 60% of the urban population had access to public water supply and less than 30% were connected to sewerage systems. Furthermore, in the majority of Brazil's cities, the capacity of the water supply systems was insufficient to meet demand requirements.

2.04 Initial measures to improve sector development were undertaken in 1967 when the Federal Government created the Sistema Financeiro de Saneamento (SFS) and assigned to it the responsibility for the financing of the sanitation sector in the country. At the same time the Banco Nacional da Habitacao (BNH), was designated as the agency to operate SFS. A concerted effort began in 1971 when BNH launched PLANASA, the National Sanitation Plan for Brazil, which encompassed the financing, design, and construction of water and sewerage services and the training of personnel for their management and operation. The PLANASA objectives for 1980, as revised in 1975, are to provide water services to 80% of the urban population in 80% of the communities and sewerage services to all main urban centers (over 50,000 inhabitants). The program is expected to cost around US\$6.6 billion in 1977 prices, 2.6 times the original estimate as a result of enlarged programs, underestimation of project costs, and inflation, which has particularly affected the construction industry.

2.05 The PLANASA program is implemented through SWCs formed in each state through consolidation of existing regional or local water companies. Each SWC is responsible for construction and operation of the water supply and

^{1/} Source: World Development Report, August 1978 - World Bank.

sewerage systems throughout the state. Initially each SWC prepared a global feasibility study for the state which set forth the sector service level objectives, priorities, and financing program. On the basis of this study and a commitment by the state to provide one-half of the financing for the sector investment program from a Sanitation Revolving Fund (Fundo de Aguas y Esgoto - FAE), BNH has entered into "PLANASA Agreements" with all the states, which incorporate the service level objectives of the global feasibility studies and commit BNH to providing the other half of the financing for the investment program. The PLANASA program has been conceived to alleviate regional imbalances in services through cross subsidization and to remedy, through the creation of SWCs, municipal deficiencies in qualified manpower, capacity of expansion, and maintenance and administration of systems, especially outside of the capital cities. It replaces a large number of municipal companies in each state with one organization enabling economies of scale, central review of all system designs and proper operation and maintenance of municipal systems.

2.06 Implementation of the PLANASA program has been slower than expected due to time taken to organize SWCs and consolidate operations, and to the capacity of some SWCs in preparing and implementing water supply and sewerage projects. In retrospect, the PLANASA objectives were too ambitious considering the fragmented state of the sector in 1971. Actual performance, however, has been satisfactory in water supply. By the end of 1977, 75% of the urban population was receiving water supply services and 35% was served with sewerage. In terms of number of urban centers (total 3,164) to be served with water systems, some 1,511 (47%) remained to be supplied, and these are almost all small communities. Out of the 160 cities and towns to be provided with sewerage services, 93 were partially served in 1977 and 67 remained unattended. Meeting sewerage service level objectives will be a major problem in the next decade, especially because of the amounts of capital required and the technical problems involved.

2.07 It appears that by 1980 the original water supply service level objective of 80% of the urban population could be met, although the target to reach 80% of the communities will not be attained. The sewerage service level objective will not be met in 1980. It is estimated that 3 to 4 additional years, after 1980, are required to meet the proposed objectives for water supply and more than that to reach sewerage targets.

2.08 The PLANASA program has established service level targets for the urban subsector but there are no explicit objectives for the rural areas and knowledge of this subsector is still very incomplete. There is no organized plan of action on a countrywide basis, although specific programs to assist the rural subsector have been established at federal, state and municipal levels. The Ministry of Health has a "Special Public Health Service Foundation" (FSESP), which provides subsidies to the poorest municipalities for implementation of water supply and waste disposal projects. Recently, BNH entered into the rural sector (para. 3.05), offering funds to the state government (2% below the interest rate charged for urban projects). Regional development agencies have also been including assistance to the rural population through their integrated rural development programs. Actions are clearly required to coordinate and organize these efforts to make them more efficient.

The Bank is planning to include in the sector review to be carried out in cooperation with the Pan-American Health Organization (PAHO) 1/, a preliminary assessment of the rural subsector. This sector review has been tentatively planned for 1979.

Institutional Developments

2.09 In order to strengthen the execution capabilities and administrative efficiency of the SWCs, BNH in 1974 entered into an agreement with PAHO to carry out a technical assistance program, SATECIA 2/. The program is being developed by 36 specialists, including 12 foreign experts, and has improved organization and financial reporting in the SWCs. The first three-year program, which included a diagnosis and formulation of recommendations of each of the SWCs and produced standardized information systems, has been completed, and a new program (1978/79) is now underway which will assist the SWCs in implementing the recommendations.

2.10 As a complement to the technical assistance program, BNH established a National Sanitation Training Program through the National Association of Sanitary Engineers (ABES). The initial objective of the program was to train 60,000 employees from the SWCs by the end of 1980. This objective was revised in January 1977, and a new target was set at 84,000 employees. Through 1976, some 37,000 participants, 44% of the new target, were trained. ABES and the SWCs are periodically analyzing the results of the program and introducing adjustments to make the training meet the actual needs of the sector.

2.11 For the sector overall, design and construction capabilities, and availability of finance from BNH/FAE appear to be in balance. There are, however, unclear financial and economic criteria applied in evaluation and selection of BNH-financed projects, and specific criteria should be agreed to in negotiations for the proposed loan (para 6.18). BNH's loan supervision through its regional offices and Technical Supervisory Agency (OTs) (para. 3.03), which covers technical, administrative and financial aspects of the projects and the SWCs, is working satisfactorily. Project execution is monitored through periodic visits to each project site by representatives of BNH and its OTs. Disbursements are controlled by BNH on a quarterly basis.

Financial Viability

2.12 One of the basic principles of the PLANASA program was that the SWCs should be financially viable, with revenues sufficient to cover cash operating and maintenance costs and debt service payments. For the sector generally and most SWCs individually, this requirement has not been met. The principal reason for this is the failure of tariffs, which are regulated by both the Federal and state governments, to keep pace with the increases in operating costs and debt service requirements. As a result, some SWCs are meeting debt service payments, and even operating expenses, through loans from BNH/FAE and state government equity contributions.

1/ IBRD/WHO - Cooperative Program - Latin America Region.

2/ SATECIA: Programa de Assistencia Technica para o Desenvolvimento Institucional das Empresas Estaduais de Saneamento.

Tariffs

2.13 One major problem of the SWCs has been the mechanism for revising tariffs which has resulted in delays in rate increases, and increases granted often being of insufficient magnitude to improve an SWC's financial viability. In the past an SWC presented a request for tariff increase, along with proper justification to the state government, which had the power to approve a level lower than requested. Approval must then be obtained from the Interministerial Price Committee which in 1977 established annual ceilings on increases of 25% in current terms as a normal case. Since operating costs and debt service are indexed in line with the UPC, which in 1976 and 1977 increased 34% p.a. in relation to the Brazilian Cruzeiro, tariff increases have often not maintained revenues of the SWCs at existing levels in real terms.

2.14 On May 12, 1978 a National Tariff Law for the Water Supply and Sewerage Sector was approved by the Brazilian Congress. The objectives of the Law are: (a) to relate tariffs to service costs; (b) to ensure the financial viability of the SWCs; (c) to put a ceiling on the cost of obtaining water supply and sewerage services for the low-income population by establishing a minimum consumption tariff related to income level; and (d) to set tariff levels which would produce the necessary revenue to pay for all costs and allow a rate of return of up to 12% on capital investments. In addition, the Law establishes that tariff studies should be undertaken in accordance with guidelines to be set by the Ministry of the Interior.

2.15 Implementing regulations of the Tariff Law are contained in Decree No. 82586 of November 6, 1978. The regulations set forth the procedure for, and frequency of, tariff adjustments and spell out the criteria to be used in the design of tariff structures. The regulations establish 1983 as the year for SWCs to attain the position where revenues cover operating and maintenance costs and depreciation and provide a rate of return on operating assets, after covering these expenses, which will produce sufficient cash flow to cover debt service. Gradual and continuous financial programs are provided for SWCs to reach this objective, although interim targets are not specified. The main features of the Decree are the following:

- (a) SWCs must submit to BNH by March 1979 financial plans for the 1979-1983 period, including tariff proposals to attain in 1983 the financial objectives of the Law and Decree.
- (b) Tariffs are to be revised each year. SWCs will prepare and submit to BNH annual tariff recommendations which will enable them to comply with the Law and Decree. No approval of the tariff recommendations is required now by the state governments.
- (c) BNH is responsible for reviewing the tariff proposals prepared by the SWCs and, if in agreement with a proposal, to forward it to the Interministerial Price Committee (IPC) with a recommendation for approval, otherwise the proposal will be returned to the SWCs for review. BNH is also responsible for supervising the financial performance of the SWC's.

- (d) Responsibility for final tariff approval is with the IPC, and authorization of effectiveness of tariff adjustments is done by the Ministry of the Interior.
- (e) SWCs revenues must cover operation and maintenance costs and depreciation and, after covering these expenses, provide a rate of return on fixed assets in operation which in 1983 and subsequent years will produce sufficient cash flow to cover debt service.
- (f) Tariffs should be progressive according to volumes consumed, and users should be classified as residential, industrial, commercial and public.

It is expected that under the Decree the process of tariff adjustment will be more systematic and timely. In addition, water and sewerage rates will be related to costs and cross-subsidization to the poor will be possible through improved tariff structures. Progressiveness of tariffs would also permit pricing practices to control waste.

Environmental Legislation

2.16 The federal and state authorities in charge of environmental pollution controls regulate the permissible pollution loads to be discharged into the water courses. In October 1973, the Federal Government created the Secretaria Especial do Meio Ambiente in the Ministry of Interior to monitor changes in the environment, establish air and water quality standards, enforce pollution control legislation, and coordinate all federal pollution control programs. Several laws and decrees were issued thereafter providing regulations for the enforcement of pollution control. In January 1976, the Government issued a regulation to classify inland water resources according to their uses, and limit their contamination by setting up maximum permissible physical, chemical and biological concentration.

2.17 The enforcement of the pollution control laws will demand large investments, as well as substantial operational and maintenance expenditures for sewage disposal. For those cities needing sewage treatment, the total costs of the services, including water supply, could be so high that tariff increases will not be sufficient to recover these costs, and capital contributions from the state and/or the Federal Government might be required in addition to BNH and FAE debt financing. Sewage tariffs will have to be structured so as to achieve, where appropriate, a cross-subsidization among the consumers, in particular the industrial ones, to make systems financially viable. Studies to establish appropriate tariff structures and levels for sewage collections and treatment are now underway by BNH under a covenant in the Greater Sao Paulo Sewage Collection and Treatment Project (Ln. 1525-BR).

Bank Participation

2.18 The Bank has been assisting Brazil since 1971 in the implementation of PLANASA through the financing of five projects. Five loans totalling US\$220 million have been extended for water supply and sewerage. In 1971, two

loans were approved for the City of Sao Paulo (Lns. 757 and 758-BR), one for water distribution and storage (US\$22.0 million), and one for sewage collection and disposal (US\$15.0 million subsequently reduced to US\$12.0 million). In 1974, a loan was extended to BNH (US\$36.0 million, Ln. 1009-BR) for relending to the SWC in Minas Gerais for municipal water supply and sewerage projects, and a second loan for the same purpose followed in 1976 (US\$40.0 million, Ln. 1309-BR). The last loan, approved in February 1978 (US\$110.0 million), is for the first phase of a large sewage collection and treatment project in Sao Paulo which forms part of a high priority program of water pollution control.

2.19 Total actual and planned Bank assistance to the water supply and sewerage sector is estimated to account for about 10% of sector investment in the period 1971 through 1981. The only other external lenders to the sector since 1970 have been USAID, which in 1971 extended a loan to BNH (US\$25.0 million) for urban sanitation, and IDB which in 1971 provided a loan to BNH (US\$30.0 million) for water and sewerage projects throughout Brazil.

Experience Under Previous Loans

2.20 Projects financed under Loans 757-BR and 758-BR were completed with a three-year delay. Initial failure of the State of Sao Paulo to supply the necessary funds to complete financing, substantial technical revision of the project, and reorganization of the executing agencies resulted in the above-mentioned slippage. However, population served with water as a result of the project reached 3.3 million (against 2.4 million initially targeted). At the same time 1.3 million persons were served with sewers, the water pollution control component kept pace with population growth, and the Borrower improved substantially its overall operations. As a result, service levels rose from 58.9% to 88.7% of population served with water and from 35.8% to 44.6% served with sewerage during 1971-1977.

2.21 The first Minas Gerais Loan (US\$36.0 million) became effective in January 1975 and is now fully committed. The second Minas Gerais Loan (US\$40.0 million) became effective in January 1977 and is also fully committed. The Sao Paulo Loan 1525-BR (US\$110.0 million) became effective in August 1978. Initially, there were problems related to efficiency of internal operations of the executing agencies, especially in regard to commercial and financial areas as well as to technical quality of the projects. These problems have been substantially overcome and projects are progressing satisfactorily. There are still financial problems in Sao Paulo and Minas Gerais as a result of inadequate tariff increases, which have resulted in non compliance with the revenue covenant for 1978. Recently the Government has approved a 36% increase in their tariffs effective January 1, 1979, which will allow both companies to achieve a satisfactory financial condition. However, the water company of Minas Gerais may require a further tariff increase in mid-1979. For the future it is expected that the application of the new tariff legislation (paras. 2.14 and 2.15) will allow them to operate within a framework of financial discipline.

2.22 The Bank has been holding regular discussions with BNH regarding improvements in its operations in the sanitation sector. The major improvements have been: (i) the decentralization of project approval and loan supervision to BNH's regional offices which has resulted in faster project execution; and (ii) the establishment of a uniform accounting system for the SWCs, which, with some revisions, will enable BNH and the SWCs to have uniform

and reliable financial information. Much has still to be done in other areas such as coordination with the SWCs, general information systems for BNH in regard to SWCs' operational and technical data, project appraisal, and loan administration by BNH. These objectives will be pursued in the proposed project.

III. THE BORROWER

Organization

3.01 The Borrower for the proposed loan will be the Banco Nacional da Habitacao which has also been the Borrower for Loans 1009-BR and 1309-BR for the First and Second Water Supply and Sewerage Projects for Minas Gerais, and Loan 1525-BR for the Greater Sao Paulo Sewage Collection and Treatment Project. BNH was established by Federal Law in August 1964, and since 1967 has been under the Ministry of the Interior. It has legal personality, is tax exempt and is administratively and financially independent of the Ministry. Its major activities have been to finance low-cost housing programs, urban development and sanitation. BNH does not operate as a commercial or savings bank.

3.02 BNH is administered by a Board of Directors (Conselho de Administracao) and an Executive Committee (Diretoria). The Board consists of the seven Directors of the Executive Committee and nine counselors. The Executive Committee is composed of the President of the Board and six Directors, all appointed by the President of the Country with the approval of the Federal Senate. Daily operations are the direct responsibility of the President and Department Heads, but decisions concerning routine operations have been delegated to Regional Credit Committees.

3.03 Since September 1967, BNH has had a Department (Superintendencia), called the "Superintendencia do Sistema Financeiro do Saneamento" (S/SFS), which is responsible for water and sewerage activities. The S/SFS consists of three divisions as indicated on the organization chart (3.1). The Analysis and Planning Division is responsible for the review and approval of each water supply and sewerage investment programs and supervises projects proposed by the SWCs for BNH financing. The Technical Control Division supervises the Technical Supervisory Agency (OT) which has been retained by BNH to review project design and assist in supervision of construction, and in addition, provides S/SFS with technical consulting services when needed. The Finance Division authorizes disbursements from BNH and FAE and monitors the financial performance of the SWCs.

3.04 Project technical review and project supervision are done by 11 BNH regional offices established in December 1976. These offices are a microcosm of the S/SFS Department in BNH Headquarters and operate under well-defined guidelines. The functions of the offices include the control of loan agreements between BNH and the SWCs, the control of disbursements, the updating of the physical and financial project schedules, the monitoring of the FAE's and OT's performance, and the supervision of the SWCs' operations, technical assistance, and training programs. This decentralization is necessary and is working effectively. A graphical representation of the supervision system is shown in Annex 1.

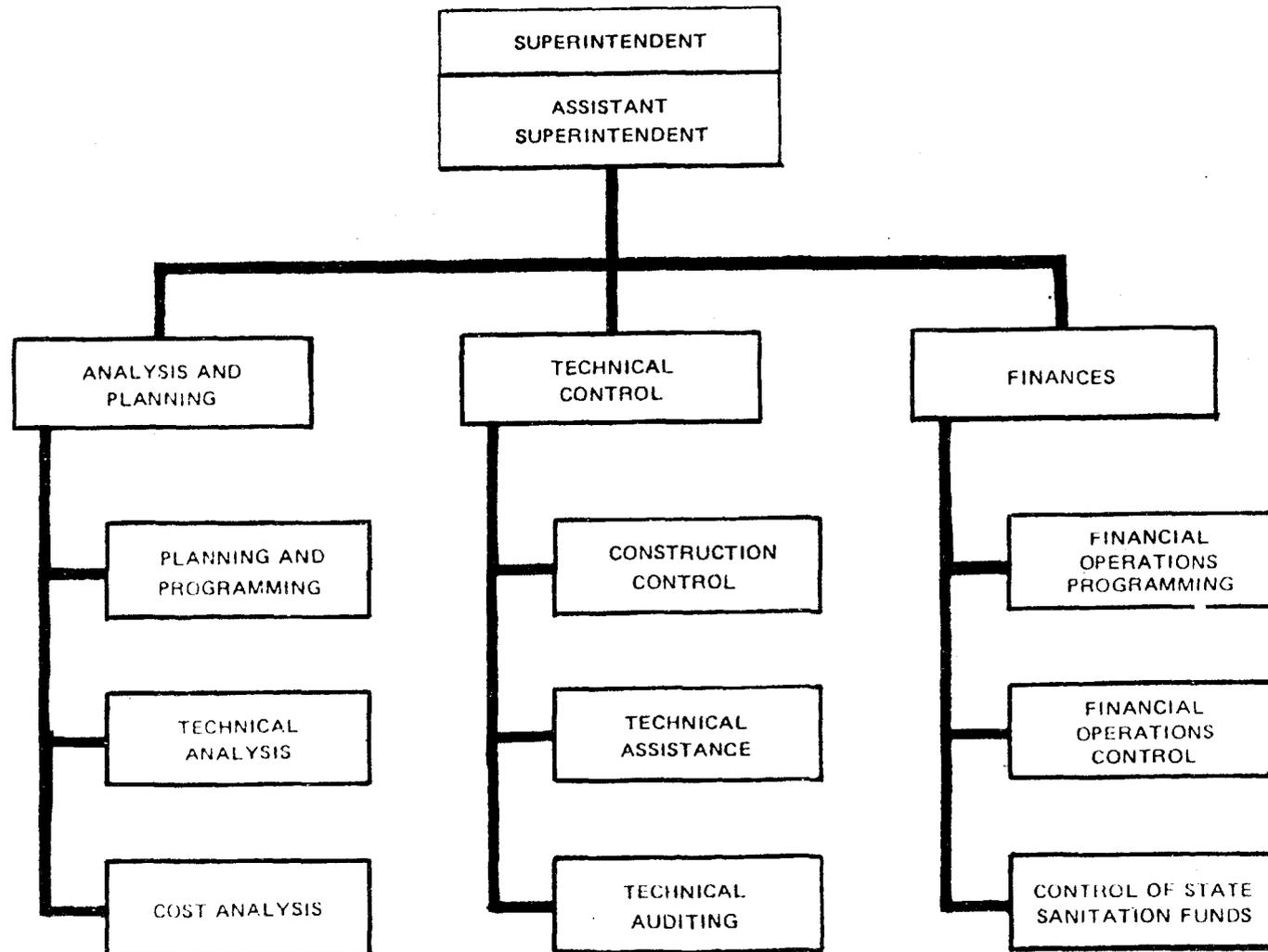
CHART 3.1

BRAZIL

NORTHEAST WATER SUPPLY AND SEWERAGE PROJECT

National Housing Bank (BNH)
Superintendency of the Sanitation Finance System (SFS)

Organization Chart



Loan Approvals Procedure

3.05 BNH analyzes water supply and sewerage projects proposed for financing by the SWCs, extends loans, and provides technical assistance to SWCs through S/SFS. Projects are normally prepared by local consultants retained by the SWCs or sometimes by SWCs' staff. The technical aspects and costs of the projects are then reviewed by the OTs, which are specialized agencies (or consultants) retained by BNH, and are then either returned to the SWCs for revision or accepted and forwarded to BNH headquarters by the regional office for final evaluation and approval. BNH has established a basic line of credit for the water supply and sewerage sector. Through this line BNH lends to the SWCs (through the state banks, called the financial agents) 50% of project costs for medium and large-size cities 1/. A second line of credit, known as FINEST I 2/, has been created to assist the states to meet their obligations to finance 50% of the project costs. Under this line, loans are made to the states (through financial agents) upon request and channeled to SWCs through FAEs. Two additional credit lines with the objective of promoting investments in small communities, FINEST II and FINEST III, are available for direct lending to state governments (through the financial agents) which are used to assist the states in the financing of projects for small communities. To be eligible for these loans, at least 40% of the state contributions to FAEs must be allocated to small communities. The SWCs receive 70% of these funds as equity and 30% as an FAE loan. Loans granted to the states under FINEST II and III are repaid to BNH out of the proceeds of general tax revenues. Principal and interest payments on all BNH loans are guaranteed by the state government.

3.06 State government funds for financing 50% of subproject costs are deposited in the FAEs for lending to the SWCs. The FAE is a revolving fund continually replenished by appropriations from the state government, normally equivalent up to 5% of the state tax revenues, and by the debt service payments of the SWCs.

3.07 Interest rates on BNH/FAE loans vary from 2% to 8% p.a. depending upon the per capita tax revenue levels in the state. Maturities are normally 18 years, after a one to three-year grace period on principal repayment. Interest and principal on loans are denominated in indexed standard capital units (UPCs) 3/.

Evaluation

3.08 Up to 1975, the PLANASA program did not develop as expected, due to poor organization and management in the SWCs resulting in underestimated

1/ Medium-size and large cities are those over 5,000 people. Small size villages are those with less than 5,000 inhabitants, according to 1970 census figures.

2/ Subprograma de Empréstimo Suplementar.

3/ An accounting unit which is revalued quarterly using the Ministry of Finance monetary correction index (ORTN).

project costs, overoptimistic scheduling, constraints of interrelated activities, such as poor engineering studies and cost estimates, and a shortage of materials and equipment. In addition, S/SFS activities were centralized at BNH Headquarters in Rio de Janeiro, where inaccurate information was received from the SWCs, further delaying projects' review and approval by overloaded staff. During implementation of the three Bank-financed projects with BNH and during project appraisal, many discussions were held with S/SFS staff in order to solve the above-mentioned problems. In early 1976, BNH issued new regulations decentralizing PLANASA and delegating more responsibility and authority to the regional offices in order to speed up implementation. It is now considered that BNH's project selection, approval and disbursement procedures, and loan supervision procedures are improving, but further efforts by BNH are necessary to adapt these procedures to the requirements of expanded operations. Assurances were obtained that the Bank will be given the opportunity to exchange views on any proposed modifications to S/SFS organization and guidelines.

IV. THE BENEFICIARIES

Background

4.01 The three beneficiaries and executing agencies for the project will be Empresa Bahiana de Aguas e Saneamento S.A. (EMBASA), Companhia Pernambucana de Saneamento (COMPESA), and Companhia de Agua e Esgoto do Ceara (CAGECE). The three SWCs were formed in 1974 through mergers of the water authorities in the state capital cities and a large number of municipalities. All states have complied with S/SFS requirements and have signed PLANASA agreements setting forth service level objectives, state financial participation and empowering BNH to control all SWCs' programs financed by BNH. All states have committed 5% of state tax revenues to FAEs and are eligible for maximum BNH loans. The three SWCs have completed global feasibility studies and have ongoing construction programs financed by BNH, FAEs, and the states.

Organization and Management

4.02 All SWCs are owned by their respective state governments. Each has a six-member Board of Directors appointed by the state governor for a period of four years. Apart from the President, who is the Chief Executive Officer, each director is the working head of one of the functional departments.

4.03 Organizational structures have evolved with the assistance of SATECIA and are straightforward with departments for planning, construction, operations, administration, and finance and accounting (see Organization Charts, Annex 2). These organizational structures are considered appropriate for the activities undertaken. In all of the SWCs, investment planning has been over-ambitious, and the expansion programs, such as they appear in the global feasibility studies presented to the Bank during project preparation, were unrealistically high with respect to executing capabilities and funding limitations. The state government plays an active role in the selection of projects. Construction activities are carried out by local contractors.

Engineering studies and design as well as supervision of works are executed mainly through local consultants and coordinated by SWCs engineering units (para. 6.17). Projects are generally implemented on schedule. Project programming and control procedures are now being improved to handle the increased volume of construction. System operations and maintenance require improvements, especially in EMBASA and CAGECE, and programs have been developed with the assistance of SATECIA which are now being implemented. In addition, the three SWCs annually prepare two-year training programs to be executed under ABES (para. 2.10). These programs were reviewed and found acceptable vis-a-vis the forecasted staffing needs of the SWCs. Administration and finance and accounting are the weakest areas in the SWCs and special assistance is being provided through SATECIA for this purpose (para. 6.06).

4.04 All three SWCs have suffered from the common problems of new organizations and the need to consolidate the large number of previously separate operations into a unified operation. The difficulties of consolidation have been compounded by the large geographic areas covered by these SWCs, their inability to attract and retain qualified technical and managerial staff and by too frequent changes in directors who are working department heads. In the environment in which they are operating, the present managements of the SWCs may be considered satisfactory.

Metering, Billings and Collections

4.05 Metering levels for consumption are very low in the three SWCs (Table 5.4). On the average 69% of the connections are unmetered and production metering is nonexistent. Meter maintenance is poor. Only COMPESA and EMBASA have completed partial studies in this regard. Meter reading, billing and collection procedures are satisfactory in all three SWCs. Meters are read monthly on a continuous basis by zones, and consumers are billed within 20 to 30 days of the reading. Inspectors are used to verify accuracy of the readings. Billing is centralized in the SWCs' headquarters, and all bills are prepared on the state government computers, although keypunching is performed by SWCs' staff. Bills are delivered by messenger (EMBASA) and by mail (COMPESA, CAGECE); payments may be made at the SWCs' offices or in state banks throughout the states. Recent programs to improve collections, including the cut-off of service after two months of nonpayment of bills, have resulted in monthly receipts exceeding new billings, and outstanding accounts receivable now represent slightly less than three months of billing, which is satisfactory.

