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HARD CHOICES

A Report on the Increasing Gap Between America's Infrastructure Needs and Our Ability To Pay for Them

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Appendix 7. LOUISIANA

A CASE STUDY

PREPARED FOR THE USE OF THE

SUBCOMMITTEE ON ECONOMIC GOALS AND INTERGOVERNMENTAL POLICY

OF THE

JOINT ECONOMIC COMMITTEE
CONGRESS OF THE UNITED STATES

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Preface

Infrastructure problems are widespread. They do not respect regional or state boundaries. To secure a better data base concerning national and state infrastructure conditions and to develop threshold estimates of national and state infrastructure conditions, the Joint Economic Committee of the Congress requested that the University of Colorado's Graduate School of Public Affairs direct a twenty-three state infrastructure study. Simultaneously, the JEC appointed a National Infrastructure Advisory Committee to monitor study progress, review study findings and help develop policy recommendations to the Congress.

In almost all cases, the studies were prepared by principal analysts from a university or college within the state, following a design developed by the University of Colorado. Close collaboration was required and was received from the Governor's staff and relevant state agencies.

Because of fiscal constraints each participating university or college agreed to forego normal overhead and each researcher agreed to contribute considerable time to the analysis. Both are to be commended for their commitment to a unique and important national effort for the Congress of the United States.

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LOUISIANA: INFRASTRUCTURE
(A Study of Louisiana's Public Facilities)
Phase I

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June 1983

PREFACE AND ACKNOWLEDGEMENTS

LOUISIANA: INFRASTRUCTURE (A Study of Louisiana's Public Facilities) PHASE I was prepared as a result of Louisiana's participation in a nationwide assessment of public infrastructure needs conducted for an advisory committee to the United States Congressional Joint Economic Committee. The study project was coordinated at the national level by Marshall Kaplan, Dean of the Graduate school of Public Affairs, University of Colorado at Denver and at the state level by Theodore N. McMullan, Policy Planner at the Louisiana State Planning Office. The study was conducted by James D. Shilling, Assistant Professor of Finance of the Department of Finance, College of Business Administration, Louisiana State University at Baton Rouge.

The following individuals participated in the development of information for the study and will be involved with the continuing research of the state's public facility needs.

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The text was prepared by Brenda Gatlin of Louisiana State University (draft text) and Peggy S. Moak of the Louisiana State Planning Office (final text) and proofread by Genelle C. Foster of the Louisiana State Planning Office. Graphics were prepared by David C. Fruge' of the State Planning Office.

As the report title indicates, this study represents a threshold examination or "first look" at the public infrastructure situation in Louisiana. Further study and analysis of this topic will be part of the State Planning Office's ongoing activities.

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I. PRINCIPAL FINDINGS

1.1 Purpose and Scope of Study

Growing concern in recent years over the state of our public facilities has led to much attention to the issue of revitalizing our nation's highways, railroad lines, water and sewer supply systems, airports, mass transit systems, and ports — that is, to the revitalization of our public infrastructure. Since the 1960s public works spending in constant dollars has been declining approximately 5 percent per year nationwide. The durability of capital assets and the build up in capital throughout the 1960s and the concomitant neglect since then is partially responsible for this decline. This phenomenon is considered to adversely affect the public's health, safety and welfare and net private investment which ultimately leads to declining productivity.

The purpose of this study is to address these capital adequacy issues. The research was conducted as part of the Congressional Joint Economic Committee advisory committee's probe to assess the condition of America's infrastructure. The scope of the study is to examine the infrastructure needs in Louisiana and evaluate the financial capabilities of the state to meet these needs over the next two decades.

1.2 Summary of State and Local Investment Needs by Function

State and local expenditures for capital improvements by function are classified as follows: highways, bridges, local roads, railroads, airports, public service transportation, water supply and wastewater treatment, and solid waste disposal. Two other classifications—ports and waterways, and flood control programs—are included as major categories but represent areas where increased data and planning are needed. Expenditures for these activities are likely to constitute an ever increasing percentage of total spending.

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In this summary, state and local expenditures of Louisiana are compared to estimates of available revenues (Table 1). Revenue projections are based on current funding levels and estimates of anticipated federal grants-in-aid. Investment needs are unconstrained estimates of recurring expenditures by category.

Highways

Louisiana's projected expenditures of $11.639 billion for the construction and maintenance of the state-maintained highway system for the period 1983 to 2000 equals approximately 50 percent of total state and local capital expenditures. Included in these expenditures are $1.540 billion for interstate construction, $1.630 billion for overlay, construction and rehabilitation of roads currently deemed deficient, $600 million for improvements to structures, and $7.869 billion for projected deficiencies and normal maintenance over the next two decades. The total cost of essential improvements for highways (to meet standards established by the Louisiana Department of Transportation and Development) is estimated to exceed highway revenues by $450 million. On an annual basis, this means a shortfall of $27 million per year or that expenditures for overlay improvements should equal $80 to $100 million annually. Cutbacks in this funding could eventually have significant implications on the cost of maintaining adequate road pavement conditions, grading, sight distances and other functional categories.