Accounting Organizations

4.06 All SWCs have similar organizational structures for the accounting and finance functions. The department is headed by a director of the SWC and is divided into two functional divisions, one for accounting and one for finance. The Accounting Division is responsible for general accounting, cost accounting, and budget and expense control and the Finance Division for financial planning, treasury, and control of borrowings. These organization structures are considered appropriate, and accounting staff are considered capable of satisfactorily implementing the routine accounting functions in the SWCs.

4.07 EMBASA's Accounting and Finance Department is in the process of reorganization under a Finance Director appointed in May 1977. COMPESA's and CAGECE's Accounting Departments are satisfactorily organized. While CAGECE's Accounting Department is almost fully computerized, both EMBASA and COMPESA have been slow in having their accounting systems placed on the computer, and require additional assistance from SATECIA.

Accounting Systems

4.08 Accounting functions are centralized in the three SWCs headquarters located in the capital cities. All SWCs are utilizing the uniform system of accounts prepared in January 1976 by S/SFS with the assistance of SATECIA. The SWCs' new accounting systems are expected to be fully computerized in 1979. The introduction of the uniform system of accounts and the use of the computer will provide timely financial reports for management review and for the first time will permit BNH to consolidate SWCs' financial statistics and to evaluate and compare SWCs' financial performance on a consistent basis. It does not, however, provide for an appropriate statement of sources and applications of cash, and it is difficult to derive this data from the existing income statements and balance sheets. Since cash management is critical for all SWCs, it is essential that the uniform system of accounts include a statement of sources and applications of cash. BNH has agreed to revise the uniform accounting manuals to include cash flow statements before December 31, 1979.

4.09 The individual SWCs are to some extent having difficulties in producing meaningful financial statements under the new accounting system. First, all SWCs have been formed by mergers of the capital city water authorities and a large number of interior municipal water authorities. Because of incomplete inventories and cost data, it has been difficult for them to determine a proper valuation of fixed assets, and efforts are being made to accomplish this. Also, there are delays in transferring assets of completed projects from construction in process to fixed assets in operation, which understates the value of the latter. Finally, none of the three SWCs has its own in-house computer specialists or a computer, and have to rely on outside services which has made the shift to the uniform accounting system more difficult. These areas will all be included in the technical assistance program to be provided under the proposed project (para. 6.06). Assurances have been obtained from the SWCs that not later than December 31, 1980: (a) they will take the necessary steps satisfactory to the Bank to update fixed asset inventories and to have them properly recorded in the books of account; and (b) that uniform accounting systems, including a statement of sources and applications of cash, will be fully implemented.

4.10 Accounting for long-term debt obligations and for project disbursement is relatively complicated. Since all borrowings are specifically related to individual SWC projects, separate bank accounts and loan accounts are maintained for each project (one BNH and one FAE account for each project). All loan advances and interest and principal repayments are effected by BNH/FAE, and the SWCs do not now maintain proper separate accounting records for these transactions, but simply record the transactions from statements provided by BNH/FAE. Thus, at this time there is no independent verification of SWCs' transactions with BNH/FAE. This situation will be remedied when the accounting system is computerized.

Finance

4.11 Financial planning in the SWCs has been poor. While all SWCs have long-range capital budgets, these have been unrealistically high in relation to demonstrated capabilities of preparing and executing projects and the availability of funds from FAE and BNH. Because the SWCs have operated with the knowledge that a project's costs will be wholly-financed by BNH/FAE, they have not been particularly concerned with either long-range or short-range cash management. The SWCs have now introduced financial projections which are expected to become increasingly useful as accounting statements improve. Assurances have been obtained from the SWCs that these financial projections will be submitted annually to the Bank and BNH not later than March 31 (para. 7.24). Technical assistance for financial planning will be implemented under SATECIA's supervision (para. 6.06).

Audit

4.12 CAGECE and EMBASA have internal auditors, but COMPESA does not. The internal audits now made are of limited utility under existing authorities and staffing, and assurances have been given by the SWCs that they will maintain adequately staffed and properly functioning internal audit offices beginning no later than December 31, 1980.

4.13 All SWCs retain external independent private auditors 1/. These audits are generally superficial and are concerned primarily with the presentational aspects of the financial statements. The audits by SWCs' lenders, BNH and the FAEs, and the Federal and state governments are more comprehensive, but are designed primarily to ensure that federal and state loans to the SWCs are properly disbursed and accounted for. None of the audits may be considered satisfactory in the commercial sense, as no independent verification is made of fixed assets, inventories, and accounts receivable and payable. Assurances were obtained from the SWCs that their accounts and financial statements for each fiscal year will be audited by independent auditors satisfactory to the Bank and in accordance with generally accepted accounting principles, and that by April 30 of each subsequent year certified copies of the audited financial statements will be submitted to the Bank.

4.14 In addition to its audit, BNH provides a continuing control over disbursements on projects. At the time a loan contract is signed with BNH/FAE, the SWC presents a monthly disbursement schedule against which actual disbursements are compared by the BNH regional office. When actual disbursements are 20% below projections, disbursements are suspended until the SWC provides a satisfactory explanation. BNH technical staff, together with its OT staff, visit project sites quarterly to verify the extent to which construction is completed. The BNH regional offices supervising the three project SWCs are functioning satisfactorily.

1/ CAGECE and COMPESA, Boucinhas, Campos and Claro S/C Ltda., EMBASA, Loudon Blomquist Auditores Associados Ltda.

V. PROJECT AREA, DEMAND AND MARKET ASPECTS

Location and Development Prospects

5.01 With an estimated 33.6 million inhabitants and a per capita product estimated at 38% of the country's average (US\$1,140 in 1976), the Northeast Region of Brazil ^{1/} is one of the largest concentrations of poverty in Latin America. Total population of the Region is growing at an average annual rate of 2.5% and urban population is growing at 3.2% to 4.6% per annum. Life expectancy at birth is only 49 years compared to 61 years for Brazil and infant mortality rate reaches 137 per 1,000 live births in the Northeast, against 70 for the country. These high indices are partly due to poor sanitation conditions.

5.02 The project area consists of three states in the Northeast of Brazil (Bahia, Pernambuco and Ceara; see Map 13716) which accounts for 9.5% of the land area and 18% of the population of Brazil. These three states were selected by BNH and the Bank as the ones having the strongest executing capacity as well as the largest investment requirements for 1979-82. Economic and health conditions for these states are similar to those prevailing throughout the Region.

5.03 Aware of the serious income disparities and economic and social development differences between the Northeast and other more developed regions in the country, the Government has launched a series of programs aimed at promoting employment, industrializing the area and diversifying production. The Government's actions have been mainly devoted to heavy investments in transport, power, rural development, and stimulus to industrialization which have contributed to regional growth. These investments together with the population increase have built up pressure on the already precarious public services, especially urban water supply and sewerage. The Bank has supported this regional development policy through several recent loans to develop different sectors in the Northeast. According to the Superintendency for Development of the Northeast (SUDENE) the regional GDP grew during 1977 at 8% as a result of the above-mentioned programs, compared with 4.7% for the country. This growth is closely related to agriculture and in minor scale to industrial activities. If this growth is to be maintained, adequate infrastructure has to be provided in the immediate future.

Water Resources

5.04 The Northeast can be classified in general as a semi-arid region. Rainfall is scarce (200 to 1,000 mm per year) and unevenly distributed. Average annual rainfall is higher along the coast (around 1,000 mm) and less towards the interior (as low as 200 mm). Severe droughts are frequent in the State of Ceara, the interior of Pernambuco and the northern part of Bahia (see Map 13717). Surface water is available only on a seasonal basis in most

^{1/} Northeast Region comprises the States of Maranhao, Piaui, Ceara, Rio Grande do Norte, Paraiba, Pernambuco, Alagoas, Sergipe and Bahia.

of the project area. Groundwater, especially in the State of Ceara and in the interior of Pernambuco (with the exception of narrow river valleys), is scarce and of poor quality (high salinity). This is basically due to predominance of geologic crystalline formations of low permeability. These characteristics are reflected quite often in high water supply project costs in comparison to those in the rest of the country.

Population

5.05 The combined population of the three project area states is 20.4 million, equivalent to 61% of the total population of the Northeast Region. The population and density of the individual states are given in the following table:

Table 5.1: Population Data in the Project States and Brazil (1977)

	Bahia	Ceara	Pernambuco	Brazil
Estimated Population	8,850,000	5,409,000	6,141,000	113,209,000
Area (km ²)	559,951	146,817	98,281	8,512,000
Density (persons/km ²)	16	37	62	13

Source: Anuario Estatístico do Brasil.

5.06 Of note is the fact that while Bahia has a large population, its population density is low because of its large area. Conversely, both Ceara and Pernambuco have population densities that are well above the average for Brazil. The latter is in fact one of the most densely populated states, on par with those in the southeast of Brazil.

5.07 Population growth in the project states overall is below the 2.8% p.a. growth rate for Brazil. In Ceara the growth rate is 2.9% p.a., and in Pernambuco and Bahia 2.5% and 2.4% p.a., respectively. The lower population growth rates have been primarily a result of outward immigration, and it is expected that this will continue to be the situation in the near future.

5.08 The ratio of urban to total population of the project area is below the national average of 61.4% as indicated in Table 5.2. Of the three states, only Pernambuco in the future can be expected to approximate the national degree of urbanization, as the economic activity in Bahia and Ceara is more centered in the rural areas. Population annual growth rates in the capital cities are estimated at 4.9% for Salvador (Bahia), 4.4% for Recife (Pernambuco) and 5.8% for Fortaleza (Ceara), which are in excess of the overall urban growth rates for each state.

Table 5.2: Urban Population in the Project States (1977)

	Bahia	Ceara	Pernambuco
Urban Population	4,044,000	2,439,000	3,741,000
% of Total	45.7	45.1	60.9
Growth Rates (%)	3.6	4.0	3.7

Source: SUDENE.

Present Water Supply and Sewerage Service Levels

5.09 Service levels for urban water supply are below the national average of 75% of the urban population as indicated in the following table:

Table 5.3: Water Supply Service Levels for 1977 (%)

	Bahia	Ceara	Pernambuco
Capital City <u>a/</u>	73	34	71
Total Urban <u>b/</u>	63	30	56
Total State (urban and rural) <u>b/</u>	28	14	32

a/ Source: State Water Companies.

b/ Source: SUDENE.

5.10 The service levels appear relatively good for the capital cities in Bahia and Pernambuco but poor in Ceara. The situation is less satisfactory than is statistically indicated because of the deficient water supply conditions (para. 5.11). Also, in these states with relatively large rural populations, the overall state service levels are very low compared to the estimated national average of 46% of the population served. In Ceara the situation is the most serious with only 14% of total population served and less than one-third of the urban sector being attended.

5.11 The inadequacy of service is very serious in the capital cities where vast portions of population, mostly poor, remain unserved or served on a very restricted basis. In Salvador (capital of Bahia), present production capacity is only one-half of that required to serve the population connected to the system. Consequently, service is provided intermittently and is

suspended 40% of the time on a rotational basis. The city has a hilly topography and consumers located in the higher areas are deprived of service for one to three continuous days of the week. In Recife (capital of Pernambuco), idle production capacity coexists with unsatisfied demand due to inadequacy of the storage and distribution system. The system is subject to low pressures in some city districts combined with frequent pipe bursts in others. In Fortaleza (capital of Ceara) the situation is even more serious due to low percentage of the population served through networks. The unconnected population relies basically on individual dug wells. However, due to the extensive use of latrines and septic tanks, resulting from low coverage of sewerage networks, groundwater is heavily contaminated.

5.12 Although inadequate records, and limited metering of production and consumption do not allow precise computations of water production, sales, and unaccounted-for water, the mission prepared rough estimates, shown in Table 5.4, based upon water production capacity and other operational data.

Table 5.4: Water Production and Sales for 1977

	Bahia	Ceara	Pernambuco
Water Production (m ³ /sec)	4.4	2.0	5.9
Water Sales (m ³ /sec)	2.4	1.0	3.0
Unaccounted-for Water (%)	46	50	49
Number of Connections	340,000	93,000	271,000
Percentage Metered	26	10	44

From these estimates it appears that a substantial amount of water produced is unaccounted for as a result of the lack of metering, illegal connections and water leakages in older or poorly maintained systems.

5.13 Sewerage service levels in urban areas were estimated to be, at the end of 1977, 8% for Pernambuco, 5% for Ceara and 6% for Bahia in comparison with the national average of 35%. Since most of the sewerage systems are in the capital cities, the situation in the other urban centers is even more serious, with Bahia and Ceara not having any sewerage systems outside the capital cities. As a result of the unequal expansion in water supply and sewerage, there has been increased water use without improving disposal systems, and the population basically relies on septic tanks and latrines, or discharges wastes in the storm drain system. In very poor areas where people cannot afford these facilities, sewage is dumped on the streets or in sidewalk drainage ditches with great danger of epidemic diseases. This situation, if not solved, will be aggravated by the increased consumption of water.

5.14 The situation of sewerage services in the capital cities varies among them. In Salvador, EMBASA recently completed the first stage of a collection and disposal system (about 150 km of collectors and interceptors, pumping stations and sea outfall) to serve the most densely populated areas. However, for technical and financial reasons, connection rates have been very low, and in four years only 5,300 connections have been made. The portion served with networks corresponds only to about 10% of the city area although the disposal facilities (pumping and sea outfall) were designed and constructed to handle 100% of the sewage in 1990.

5.15 In Recife only 20% of the urban area is served with sewerage networks due to high construction costs. High water table levels and expansive soils make it difficult and costly to install interceptors and collectors. For this reason, programs for Recife are more modest in terms of increased coverage.

5.16 In Fortaleza there are some 200 km of sewerage networks of which 100 km are operative and the rest require complementary investments to be committed. Only less than 5% of the city is now served with networks. Fortaleza has primarily single dwellings and low-rise buildings and, therefore, extension of required networks is considerable.

Demand Projections

5.17 Expected water production and sales through 1982 are indicated for each state in Table 5.5. The estimates were based on: (i) the future availability of supply coupled with distribution facilities resulting from the investments programs; and (ii) per capita consumption was considered constant after supply constraints are removed. This assumption is justified because the increased industrial demands and the elimination of rationing should offset the lower per capita consumption in the poor areas to be incorporated in the systems. For this estimate present per capita consumptions for metered and permanently supplied sectors in the cities or figures provided for in the consultants' studies were used. Because of the inability to measure unaccounted-for water (para. 5.12), these projections are considered only indicative of the expected results.

5.18 Forecasted sewerage connections over the next four years are a result of the planned works. Levels of service are still far behind the requirements for collective waste disposal systems, but it is expected that only after 1982 will it be possible to improve the situation substantially, given the limited investment capacity of the SWCs.

Table 5.5: Present and Projected Water Production and Sales, 1977-1982

	1977	1978	1979	1980	1981	1982
<u>EMBASA</u>						
<u>Water</u>						
Water Production (million m ³)	157	173	188	200	207	215
Water Sales (million m ³)	85	99	107	116	124	133
Unaccounted-for Water (%)	46	43	43	42	40	38
Number of Connections ('000)	340	345	368	396	424	452
Urban Population Served ('000)	2110	2261	2429	2617	2798	2890
Percent of Urban Population Served	63	64	66	68	72	74
<u>Sewerage</u>						
Population served ('000)	210	252	288	507	570	660
Percent of Urban Population Served	6	7	8	13	15	17
<u>COMPESA</u>						
<u>Water</u>						
Water Production (million m ³)	186	196	229	248	267	285
Water Sales (million m ³)	94	106	128	143	160	176
Unaccounted-for Water (%)	49	46	44	42	40	38
Number of Connections ('000)	271	304	356	386	415	444
Urban Population Served ('000)	2020	2190	2572	2802	3209	3260
Percent of Urban Population Served	56	59	66	69	72	74
<u>Sewerage</u>						
Population Served ('000)	280	285	371	463	639	810
Percent of Urban Population Served	8	8	10	11	14	18
<u>CAGECE</u>						
<u>Water</u>						
Water Production (million m ³)	64	67	69	69	98	103
Water Sales (million m ³)	32	34	36	38	59	67
Unaccounted-for Water (%)	50	49	48	45	40	35
Number of Connections ('000)	93	106	126	151	181	211
Urban Population Served ('000)	670	756	881	1052	1207	1400
Percent of Urban Population Served	30	31	34	39	43	47
<u>Sewerage</u>						
Population Served ('000)	115	128	191	252	313	375
Percent of Urban Population Served	5	5	7	9	11	12

VI. THE PROJECT

Project Origin

6.01 Since October 1975 the Brazilian Government has been considering the possibility of Bank participation in the implementation of PLANASA in the Northeast Region. During that year the Bank held discussions with the Government and BNH on the nature and scope of a potential Bank-financed project for the Northeast. Since then, three Bank missions have visited Brazil to assist BNH in the identification and subsequent preparation of the project. The investment programs initially presented by the SWCs to the Bank were too ambitious and reduced substantially during preparation to keep them in line with the executing capacity of the companies, the availability of funds and the possibility of timely and adequate supply of materials and equipment for the works.

Project Objectives

6.02 The objectives of the proposed project are:

- (a) to support through the provision of water and sewerage services the Government actions aiming to promote economic growth and social development in the Northeast Region;
- (b) to improve the environment and health conditions of the population in the project area by assisting the SWCs in achieving PLANASA's water supply and sewerage objectives. It is estimated that the project will provide safe water to an additional 2.3 million people and sewerage to an additional 1.2 million by the end of 1982;
- (c) to assist the SWCs in making institutional improvements in the areas of planning, operations, finance and accounting, through technical assistance under the coordination of SATECIA program;
- (d) to ensure the continuation of the training program under the coordination of ABES;
- (e) to improve the financial position of the SWCs through the establishment of adequate tariff levels and structures and rationalization of operating costs;
- (f) to contribute to the strengthening of BNH's capability for project appraisal and supervision; and
- (g) to gain experience in administration of loans for this sector covering several SWCs that can be replicated in future operations in Brazil.

Project Description

6.03 The project consists of all major subprojects (representing 68% of the total investment program) to be commenced and completed in the States of Bahia, Ceara and Pernambuco in the period 1979-1982. The proposed Bank financing would cover the foreign exchange component of procurement contracts awarded by the SWCs for eligible subprojects between loan signature date (expected to be February 1979) and June 30, 1981. The project includes the following:

- (a) the increase of water production, treatment, storage, and distribution facilities for the capital cities of Salvador (Bahia) and Fortaleza (Ceara);
- (b) the extension of water distribution networks in Recife (Pernambuco);
- (c) the provision of about 125,000 new house connections in the three capital cities;
- (d) the execution of metering and leak detection and control programs in the capital cities and major towns;
- (e) the extension of sewerage networks, sewage treatment and disposal facilities, and house connections in the capital cities and in about 20 of the major urban centers of the interior of the states;
- (f) the expansion and improvement of water supply systems in approximately 35 medium-sized cities;
- (g) the construction or expansion of water systems in small villages as follows:

Bahia	-	approximately 140 villages
Ceara	-	approximately 60 villages
Pernambuco	-	approximately 85 villages
- (h) tariff and metering studies for the three SWCs;
- (i) specific consulting services provided under the coordination of SATECIA to the SWCs in the areas of project management, finance and accounting, systems operations and inventory control; and
- (j) engineering services for detailed design and construction supervision.

6.04 A listing of communities to be served through Bank-financed subprojects during 1979-1982 in the interior of the states is presented in Annex 3. A description of the subprojects for the capital cities, and their execution

schedules are included in Annexes 3 and 4, respectively. Major works for the capital cities are indicated on Maps 13718, 13719, and 13720. Cost estimates are shown in Annex 5.

6.05 The tariff and metering studies included in the project are geared to: (a) rationalizing consumption; (b) improving the financial position of the SWCs; (c) removing subsidies to commercial and industrial consumers; (d) establishing a more progressive tariff structure; and (e) implementing adequate metering levels and meter maintenance practices (paras. 4.05 and 7.14).

6.06 Although SATECIA is carrying out a nationwide technical assistance program for all SWCs in Brazil (para. 2.09), additional and specifically tailored support in certain areas in the three SWCs was found necessary as summarized below:

<u>SWC</u>	<u>Areas for Technical Assistance</u>
EMBASA (Bahia)	Financial Management, Accounting, Systems Operation, Information Systems
CAGECE (Ceara)	Financial Management, Project Management, Systems Operation, Commercial Area
COMPESA (Pernambuco)	Financial Management, Supplies and Materials Control

It is estimated that a total of 100 man-months of specialized consulting services, in addition to the regular SATECIA program, are required. The assistance would be coordinated by SATECIA. BNH submitted during negotiations a detailed program, prepared with the assistance of SATECIA, to carry out these activities, which is considered satisfactory. Assurances were obtained that the programs will be implemented by BNH in accordance with the proposed plan and that the SWCs will take all required steps to enable BNH to implement the program.

Engineering

6.07 Final engineering design is completed or well advanced for all major works in the capital cities and for some 50% of the subprojects to be executed in the interior. It is estimated that an equivalent of 70% of the total program is already designed and that bids for about 30% of the total project components will be called during the first year of project execution. Additional engineering consultant services, about 2,850 man-months, are required to complete designs and for construction supervision during 1979-1982.

6.08 Water works proposed for Salvador are part of the Master Plan for water supply and pollution control prepared in 1974 by consulting engineers, Hidroservice and Coplasa from Sao Paulo. The study is a comprehensive analysis of demands, sources and alternatives of supply to meet demands up to the year 2000. The plan analyzed five technically feasible alternatives of sequential

works (four using Joanes Basin waters and a fifth using Paraguacu River waters) and selected the least-cost solution. Part of the works recommended by the consultants are under construction (interconnections of storage tanks and Santa Elena Reservoir). Sewerage works are also part of a master plan prepared by Walter Sanchez y Asociados from Rio de Janeiro. The feasibility report, concluded in 1968, reviewed the different alternatives for sewage collection and disposal in the natural basins of Salvador City and recommended the least-cost plan. Later, in 1969, the same consultants prepared a basic project for the recommended alternative which has been followed by EMBASA. These studies were reviewed by the Bank during the appraisal and the conclusions and recommendations found acceptable.

6.09 Water distribution and sewerage networks for Recife are now under final design by private consultants retained by COMPESA. The alternative for final disposal of sewage, which was found acceptable, is under design by the consultants as well as the updating of the Sewerage Master Plan for Metropolitan Recife. The results of this updating would be reviewed by the Bank during project execution. Detailed designs for Fortaleza, with the exception of water distribution networks, that are being designed by CAGECE's own engineers, were executed by local consulting firms on the basis of previous preliminary studies to select the least-cost approach, and were found satisfactory during appraisal.

Project Costs

6.10 Table 6.1 shows a summary of investment costs for the three SWCs from 1979-1982. The program amounts to US\$460 million. Out of this total program, about US\$148 million corresponds to ongoing works or works which would be committed before expected loan signature (February 1979) or after July 1981, and would not be eligible for Bank financing. In addition, according to previous experience in other similar Bank-financed operations, it is estimated that some 3% (or US\$10 million) of the proposed investments will not meet subproject selection criteria (para. 6.18). Total project cost for which Bank financing would be available is about US\$303 million and the resulting proposed loan amount is US\$100 million, representing the estimated foreign exchange cost of the project. Table 6.2 shows a summary of project costs. Subprojects for capital cities represent about 61% of the total project cost.

Table 6.1

PROJECTED ANNUAL INVESTMENTS FOR EMBASA, COMPESA, AND CAGECE - 1979-1982

DESCRIPTION	(thousand of UPCs)					(million of US\$)				
	1979	1980	1981	1982	TOTAL	1979	1980	1981	1982	TOTAL
<u>EMBASA</u>										
Water Supply	2942.4	2311.4	2469.1	1172.8	8895.7	42.9	33.7	36.0	17.1	129.7
Sewerage	<u>1076.8</u>	<u>1035.7</u>	<u>864.2</u>	<u>109.7</u>	<u>3086.4</u>	<u>15.7</u>	<u>15.1</u>	<u>12.6</u>	<u>1.6</u>	<u>45.0</u>
Subtotal	4019.2	3347.1	3333.3	1282.5	11982.1	58.6	48.8	48.6	18.7	174.7
Price Contingencies	<u>219.5</u>	<u>404.7</u>	<u>692.7</u>	<u>377.2</u>	<u>1694.1</u>	<u>3.2</u>	<u>5.9</u>	<u>10.1</u>	<u>5.5</u>	<u>24.7</u>
TOTAL (EMBASA)	<u>4328.7</u>	<u>3751.8</u>	<u>4026.0</u>	<u>1659.7</u>	<u>13676.2</u>	<u>61.8</u>	<u>54.7</u>	<u>58.7</u>	<u>24.2</u>	<u>199.4</u>
<u>COMPESA</u>										
Water Supply	2174.2	1076.8	1618.6	473.2	5342.8	31.7	15.7	23.6	6.9	77.9
Sewerage	<u>1035.7</u>	<u>1001.4</u>	<u>1625.5</u>	<u>939.6</u>	<u>4602.2</u>	<u>15.1</u>	<u>14.6</u>	<u>23.7</u>	<u>13.7</u>	<u>67.1</u>
Subtotal	3209.9	2078.2	3244.2	1412.9	9945.2	46.8	30.3	47.3	20.6	145.0
Price Contingencies	<u>178.3</u>	<u>253.8</u>	<u>665.3</u>	<u>342.9</u>	<u>1440.3</u>	<u>2.6</u>	<u>3.7</u>	<u>9.7</u>	<u>5.0</u>	<u>21.0</u>
TOTAL (COMPESA)	<u>3388.2</u>	<u>2332.0</u>	<u>3909.5</u>	<u>1755.8</u>	<u>11385.5</u>	<u>49.4</u>	<u>34.0</u>	<u>57.0</u>	<u>25.6</u>	<u>166.0</u>
<u>CAGECE</u>										
Water Supply	2366.2	1111.1	816.2	397.8	4691.3	34.5	16.2	11.9	5.8	68.4
Sewerage	<u>445.8</u>	<u>68.6</u>	<u>473.2</u>	<u>68.6</u>	<u>1056.2</u>	<u>6.5</u>	<u>1.0</u>	<u>6.9</u>	<u>1.0</u>	<u>15.4</u>
Subtotal	2812.0	1179.7	1289.4	466.4	5747.5	41.0	17.2	18.8	6.8	83.8
Price Contingencies	<u>157.8</u>	<u>144.0</u>	<u>267.5</u>	<u>137.2</u>	<u>706.5</u>	<u>2.3</u>	<u>2.1</u>	<u>3.9</u>	<u>2.0</u>	<u>10.3</u>
TOTAL (CAGECE)	<u>2969.8</u>	<u>1323.7</u>	<u>1556.9</u>	<u>603.6</u>	<u>6454.0</u>	<u>43.3</u>	<u>19.3</u>	<u>22.7</u>	<u>8.8</u>	<u>94.1</u>
TOTAL (GENERAL)	<u>10596.7</u>	<u>7407.5</u>	<u>9492.4</u>	<u>4019.1</u>	<u>31515.7</u>	<u>154.5</u>	<u>108.0</u>	<u>138.4</u>	<u>58.6</u>	<u>459.5</u>

- Investment costs include provisions for physical contingencies (between 10% and 20% depending upon the nature of the works and status of engineering) and for engineering and administration (8%).
- 1 UPC = US\$14.68.
- Base costs at September 1978.

Table 6.2: Summary of Project Costs a/
(In US\$ million)

Item	-----SWCs-----			Local	Foreign	Totals
	EMBASA	COMPESA	CAGECE			
Construction Costs:						
Water Supply	72.1	45.6	32.8	85.9	64.6	150.5
Sewerage	27.5	35.9	10.3	59.5	14.2	73.7
Engineering and Technical Assistance	<u>7.9</u>	<u>6.4</u>	<u>3.4</u>	<u>17.1</u>	<u>0.6</u>	<u>17.7</u>
Base Cost	107.5	87.9	46.5	162.6	79.3	241.9
Physical Contingencies	11.3	10.5	4.8	18.0	8.6	26.6
Price Contingencies	<u>14.2</u>	<u>13.5</u>	<u>6.8</u>	<u>22.5</u>	<u>12.0</u>	<u>34.5</u>
Total	133.0	111.9	58.1	203.0	100.0	303.0

a/ See Annex 3 for details.

6.11 Cost estimates have been based on bills of quantities prepared by the consultants for those projects with final engineering designs. Estimates for the rest were obtained on the basis of average unit per capita costs using samples of similar projects previously financed by the Bank in Brazil or executed by SWCs. Basic costs were estimated at December 1977 price levels and updated to September 1978 and include physical contingencies allowance which vary between 10% and 20% according to the type and location of works and to the status of engineering. Engineering and technical assistance consulting services have been calculated on the basis of US\$6,000 per man-month, with an estimated cost of US\$17.7 million. Costs exclude administrative expenses incurred by the SWCs that may be capitalized and interest during construction. Estimates were prepared in UPCs (para 3.07). Over the years the relative value of UPC with respect to the US dollar has been approximately constant. Thus an annual price escalation of 7% in US dollar terms was used for the period covered by the program.

Financing

6.12 The SWCs expansion programs are to be financed by loans from BNH and state revolving funds (FAEs). The Bank loan of US\$100 million would finance the estimated foreign exchange cost of the project estimated at 33% of project costs. The balance of project costs will be financed by BNH funds (17%) and loans from the state FAEs (50%). Due to the possible shortages of FAE funds, assurances were obtained from BNH and the state governments for the timely provision of necessary local currency funds to carry out the Bank-financed program on schedule.

6.13 BNH would relend the Bank funds to the SWCs at interest rates of 3% to 4% per annum, a one- to three-year grace period on principal repayments and 19 to 21 years' final maturity and principal and interest subject to monetary correction (denominated in UPCs, para. 7.09). The loan would be allocated among the three SWCs as follows: US\$60 million distributed according to project costs for the three capital cities; US\$20 million in proportion to the investments in the interior of the three states; US\$0.6 million for technical assistance to be provided under SATECIA and US\$19.4 million unallocated, to be assigned on a first-come first-served basis. According to these criteria, distribution of loan funds would be as follows:

	<u>US\$ million</u>
EMBASA (Bahia)	38.0
COMPESA (Pernambuco)	26.0
CAGECE (Ceara)	16.0
Technical Assistance	0.6
Unallocated	<u>19.4</u>
Total	<u>100.0</u>

Implementation

6.14 The project will be executed by EMBASA, COMPESA and CAGECE during the period 1979-1982 in accordance with the investment program shown in Table 6.1. The construction schedule for the capital cities is given in Annex 4. Annual construction schedules for the interior would be prepared during project execution, with the schedule for 1979 to be agreed upon in January 1979. The individual subprojects to be financed by the Bank have been prepared, or will be prepared, by competent consultants retained by the SWCs. Subproject design will be subsequently reviewed by BNH's OT for the Northeast Region, SUDENE. SUDENE has a well-qualified team which reviews first the basic project and then the final designs and also assists BNH's central and regional offices in the supervision and control of project execution. Financial and economic evaluation will be carried out by BNH headquarters. BNH will have the responsibility for coordination of the entire project.

6.15 The Bank will review all subprojects with an estimated investment cost of US\$2.0 million or more. It is estimated that some 35 subprojects will require review. These 35 subprojects, together with the ones for the capital cities, represent around 80% of the programmed investments. Subprojects where the estimated investment cost is less than US\$2.0 million may be approved by BNH subject to ex post review by the Bank on a selective basis. At the time Bank financing is approved, funds sufficient to cover the Bank's share of subproject costs will be committed to the subproject to ensure Bank participation in the subproject up to the time of its completion. BNH has prepared technical guidelines, and on this basis the SWCs have adopted standard technical designs for communities with fewer than 5,000 inhabitants. These design standards aim at: (a) reducing the design costs and the construction period for subprojects; (b) ensuring that construction costs are kept to the

minimum level; and (c) reducing, through standardization, the operating and maintenance costs of small communities. These design standards were reviewed during the appraisal and found in conformity with the current design practices followed for similar Bank-financed small community systems and with sound engineering principles. The delegation of approval authority to BNH for sub-projects under US\$2.0 million is consistent with the institutional capabilities of BNH in subproject analysis and approval.

6.16 Low connection rates to existing sewerage networks in Salvador have been a problem for EMBASA. There are several areas, especially in the older parts of the city, where connections to the network are difficult due to topographic and other reasons. However, the variety of individual situations is not very large and typical technical solutions can be devised for similar connection conditions. In addition, there are some low-income areas with very narrow, steep and zigzagging streets where conventional network designs could be very costly and alternative technological solutions should be analyzed. Finally, EMBASA has not officially approved technical norms for sewerage of new construction sites. Assurances were obtained that: (a) as a condition for disbursements for sewerage in Salvador, EMBASA will prepare a plan satisfactory to BNH and the Bank including technical and financial solutions to the existing problem of difficult sewer house connections in Salvador; (b) not later than December 31, 1979 EMBASA will prepare alternative solutions and implementation schedules satisfactory to the Bank to collect and dispose of sewage in those areas where current sewerage practices are very expensive or inappropriate; (c) EMBASA will prepare sewer house connection standards satisfactory to BNH and the Bank, not later than December 31, 1979.

6.17 The proposed investment program and construction schedules have been discussed with the SWCs and are compatible with their execution capabilities. SWCs are staffed with qualified personnel and have experienced engineering units, which with appropriate consultants' assistance as provided for in the project, can execute the proposed works (para. 6.07).

Subproject Selection

6.18 Assurances were obtained that the following basic criteria for subproject acceptability for Bank financing will be used (para. 8.07):

- (a) All subprojects should comply with the following two conditions:
 - (i) design must be in conformity with sound engineering practices; and
 - (ii) subprojects must be the least-cost solution.
- (b) Subprojects for communities with fewer than 5,000 inhabitants must be in accordance with the standards for small communities (para. 6.15) and must:
 - (i) generate revenues to cover at least operating and maintenance costs; and

- (ii) have a per capita construction cost of less than 10 UPCs (or approximately US\$150).
- (c) Subprojects for municipalities between 5,000 and 50,000 inhabitants must have a positive internal financial rate of return;
- (d) Subprojects for municipalities with 50,000 or more inhabitants must have an internal financial rate of return of not less than 5%; and
- (e) If a project for a municipality between 5,000 and 50,000 inhabitants does not meet the criteria under (c) above, it would be redesigned in accordance with lower acceptable standards to fulfill the criteria. If, even after redesign, the project does not meet the criteria on (c) above, it would be eligible for Bank financing only if its revenues cover at least operation and maintenance costs and if economic and social justifications are presented to the Bank and found acceptable.

BNH would furnish subprojects for approval (para 6.15) together with an appraisal of the subprojects including economic and financial analysis. BNH would also provide information on financial terms to be applied to the subproject.

Procurement

6.19 Project goods and civil works will be purchased and carried out respectively under contracts awarded in accordance with Bank guidelines, on the basis of international competitive bidding. However, civil work contracts under US\$1,200,000 and equipment or materials supply contracts under US\$400,000 can be awarded on the basis of local competitive bidding according to procedures satisfactory to the Bank. Foreign bidders will not be precluded from participating in local bidding. Assurances were obtained that: (a) SWCs will prepare and make available to the Bank not later than sixty days prior to the issue of first tender or prequalification documents a general procurement notice satisfactory to the Bank; and (b) SWCs will update such a notice annually as long as any goods or works remain to be procured. The Bank will request prior review and concurrence of invitations to bid and of proposed awards for all contracts estimated to cost US\$2.0 million or more. For all other contracts the SWCs will make available to the Bank for review copies of each contract together with the respective bidding documents, bid analysis report and recommendations for award. In the evaluation of bids, the local manufacturers will be allowed a margin of preference of either 15% of the c.i.f. price or the applicable import duty, whichever is lower. Consulting services will be awarded on terms and conditions acceptable to the Bank. It is expected that all contracts for engineering design and supervision be awarded to local firms. Given the advanced development of the civil works construction industry in Brazil, all civil works contracts are expected to be won by local contractors. Also, the bulk of the equipment and materials are likely to be won by Brazilian firms or Brazilian subsidiaries of foreign suppliers.

Disbursements

6.20 Disbursements for the proposed loan are scheduled to be completed before December 31, 1982. The closing date for the loan would be June 30, 1983. Table 6.3 shows the estimated schedule of disbursements. The proceeds of the loan would be made available to BNH in an amount equivalent to:

- (a) 58% of BNH's disbursements to SWCs on eligible subprojects 1/;
- (b) 29% of BNH's disbursements to the states under FINEST II line of credit for small communities approved subprojects; 2/
- (c) 58% of BNH's disbursements to the states under FINEST III line of credit for small communities program 1/; and
- (d) 100% of foreign costs for consulting services for the technical assistance program referred to in para. 6.06.

In case the amounts disbursed by BNH qualify for withdrawals from the Loan Account under (b) and (c) above, withdrawals shall be made, at BNH's choice, under either subparagraphs but not both. Bank disbursements would be made against a certificate of expenditure made by the Borrower for each subproject, the detailed documentation of which would not be submitted for Bank review, but would be retained by the beneficiary and made available for inspection during the course of supervision missions. Disbursements against consulting services for technical assistance program ((d) above) would be made against standard documentation. No works by force account are envisaged. Similar procedures have been used in previous loans for the sector in Brazil.

1/ BNH and FAE each lend to SWCs 50% of the direct project cost, plus an amount equivalent to 6.5% of the direct project cost to cover project related expenses of the SWCs which are capitalized (Annex 7, para. 1.04).

2/ BNH loans under FINEST II finance 100% of the direct project cost plus an amount equivalent to 6.5% of the direct project costs to cover project related expenses of the SWCs which are capitalized.

Table 6.3: Estimated Schedule of Disbursements

(US\$'000)

<u>Fiscal Year and Quarter</u>	<u>Disbursement in the Quarter</u>	<u>Cumulative at end of Quarter</u>
<u>1978/79</u>		
March 31, 1979	-	-
June 30, 1979	0.5	0.5
<u>1979/80</u>		
September 30, 1979	3.5	4.0
December 31, 1979	5.0	9.0
March 31, 1980	6.5	15.5
June 30, 1980	7.2	22.7
<u>1980/81</u>		
September 30, 1980	8.0	30.7
December 31, 1980	9.2	39.9
March 31, 1981	8.2	48.1
June 30, 1981	9.4	57.5
<u>1981/82</u>		
September 30, 1981	9.0	66.5
December 31, 1981	8.6	75.1
March 31, 1982	7.0	82.1
June 30, 1982	6.8	88.9
<u>1982/83</u>		
September 30, 1982	6.4	95.3
December 31, 1982	4.7	100.0

VII. FINANCIAL ANALYSIS

The Borrower

7.01 BNH is the largest government-owned banking institution in Brazil dedicated to social development, with total assets at the end of 1977 of US\$11.6 billion. BNH's main activities, which are nationwide, are concerned with the financing of low-cost housing, urban development and the sanitation sectors. Over the period 1971-1980, BNH expects to invest about 54% of its resources in low-cost housing programs, 17% in urban development for infrastructure and mass transportation systems, 17% in sanitation projects, and the remaining 12% in studies, training, technical assistance, and miscellaneous activities. BNH's primary source of funds is an 8% employer's payroll contribution (Employee Indemnity Fund-FGTS) for all nongovernment employees covered by labor legislation. Individual FGTS accounts are maintained for the participants and withdrawals of the deposits can be made when a worker is unemployed or retired. All deposits made after 1974 earn interest at the rate of 3% p.a. Other fund sources for BNH include interest and principal repayments from its existing loans and investments.

Past and Present Finances

7.02 The following summary financial statements indicate the development of BNH's financial activities since 1971. Full details are given in Annex 6.

Table 7.1

BNH Summary Funds Flow Statement

(US\$ millions)

	1971	1973	1975	1976	1977
Loan and Service Income	163.0	341.1	559.6	667.2	801.3
Operating Expense	102.0	196.5	339.0	411.2	592.6
Operating Income	61.0	144.6	220.6	256.0	208.7
Indemnity Deposits (net)	424.4	727.1	1,135.1	1,199.6	1,458.0
All Other Sources	249.0	361.8	904.7	1,132.5	912.2
Total Sources	<u>734.4</u>	<u>1,233.5</u>	<u>2,260.4</u>	<u>2,588.1</u>	<u>2,578.8</u>
New Loans Granted	618.4	1,021.9	1,939.4	2,569.7	2,483.2
All Other Applications	116.0	211.6	321.0	18.4	95.6
Total Applications	<u>734.4</u>	<u>1,233.5</u>	<u>2,260.4</u>	<u>2,588.1</u>	<u>2,578.8</u>

Table 7.2

BNH Summary Balance Sheets

(US\$ Millions)

<u>December 31</u>	<u>1971</u>	<u>1973</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>
Loan Receivables	1,545.3	3,131.7	5,461.4	7,246.1	9,284.9
Negotiable Bonds	203.8	761.1	1,120.0	1,048.8	1,001.3
All Other Assets	<u>378.1</u>	<u>345.4</u>	<u>893.2</u>	<u>995.8</u>	<u>1,279.7</u>
Total Assets	<u>2,127.2</u>	<u>4,238.2</u>	<u>7,474.6</u>	<u>9,290.7</u>	<u>11,565.8</u>
Indemnity Fund Deposits	1,741.5	3,373.3	5,337.7	6,400.3	8,021.7
Capital and Reserves	283.8	696.4	1,349.8	1,495.2	1,644.5
Other Liabilities	<u>101.9</u>	<u>168.5</u>	<u>787.1</u>	<u>1,395.2</u>	<u>1,899.6</u>
Total Liabilities	<u>2,127.2</u>	<u>4,238.2</u>	<u>7,474.6</u>	<u>9,290.7</u>	<u>11,565.8</u>

7.03 BNH's gross loan and service income has shown steady and rapid growth (30% p.a.) since 1971, and until 1976 operating income increased at the same rate and averaged about 40% of revenues during the period. The Government has directed BNH, as an institution promoting social welfare, to minimize its operating income. While loan and service income continued to grow in 1977, operating income declined from US\$256.0 million in 1976 to US\$208.7 million in 1977, a figure which represented only 26% of loan and service income. This reduced margin reflected primarily the fact that operating expenses increased at more than twice the rate of revenue growth, 44% and 20%, respectively.

7.04 Since 1971 net receipts of the Employee Indemnity Fund have grown at a rate of 23% p.a. In 1977 they increased at almost the same rate (22%) and represented about 57% of total BNH fund sources, about the same level which prevailed in 1971. Amortization of loan principal, which has increased only slightly since 1974, was about the same level as the previous year. As a result of this, the reduction in internal cash generation, and lesser funds being provided by working capital reductions, total funds available for investment were almost the same in 1977 as in the previous year. They were, however, sufficient to meet requirements for new loans, which were below the 1976 level reflecting the Government's desire to restrain investment for the purpose of reducing inflation.

7.05 In 1974, BNH established a liquidity fund (Fundo de Assistencia de Liquidez-FAL) financed by contributions from savings and loan institutions to provide short-term assistance to financial institutions in the housing sector in financial difficulty. In spite of the assistance, BNH had to take judicial action to force the liquidation of six institutions. Debts of these Borrowers amounted to US\$636.8 million, or about 6% of BNH's total assets at

the end of 1977. BNH has established a reserve of US\$255.0 million to cover any loss from these liquidations although none are expected.

7.06 Since 1971, BNH's loan portfolio has expanded five-fold and its total assets have grown by 440%. To protect the Employee Indemnity Funds from losses due to inflation, BNH denominates all financial transactions in a constant monetary equivalent, the Unidade Padrao de Capital (UPC). Additionally, BNH requires that all its loans be guaranteed by state or municipal governments, financial institutions, or by mortgages where appropriate. At the end of 1977 BNH's capital and reserves were equal to 16% of liabilities, which is satisfactory.

Financial Projections

7.07 Each year BNH prepares a three-year investment program (expressed in UPCs) which is approved by the Minister of Interior. For the period 1978-1980 BNH's investment budget totals US\$11.4 billion with projected fund sources and applications as indicated in the following Table:

Table 7.3: BNH Projected Sources and Application of Funds, 1978-1980

	<u>Amount</u>	<u>%</u>
	(In US\$ Millions)	
<u>Sources</u>		
FGTS (Net)	5,559	49
Net Receipts on Lending Operations	3,571	31
Operating Income	808	7
Sale of Securities/Other (Net)	1,201	11
Foreign Loans (including Bank Loan)	<u>220</u>	<u>2</u>
Total Sources	<u>11,359</u>	<u>100</u>
<u>Applications</u>		
Housing	7,169	63
Sanitation	1,872	17
Urban Development	1,176	10
Technical Assistance	747	7
Other	<u>395</u>	<u>3</u>
Total Applications	<u>11,359</u>	<u>100</u>

7.08 During the three-year program period, BNH's growth has been projected at 14% p.a. The sectoral distribution of investments, in general, follows the same proportions as in previous periods. BNH's administrative costs are projected to rise from their historic 40% of service income level to

67%. This increase is attributed to the need to establish a new reserve for contingencies, additional technical assistance, and additional personnel for the decentralization of BNH's activities. BNH's management is aware of its rapidly increasing administrative costs, and has recently initiated programs to promote better utilization of its personnel.

7.09 As the interest rate on the Bank loan will be higher than the relending rate and the maturity of BNH's loans to the SWCs exceeds the maturity of the Bank loan, BNH's debt service payments to the Bank will exceed payments to BNH by the SWCs. BNH's financial position is expected to be strong enough to absorb this shortfall without difficulty. A comparison of Bank terms and BNH onlending terms to the SWCs follows:

	<u>Normal</u>		<u>Lending in the</u> <u>Northeast</u>		<u>Bank Terms</u>
	<u>PLANASA Terms</u>		<u>Terms</u>		
	<u>BNH</u>	<u>FAE</u>	<u>BNH</u>	<u>FAE</u>	
Annual Interest (%)	2-8	5.5 ^{/a}	3.0-4.0	3.5-4.0	-
Grace Period (years)	1-3	1-3	1-3	1-3	3
Final Maturity (years)	19-21	19-21	19-21	19-21	12

/a Average.

In addition to the interest rates, BNH may charge up to 2% of the total loan as a one time fee for administration and technical services. Also a commitment fee of 1% is charged by BNH on the undisbursed portion of the loan. The financial agent also charges 1% per year for administrative expenses and is entitled to receive 0.1% of each periodic payment made by the SWCs to amortize the loan. The resulting interest cost on BNH loans to the SWCs thus ranges between 4.0 and 5.0% p.a. The low interest rates and extended maturity periods for the Northeast SWCs are justified for the following reasons: (a) the urgency to provide safe water and sewerage services to satisfy at least basic minimum needs, at the lowest possible cost to a large segment of the poor population; (b) the magnitude of tariff increases required to meet the debt service; (c) higher tariffs could jeopardize consumers' affordability of these services; and (d) the maturity period is in line with the economic life of the project.

The Beneficiaries

7.10 All three SWCs share the common problem of inadequate rates of return on assets and low internal cash generation. This situation exists primarily because of high cost structures and inadequate tariff levels. This section will cover tariff matters common to all SWCs and then review the past, current and projected financial position of each SWC.

7.11 Tariff structures for the SWCs are basically similar, with three consumer categories including residential, commercial and industrial as indicated on Table 7.4. The bulk of residential customers are not metered (para. 5.12 and Table 5.4) and most are billed at a flat rate of about US\$1.75 per month. Metered residential customers pay minimum charges for the first 12 to 15 m³, which is roughly equivalent to the nonmetered customers' total

Table 7.4

BRAZIL - NORTHEAST WATER SUPPLY AND SEWERAGE PROJECT

PROJECT SWCs TARIFF STRUCTURES - 1977

(current Cr\$)

CONSUMER CLASSIFICATION	EMBASA		Minimum 20m ³	CAGECE			Minimum 15m ³	COMPESA		
	Minimum 12m ³	Excess m ³		21-50m ³	51-100m ³	Excess m ³ over 100m ³		16-55m ³	56-75m ³	Excess m ³ over 75m ³
<u>RESIDENTIAL/PUBLIC</u>										
Not metered	(small)25.00 (large)56.00		33.00				30.00 - 121.00	Based on floor area		
Metered	(small)25.00 (large)40.00	3.75 3.75	33.00	1.72	1.80	1.87	30.00	2.00	2.20	2.50
<u>COMMERCIAL/PUBLIC</u>										
Not metered	56.00		33.00				30.00 - 121.00	based on floor area		
Metered	56.00	3.75	33.00	1.72	1.80	1.87	60.00	2.20	2.60	
<u>INDUSTRIAL</u>										
Not metered	190.00		66.00				60.00 - 256.00	based on floor area		
Metered	(30m ³)190.00	1.75	66.00	1.57	1.50	1.35	60.00	2.20	2.60	
Raw water							1.50/m ³			

billing, and then pay US\$0.11 to US\$0.22 per m³ for excess consumption. EMBASA has a flat charge per m³ for excess consumption, while COMPESA and CAGECE have slightly increased charges in three successive consumption blocks. Commercial and industrial rates are about the same as the residential rate, with the exception of higher initial minimums. Sewerage tariffs are generally a percentage of water tariffs, with the percentage ranging from 30% to 110%.

7.12 The tariff structures are applicable to both the capital city and interior municipalities and no attempt is made to relate charges to capital investments and operating cost conditions in the various municipalities. The tariff structures are only mildly progressive, except for EMBASA which bills any consumption above the minimum 12 m³ block at almost twice the base rate per cubic meter for small consumers, and the structures, therefore, provide only limited incentive for metered large customers to conserve water.

7.13 All SWCs and their respective state governments have recognized the need to improve their financial position and have agreed to revenue covenants which will provide for sufficient revenues to cover the sum of operating and maintenance expenses and depreciation, and provide the following rates of return on revalued net fixed assets in operation:

	<u>1979/1980</u>	<u>1981</u>	<u>1982</u>	<u>1983/ Subsequent Years</u>
EMBASA	6%	6%	6%	7%
COMPESA	5%	5%	5%	7%
CAGECE	1%	3%	5%	6%

The specified rates of return are consistent with each SWC's present financial position and future cash requirements. In the case of CAGECE, the magnitude of real tariff adjustments required to achieve the long-run objective return is large, and accordingly lower rates of return have been established for the early years to allow for more gradual tariff increases.

7.14 In the past, tariff increases have generally been affected by adding a fixed percent to the water charge for each category. Because of the low per capita income in the project states, this procedure could result in unmetered residential consumers paying for water an amount in excess of the government guidelines of 5.0% of the minimum wage. Accordingly, future tariff increases will have to be accompanied by tariff restructuring and metering policies to take into account aspects of income distribution, resource allocation, and water conservation. Under the project, by October 31, 1979, the SWCs will carry out studies in the fields of metering policies and water supply and sewerage tariffs, in accordance with terms of reference and with the assistance of consultants satisfactory to the Bank. These studies are expected to make recommendations on the improvement of tariff structures and metering policies. The summary terms of reference for the studies are included in Annex 8. The individual SWCs will put into effect the findings and conclusions of the studies as shall be agreed upon between the Bank, BNH and each SWC.

Financial Status and Projections of the Beneficiaries

7.15 Past and projected income, cash flow statements and balance sheets for EMBASA, COMPESA and CAGECE are presented in Annex 7. Because of the high rates of inflation, which distort year to year comparisons, the historical income statements and balance sheets and the projected financial statements have been stated in UPCs. The 1976 and 1977 results are at best indicative, since SWCs income statements include monetary adjustments, and asset and liability accounts are maintained by the SWCs in current Cruzeiros, both of which make it difficult to present financial statements on the basis of a constant monetary unit. ^{1/} The UPCs used in the financial projections have been escalated at 7% p.a. during the period 1979-1982, to reflect the recent differential growth rates in the ORTN (on which the UPC/Cruzeiro parity is based) and the general price index in Brazil.

EMBASA

7.16 In 1977 EMBASA had an operating ratio of .77, but interest expense exceeded operating income resulting in a net loss equal to 11% of revenues. The rate of return on net revalued fixed assets in operation was 2.9%. EMBASA had not generated enough cash internally to meet its debt service requirements in 1977 (debt service ratio 0.8), and required equity contributions from the state for these purposes. EMBASA's current financial position is tight in spite of a satisfactory current ratio of 2.8. This is because some cash balances represent advance loan drawdowns from BNH/FAE and are reserved for subsequent disbursements to contractors on specific projects. The capital structure of EMBASA is overburdened with debt, which accounts for 86% of total capitalization. The following table summarizes financial results for 1977 and projections through 1983:

^{1/} Decree Law 1598 of December 26, 1977 requires firms to set up a special ledger as of January 1, 1978 in ORTN in which all items subject to monetary correction are to be entered.

Table 7.5: Selected Financial Data - EMBASA

(UPC millions)

	1977	1978	1979	1980	1981	1982	1983
Water Sold (Million m ³)	85	99	107	116	124	133	141
Revenue/m ³ (water) (UPCs)	.015	.017	.019	.021	.023	.027	.029
Revenues	1.51	1.98	2.44	3.03	3.60	4.41	4.95
Operating Costs <u>a/</u>	1.17	1.43	1.52	1.92	1.28	2.91	3.06
Operating Income	.34	.55	.92	1.11	1.32	1.50	1.89
Interest	.50	.54	.63	.69	.78	.98	1.15
Net Income (Loss)	(.16)	.01	.29	.42	.54	.52	.74
Operating Ratio	.77	.72	.62	.63	.63	.66	.62
Debt Service Ratio	0.8	1.2	1.6	1.7	1.8	1.7	1.6
Rate of Return (%)	2.9	4.3	6.0	6.0	6.0	6.0	7.0
Debt/Total Capital (%)	86	88	89	89	89	87	86

a/ Includes depreciation.

7.17 Income projections based on tariffs designed to meet the Bank's revenue covenant (para. 7.13) indicate that through 1983 operating ratios will be in the range of 62% to 66% and that EMBASA will have a satisfactory net income position. To achieve this performance EMBASA will have to increase tariffs in real terms by about 21% during the 1979-1983 period. 1/ Internal cash generation will be adequate to cover working capital and debt service requirements during the forecasted period. All capital expenditures not covered by internal cash generation are assumed to be financed by BNH/FAE loans. With regard to the balance sheet, liquidity will be satisfactory and the ratio of debt to total capital is expected to remain close to its present level of about 88% as a result of the fact that the bulk of capital expenditures will be debt-financed.

COMPESA

7.18 In 1977 COMPESA had an operating ratio of .75 and reported a net income equivalent to 9% of revenues. However, construction in progress included a large amount of completed work, and had this work been transferred to

1/ In current Cruzeiros the tariff increase needed to keep pace with price escalation is estimated to be equivalent to the annual devaluation of the Cruzeiro vis-a-vis the UPC plus 7% (para. 7.15), currently equivalent to between 35% and 40% p.a.

fixed assets, the larger amount of depreciation would have placed COMPESA in a loss position. The rate of return on net fixed assets in operation was 11.1%, the high figure resulting from the understatement of fixed assets (para 4.09). Internal cash generation was sufficient to provide a debt service ratio of 1.5. COMPESA's current financial position is tight (current ratio 1.6), and most of the cash balance is committed to specific work in progress payments. COMPESA's capital structure is largely debt, which constitutes 77% of the total. The following table gives the highlights of COMPESA's financial performance for 1977 and the projected performance through 1983:

Table 7.6: Selected Financial Data - COMPESA

(UPC millions)

	1977	1978	1979	1980	1981	1982	1983
Water Sold (Million m ³)	94	106	128	143	160	176	196
Revenue/m ³ (water) (UPCs)	.011	.012	.013	.014	.014	.015	.017
Revenues	1.32	1.57	2.07	2.66	3.07	3.88	4.71
Operating Costs /a	.99	1.32	1.64	2.11	2.38	3.04	3.34
Operating Income	.33	.25	.43	.55	.69	.84	1.37
Interest	.22	.19	.30	.49	.60	.77	.89
Net Income/(Loss)	.12	.06	.13	.06	.09	.07	.48
Operating Ratio	.75	.84	.79	.79	.77	.78	.71
Debt Service Ratio	1.5	1.5	1.2	1.3	1.2	1.5	1.4
Rate of Return (%)	11.1	4.5	5.0	5.0	5.0	5.0	7.0
Debt/Total Capital (%)	77	78	80	81	83	84	83

/a Includes depreciation.

7.19 Income projections based on maintaining tariffs in real terms through 1983, which will allow COMPESA to meet the Bank's revenue covenant in 1979 and subsequent years (para. 7.13), indicate an operating ratio averaging about 78%, and a net income position in all forecast years. COMPESA's internal cash generation will be adequate to meet debt service, with the debt service ratio averaging 1.3 during the forecast period. The debt to total capital ratio is projected to increase slightly to .83 by 1982.

CAGECE

7.20 In 1977 CAGECE had an operating ratio of .79 and reported a modest net income, although both depreciation and interest expense have been understated. More importantly, CAGECE capitalized an estimated 73% of its operating

and administrative costs (Annex 7, para. 1.04) without which a 100% increase in tariffs would have been required to break even. The rate of return on net fixed assets in operation was 3.2%, also overstated because of the above items and because of excessive construction in progress which did not enter the rate base. The debt service ratio was 1.5. CAGECE's current position is poor, with a current ratio of .9, but CAGECE's capitalization is satisfactory, with debt equivalent to 56% of total capital. CAGECE's financial position is worse than the other two SWCs because revenues are extremely low in relation to assets and debt and are also lower on a unit basis. The table below indicates CAGECE's financial results for 1977 and projected financial performance through 1983:

Table 7.7: Selected Financial Data - CAGECE

(UPC millions)

	1977	1978	1979	1980	1981	1982	1983
Water Sold (Million m ³)	32	34	36	38	59	67	75
Revenue/m ³ (water) (.01 UPC)	.008	.010	.014	.017	.017	.023	.024
Revenues	.31	.40	.61	.83	1.23	1.83	2.17
Operating Costs /a	.25	.37	.54	.75	.99	1.30	1.42
Operating Income (Loss)	.06	.03	.07	(.08)	.24	.53	.75
Interest	.05	.14	.14	.15	.27	.45	.52
Net Income (Loss)	.01	(.11)	(.07)	(.07)	(.03)	.08	.23
Operating Ratio	.79	.92	.89	.91	.80	.71	.65
Debt Service Ratio	1.5	1.1	1.7	1.6	1.4	1.4	1.5
Rate of Return (%)	3.2	0.9	1.2	1.1	3.0	5.0	6.0
Debt/Total Capital (%)	56	70	80	82	84	84	83

/a Includes depreciation.

7.21 For CAGECE's projections, tariffs have been increased gradually as the real increase in tariffs required to meet the Bank's financial viability in 1979 and 1980 (para. 7.13) would be too large in terms of consumer affordability. Through 1981 CAGECE is projected to be in a loss position, but will be able to meet its debt service. By 1983 CAGECE will have to raise its tariffs by 71% in real terms to meet the rate of return requirement of 6%. CAGECE's financial position is worse than the other two SWCs because revenues are extremely low in relation to assets and debt and are also lower on a unit basis. In that year the operating ratio will be .65, the debt service ratio 1.5, and debt will account for 84% of total capital.

Evaluation

7.22 The financial performance of the SWCs will have to be closely monitored during supervision and the financial projections revised at least annually. In this regard it must be noted that the risks of the three SWCs not attaining or maintaining financial viability during the forecasted period are high for a number of reasons, the most important of which is the requirement for a 35-40% annual tariff increase needed just to keep pace with inflation. Also the required tariffs have been based on aggregate statewide projections of water produced, unaccounted for and sold, and if water sales fail to materialize, actual tariffs in real terms will have to be higher than indicated in the financial projections. Another major problem is that all three SWCs have embarked on large sewerage programs in the capital cities which are not likely to be financially viable during the forecast period. The sewerage investments, coupled with high cost per capita water supply systems and correspondingly high debt service requirements, will make it difficult to maintain tariffs at levels which will keep the SWCs financially viable. Assurances have been obtained from the Federal and state governments and BNH that they will support and assist the SWCs in meeting the Bank's revenue covenant (para. 7.13).

7.23 The SWCs' managements are aware of the magnitude of their problems and have developed financial recovery programs encompassing the following actions: (a) increased metering of existing connections, particularly in high income and high consumption areas; (b) increased water supply through upgrading the capacity of existing treatment plants; (c) increased consumer connections in existing water distribution systems and sewerage networks; (d) close control of operating expenses; and (e) reduction of unaccounted-for water. Assurances were obtained that the SWCs will propose for Bank consideration specific programs, implementation schedules, and objectives not later than October 31, 1979, and these programs will be carried out in accordance with agreed-upon schedules.

Monitoring Indicators/Reporting Requirements

7.24 In order to permit the satisfactory monitoring of its investment program and financing plans, EMBASA, COMPESA and CAGECE have agreed:

- (a) to prepare three-year financial projections before March 31 of each year expressed in local currency and UPCs, which would include an income statement, statement of cash flow, balance sheet, and calculation of fixed assets in operation;
- (b) to establish, not later than October 31, 1979 a system of monitoring indicators satisfactory to the Bank. Under this system, each SWC would provide a quarterly progress report which would include:
 - (i) progress on the project implementation, giving details about design completion, physical execution of the works and disbursements;

- (ii) progress in meeting the objectives of the financial recovery programs (para 7.23);
 - (iii) statistical data for the number of water and sewer connections, volume of water produced, volume of water and sewerage billed, and average tariffs; and
 - (iv) preliminary financial statements indicating key operating and financial ratios for water supply and sewerage; and
- (c) to prepare a report satisfactory to BNH and to the Bank on the execution and initial operation of the project, not later than six months after project completion. BNH will be responsible for the timely preparation and submission of these project completion reports.

VIII. ECONOMIC AND SOCIAL ANALYSIS

Introduction

8.01 The project aims to achieve two major objectives: (a) to enhance the living and health conditions of the people in the three project states, especially for the low-income population, by improving and extending water supply and sewerage systems; and (b) to improve the planning and execution capabilities of the three project SWCs by additional consulting services and Bank supervision. These objectives are particularly important in the Northeast Region where health conditions are worse than in the rest of the country and water supply and sewerage coverage is behind the PLANASA targets set for 1980.

Internal Rate of Return and Long Run Marginal Cost

8.02 The combined internal financial rate of return (IFRR) for the sub-projects and their complementary works in the three capital cities is estimated to be 10%. These subprojects, the cost of which is US\$250.1 million at December 1977 prices ^{1/}, account for 61% of the total project cost. Of these subprojects, the IFRRs for Recife, Fortaleza, and metropolitan Salvador are estimated to be 13%, 12%, and 7% and account for 17%, 15%, and 29% of the total project cost, respectively. Since the subprojects outside the capital cities are numerous and are at various stages of preparation, their internal rate of return has not been calculated. Their cost is estimated to US\$152.9 million which represents 39% of the total project cost.

8.03 The IFRRs can be used as a proxy for the minimum internal economic rates of return (IERR) by using existing tariff levels to represent benefits based on demonstrated willingness to pay. All taxes and subsidies are excluded and the foreign exchange costs are shadow priced at 1.30 times the official exchange rate, to represent its opportunity cost. On this basis the minimal economic rates of return are 11.2% for Recife, 1.2% for Fortaleza, and 3.4% for metropolitan Salvador. These IERRs understate the real economic return since

^{1/} Including complementary investments.

they do not include those important benefits that are not meaningfully quantifiable. Water sales to the urban poor ^{1/} (about 28% of total incremental volume sold), while priced at a low tariff, represent in fact much higher benefits since they are the first increment in safe water consumption and will ensure most of the health benefits from an improved supply. Improvements in public health, labor productivity, infrastructure for economic development and institutional capabilities, are not reflected in most cases in revenues from tariffs, and provide evidence that economic and social benefits of the proposed project exceed its financial benefits. These considerations lead to the conclusion that the above IFRRs are acceptable.

8.04 The estimated IFRRs are highly sensitive to tariffs or demand changes since estimated benefits include only revenues from consumption charges. The existence of water rationing and the extremely low level of sewerage coverage suggest that services to be provided by the project are not likely to be restricted by a limited demand despite the increase in tariffs in real terms. Annex 9 includes the calculation of the IFRRs for the three capital cities.

8.05 The long-term marginal cost of water supply and sewerage has been estimated for the three capital cities by calculating the average incremental cost of each subproject and complementary works. Details of the calculations are also given in Annex 9. A comparison between average incremental cost and the average tariff at December 1977 price level is also shown in Table 8.1.

Table 8.1: Average Incremental Cost and Tariffs a/

(December 1977 prices)

City	Average Incremental Cost (at 11% Discount Rate)	Average Tariff
<u>Salvador</u>		
Water Supply (Cr\$/m ³)	5.3	3.7
Sewerage (Cr\$/m ³ equivalent)	8.8	3.8
<u>Recife</u>		
Water Supply (Cr\$/m ³)	3.2	2.6
Sewerage (Cr\$/m ³ equivalent)	2.3	2.7
<u>Fortaleza</u>		
Water Supply (Cr\$/m ³)	3.5	2.2
Sewerage (Cr\$/m ³ equivalent)	3.9	2.2

a/ A shadow exchange rate factor of 1.3 was used to reflect the opportunity cost of the foreign exchange.

^{1/} See para. 8.01 for definition.

8.06 From the preceding table, it can be concluded that, except for sewerage charges in Recife, average tariffs for water supply and sewerage are significantly lower in all three capital cities than the corresponding average incremental costs. Since tariffs in most cases are not progressive with respect to volume, tariffs for marginal consumption are also lower than average incremental costs and are likely to have a detrimental impact on resource allocation. Specific tariff studies are included in this project to correct the present situation (para. 7.14).

Design and Selection Criteria

8.07 Project design and selection (para. 6.18) are in accordance with the objectives of the Brazilian sector authorities (to serve 80% of urban population) to ensure that a significant proportion of low-income population will have access to safe water and basic sanitation at an affordable tariff, while still ensuring, through cross-subsidization, the basis for the financial viability of the SWCs.

Population Served

8.08 On an overall basis (para 6.02, Table 5.5) it is estimated that by 1982, an additional 2.3 million persons will benefit from the water supply extension and 5.3 million existing consumers from improved service. The project will increase the overall urban water supply service levels in the three project states from 52% in 1977 to about 67% of the urban population by 1982. Sewerage service will be extended to about 1.2 million individuals, increasing service levels from 6.5% to 16% of the urban population. The impact of the project will continue increasing as complementary works are completed.

Impact on Poverty Groups

8.09 The direct impact of the project on the poverty group, defined as families earning a monetary income of three regional minimum salaries or less ^{1/}, in the three capital cities was estimated by calculating the proportion of urban poor in the total incremental population served. In water supply this rate is 61%, increasing the amount of urban poor served from 53% (1,300,000) in 1977 to 73% (2,500,000) by 1985. The SWCs will undertake studies with the Bank's assistance to prepare low-cost solutions to service the remaining poor areas.

^{1/} According to the 1970 census, close to 1.6 million families or 8.1 million persons living in the metropolitan areas of Brazil were in the poverty group that year. The percentage of families living in poverty ranged from 41% in Sao Paulo to 76% in Fortaleza. Variations in the minimum salary among regions were assumed to reflect variations in the cost of living. On an annual basis the three minimum salary threshold corresponds approximately to one-third of the national per capita income. Minimum monthly salaries on April 28, 1978 were (for the capital cities):

Fortaleza	Cr\$ 1,111.20 (US\$68)
Recife	Cr\$ 1,226.40 (US\$69)
Salvador	Cr\$ 1,226.40 (US\$69)

Table 8.2: Water Supply: Incremental Change in Population Served in the Capital Cities, 1977-1985

(‘000 inhabitants and percentages)

	Urban Poor	Others	Total
Salvador	452 (62%)	282 (38%)	734 (100%)
Recife	283 (64%)	160 (36%)	443 (100%)
Fortaleza	<u>469 (60%)</u>	<u>317 (40%)</u>	<u>786 (100%)</u>
Total	1,204 (61%)	759 (39%)	1,963 (100%)

8.10 Since the limited information available suggests that the proportion of low-income population is higher in the interior than in the capital cities, the impact of investments on poverty outside the capitals (about 40% of total project cost) is likely to be more significant.

8.11 Due to present low coverage of sewer service, the investments programmed under this project will cover initially commercial and high-rise, high-density residential areas. The proportion of urban poor in these areas is lower than in the areas to be served with water. The distribution of house connections among the different income groups was not available at the time of appraisal and consequently, only rough estimates of the incremental poor to be served are possible. The situation would be as follows:

Table 8.3: Sewerage: Incremental Change in Population Served in the Capital Cities 1977-85

City	Percent of incremental population served by the project which are classified as urban poor (1977-1985)
Salvador	35
Recife	37
Fortaleza	39

Project Services Affordability

8.12 Brazilian Government guidelines indicate that the minimum charges for water and sewerage should not exceed 5% of one minimum monthly salary (equivalent to Cr\$56 to Cr\$61) and the combined charge for water and sewerage should not exceed 7% of one minimum monthly salary. The existing monthly charges for minimum consumption range from Cr\$34 to Cr\$51, and are therefore within Government guidelines. However, since between 1978 and 1982 the three SWCs will be maintaining or increasing tariffs in real terms, the SWCs tariff structures may have to be made more progressive if revenue objectives are to be met without exceeding Government guidelines for the low, income population. Since approximately 70% of the poor earn more than one minimum wage per family, it may be concluded that water will be provided to most families at affordable prices. It must be recognized, however, that even 5% of one minimum salary may represent an unaffordable amount to the 30% of the poor classified as extremely deprived and greater cross-subsidization than now exists has to be incorporated into the tariff structure to serve these persons. It is estimated that although 61% of the incremental population served with water belongs to the poverty group, only 28% of the incremental water produced will be consumed by these groups. Therefore, the possibilities of cross-subsidization between low-income and high-income groups are feasible with an appropriately designed tariff structure. A tariff study to be undertaken by the three SWCs will include these considerations (para. 7.14 and Annex 8).

IX. AGREEMENTS REACHED AND RECOMMENDATIONS

9.01 During loan negotiations, agreements were obtained:

- (a) from the Banco Nacional da Habitacao (BNH) that it will:
 - (i) implement a technical assistance program to the three SWCs (para. 6.06);
 - (ii) ensure that sufficient local currency funds are made available to the SWCs for completion of the project on schedule (para. 6.12);
 - (iii) ensure that subprojects will be selected in accordance with agreed upon criteria (para. 6.18);
 - (iv) give the Bank a reasonable opportunity to exchange views on future modifications to BNH/SFS organization and guidelines and rules to be used for PLANASA (para. 3.08);
 - (v) revise the uniform accounting manuals to include cash flow statements before December 31, 1979 (para. 4.08);
and

- (vi) cause SWCs to prepare and submit not later than six months after project completion individual reports, satisfactory to the Bank, on the execution and initial operation of the project (para. 7.24).
- (b) from the State Governments of Bahia, Pernambuco and Ceara that they will:
- (i) ensure that sufficient local currency funds for the project will be made available to the SWCs for completion of the project on schedule (para. 6.12); and
 - (ii) take whatever steps are required to ensure that the respective SWCs maintain revenues at levels sufficient to cover all cash operating and maintenance expenses and depreciation and provide the rates of return on revalued net fixed assets in operation established in para. 7.13;
- (c) From State Water Companies:
- (i) The SWCs will take all required steps to enable BNH to implement a technical assistance program, according to the plans agreed upon during negotiations (para. 6.06);
 - (ii) EMBASA will propose with respect to the city of Salvador, a plan satisfactory to the Bank on: a) solution of the technical difficulties for sewer house connections. The submission and Bank concurrence on this plan will be a condition for disbursements for sewerage in Salvador; b) not later than December 31, 1979 alternative technical solutions and an implementation schedule satisfactory to the Bank for sewage disposal where conventional sewerage is not feasible; and c) sewer house connection standards not later than December 31, 1979 (para. 6.16);
 - (iii) ensure that subprojects will be selected in accordance with agreed-upon criteria (para. 6.18);
 - (iv) SWCs will prepare and make available to the Bank not later than 60 days prior to the issue of first tender or prequalification documents a general procurement notice satisfactory to the Bank. Such a notice will be annually updated as long as any goods or works remain to be procured (para. 6.19);
 - (v) SWCs will take the necessary steps satisfactory to the Bank to update fixed asset inventories and to have them properly recorded in the books of account, and will fully implement uniform accounting systems not later than December 31, 1980 (para. 4.09);

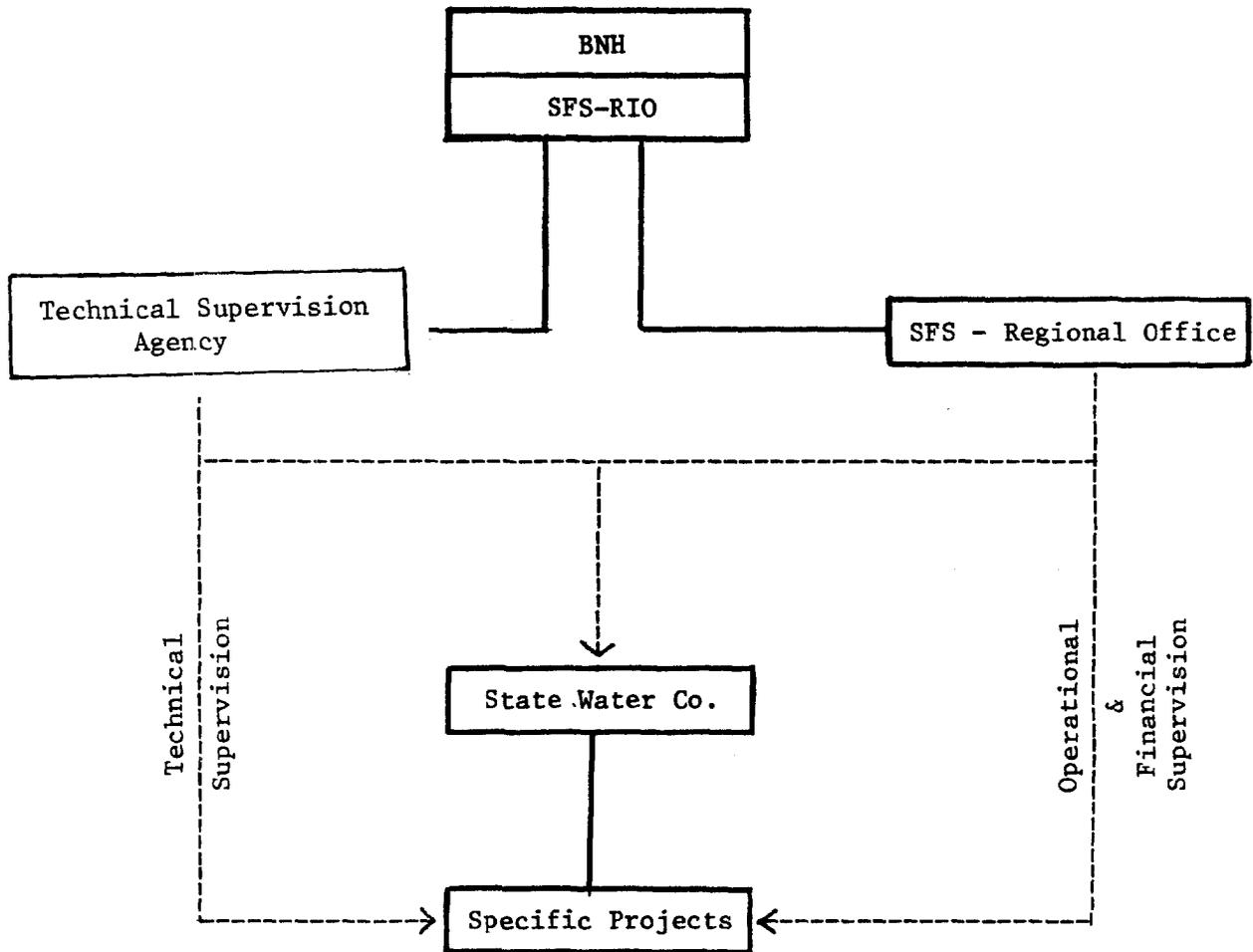
- (vi) SWCs will submit annually, not later than March 31, updated three-year financial projections satisfactory to the Bank (para. 4.11);
- (vii) SWCs will establish internal audit offices adequately staffed and properly functioning no later than December 31, 1980 (para. 4.12);
- (viii) SWCs will have their accounts and financial statements for each fiscal year audited by independent auditors acceptable to the Bank, and will submit to the Bank no later than April 30 of each year, starting calendar year 1979, certified copies of the audited financial statements (para. 4.13);
- (ix) SWCs will undertake whatever steps required to ensure that revenues will be maintained at levels sufficient to cover cash operating and maintenance expenses, and depreciation and to provide the rates of return on revalued fixed assets in operation established in para. 7.13 (para. 7.13);
- (x) SWCs will prepare not later than October 31, 1979 tariff and metering studies satisfactory to the Bank to be implemented not later than December 31, 1979 (para. 7.14);
- (xi) SWCs will submit for Bank consideration specific programs and objectives for financial recovery, including a water loss reduction program, not later than October 31, 1979. These programs will be carried out in accordance with agreed-upon schedules (para. 7.23);
- (xii) SWCs will establish and implement, not later than October 31, 1979, a system of monitoring indicators and quarterly progress reports covering project implementation, operations, and financial performance (para. 7.24); and
- (xiii) SWCs will submit to BNH not later than six months after project completion a report satisfactory to the Bank on the execution and initial operation of the project (para. 7.24).

9.02 Provided the above conditions are met, the project would be suitable for a Bank loan of US\$100.0 million. The loan would be for a period of 15 years, including a grace period of three years.

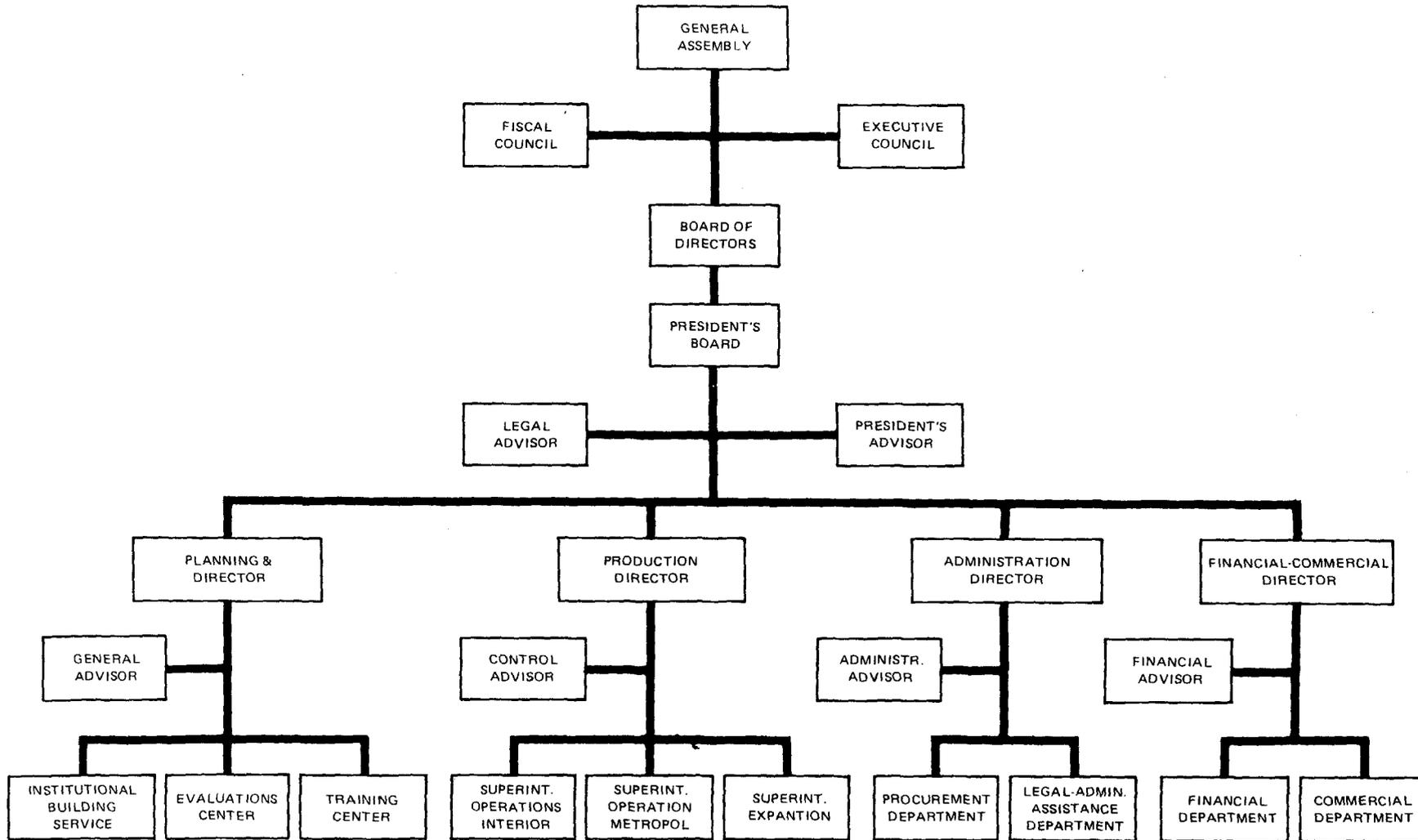
BRAZIL

NORTHEAST WATER SUPPLY AND SEWERAGE PROJECT

Graphical Representation of BNH's Supervision Arrangements

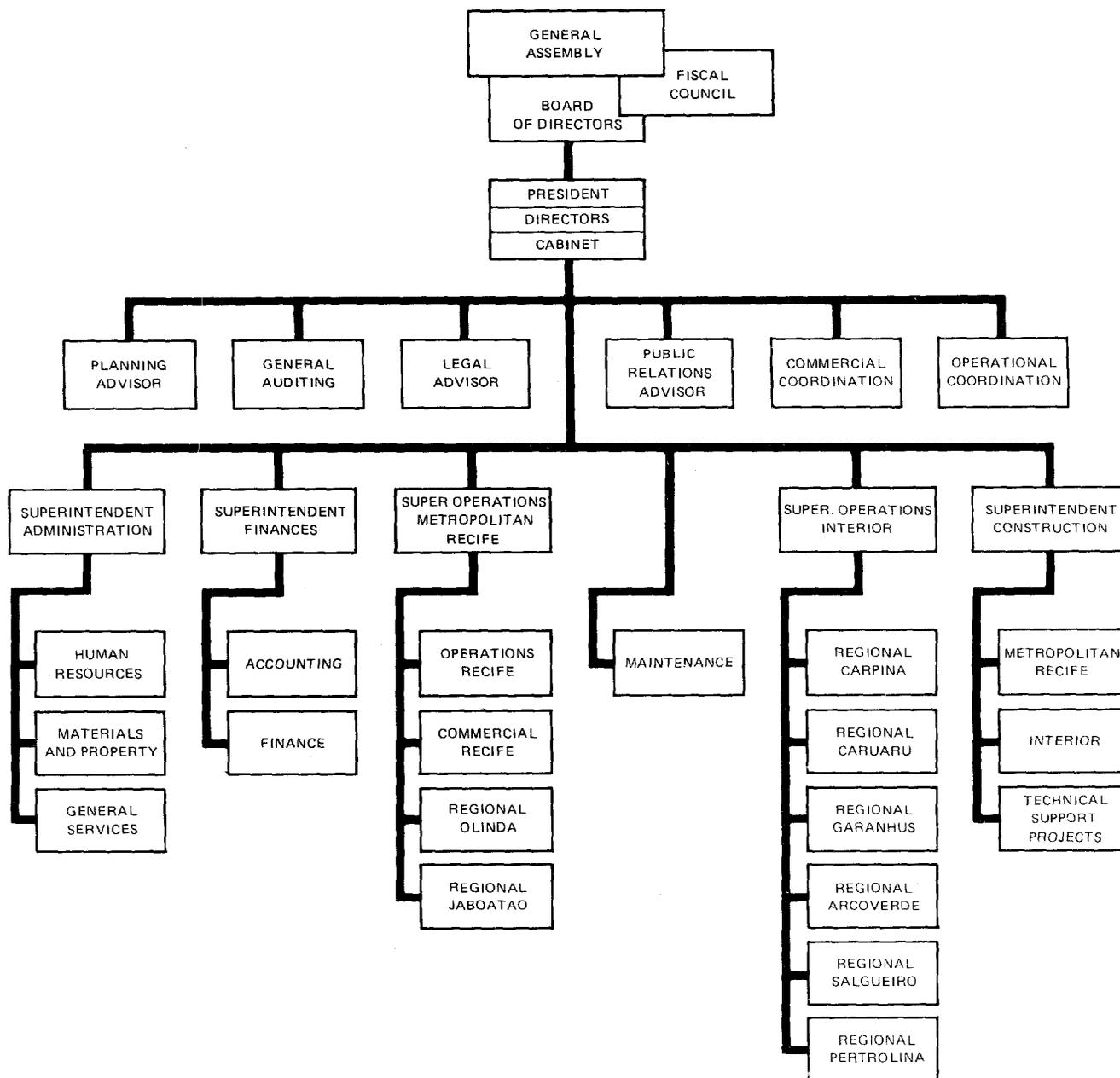


BRAZIL – NORTHEAST WATER SUPPLY AND SEWERAGE PROJECT
 EMBASA ORGANIZATION CHART JUNE 1978

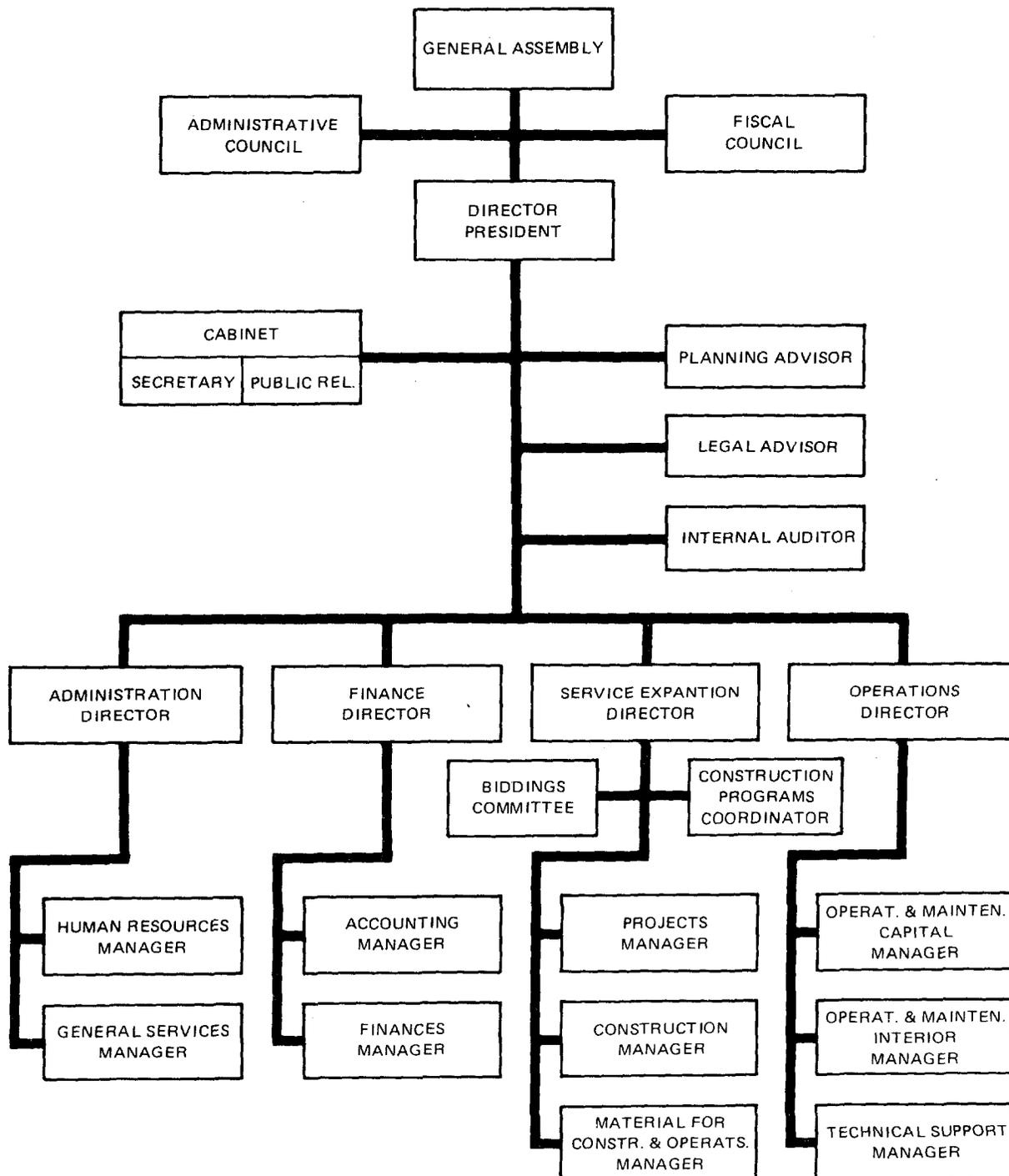


World Bank – 19081

BRAZIL – NORTHEAST WATER SUPPLY AND SEWERAGE PROJECT
COMPESA ORGANIZATION CHART



BRAZIL – NORTHEAST WATER SUPPLY AND SEWERAGE PROJECT
CAGECE ORGANIZATION CHART



BRAZIL

NORTHEAST WATER SUPPLY AND SEWERAGE PROJECT

Description of Subprojects for the Capital Cities and a List of
Communities to be Served in the States of Bahia, Ceara, and Pernambuco

1. Water Supply and Sewerage Subproject for Salvador-Bahia

This subproject comprises:

(a) Water Supply

- (i) Construction of intake works and raw water transmission main (4 km in length and 1,500 mm in diameter) and pumping stations (5 x 2,000 hp) with a capacity to divert up to 4.5 m³/sec, to interconnect Joanes I and Ipitanga II Reservoirs.
- (ii) Construction of intake works, pumping stations (4 x 1,240 hp) and raw water transmission main (2 km in length, 1,800 mm in diameter) with a capacity for 4.5 m³/sec to connect Ipitanga Reservoir to the new treatment plant.
- (iii) Construction of the first stage of the new treatment plant with an initial capacity of 4.5 m³/sec. Upgrading of Boulendera treatment plant and related works.
- (iv) Pumping stations (5 x 1,100 hp) and treated water transmission mains from new treatment plant to R-7 storage tank with a total length of 13 km and diameters varying from 1,100 to 1,400 mm.
- (v) Construction of approximately 350 km of primary and secondary distribution networks with diameters varying from 32 to 600 mm, for reinforcement of existing networks and extensions of services to new areas.
- (vi) Construction of approximately 45,000 new house connections.
- (vii) Metering and leak detection and repairs programs, the scope of which will be agreed upon on the basis of the studies provided for in the project (para 4.04, d).

(b) Sewerage

- (i) Construction of approximately 22 km of interceptors and collectors in diameters varying from 400 to 1,750 mm.
- (ii) Construction of approximately 237 km of sewerage networks in diameters varying from 100 to 300 mm.

- (iii) Construction of two sewerage pumping stations (4 x 29 hp and 8 x 160 hp).
- (iv) Construction of approximately 18,000 new house connections.

2. Water Supply and Sewerage Subproject for Recife - Pernambuco

This subproject comprises:

(a) Water Supply

- (i) Construction of approximately 207 km of primary distribution networks in diameters varying from 150 to 1,500 mm for reinforcement of existing networks and extensions to new areas.
- (ii) Construction of approximately 740 km of secondary distribution networks in diameters varying from 60 to 300 mm for reinforcement and extensions.
- (iii) Construction of approximately 40,000 new house connections.
- (iv) Installation of about 50,000 water meters for house connections and meters for production and for storage tanks outlets.
- (v) Execution of leak detection and repair program.

3. Sewerage

- (i) Construction of 27 km of collectors and interceptors varying from 400 to 900 mm in diameter.
- (ii) Construction of 21 sewerage pumping stations totalling 1,700 hp and ranging from 5 to 300 hp in capacity.
- (iii) Construction of approximately 260 km of sewerage networks with diameters ranging from 150 to 350 mm.
- (iv) Construction of approximately 25,000 new house connections.
- (v) Expansion of sewage treatment capacity in $2.4 \text{ m}^3/\text{sec}$. Definition of the location of this expansion (Cabanga or Peixinhos) is under study.

3. Water Supply and Sewerage Subproject for the City of Fortaleza - Ceara

This subproject comprises:

(a) Water Supply

- (i) Improvements and reinforcement of Gaviao Dam to increase the firm capacity from 0.3 to $0.4 \text{ m}^3/\text{sec}$.
- (ii) Raw water intake with a final capacity of $9 \text{ m}^3/\text{sec}$.

- (iii) First stage of a new treatment plant for 3 m³/sec initial capacity.
 - (iv) Construction of first stage of treated water pumping station with 3 m³/sec initial capacity (2 x 260 hp).
 - (v) Construction of force main from pumping station to Ancuri storage tank 1,400 mm in diameter and 4.7 km in length.
 - (vi) Construction of Ancuri storage tank 70,000 m³ in capacity.
 - (vii) Interconnections from Ancuri storage tank and other existing storage tanks with a total length of 38 km and diameters ranging from 400 to 1,600 mm.
 - (viii) Construction of three new storage tanks (Messejana, Coco and Mucuripe) with capacities of 10,000 m³, 2,000 m³ and 2,000 m³, respectively.
 - (ix) Construction of approximately 195 km of water distribution networks.
 - (x) Construction of approximately 40 000 house connections.
 - (xi) Metering and leak detection and repair programs.
- (b) Sewerage
- (i) Construction of approximately 175 km of sewerage networks in diameter varying from 150 to 1,200 mm.
 - (ii) Construction of approximately 12,000 new house connections.

BRAZIL

NORTHEAST WATER SUPPLY AND SEWERAGE PROJECT

List of Medium-Size Towns to be Served by the Project

STATE OF BAHIA

Name of Town	Population 1977
<u>Water Supply</u>	
1. San Francisco do Conde	7,000
2. Caetit�	8,150
3. Jeiqu�	80,500
4. Jacobina	24,300
5. Itabina	120.500
6. Tucano du Sul	6,800
7. Paulo Alfonso	57,200
8. Entre Rios	7,000
9. San Antonio de Jesus	26.000
10. Cachoeira	11.800
<u>Sewerage</u>	
1. Feira de Santa Ana	197.000
2. Ilheus	68.000
3. Itabuna	120.500
4. Vitoria da Conquista	115.000
5. Jeiqu�	80.500

STATE OF PERNAMBUCO

Water Supply

1. Afogados Ingazuna	10,900
2. Aguas Belas	10,378
3. Altinho-Cruzes-Ibirajuba	6,500

Name of Town	Population 1977
4. Amaraji	5,422
5. Arcoverde	47,800
6. Cabo	47,300
7. Caruaru-Granhuns-Vitória/outros	140,000
8. Catende	13,400
9. Cupira	6,100
10. Custódia	5,200
11. Floresta	8,300
12. Gameleira	6,600
13. Goiana	28,500
14. Gravatá	26,000
15. Jaboatao	68,000
16. Moreno	20,000
17. Nazaré da Mata	15,000
18. Palmares	44,300
19. Pedra	6,200
20. Ribeirao	17,000
21. S. Lourenco-Camaragibe	63,000
22. Também	7,000
23. Toritama	5,600
24. Vit. Sto. Antao	52,200

Sewerage

1. Paulista/Apreu e Lima/Praias da zona Norte	23,000
2. Cabo	47,300
3. Jaboatao/Cavaleiro	6,800
4. Sao Lourenco da Mata/Camaragibe	63,000
5. Petrolina	67,000
6. Caranhuns	61,000
7. Limoeiro	38,300
8. Pesqueira	27,900
9. Igarassu	30,100
10. Moreno	20,000
11. Itamaracá	6,300
12. Gravatá	2,600
13. Carpina	33,400
14. Timbaúba	33,300

STATE OF CEARA

Name of Town	Population 1977
--------------	-----------------

Water Supply

- | | |
|--------------|-------|
| 1. Bela Cruz | 7,800 |
|--------------|-------|

List of Small-Sized Communities to be served by the Project

STATE OF BAHIA

- | | |
|--|------------------|
| 1. Acupe (Sta. Amaro) | NA ^{1/} |
| 2. Agua Fria | 1,213 |
| 3. Amelia Rodrigues | 5,703 |
| 4. Andaraí | 2,243 |
| 5. Argolo (N. Vicoso) | NA |
| 6. Agua Quente | 1,205 |
| 7. Baixa Grande (Inhambupe) | 2,655 |
| 8. Banes do Pedro (Ilehus) | NA |
| 9. Raitanga | NA |
| 10. Belo Campo | 3,068 |
| 11. Brotoas Macaubas | NA |
| 12. Boninal | 819 |
| 13. Baixos (Esplanada) | NA |
| 14. Bom Jesus dos Pobres | NA |
| 15. Cabucu | NA |
| 16. Cardeal da Silva | 685 |
| 17. Condeuba | 1,607 |
| 18. Cacule | 5,818 |
| 19. Campo Alegre de Lourdes | 1,943 |
| 20. Cabeceiras do Paraguacu (Muritiba) | NA |
| 21. Cansancao | 2,986 |
| 22. Campin Grosso (Jacobina) | NA |
| 23. Cassilandia (Itambe) | NA |
| 24. Cordeiros | 1,036 |
| 25. Cotegipe | 1,343 |
| 26. Cruzeiro do Sul (Prado) | NA |
| 27. Caldeirao Grande | 2,172 |
| 28. Carrapichel (S. Bonfim) | NA |
| 29. Coqueiros (Maragogipe) | NA |
| 30. Carnaibas (C. Formoso) | NA |
| 31. Campo Formoso (P. Dutra) | 5,972 |
| 32. Cinco Rios | NA |
| 33. Coquinhos (F. Azul) | NA |

^{1/} Not available. Mostly communities subsidiaries of municipalities.

Name of Town	Population 1977
34. Cachoeira do Mato (Alcobaca)	11,727
35. Catulezinho (Itambé)	NA
36. Dario Meira	2,517
37. Duas Serras (Antas)	NA
38. Duque de Caxias (Caravelas)	NA
39. Dom Basilio	585
40. Entre Rios	7,758
41. Entrocamento (Jaguaquara)	NA
42. Elisio Medrado	941
43. Fatima (C. Dautas)	NA
44. Ferradas (Itabuna)	NA
45. Gentio do Ouro	920
46. Goes Calmón (Simoes Filho)	NA
47. Ipupiara	2,020
48. Ibipetum (Ipupiara)	NA
49. Itabatam (Mucuri)	NA
50. Ibitiara	533
51. Ituacu	1,667
52. Iraporanga (Iraquara)	NA
53. Iraji (Itamaraju)	NA
54. Itiuba	NA
55. Itamari	1,643
56. Ibirajá (Itanhem)	NA
57. Itubera	5,469
58. Iuiu (Malhada)	NA
59. Ibicoará	313
60. Itupeva (M. Neto)	NA
61. Inhatá (A. Rodrigues)	NA
62. Ibipitanga	1,074
63. Ibiassuce	1,219
64. Itaia (F. Alves)	NA
65. Iraquara	1,266
66. Itanagra	761
67. Jussiape	NA
68. Jacaraci	615
69. Joao Amaro	NA
70. Junco (Jacobina)	NA
71. Jacuipe (S. S. Passe)	NA
72. Jacurucu (Itamaraju)	NA
73. Juacema (Jaguarari)	NA
74. Lucinio de Almeida	3,494
75. Livramento do Brumado	6,321
76. Laje	1,811
77. Malhada	1,703
78. Macarani	5,385
79. Mortugaba	2,036
80. Malhada de Pedras	1,016
81. Mairi	3,942
82. Marau	1,561

Name of Town	Population 1977
83. Mirangaba	1,163
84. Mulurgu do Morro (Caparnaum)	NA
85. Mata da Alianca (A. Rodrigues)	NA
86. Manoel Victormo	2,140
87. Nilo Pechara	1,550
88. Naçe (Maragogipe)	NA
89. Nova Lidice	NA
90. Nova Alegria (Itamaraju)	NA
91. Oliveira dos Brejinhos	1,081
92. Paramirim	3,686
93. Palmeiras	2,442
94. Porto Nova	NA
95. Pedrao	834
96. Piritiba	3,719
97. Presidente Dutra	4,346
98. Pecho Alexandre	NA
99. Paripiranga	3,837
100. Palmira (I do Colonia)	NA
101. Posto da Mata (N. Lidice)	NA
102. Planalto	4,752
103. Piripa	899
104. Pindobacu	2,011
105. Paraiso (Jacobina)	NA
106. Pirai do Norte (Itubera)	NA
107. Piraja (Itamaraju)	NA
108. Pocos (Campo Formoso)	NA
109. Quice (S. do Bonfim)	NA
110. Ribeira do Amparo	448
111. Rio do Pires	1,217
112. Sitio do Meio (E. Rios)	NA
113. Santo Antonio Barcelona	NA
114. Saubara	NA
115. S. Jose do Colonia (Itambe)	NA
116. Santiago do Iguape	NA
117. Santa Cruz da Vitoria	NA
118. S. Miguel das Matas	NA
119. Salobro (Canarana)	NA
120. Sao Jose (Buerarema)	NA
121. Santa Luzia (Canavieiras)	NA
122. Sao Paulinho (Itamaraju)	NA
123. Tremedal	1,096
124. Triunfo (Antas)	NA
125. Taquarinha (Mucuri)	NA
126. Tanhacu	2,063
127. Teolandia	NA
128. Ubiraita (Andaraí)	NA
129. Utinga	2,165
130. Varzea do Poco	3,131
131. Varzea	NA

STATE OF CEARA

Name of Community	Population 1977
1. Alcantaras	NA
2. Antonina do Norte	3,788
3. Aratuba	NA
4. Arneiroz	1,314
5. Aurora	6,111
6. Caridade	1,068
7. Coreau	2,830
8. Itatira	563
9. Meruoca	1,145
10. Moraujo	1,346
11. Penaforte	794
12. Piquet Carneiro	1,947
13. Abaiara	607
14. Alto Santo	1,698
15. Apuiaras	2,063
16. Aquiraz	1,976
17. Aracoiaba	2,910
18. Araripe	1,529
19. Assaré	3,327
20. Barro	2,830
21. Beberibe	1,837
22. Capistrano	1,776
23. Cariré	1,702
24. Cariús	1,590
25. Carnaubal	4,087
26. Catarina	1,229
27. Chaval	5,198
28. Frecheirinha	2,218
29. General Sampaio	2,696
30. Granjeiro	849
31. Groairas	2,278
32. Guaramiranga	607
33. Ipueiras	4,389
34. Iracema	3,144
35. Itapiuna	1,628
36. Jaguaruana	6,838
37. Jati	1,782

STATE OF CEARA (Continued)

Name of Community	Population 1977
38. Lavras da Mangabeira	5,301
39. Mauriti	5,207
40. Milagres	6,379
41. Mucambo	2,376
42. Novo Oriente	2,640
43. Pacoti	1,445
44. Pacujá	1,104
45. Palhano	1,473
46. Poranga	2,547
47. Porteiras	1,903
48. Potengi	2,793
49. Quixeré	1,622
50. Redencao	3,776
51. Reriutaba	4,395
52. S. Goncalo do Amarante	2,081
53. S. Luiz do Curu	4,494
54. Senador Sá	1,000
55. Tamboril	1,218
56. Trairi	919
57. Ubajara	2,747
58. Uruburetama	5,335
59. Uruoca	2,784
60. Vicosa do Ceará	3,451
61. Taperuaba	NA
62. Varjota	NA

STATE OF PERNAMBUCO

1. Afranio	2,100
2. Agrestina	3,778
3. Agua Fria	NA
4. Agua Preta	4,903
5. Alagoinha	3,288
6. Altinho	4,870
7. Barra da Gaubiraba	3,296
8. Belém de Maria	3,678
9. Betania	877
10. Bodocõ	3,148
11. Brejao	1,455
12. Brejinho	1,611
13. Buenos Aires	1,667
14. Caetés	1,742

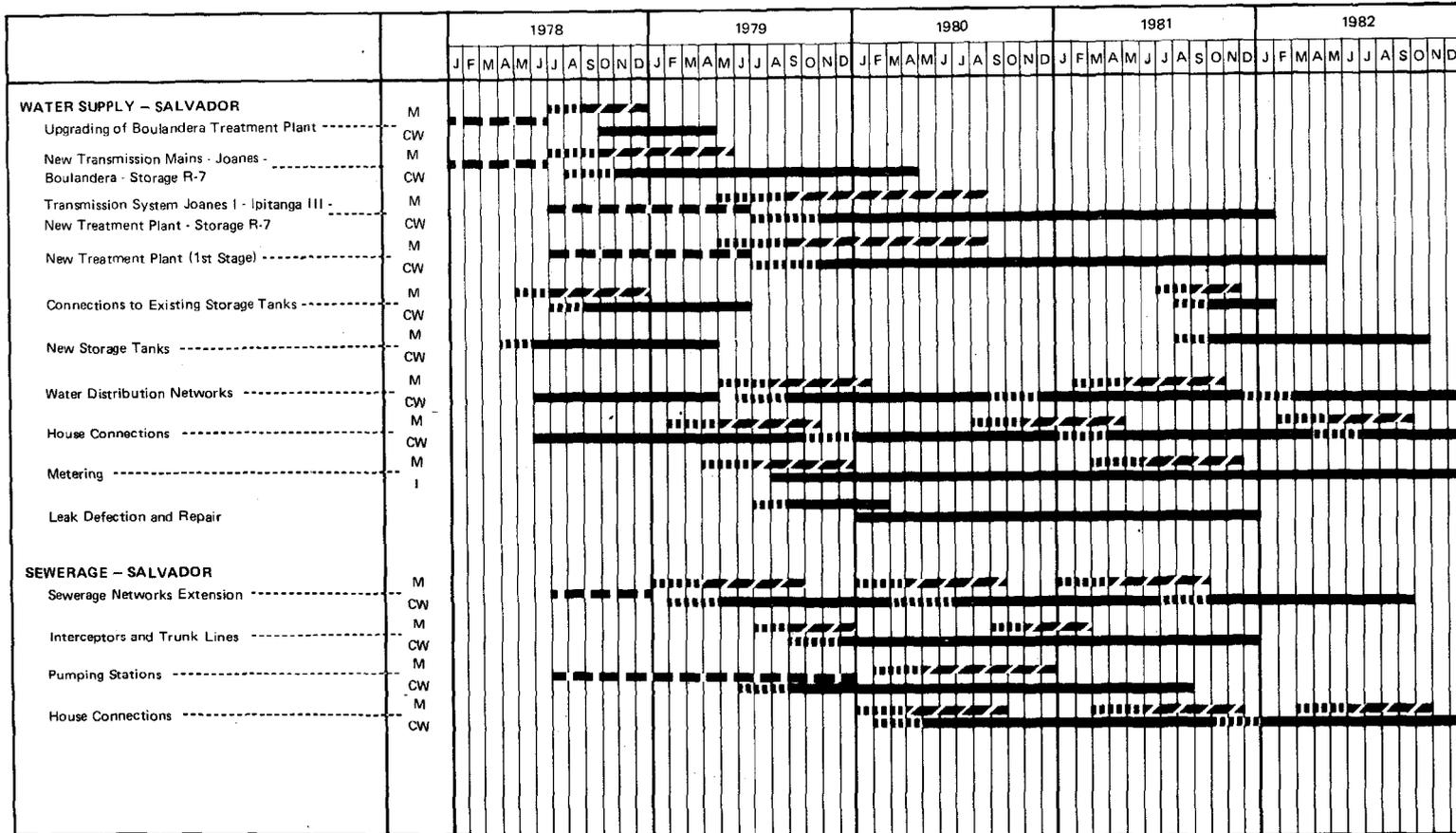
STATE OF PERNAMBUCO (Continued)

Name of Community	Population 1977
15. Calçado	1,534
16. Calumbi	935
17. Camutanga	3,660
18. Capoeiras	2,237
19. Carnaiba	3,623
20. Cedro	1,057
21. Cha de Alegria	3,714
22. Cha Grande	2,981
23. Cortez	4,152
24. Cumaru	1,648
25. Exu	4,563
26. Ferreiros	4,200
27. Flores	2,689
28. Frei Miguelinho	952
29. Glória de Goitá	3,108
30. Granito	730
31. Iati	1,484
32. Ibimirim	4,622
33. Ibirajuba	1,090
34. Iguaraci	1,091
35. Inaja	2,252
36. Ingazeiya	1,912
37. Ipojuca	3,982
38. Ipubi	3,269
39. Itacuruba	2,008
40. Itaiba	2,591
41. Itapetim	5,052
42. Jatauba	2,505
43. Joao Alfredo	3,705
44. Lagoa do Itaenga	4,936
45. Lagoa do Ouro	1,667
46. Lagoa dos Gatos	2,481
47. Macaparana	5,299
48. Machados	1,619
49. Maraial	3,810
50. Mirandiba	2,699
51. Orobó	1,817
52. Orocó	2,182
53. Palmeirina	2,115
54. Pannels	2,236
55. Paranatama	945
56. Paranamirim	4,071
57. Passira	2,962
58. Pocao	1,810
59. Pombos	2,957

STATE OF PERNAMBUCO (Continued)

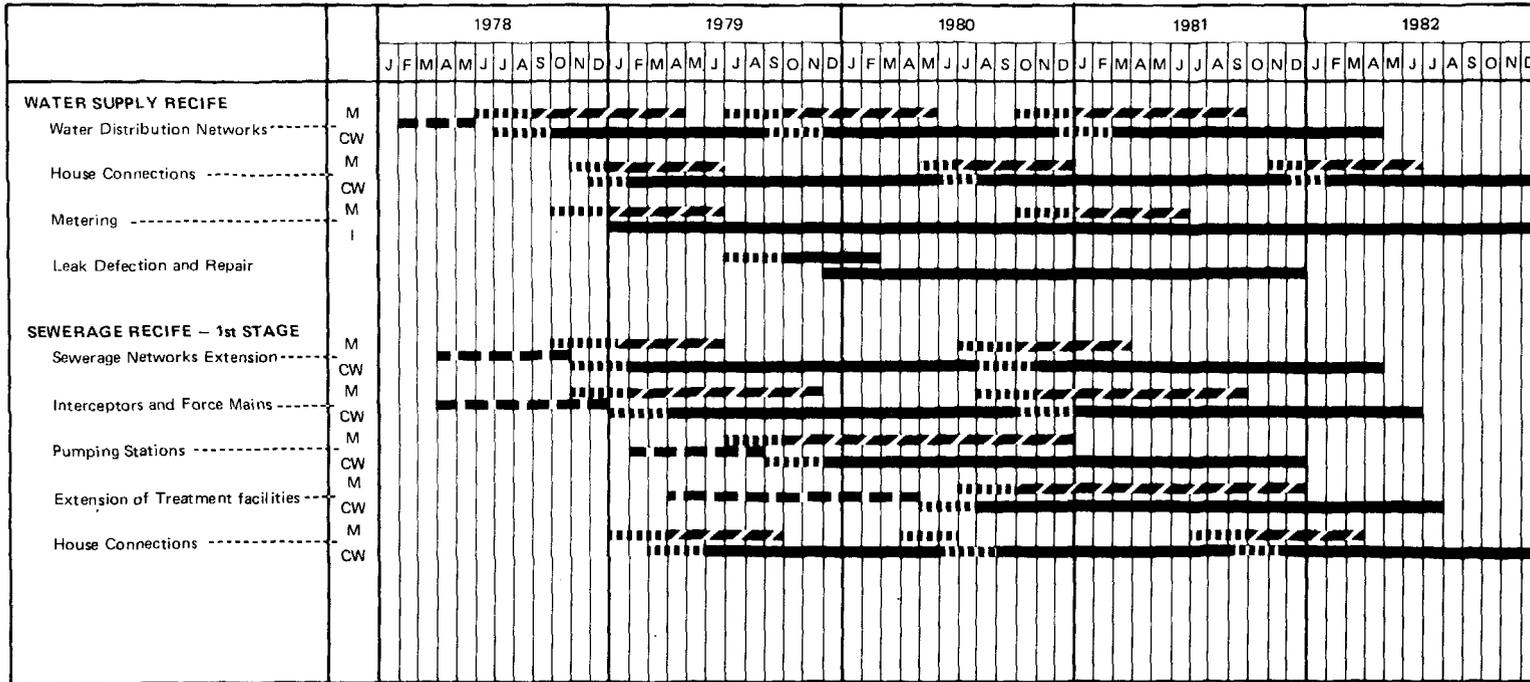
Name of Community	Population 1977
60. Primavera	4,187
61. Quipapa	4,702
62. Riacho das Almas	1,266
63. Rio Formoso	4,463
64. Saire	1,235
65. Salgadinho	929
66. Saloá	2,157
67. Sanharó	4,021
68. Sta. Maria da Boa Vista	2,671
69. Sta. Maria do Cambucá	1,232
70. Sao Benedito do Sul	2,458
71. Sao Joao	2,680
72. Sao Joaquim do Monte	3,839
73. Sao Vicente Ferrer	2,203
74. Serrita	1,684
75. Sitio dos Moreiras	1,634
76. Solidao	913
77. Tacaratu	3,655
78. Taquaritinga do Norte	2,747
79. Teresinha	1,092
80. Terra Nova	1,950
81. Tracunhame	2,575
82. Tupanatinga	4,307
83. Tuparetama	2,293
84. Venturosa	3,839
85. Vertentes	3,697

BRAZIL NORTHEAST WATER AND SEWERAGE PROJECT
BAHIA – EMBASA
Schedule of Execution for Water and Sewerage Works in Salvador
Period 1978 – 1982



- Legend**
- Design
 - ▤ Bidding
 - ▥ Delivery
 - ▧ Construction
 - M Materials or Equipment
 - CW Civil Works
 - I Installation

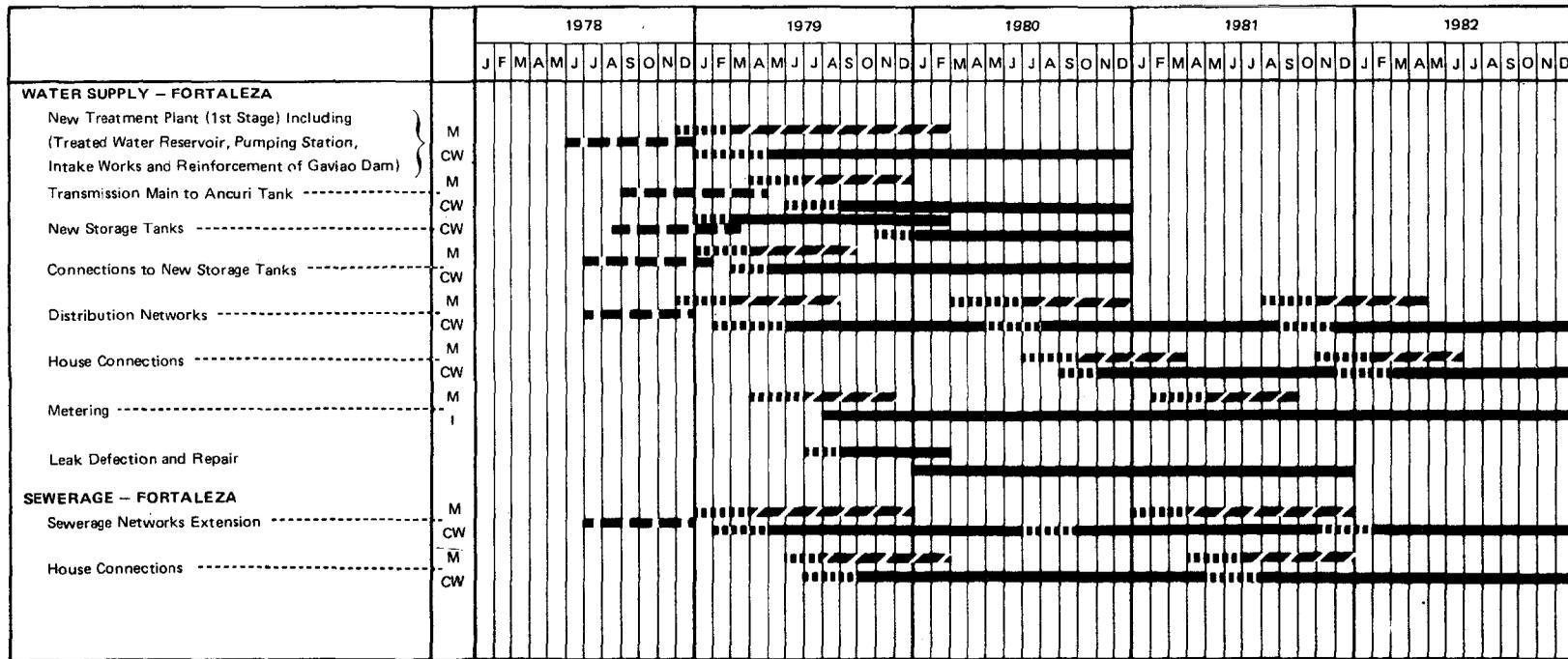
**BRAZIL NORTHEAST WATER AND SEWERAGE PROJECT
 PERNAMBUCO – COMPESA
 Schedule of Execution for Water and Sewerage Works in Recife
 Period 1978 – 1982**



- Legend
- Design
 - ▨ Bidding
 - ▧ Delivery
 - ▬ Construction
 - M Materials or Equipment
 - CW Civil Works
 - I Installation

World Bank – 19083

BRAZIL NORTHEAST WATER AND SEWERAGE PROJECT
CEARA – CAGECE
Schedule of Execution for Water and Sewerage Works in Fortaleza
Period 1978 – 1982



- Legend**
- Design
 - Bidding
 - /// Delivery
 - ███ Construction
 - M Materials or Equipment
 - CW Civil Works
 - I Installation

World Bank – 19084

BRAZIL

NORTHEAST WATER SUPPLY AND SEWERAGE PROJECT

Summary of Project Costs - EMBASA

DESCRIPTION	<u>Local</u>	<u>Foreign</u>	<u>Total</u>	<u>Local</u>	<u>Foreign</u>	<u>Total</u>
	(thousands of UPC)			(million of US\$)		
<u>Water Supply - Salvador</u>						
Transmission System Joanes I- Ipitanga III - New Treatment Plant - Storage R-7	514	494	1008	7.54	7.25	14.79
Intakes & pumping stations	189	242	431	2.77	3.55	6.32
New treatment plant - 1st stage	426	526	952	6.25	7.72	13.97
Water distribution networks	510	342	852	7.49	5.02	12.51
House connections	38	21	59	0.56	0.31	0.87
Metering	21	21	42	0.31	0.31	0.62
Leak detection & repairs	17	4	21	0.25	0.06	0.31
<u>Sewerage - Salvador</u>						
Sewerage network extension	552	63	615	8.10	0.92	9.02
Interceptors and trunk lines	350	33	383	5.14	0.48	5.62
Pumping stations	43	53	96	0.63	0.78	1.41
House connections	147	26	173	2.16	0.38	2.54
<u>Water Supply Medium-Size Cities</u>	<u>547</u>	<u>263</u>	<u>810</u>	<u>8.03</u>	<u>3.86</u>	<u>11.89</u>
<u>Sewerage Medium-Size Cities</u>	<u>522</u>	<u>58</u>	<u>610</u>	<u>8.10</u>	<u>0.85</u>	<u>8.95</u>
<u>Water Supply Small Communities</u>	<u>473</u>	<u>263</u>	<u>736</u>	<u>6.94</u>	<u>3.86</u>	<u>10.80</u>
<u>Engineering & Administration</u>	<u>526</u>	<u>10</u>	<u>536</u>	<u>7.72</u>	<u>0.15</u>	<u>7.87</u>
Total Basic Cost	<u>4905</u>	<u>2419</u>	<u>7324</u>	<u>72.00</u>	<u>35.51</u>	<u>107.51</u>
<u>Physical Contingencies (10.5%)</u>	<u>517</u>	<u>254</u>	<u>771</u>	<u>7.59</u>	<u>3.72</u>	<u>11.31</u>
<u>Price Contingencies (12%)</u>	<u>629</u>	<u>338</u>	<u>967</u>	<u>9.23</u>	<u>4.97</u>	<u>14.20</u>
Total cost of EMBASA	<u>6051</u>	<u>3011</u>	<u>9062</u>	<u>88.82</u>	<u>44.20</u>	<u>133.02</u>

BRAZIL

NORTHEAST WATER SUPPLY AND SEWERAGE PROJECT

Summary of Project Costs - COMPESA

DESCRIPTION	<u>Local</u>	<u>Foreign</u>	<u>Total</u>	<u>Local</u>	<u>Foreign</u>	<u>Total</u>
	(thousands of UPC)			(million of US\$)		
<u>Water Supply - Recife</u>						
Water distribution networks	910	610	1520	13.36	8.95	22.31
House connections	34	19	53	0.50	0.28	0.78
Metering	53	53	106	0.78	0.78	1.56
Leak & detection repair	17	4	21	0.25	0.06	0.31
<u>Sewerage - Recife</u>						
Networks extension	558	95	653	8.19	1.39	9.58
Interceptors & force mains	172	258	430	2.52	3.79	6.31
Pumping stations	81	99	180	1.19	1.45	2.64
Extension of treatment facilities	126	126	252	1.85	1.85	3.70
House connections	76	14	90	1.11	0.20	1.31
<u>Water Supply Medium-Size Cities</u>	568	379	947	8.34	5.56	13.90
<u>Sewerage Medium-Size Cities</u>	762	80	842	11.19	1.17	12.36
<u>Water Supply Small Communities</u>	279	184	463	4.09	2.70	6.79
Engineering & Administration	<u>425</u>	<u>8</u>	<u>433</u>	<u>6.24</u>	<u>0.12</u>	<u>6.36</u>
Total Basic Cost	4061	1929	5990	59.61	28.30	87.91
<u>Physical Contingencies</u> (12%)	489	232	721	7.13	3.39	10.52
<u>Price Contingencies</u> (14%)	<u>589</u>	<u>329</u>	<u>918</u>	<u>8.63</u>	<u>4.84</u>	<u>13.47</u>
Total Cost of COMPESA	<u>5139</u>	<u>2490</u>	<u>7629</u>	<u>75.37</u>	<u>36.53</u>	<u>111.90</u>

BRAZIL

NORTHEAST WATER SUPPLY AND SEWERAGE PROJECT

Summary of Project Costs - CAGECE

DESCRIPTION	Local	Foreign	Total	Local	Foreign	Total
	(thousands of UPC)			(million of US\$)		
<u>Water Supply - Fortaleza</u>						
New treatment plan (civil works)	189	95	284	2.77	1.39	4.16
Pumping station	46	59	105	0.67	0.87	1.54
Transmission main to Ancuri	123	101	224	1.80	1.48	3.28
Storage tanks	106	36	142	1.56	0.53	2.09
Connections to storage tanks	306	293	599	4.49	4.30	8.79
Distribution networks	246	164	410	3.61	2.41	6.02
House connections	27	15	42	0.40	0.22	0.62
Metering	21	21	42	0.31	0.31	0.62
Leak detection & repair	17	4	21	0.25	0.06	0.31
<u>Sewerage - Fortaleza</u>						
Interceptor & collector	290	25	315	4.26	0.37	4.63
Sewerage networks	307	35	342	4.51	0.51	5.02
House connections	36	6	42	0.52	0.09	0.61
<u>Water Supply Medium-Size Cities</u>	71	34	105	1.04	0.50	1.54
<u>Water Supply Small Communities</u>	105	158	263	1.54	2.32	3.86
<u>Engineering & Administration</u>	222	8	230	3.26	0.12	3.38
Total Basic Cost	2112	1054	3166	30.99	15.48	46.47
<u>Physical Contingencies (10.5%)</u>	222	109	331	3.24	1.60	4.84
<u>Price Contingencies (13.2%)</u>	312	150	462	4.58	2.21	6.78
Total Cost CAGECE	<u>2646</u>	<u>1313</u>	<u>3959</u>	<u>38.81</u>	<u>19.29</u>	<u>58.10</u>

BRAZIL
NORTHEAST WATER SUPPLY AND SEWERAGE PROJECT

BANCO NACIONAL DA HABITACAO

INCOME AND CASH FLOW STATEMENTS
(US\$ million)

<u>Year Ending December 31</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>
				Audited						
								Estimated 1/		
<u>REVENUES FROM OPERATIONS</u>										
Loan income	120.3	120.4	173.8	245.8	362.7	437.4	529.8	693.7	830.0	963.3
Service income	36.8	47.5	65.2	83.0	111.1	140.3	167.2	168.8	202.6	237.8
Other income	5.9	60.3	102.1	105.1	85.8	89.5	104.3	108.6	120.4	129.2
Total	<u>163.0</u>	<u>228.2</u>	<u>433.9</u>	<u>559.6</u>	<u>667.2</u>	<u>801.3</u>	<u>801.3</u>	<u>971.1</u>	<u>1,153.0</u>	<u>1,330.3</u>
<u>OPERATING EXPENSES</u>										
Administrative expenses	44.5	17.6	24.5	36.2	43.9	55.7	76.7	130.6	152.7	177.6
Financial expenses	83.5	115.3	159.0	196.7	273.4	336.5	494.1	567.1	673.4	786.8
Other expenses	4.0	10.6	13.0	15.1	21.7	19.0	21.8	55.8	52.8	49.9
Total	<u>102.0</u>	<u>143.5</u>	<u>196.5</u>	<u>248.0</u>	<u>339.0</u>	<u>411.2</u>	<u>592.6</u>	<u>753.5</u>	<u>878.9</u>	<u>1,014.3</u>
Internal Cash Generation	61.0	84.7	144.6	185.9	220.6	256.0	208.7	217.6	274.1	316.0
<u>CAPITAL RESOURCES</u>										
Employees/Indemnity Fund (FGTS) net of withdrawals	424.4	523.7	727.1	912.4	1,135.1	1,199.6	1,458.0	1,688.9	1,862.9	2,007.6
Amortization of loan principal	242.5	551.1	325.2	618.7	570.2	664.1	661.7	1,012.2	1,193.5	1,365.7
Foreign loans	4.1	8.7	8.6	16.5	19.9	13.6	22.8	58.7	73.4	88.1
Short-term deposits - net		49.7			301.0	20.4		198.2	168.8	161.5
Short-term investments - net (Bonds)	0.7					163.1	33.9	231.9	205.5	233.4
All other 2/	<u>1.7</u>	<u>27.3</u>	<u>28.0</u>	<u>97.7</u>	<u>13.6</u>	<u>271.3</u>	<u>193.7</u>			
<u>FUNDS AVAILABLE FOR INVESTMENT</u>	<u>734.4</u>	<u>1,245.2</u>	<u>1,233.5</u>	<u>1,831.2</u>	<u>2,260.4</u>	<u>2,588.1</u>	<u>2,578.8</u>	<u>3,407.5</u>	<u>3,778.2</u>	<u>4,172.3</u>
<u>FUNDS APPLIED</u>										
New loans granted	618.4	961.1	1,021.9	1,535.4	1,939.4	2,569.7	2,483.2	339.7	3,766.4	4,159.2
Foreign loan	0.8	0.8	0.8	0.8	0.8	1.7	2.7	10.5	11.8	13.1
Short-term deposits - net			19.2	1.1						
Short-term investments - net (Bonds)		255.6	197.7	254.0	50.1		95.6			
All other 2/	<u>115.2</u>	<u>27.7</u>	<u>11.9</u>	<u>39.9</u>	<u>270.1</u>	<u>16.7</u>				
Total Applications	<u>734.4</u>	<u>1,245.2</u>	<u>1,233.5</u>	<u>1,831.2</u>	<u>2,260.4</u>	<u>2,588.1</u>	<u>2,578.8</u>	<u>3,407.5</u>	<u>3,778.2</u>	<u>4,172.3</u>
FGTS - Withdrawals	291.8	378.1	482.6	618.3	860.2	1,061.2	1,278.5	1,466.4	1,666.3	1,886.1

1/ Data extracted from 1978-80 budget-forecast of BNH.

2/ Includes net increase or decrease in working capital.

BRAZIL
NORTHEAST WATER SUPPLY AND SEWERAGE PROJECT

BANCO NACIONAL DA HABITACAO

BALANCE SHEETS
(US\$ million)

<u>Year Ending December 31</u>	<u>AUDITED</u>						
	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>
<u>ASSETS</u>							
<u>Current Assets</u>							
Cash and Banks	4.4	9.6	6.6	8.2	9.6	6.4	23.2
Treasury bonds	73.3	56.7	56.3	92.6	121.9	36.3	1.9
Receivable from loans ^{1/}	--	160.0	195.0	418.0	420.8	284.4	348.1
Other accounts	5.7	1.1	0.9	0.9	1.2	2.1	36.5
Sub-total	<u>83.4</u>	<u>227.4</u>	<u>258.8</u>	<u>519.7</u>	<u>553.5</u>	<u>329.2</u>	<u>407.7</u>
<u>Long-term Receivables</u>							
Housing loans	1,545.3	2,144.2	3,131.7	4,176.5	5,461.4	7,246.1	9,284.9
Treasury bonds	203.8	528.1	761.1	1,062.3	1,120.0	1,048.8	1,001.3
Mortgages	249.8	7.3	0.8	0.4	--	--	--
Other investments	15.2	18.8	40.3	113.1	49.4	40.4	156.3
Collecting agents - INPS	7.7	2.8	2.3	0.9	--	--	--
Property for resale	5.0	10.3	12.9	16.8	20.5	15.1	8.3
Housing loans in liquidation	--	--	--	--	287.9	365.4	286.7
Other accounts	1.6	3.9	6.1	8.3	8.4	9.0	7.5
Sub-total	<u>2,028.4</u>	<u>2,715.4</u>	<u>3,955.2</u>	<u>5,378.3</u>	<u>6,947.0</u>	<u>8,724.9</u>	<u>10,745.0</u>
<u>Fixed Assets</u>							
Land and buildings	14.0	19.0	22.9	25.3	39.1	40.5	43.2
Equipment and installations	1.8	2.1	2.8	3.2	3.5	4.0	4.6
Other fixed assets	0.8	1.2	1.6	1.9	2.2	2.7	3.2
Sub-total	<u>16.6</u>	<u>22.3</u>	<u>27.3</u>	<u>30.4</u>	<u>44.8</u>	<u>47.2</u>	<u>51.0</u>
Accumulated depreciation	(1.4)	(2.2)	(3.4)	(4.4)	(5.9)	(8.1)	(10.5)
Sub-total	<u>15.2</u>	<u>20.1</u>	<u>23.9</u>	<u>26.0</u>	<u>38.9</u>	<u>39.1</u>	<u>40.5</u>
<u>Other Assets</u>							
Interest & monetary correction on loans to tentities in liquidation	--	--	--	--	34.8	197.0	370.9
Prepaid insurance	0.1	0.6	0.1	--	--	--	--
Material in transit	0.1	0.8	0.2	0.1	--	--	--
Interest Rec. on Treasury bonds	--	--	--	0.5	0.4	0.5	1.7
Sub-total	<u>0.2</u>	<u>1.4</u>	<u>0.3</u>	<u>0.6</u>	<u>35.2</u>	<u>197.5</u>	<u>372.6</u>
TOTAL ASSETS	<u>2,127.2</u>	<u>2,964.3</u>	<u>4,238.2</u>	<u>5,924.6</u>	<u>7,474.6</u>	<u>9,290.7</u>	<u>11,565.8</u>
<u>LIABILITIES</u>							
<u>Current Liabilities</u>							
Entities of the National Housing System (deposits)	26.1	64.5	45.0	111.7	324.7	634.4	823.1
Sundry creditors	3.3	9.2	16.2	19.2	29.5	41.9	162.5
Sub-total	<u>29.4</u>	<u>73.7</u>	<u>61.2</u>	<u>130.9</u>	<u>354.2</u>	<u>676.3</u>	<u>985.6</u>
<u>Long-term Debt</u>							
Employees' Indemnity Fund	1,741.5	2,379.5	3,373.3	4,424.7	5,337.7	6,400.3	8,021.7
BNH housing bonds	31.2	35.4	36.3	37.8	36.2	34.2	34.2
Foreign Loans:							
IDB (IDB/BNH 104/SF-BR)	18.9	21.0	25.4	30.7	37.9	48.4	52.1
AID	10.2	15.8	19.4	29.8	40.6	40.6	40.5
IBRD	--	--	--	--	0.9	12.5	27.8
Miscellaneous	0.2	0.3	--	--	148.8	166.9	180.9
Sub-total	<u>1,802.0</u>	<u>2,452.0</u>	<u>3,454.4</u>	<u>4,523.0</u>	<u>5,602.1</u>	<u>6,702.9</u>	<u>8,375.2</u>
<u>Other Liabilities</u>							
Unallocated collections and repayments	12.0	16.0	14.3	4.7	8.8	30.8	26.8
Deferred income	--	13.3	11.9	8.9	9.3	10.6	7.9
Emp. Ind. Fund - to confirm	--	--	--	--	215.6	189.7	196.9
Other unidentified receipts	--	--	--	--	34.8	185.2	346.9
Sub-total	<u>12.0</u>	<u>29.3</u>	<u>26.2</u>	<u>13.6</u>	<u>268.5</u>	<u>416.3</u>	<u>578.5</u>
<u>Capital and Reserves</u>							
Capital	177.5	160.9	321.5	442.1	1,068.1	1,392.1	1,641.4
Reserves	106.3	248.4	374.9	815.0	281.7	103.1	3.1
Sub-total	<u>283.8</u>	<u>409.3</u>	<u>696.4</u>	<u>1,257.1</u>	<u>1,349.9</u>	<u>1,495.2</u>	<u>1,644.5</u>
TOTAL LIABILITIES	<u>2,127.2</u>	<u>2,964.3</u>	<u>4,238.2</u>	<u>5,924.6</u>	<u>7,574.6</u>	<u>9,290.7</u>	<u>11,568.8</u>

^{1/} During 1971 through 1974, BNH considered all items over 180 days as long-term. In 1975, BNH changed to 365 days or more as the long-term criterion. Data shown for 1972 through 1974 was estimated by BNH auditors.

BRAZIL

NORTHEAST WATER SUPPLY AND SEWERAGE PROJECT

State Water Companies Financial Statements

Assumptions Underlying Financial Projections

1. Notes on Existing Financial Statements

1.01 The financial projections are based on the historical financial statements of the SWCs, which are prepared in current Cruzeiros. Because of rapid inflation and incomplete records, it has been difficult to convert these Cruzeiros statements into UPCs in which the financial projections have been made by Bank staff. There are also deficiencies in the uniform accounting system presently in use by the SWCs, as noted below, and as a result of these factors, the historical financial statements do not provide a reliable base for the financial projections.

1.02 The first deficiency in the accounting system is in the treatment of monetary corrections on fixed assets and long-term debt, which are revalued quarterly in conformity with an index provided by the Ministry of Finance for adjustment of Obrigacoes Readjustaveis do Tesouro Nacional (ORTN). Under the corporate law, for income tax determination 1/, these monetary adjustments must be reflected respectively as income and expense in an SWC's income statement, and this has been provided for in the uniform system of accounts. Since the monetary adjustments to assets and debt have not usually been equivalent, due either to differing indexing and/or to differing ratios of assets to debt, the net income shown for an SWC has often been distorted. A commercial accounting system would exclude these monetary adjustments from the income statement and only adjust asset, liability and revaluation surplus accounts. While from an economic and investor standpoint these adjustments have merit, they must be excluded if income and cash statements meaningful for purposes of cost control, rate making and comparisons of financial performance among SWCs are to be produced. Monetary corrections have been excluded from the SWCs' historical income statements and financial projections have been prepared in UPCs which obviates the need to adjust for monetary correction. 2/

1.03 The second deficiency in the uniform system of accounts is the fact that it does not provide for an appropriate statement of sources and applications of cash. It is difficult to derive this data from the existing income statements and balance sheets, and the historical statements presented here are subject to a margin of error.

1/ The SWCs must follow the accounting requirements of the corporate law, although they are specifically exempted from income taxes.

2/ The new corporate law effective January 1, 1978, requires corporations to keep accounts in ORTN for all items subject to monetary correction.

1.04 Finally, the uniform accounting system provides for one other adjustment which distorts reported net income. To cover operating and administrative costs of SWCs which are considered directly related to project design and construction, BNH and FAE lend an amount equivalent to 10% of total direct project cost. The SWCs in turn may capitalize an equivalent amount of operating expense which will likely be in excess of actual project-related internal costs and will result in an understatement of operating expenses and an overstatement of net income. For the three SWCs combined in 1978, it is estimated that about 30% of operating expenses exclusive of depreciation will be capitalized, and for CAGECE about 49% of operating expenses will be capitalized. Proper cost accounting, which is not now undertaken in the SWCs, would allow capitalization of only project-related costs and provide a more realistic income statement. The present practice will be reviewed by consultants to be recruited to assist the SWCs in the areas of Finance and Accounting. However, it is not expected that this practice will change in the near future and the income statement projections reflect the capitalization of operating expenses equivalent to 10% of direct project costs.

1.05 Finally, in addition to these conceptual deficiencies, the individual SWCs are having difficulties in producing meaningful financial statements. First, all SWCs have been recently formed by mergers of the capital city water authorities and a large number of interior municipal water authorities. Because of incomplete asset inventories and cost data, it has been difficult for them to determine a proper valuation of fixed assets, and efforts are being made to accomplish this. Also, there have been delays in transferring assets of completed projects from construction in process to fixed assets in operation, which understates the value of the latter as well as the charge for depreciation. Finally, none of the SWCs has its own in-house computer specialists or a computer, and they have to rely on outside services which has made the shift to the uniform accounting system more difficult.

1.06 Financial planning in the SWCs is virtually non-existent. None of the SWCs has made any attempt to project operating financial results beyond one year. All SWCs do have long-range capital budgets, but these have been unrealistically high in relation to demonstrated capabilities of preparing and executing projects and the availability of funds from FAE and BNH. One year's capital expenditure disbursement projections on a monthly basis are maintained for those projects for which loan contracts have been signed with BNH/FAE. Basically, the SWCs operate with the knowledge that a subproject's costs will be wholly financed by BNH/FAE and have not been concerned with either short-range or long-range cash management.

2. Financial Projections

General

2.01 The financial projections are presented in UPCs. The implied assumption is that tariffs will be regularly adjusted upward to compensate for Cruzeiro depreciation against the UPC, (which was 33.9% in 1976 and 30.1% in

1977), apart from real increases needed to achieve or maintain financial viability. If revenues are not in fact maintained in real terms, and the tariff increases assumed are not implemented, the future financial performance will be less satisfactory than is indicated in the projections.

Income Statement

2.02 Water produced has been based on the expected availability of water from on-going source and treatment plant projects and planned projects. Water sold has been determined in relation to supply availability, gradual reductions in unaccounted-for water and on expected consumption per connection under normal conditions of supply. Tariffs have been assumed at levels sufficient to comply with the Bank's revenue covenant.

2.03 Operation and maintenance expense has been assumed to increase in time with water connections plus 7% during the 1978-82 period to reflect inflation. In the 1983-85 period these expenses have been increased in line with water connections only on the assumption that the UPC will no longer have to be adjusted for inflation. ^{1/} As is the practice of the SWCs (see para. 1.04), an amount equivalent to 10% of the current year's capital expenditures has been capitalized and treated as an offset to operating and maintenance expenses on the income statement.

2.04 Administrative expenses have been increased under the same assumption indicated in para 2.03.

2.05 Interest expense has been based on an average interest rate of 5.0% p.a. and normal average BNH/FAE terms of a three-year grace period on principal repayments followed by an 18-year repayment period. Interest on loan requirements to construction in progress has been capitalized.

3. Cash Requirements and Sources

3.01 Capital expenditures are based on the expansion programs of the SWCs (Table 6.1). Long-term debt incurred is assumed to be equivalent to capital expenditures, which include capitalized administrative expenses and interest during construction, less available internal cash generation. To the extent any projects may actually be financed by equity, the amount of such contributions would be subtracted from the new long-term debt and reflected in new equity.

3.02 Debt service has been based on assumptions given in paragraph 2.05.

^{1/} In the period 1975-1977 the general price index was up by 37% as opposed to devaluation of the Cruzeiro vis-a-vis the UPC of about 30.3%. To reflect the likelihood of this disparity, continuing in the 1979-82 period, the UPCs in the forecast have been escalated at 7%.

3.03 Net working capital requirements have been based on the assumption that inventories would be three months' stock, accounts receivable would amount to three months' sales, and current liabilities would be equivalent to inventories plus an amount equivalent to 5% of annual investments to allow for contractor's guarantee retentions.

4. Balance Sheets

4.01 Current assets and liabilities have been derived from the assumptions given in paragraph 3.03.

4.02 The long-term debt has been derived from the assumptions given in paragraphs 2.05 and 3.01. Equity has been increased (decreased) annually by the amount of net income (loss) for that year and by new equity contributions.

NORTHEAST WATER SUPPLY AND SEWERAGE PROJECT - ENRASA

FINANCIAL RESULTS EXPRESSED IN THOUSANDS OF UFGs

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
OPERATING DATA										
Water produced (million m ³)	133	157	173	188	200	207	215	224	239	248
Water sold (million m ³)	69	85	99	107	116	124	133	141	153	161
Unaccounted-for (%)	52	46	43	43	42	40	38	37	36	35
No. of connections (000)-water	300	340	345	368	396	424	452	476	498	522
No. of connections (000)-sewerage	--	19.9	24.3	28.4	42.1	48.4	51.8	56.1	60.4	64.7
Revenue/thousand m ³ -water (UPCs)	12.38	15.09	16.90	19.10	21.09	23.35	27.11	28.70	27.49	27.80
Revenue/connection-sewerage	--	7.04	7.90	9.12	9.96	10.53	11.27	11.92	11.92	11.92
STATEMENT OF INCOME AND EXPENSE										
REVENUES										
Water	854	1,283	1,673	2,044	2,446	2,896	3,606	4,047	4,206	4,367
Sewerage	10	140	192	259	419	511	584	669	720	771
Other	20	90	119	139	165	193	224	238	258	272
Total	884	1,513	1,984	2,442	3,030	3,600	4,414	4,954	5,184	5,410
EXPENSES										
Operations and maintenance	462	449	586	678	786	899	1,032	1,094	1,187	1,299
Administration	405	408	437	500	572	655	750	803	859	919
Capitalized	(215)	(135)	(201)	(433)	(375)	(400)	(166)	(238)	(240)	(241)
Subtotal	652	722	822	745	983	1,154	1,616	1,659	1,806	1,977
Depreciation	287	450	612	776	935	1,130	1,289	1,396	1,442	1,466
Total	939	1,172	1,434	1,521	1,918	2,284	2,905	3,055	3,228	3,443
Operating income	(55)	341	550	921	1,112	1,316	1,509	1,899	1,936	1,967
Interest	216	503	541	625	690	779	978	1,147	1,333	1,346
Net income (loss)	(271)	(162)	9	296	422	537	531	752	603	621
Operating ratio	1.06	.77		.62	.63	.63	.66	.62	.62	.64
Rate base	9,871	11,690	12,794	15,356	18,541	21,928	25,144	27,133	27,655	28,102
Rate of return (%)	(0.6)	2.9	4.3	6.0	6.0	6.0	6.0	7.0	7.0	7.0
STATEMENT OF CASH FLOW										
SOURCES										
Internal cash generation	232	791	1,162	1,697	2,047	2,446	2,798	3,295	3,378	3,433
Long-term debt	2,365	1,701	2,222	4,406	3,588	3,661	988	1,404	1,687	1,692
Equity	--	79	--	--	--	--	--	--	--	--
Total	2,597	2,571	3,384	6,103	5,635	6,107	3,786	4,699	5,065	5,125
APPLICATIONS										
Capital expenditures	2,037	1,349	2,010	4,329	3,752	4,026	1,660	2,375	2,400	2,410
Capitalized administrative expenditures	215	150	201	433	375	400	166	138	140	141
Capitalized interest	113	151	145	184	213	220	144	101	118	159
Total	2,365	1,650	2,356	4,946	4,340	4,646	1,970	2,614	2,658	2,710
Debt service	460	934	978	1,078	1,190	1,344	1,686	1,997	2,298	2,321
Working capital	(218)	26	35	55	75	81	86	39	57	40
Total	2,607	2,610	3,369	6,079	5,605	6,071	3,742	4,650	5,013	5,071
Increase (Decrease) in Cash	(10)	(39)	15	24	30	36	44	49	52	54
Debt service ratio	0.5	0.8	1.2	1.6	1.7	1.8	1.7	1.6	1.5	1.5
BALANCE SHEET										
ASSETS										
Fixed Assets										
Fixed assets in operation	10,962	12,841	15,295	19,404	23,374	28,244	32,225	34,907	36,107	38,709
Reserve for depreciation	519	993	1,605	2,381	3,316	4,446	5,735	7,131	8,573	10,039
Net fixed assets in operation (NFA)	11,481	11,898	13,690	17,023	20,058	23,798	26,490	27,776	27,534	28,670
Construction in progress	2,500	3,360	3,313	4,360	5,141	5,542	4,015	4,256	5,827	5,986
Total	13,981	15,208	17,003	21,383	25,199	29,340	30,505	32,032	33,361	34,656
Current Assets										
Cash	600	645	586	678	786	899	1,032	1,094	1,187	1,249
Inventories	170	189	248	295	375	463	544	579	627	665
Accounts Receivable	580	541	556	580	610	646	690	739	791	845
Other	25	18	19	19	19	19	19	19	19	19
Total	1,375	1,393	1,409	1,572	1,790	2,027	2,285	2,431	2,624	2,778
TOTAL ASSETS	15,356	16,601	18,412	22,955	26,989	31,367	32,790	34,463	35,985	37,434
LIABILITIES AND CAPITAL										
Long term debt	12,611	13,901	15,694	19,857	23,356	27,077	27,840	28,703	29,538	30,306
Equity	2,292	2,209	2,218	2,514	2,936	3,473	4,004	4,756	5,359	5,980
Total Capital	14,903	16,110	17,912	22,371	26,292	30,550	31,844	33,459	34,897	36,286
Current Liabilities	453	491	500	584	697	817	946	1,004	1,088	1,148
TOTAL LIABILITIES & CAPITAL	15,356	16,601	18,412	22,955	26,989	31,367	32,790	34,463	35,985	37,434
Debt/Total Capital (%)	85	86	88	89	89	89	87	86	85	84

BRAZIL

NORTHEAST WATER SUPPLY AND SEWERAGE PROJECT - CAGECE

ACTUAL AND PROJECTED FINANCIAL STATEMENTS (UPCs '000)

	Actual				Projected				
	1977	1978	1979	1980	1981	1982	1983	1984	1985
OPERATING DATA									
Water produced (million m3)	64	67	69	69	98	103	107	118	130
Water sold (million m3)	32	34	38	38	59	67	75	83	91
Unaccounted-for (%)	50	49	48	45	40	35	30	30	30
No. of connections ('000) - water	93	106	126	151	181	211	236	261	286
No. of connections ('000) - sewerage	8.7	9.7	14.7	19.7	24.7	29.7	34.7	39.7	44.7
Revenue/thousand m3 - water (UPC)	8.31	10.06	14.00	17.47	17.47	23.03	23.78	23.99	24.07
Revenue/connection - sewerage	3.91	4.32	5.58	6.42	6.42	7.25	8.00	8.00	8.00
STATEMENT OF INCOME AND EXPENSE									
REVENUES									
Water	266	342	504	664	1,031	1,543	1,784	1,991	2,190
Sewerage	34	42	82	126	159	215	278	318	358
Other	13	17	25	35	40	68	90	100	103
Total	<u>313</u>	<u>401</u>	<u>611</u>	<u>825</u>	<u>1,230</u>	<u>1,826</u>	<u>2,172</u>	<u>2,409</u>	<u>2,651</u>
EXPENSES									
Operations and maintenance	230	257	272	305	384	430	451	475	546
Administration	186	208	233	261	343	375	441	485	560
Capitalized	(304)	(230)	(297)	(132)	(156)	(60)	(94)	(94)	(94)
Subtotal	112	235	208	434	571	745	798	866	1,012
Depreciation	134	134	336	317	418	555	624	703	720
Total	<u>246</u>	<u>369</u>	<u>544</u>	<u>751</u>	<u>989</u>	<u>1,300</u>	<u>1,422</u>	<u>1,569</u>	<u>1,732</u>
Operating income	67	32	67	74	241	526	750	840	919
Interest	50	141	135	145	273	446	520	601	611
Net income (loss)	17	(109)	(68)	(71)	(32)	80	230	239	308
Operating ratio	.79	.92	.89	.91	.80	.71	.65	.65	.65
Rate base	2,100	3,755	5,648	6,859	8,020	10,511	12,501	13,429	13,914
Rate of return (%)	3.2	0.9	1.2	1.1	3.0	5.0	6.0	6.3	6.6
STATEMENT OF CASH FLOW									
SOURCES									
Internal cash generation	201	228	403	391	659	1,081	1,374	1,543	1,639
Long-term debt	2,661	2,526	3,394	1,609	1,811	689	801	767	731
Equity	--	69	--	118	--	--	--	--	--
Total	<u>2,862</u>	<u>2,823</u>	<u>3,797</u>	<u>2,118</u>	<u>2,470</u>	<u>1,770</u>	<u>2,175</u>	<u>2,310</u>	<u>2,370</u>
APPLICATIONS									
Capital expenditures	2,250	2,101	2,970	1,324	1,557	604	940	940	940
Capitalized administrative expenditures	304	230	297	132	156	60	94	94	94
Capitalized interest	85	195	161	275	239	178	86	68	57
Total	<u>2,639</u>	<u>2,526</u>	<u>3,428</u>	<u>1,731</u>	<u>1,952</u>	<u>842</u>	<u>1,120</u>	<u>1,102</u>	<u>1,091</u>
Debt service	132	211	232	250	472	769	898	1,036	1,053
Working capital	144	86	134	133	35	151	143	155	205
Total	<u>2,915</u>	<u>2,823</u>	<u>3,794</u>	<u>2,114</u>	<u>2,459</u>	<u>1,762</u>	<u>2,161</u>	<u>2,293</u>	<u>2,349</u>
Increase (Decrease) in cash	(53)	-0-	3	4	11	8	14	17	21
Debt service ratio	1.5	1.1	1.7	1.6	1.4	1.4	1.5	1.5	1.6
BALANCE SHEET									
ASSETS									
Fixed Assets									
Fixed assets in operation	2,603	4,911	7,398	7,929	10,455	13,883	15,614	17,166	18,008
Reserve for depreciation	176	310	646	963	1,381	1,936	2,560	3,263	3,983
Net fixed assets in operation (NFA)	2,427	4,543	6,752	6,966	9,074	11,947	13,054	13,803	14,025
Construction in progress	2,984	3,177	4,308	5,508	4,934	2,348	1,737	1,387	1,636
Total	<u>5,321</u>	<u>7,720</u>	<u>11,060</u>	<u>12,474</u>	<u>14,008</u>	<u>14,295</u>	<u>14,791</u>	<u>15,190</u>	<u>15,661</u>
Current Assets									
Cash	144	144	147	171	162	170	184	201	222
Inventories	218	248	291	320	398	465	512	666	719
Accounts Receivable	73	100	146	206	295	410	550	615	680
Other	176	176	176	176	176	176	176	176	176
Total	<u>611</u>	<u>668</u>	<u>760</u>	<u>853</u>	<u>1,031</u>	<u>1,221</u>	<u>1,422</u>	<u>1,658</u>	<u>1,797</u>
TOTAL ASSETS	5,932	8,388	11,820	13,327	15,039	15,516	16,213	16,848	17,458
LONG-TERM LIABILITIES									
Long-term debt	2,930	5,455	9,000	10,504	12,116	12,321	12,631	12,891	13,212
Equity	2,323	2,283	2,215	2,262	2,230	2,310	2,540	2,779	3,087
Total	<u>5,253</u>	<u>7,738</u>	<u>11,215</u>	<u>12,766</u>	<u>14,346</u>	<u>14,631</u>	<u>15,171</u>	<u>15,670</u>	<u>16,299</u>
Current Liabilities	679	650	605	561	693	885	1,042	1,178	1,159
TOTAL LIABILITIES AND CAPITAL	5,932	8,388	11,820	13,327	15,039	15,516	16,213	16,848	17,458
Debt/Total Capital (%)	56	70	80	82	84	84	83	82	81

BRAZIL

NORTHEAST WATER SUPPLY AND SEWERAGE PROJECT - COMESA

ACTUAL AND PROJECTED FINANCIAL STATEMENTS (UPCs '000)

	Actual				Projected					
	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
OPERATING DATA										
Water produced (million m ³)		186	196	229	248	267	285	301	321	338
Water sold (million m ³)		94	106	128	143	160	176	196	208	220
Unaccounted-for (%)		49	46	44	42	40	38	35	35	35
No. of connections ('000) - water		271	304	356	386	415	444	473	504	533
No. of connections ('000) - sewerage		38	39	51	63	89	111	135	159	182
Revenue/thousand m ³ - water (UPC)		10.89	11.65	12.56	14.24	13.94	15.15	16.59	16.83	17.00
Revenue/connection - sewerage		6.71	7.18	7.69	8.75	8.60	10.12	10.13	10.20	10.20
STATEMENT OF INCOME AND EXPENSE										
REVENUES										
Water	571	1,024	1,235	1,608	2,037	2,230	2,667	3,251	3,501	3,740
Sewerage	149	255	280	392	551	765	1,123	1,367	1,622	1,856
Other	73	43	50	68	74	80	86	92	98	104
Total	<u>793</u>	<u>1,322</u>	<u>1,565</u>	<u>2,068</u>	<u>2,662</u>	<u>3,075</u>	<u>3,876</u>	<u>4,710</u>	<u>5,221</u>	<u>5,700</u>
EXPENSES										
Operations and maintenance	295	420	503	629	727	840	962	1,029	1,101	1,167
Administration	455	652	781	978	1,130	1,306	1,495	1,600	1,712	1,814
Capitalized	(90)	(171)	(201)	(338)	(233)	(391)	(176)	(207)	(226)	(232)
Subtotal	<u>660</u>	<u>901</u>	<u>1,083</u>	<u>1,269</u>	<u>1,624</u>	<u>1,755</u>	<u>2,281</u>	<u>2,422</u>	<u>2,587</u>	<u>2,749</u>
Depreciation	50	84	238	373	488	627	767	917	1,068	1,189
Total	<u>610</u>	<u>985</u>	<u>1,321</u>	<u>1,642</u>	<u>2,112</u>	<u>2,382</u>	<u>3,042</u>	<u>3,339</u>	<u>3,655</u>	<u>3,938</u>
Operating income	83	337	244	426	550	693	834	1,371	1,566	1,762
Interest	<u>248</u>	<u>222</u>	<u>189</u>	<u>299</u>	<u>487</u>	<u>601</u>	<u>767</u>	<u>885</u>	<u>1,095</u>	<u>1,183</u>
Net income (loss)	(165)	115	55	127	63	92	67	486	471	579
Operating ratio	.77	.75	.84	.79	.79	.77	.78	.71	.70	.69
Rate base		3,037	5,443	8,486	10,944	13,863	16,671	19,591	22,366	25,171
Rate of return (%)		11.1	4.5	5.0	5.0	5.0	5.0	7.0	7.0	7.0
STATEMENT OF CASH FLOW										
SOURCES										
Internal cash generation		421	482	799	1,038	1,320	1,601	2,288	2,634	2,951
Long-term debt		4,103	2,428	3,554	2,720	4,342	2,338	2,072	2,193	2,304
Equity		829	463	418	253	234	--	--	--	--
Total		<u>5,353</u>	<u>3,373</u>	<u>4,771</u>	<u>4,011</u>	<u>5,916</u>	<u>3,939</u>	<u>4,360</u>	<u>4,827</u>	<u>5,255</u>
APPLICATIONS										
Capitalized expenditures		4,481	2,075	3,388	2,332	3,910	1,756	2,091	2,264	2,324
Capitalized administrative expenditures		171	202	339	233	391	176	209	226	232
Capitalized interest		--	353	355	387	406	413	350	288	258
Total		<u>4,652</u>	<u>2,630</u>	<u>4,082</u>	<u>2,952</u>	<u>4,707</u>	<u>2,345</u>	<u>2,650</u>	<u>2,778</u>	<u>2,814</u>
Debt service		389	311	517	840	1,037	1,322	1,525	1,888	2,040
Working capital		31	530	55	192	141	233	138	109	106
Total		<u>5,072</u>	<u>3,471</u>	<u>4,654</u>	<u>3,984</u>	<u>5,885</u>	<u>3,900</u>	<u>4,313</u>	<u>4,775</u>	<u>4,960</u>
Increase (Decrease) in cash		281	(98)	117	27	31	39	47	52	56
Debt service ratio		1.2	1.5	1.5	1.2	1.3	1.2	1.5	1.4	1.4
BALANCE SHEET										
ASSETS										
Fixed Assets										
Fixed asset in operation	2,984	3,736	8,200	10,432	13,978	17,385	20,987	24,910	28,521	32,778
Reserve for depreciation	240	406	644	1,017	1,505	2,132	2,899	3,816	4,884	6,073
Net fixed assets in operation (NFA)	<u>2,744</u>	<u>3,330</u>	<u>7,556</u>	<u>9,415</u>	<u>12,473</u>	<u>15,253</u>	<u>18,088</u>	<u>21,094</u>	<u>23,637</u>	<u>26,705</u>
Construction in progress	4,197	8,927	7,093	8,943	8,349	9,991	8,734	7,461	6,628	5,185
Total	<u>7,661</u>	<u>12,257</u>	<u>14,649</u>	<u>18,358</u>	<u>20,822</u>	<u>25,244</u>	<u>26,822</u>	<u>28,555</u>	<u>30,265</u>	<u>31,890</u>
Current Assets										
Cash	148	429	331	448	475	506	545	592	644	700
Inventories	75	205	246	308	355	411	470	503	538	571
Accounts Receivable	198	303	391	514	653	823	999	1,139	1,248	1,354
Other	264	281	281	281	281	281	281	281	281	281
Total	<u>685</u>	<u>1,218</u>	<u>1,249</u>	<u>1,551</u>	<u>1,764</u>	<u>2,021</u>	<u>2,295</u>	<u>2,515</u>	<u>2,711</u>	<u>2,906</u>
TOTAL ASSETS	<u>8,346</u>	<u>13,475</u>	<u>15,898</u>	<u>19,909</u>	<u>22,586</u>	<u>27,265</u>	<u>29,117</u>	<u>31,070</u>	<u>32,976</u>	<u>34,796</u>
LIABILITIES AND CAPITAL										
Long-term debt	5,931	9,825	12,131	15,467	17,834	22,082	23,865	23,297	26,697	27,905
Equity	2,152	2,902	3,420	3,965	4,281	4,627	4,694	5,180	5,651	6,230
Total Capital	<u>8,083</u>	<u>12,727</u>	<u>15,551</u>	<u>19,432</u>	<u>22,115</u>	<u>26,709</u>	<u>28,559</u>	<u>30,477</u>	<u>32,348</u>	<u>34,135</u>
Current Liabilities	263	748	347	477	471	556	558	593	628	661
TOTAL LIABILITIES AND CAPITAL	<u>8,346</u>	<u>13,475</u>	<u>15,898</u>	<u>19,909</u>	<u>22,586</u>	<u>27,265</u>	<u>29,117</u>	<u>31,070</u>	<u>32,976</u>	<u>34,796</u>
Debt/Total Capital (%)	73	77	78	80	81	83	84	83	83	82

BRAZIL

NORTHEAST WATER SUPPLY AND SEWERAGE PROJECT

Outline of Terms of Reference for Metering and Tariff Studies

Introduction

1.01 Each State Water Company in the States of Salvador, Pernambuco and Ceara will undertake water supply and sewerage metering and tariff studies in order to revise their tariff structures to achieve its resource allocation objectives and to provide sound basis for the expansion of water supply and sewerage services. Each tariff study will be presented for BNH approval and submitted for Bank's comments not later than June 30, 1979.

Objectives

1.02 The purpose of the studies is to devise a tariff structure which reflects as closely as possible the costs to the economy of meeting the increasing demand for water and sewerage subject to the constraints imposed by the revenue requirements of the State Water Companies in connection with their financial objectives and by distributional objectives (e.g., subsidizing minimal services for poorer consumers). The study will recommend a timetable for the implementation of the proposed metering programs and the tariff structures.

1.03 The tariff studies should follow these basic principles:

- (a) the removal of subsidies to commercial and industrial customers for water supply and sewerage services;
- (b) the establishment of tariff structures progressive with respect to volume; and
- (c) the fulfillment of the financial covenants established in the Loan Agreement for the SWCs.

Summary of Activities

1.04 To carry out the studies, the following main activities should be undertaken:

- (a) gathering of information on:
 - (i) existing tariffs,
 - (ii) demand levels,
 - (iii) income distribution,

- (iv) operating and capital costs, and
- (v) other relevant data;
- (b) identifying the incremental cost of services;
- (c) identifying and quantifying economic, financial and social objectives to be served through the tariff design;
- (d) comparing existing tariffs with incremental costs and the tariff implications of financial and social objectives;
- (e) making a cost-benefit analysis of consumption metering for different consumer groups;
- (f) analyzing the need for lower standards of service in low-income areas;
- (g) formulating programs for meter installation and maintenance and tariff proposals, integrating economic, financial and social factors (assessing the affordability of low-income groups); and
- (h) proposing implementation schedules and procedures for the recommended metering programs and tariff structures.

BRAZIL

(A) Metropolitan Salvador

NORTHEAST WATER SUPPLY AND SEWERAGE PROJECT

INTERNAL FINANCIAL RATES OF RETURN AND AVERAGE INCREMENTAL COSTS

INTERNAL FINANCIAL RATE OF RETURN (IFRR)

(thousand UPCs of Dec. 1977)

Year	C O S T S			R E V E N U E S		N E T R E V E N U E S		A S S U M P T I O N S
	Construction Costs	Operating & Maintenance	Total	1	2	1	2	
1978	1067	101	1168	167	167	(1001)	(1001)	<u>Revenue 1:</u> Based on average tariff levels as of 1978 and assumed constant in real terms thereafter. Water Supply: UPCs 16.3/000 m ³ Sewerage: UPC 7.6/connection year <u>Revenue 2:</u> Based on expected tariff levels resulting from financial covenant.
1979	2811	207	3018	347	367	(2671)	(2651)	
1980	2484	261	2745	484	1089	(2261)	(1656)	
1981	2312	315	2627	674	755	(1953)	(1872)	
1982	495	371	886	753	902	(113)	36	
1983	153	579	732	852	1011	120	279	
1984	154	650	804	943	1081	139	277	
1985	164	736	900	1044	1183	143	283	
1986	199	785	984	1141	1295	157	311	
1987	214	836	1050	1239	1407	189	357	
1988	214	886	1100	1336	1517	236	417	
1989	214	937	1151	1434	1629	283	478	
1990	231	990	1221	1535	1745	314	524	
1991	231	1046	1277	1641	1866	364	589	
1992	247	1107	1354	1757	1999	403	645	
1993	264	1168	1432	1873	2132	441	700	
1994	280	1233	1513	1997	2274	484	761	
1995	231	1297	1528	2114	2408	586	880	
1996-2012	-	1337	1337	2167	2468	830	1131	

IFRR 1: 4.1%

IFRR 2: 7.0%

IFRR 3: 3.4% 1/

1/ Using a shadow exchange rate factor of 1.3 and present tariff levels in real terms.

LONG RUN AVERAGE INCREMENTAL COST

Year	<u>W A T E R S U P P L Y</u>		<u>S E W E R A G E</u>		<u>A S S U M P T I O N S</u>
	Volume (million m ³)	Cost (thousand UPC of Jan. 1978)	Volume (million m ³ equivalent)	Cost (thousand UPC of Jan. 1978)	
1978	10.2	1,168	-	-	0.46 million m ³ / connection year
1979	20.7	2,469	0.6	549	
1980	26.2	2,133	3.4	612	
1981	32.0	2,094	6.9	533	
1982	37.5	656	8.5	210	
1983	43.0	542	9.0	150	
1984	48.6	614	9.0	150	
1985	54.7	711	9.0	150	
1986	60.7	782	9.0	150	
1987	66.7	844	9.0	150	
1988	72.6	894	9.0	150	
1989	78.6	945	9.0	150	
1990	84.8	1,010	9.0	150	
1991	91.3	1,066	9.0	150	
1992	98.4	1,139	9.0	150	
1993	105.5	1,213	9.0	150	
1994	113.1	1,289	9.0	150	
1995	120.3	1,317	9.0	150	
1996- 2007	123.5	1,187	9.0	150	

$$\begin{aligned} \text{AICW: } & 22.24 \text{ UPC/000 m}^3 \\ & = 5.1 \text{ Cr\$/m}^3 \end{aligned}$$

$$\begin{aligned} \text{AICS: } & 36.82/000 \text{ m}^3 \\ & = 8.4 \text{ Cr\$/m}^3 \end{aligned}$$

$$\begin{aligned} \text{AICW: } & 23.50 \text{ UPC/000m}^3 \text{ } \underline{1/} \\ & = 5.3 \text{ Cr\$/m}^3 \end{aligned}$$

$$\begin{aligned} \text{AICS: } & 38.93/000\text{m}^3 \\ & = 8.8 \text{ Cr\$/m}^3 \end{aligned}$$

1/ Using a shadow exchange rate factor of 1.3.

(B) Recife

INTERNAL FINANCIAL RATE OF RETURN (IFRR)
(thousand UPCs of Dec. 1977)

Year	C O S T S			R E V E N U E S		N E T R E V E N U E S		A S S U M P T I O N S
	Construction Costs	Operating & Maintenance	Total	1	2	1	2	
1978	-	-	-					<u>Revenues 1:</u> Based on average tariff levels as of 1978 and assumed constant in real terms thereafter. Water Supply: UPC 11.3/000 m3 Sewerage: UPC 6.9/economic year <u>Revenues 2:</u> Based on expected average tariff levels resulting from financial covenant.
1979	1,628	28	1,656	75	75	(1581)	(1581)	
1980	1,162	51	1,213	149	159	(1064)	(1054)	
1981	1,762	75	1,837	348	340	(1489)	(1497)	
1982	223	97	320	520	537	(200	217	
1983	13	117	130	611	618	481	488	
1984	17	126	143	701	716	558	573	
1985	21	133	154	805	825	651	671	
1986-								
2012	-	133	133	805	825	672	692	

IFRR 1: 12.3%
 IFRR 2: 12.6%
 IFRR 3: 11.2%

1/ Using a shadow exchange rate factor of 1.3 and present tariff levels in real terms.

LONG RUN AVERAGE INCREMENTAL COST (AIC)

Year	<u>W A T E R S U P P L Y</u>		<u>S E W E R A G E</u>		<u>A S S U M P T I O N S</u>
	Volume (million m ³)	Cost (thousand UPCs of Jan. 1978)	Volume (million m ³ equivalent)	Cost (thousand UPCs of Jan. 1978)	
1978	-	-	-	-	0.56 million m ³ / "economia-year"
1979	6.0	1,074	0.6	582	
1980	12.0	446	1.1	767	
1981	18.0	1,094	11.8	743	
1982	24.0	255	20.2	65	
1983	29.0	64	23.0	66	
1984	29.0	64	30.2	79	
1985	29.0	64	38.6	90	
1986-					
2007	29.0	64	38.6	69	

$$\begin{aligned} \text{AICW: } & 12.94 \text{ UPC/000 m}^3 \\ & = 2.9 \text{ Cr\$/m}^3 \end{aligned}$$

$$\begin{aligned} \text{AICS: } & 9.52 \text{ UPC/000 m}^3 \\ & = 2.2 \text{ Cr\$/m}^3 \end{aligned}$$

$$\begin{aligned} \text{AICW: } & 13.99 \text{ UPC/000m}^3 \text{ } \underline{1/} \\ & = 3.2 \text{ Cr\$/m}^3 \end{aligned}$$

$$\begin{aligned} \text{AICS: } & 10.27 \text{ UPC/000m}^3 \text{ } \underline{1/} \\ & = 2.3 \text{ Cr\$/m}^3 \end{aligned}$$

1/ Using a shadow exchange rate factor of 1.3.

(C) Fortaleza

INTERNAL FINANCIAL RATE OF RETURN (IFRR)

(thousand UPCs of Dec. 1977)

Year	<u>COSTS</u>			<u>REVENUES</u>		<u>NET REVENUES</u>		<u>ASSUMPTIONS</u>
	Construction	Maint. & Oper.	Total	1	2	1	2	
1978	73	-	73	-	-	(73)	(73)	<u>Revenues:</u> Based on average tariff levels as of 1978 and assumed constant in real terms thereafter
1979	1930	38	1968	21	25	(1947)	(1943)	
1980	645	42	687	42	54	(645)	(633)	
1981	680	235	915	248	338	(667)	(577)	Water Supply: UPC 9.7/000 m3 Sewerage: UPC 4.2/connection year
1982	905	261	1166	326	532	(840)	(634)	
1983	100	326	426	415	662	(11)	236	
1984	110	392	502	504	810	2	308	<u>Revenues 2:</u> Based on expected tariff levels resulting from financial covenant.
1985	121	460	581	593	956	12	375	
1986	132	541	673	692	1116	19	443	
1987	145	670	815	839	1356	24	541	
1988	158	690	848	880	1420	32	572	
1989	170	750	920	958	1547	38	627	
1990								
2012	-	750	750	1000	1613	250	863	

IFRR 1: 1.8%
IFRR 2: 12.0%
IFRR 3: 1.2%

a/ Using a shadow exchange rate factor of 1.3, and present tariff levels in real terms.

LONG RUN AVERAGE INCREMENTAL COST (AIC)

Year	<u>WATER SUPPLY</u>		<u>SEWERAGE</u>		<u>A S S U M P T I O N S</u>
	Volume (million m ³)	Cost (thousand UPC of Jan. 1978)	Volume (million m ³ equivalent)	Cost (thousand UPC of Jan. 1978)	
1978	-	-	-	-	0.42 million m ³ / connection year
1979	-	1578	2.1	390	
1980	-	588	4.2	99	
1981	19.0	484	6.3	431	
1982	25.0	707	8.4	459	
1983	32.0	292	10.5	134	
1984	39.0	347	12.6	155	
1985	46.0	404	14.7	177	
1986	54.0	471	16.8	202	
1987	67.0	588	18.9	227	
1988	69.0	600	21.0	248	
1989	75.0	648	23.1	272	
1990- 2007	78.0	587	24.4	163	
AICW: 14.60 UPC/000 m ³		AICS: 16.42 UPC/000 m ³			
= 3.3 Cr\$/m ³		= 3.7 Cr\$/m ³			
AICW: 15.24 UPC/000m ^{1/}		AICS: 17.16 UPC/000m ³ ^{1/}			
= 3.5 Cr\$/m ³		= 3.9 Cr\$/m ³			

^{1/} Using a shadow exchange rate factor of 1.3.

BRAZIL

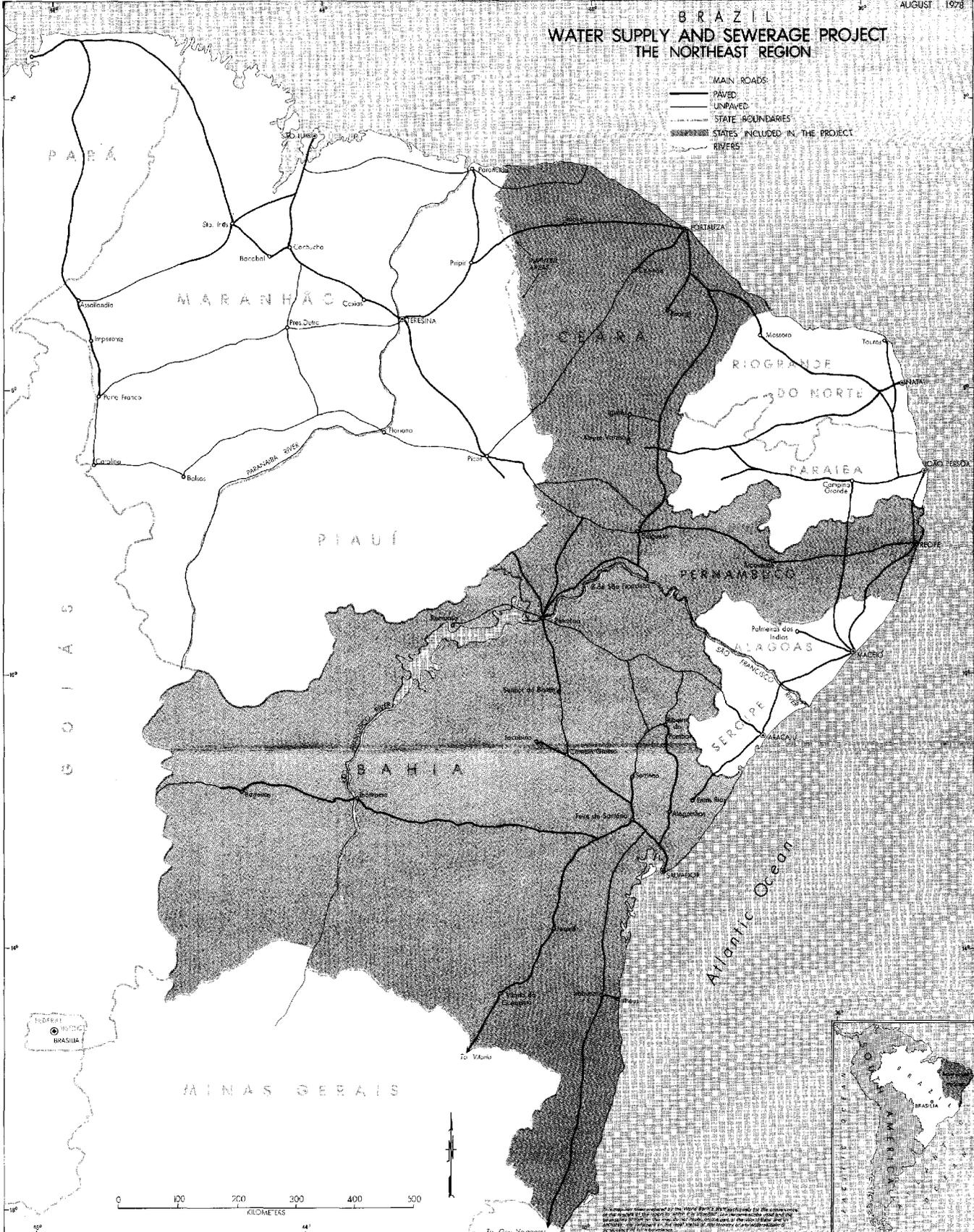
NORTHEAST WATER SUPPLY AND SEWERAGE PROJECTS

Documents Available in Project File

1. BNH Basic Legislation.
2. BNH Audited Financial Statements, 1976 and 1977.
3. BNH Annual Budgets, 1976-1980.
4. BNH Annual Reports, 1976 and 1977.
5. BNH Credit Lines.
6. Accounting Manual for SWCs.
7. Audited Financial Statements for the SWCs, 1976 and 1977.
8. Training Program for Brazil SWCs, January 1977 - ABES. Two volumes.
9. Status of Water Supply and Sewerage Service Levels in the urban areas under SUDENE - June 1977.
10. Investment programs, cost estimates and project maps for the SWCs.
11. Justificative analysis for water treatment works in Salvador.
12. Poverty impact analysis - June 1978.

BRAZIL WATER SUPPLY AND SEWERAGE PROJECT THE NORTHEAST REGION

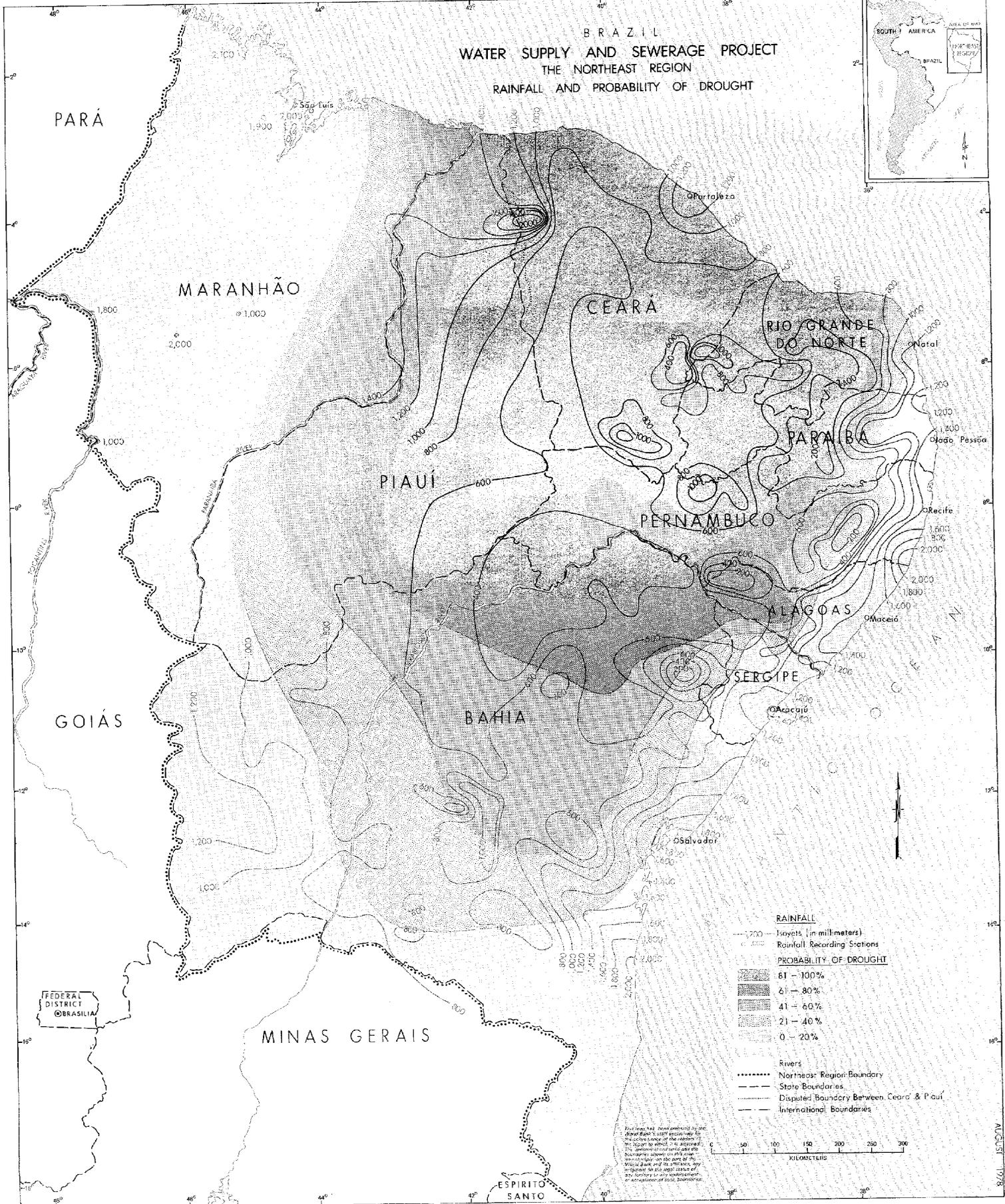
- MAIN ROADS
- PAVED
- UNPAVED
- STATE BOUNDARIES
- STATES INCLUDED IN THE PROJECT
- RIVERS



0 100 200 300 400 500
KILOMETERS

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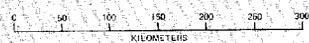
BRAZIL
 WATER SUPPLY AND SEWERAGE PROJECT
 THE NORTHEAST REGION
 RAINFALL AND PROBABILITY OF DROUGHT



FEDERAL DISTRICT
 BRASÍLIA

- RAINFALL**
- - - Isohyets (in millimeters)
 - Rainfall Recording Stations
- PROBABILITY OF DROUGHT**
- ▨ 61 - 100%
 - ▨ 41 - 60%
 - ▨ 21 - 40%
 - ▨ 0 - 20%
- Rivers
- Northeast Region Boundary
- State Boundaries
- Disputed Boundary Between Ceará & Piauí
- International Boundaries

This map has been prepared by the Federal Dept. of Water Resources for the water supply project. It is not to be used for any other purpose. The boundaries shown on this map are those shown on the map of the World Bank and its publications. No liability is assumed for any errors or omissions in the preparation of this map.

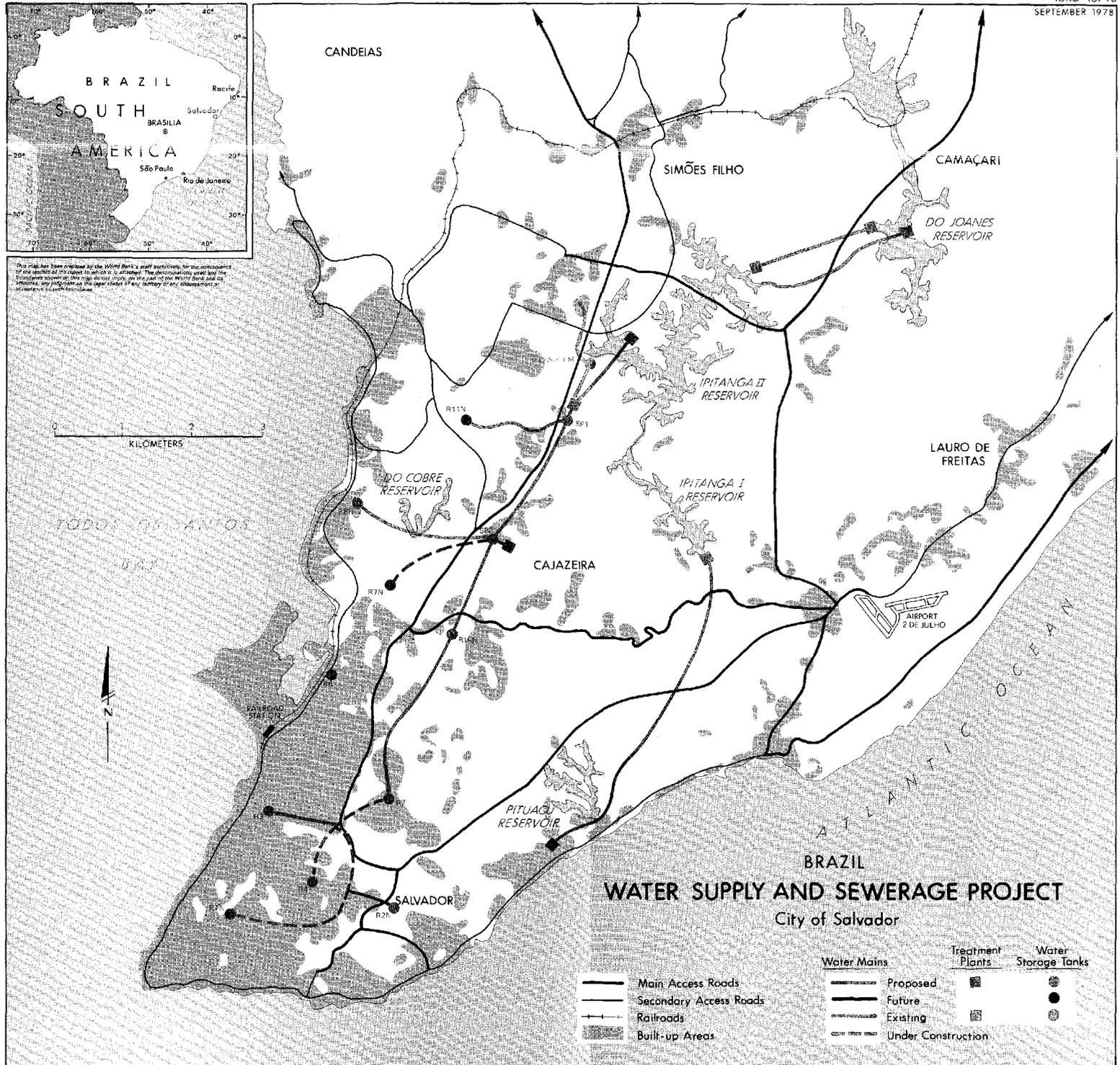




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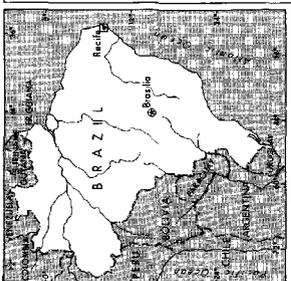


TODOS OS ANOS
BAIA



BRAZIL
WATER SUPPLY AND SEWERAGE PROJECT
City of Salvador

	Main Access Roads		Existing		Proposed		Future
	Secondary Access Roads		Existing		Future		Proposed
	Railroads		Under Construction		Proposed		Future
	Built-up Areas						



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BRAZIL Water Supply and Sewerage Project CITY OF RECIFE

- Water mains
 - Wells
 - Storage tanks
 - Pumping stations
 - Water treatment plants
 - Areas served with water
 - Areas requiring improvements in water distribution
 - Areas to be served with water
- SEWERAGE WORKS**
- Collection
 - Interceptors
 - Pumping stations
 - Sewage treatment plants
 - Areas served with sewers
 - Areas to be served with new sewers



- Built-up areas
- Bridges
- Main access roads
- Railroads
- Rivers