Bridges

Projected bridge construction and rehabilitation costs are approximately $943.5 million over the period 1983 to 2000. This projection includes the cost of replacement and rehabilitation of bridges categorized as structurally deficient or functionally obsolete. Five thousand bridges or 32 percent of the total bridges in Louisiana are targeted for replacement and rehabilitation. Revenues available

TABLE 1

Summary of Investment Needs versus Revenues, 1983–2000
(Amount in millions of 1983 dollars)

	Needs	Revenues	Shortfall
Highways	$ 11,639.0	$ 11,187.7	$ 451.3
Bridges	943.5	899.3	44.2
Local Roads	6,780.0	5,740.0	1,040.0
Railroads	23.3	- -	23.3
Airports	68.0	24.8	43.2
Public Service Transportation	1,268.2	564.4	703.8
Water Supply	308.8	308.8	.0
Wastewater Treatment	2,411.0	1,583.0	828.0
Solid Waste Disposal	2,367.0	2,367.0	.0
Total	$ 25,808.8	$ 22,675.0	$ 3,133.8
Annual	$ 1,518.2	$ 1,333.8	$ 184.4

depend heavily on the Federal Bridge Replacement Fund. Estimates indicate that the current funding level is nearly consistent with investment needs. Total bridge replacement costs equal approximately $55.5 million per year. Revenues fall short of total expenditures for bridge replacement by approximately 5 percent or $2.6 million per year. There appears, though, to be a substantial discrepancy between the quality of bridges on and off the state system. Fifty-four percent of the off-system bridges are classified as structurally deficient while 13 percent of the on-system bridges are classified as structurally deficient.

Local Roads

Expenditures to upgrade local roads over the period 1983 to 2000 are estimated to equal $6.78 billion. This condition is primarily the result of high motorist fatalities, rising traffic volumes, and terrain and soil conditions . As a result, resurfacing and reconstruction costs are estimated to equal $399 million per year. This exceeds available local revenues from local sources and intergovernmental grants-in-aid by approximately $61 million per year. Compared with the cost of recommended improvements in the state-maintained highway system, local road needs suffer from a limited tax base. While aid to localities for roads has more than kept pace with inflation over the last several years, demand for capital improvement and maintenance projects exceeds the total supply of funds by 15 percent.

Railroads

Projected expenditures for the rehabilitation of railroad branchline segments generally deemed to be of comparatively major significance to local markets may equal $23 million for the period 1983 to 2000. These rail lines for the most part

have relatively low density and are typically classified as class A and B branchlines. Since federal budget cutbacks have virtually eliminated federal grants for the rehabilitation of rail facilities, there would be a shortfall of the entire $23 million which would have to be made up from another source. An advantage of providing state funds for this purpose is the impact on local economies and industrial park development.

Airports

Infrastructure investment needs for upgrading and maintaining public airports in Louisiana equal $68 million for the period 1983 to 2000 or on the average, $4 million per year. Cost of improvements include the construction and upgrading of the airport system and new navigational equipment. This outlay exceeds estimated revenues based on current funding patterns by $2.5 million per year. Sources of funding for this shortfall could be made up by an increased reliance on user fees charged at each airport or through additional appropriations at the federal, state or local level.

Public Service Transportation

Infrastructure investment needs for public transit programs and required operation expenses anticipated for the period 1983 to 2000 equal $1.268 billion. These projections are based on assumptions regarding vehicle replacement schedules, fleet sizes, trends in operating expenses for each system in Louisiana and user revenues. Capital investment requirements include new storage, maintenance and service facilities, terminal and administrative buildings, and new buses. If it is assumed that state assistance remains constant, then total investment needs exceed revenues by $703.8 million. This shortfall constitutes the total local requirements that must be financed by local or private sources.

Water Supply

Infrastructure investment to provide adequate water supply for public consumption totals $308.8 million for the period 1983 to 2000. This investment includes outlay for wells, storage facilities, pumps, treatment plants, buildings and distribution lines. While municipal water use is considered to be well within an acceptable level of supply in most regions of the state, the dependence on ground water means water utilities are going to have to drill wells to greater depths with the likelihood of encountering lower quality of water. Sources of revenues to finance infrastructure for water supply systems depend on the user fees charged by water utilities. Faced with regulated rates on these charges, the ability of water utilities to meet water demands is determined largely by regulation and financial strength of the individual water utility companies.

Wastewater Treatment

Adequate wastewater treatment facilities for organic and inorganic discharge materials represent a major expenditure item for local governments. The estimated backlog of sewage treatment and stormwater runoff construction costs in Louisiana is $1.895 billion. This backlog represents construction spending necessary to meet current EPA goals based on 1980 population. The incremental cost necessary to meet future wastewater treatment of the state until the year 2000 is estimated to equal $516 million. Based on current funding levels, these needed investments exceed total annual expenditures by $828 million or $93 million per year. Funding for the entire EPA assessment of needs appears unlikely.

Solid Waste Disposal

Projected investment for solid waste disposal is estimated to equal $2.367 billion for the period 1983 to 2000. This amount includes capital costs necessary to

satisfy the State of Louisiana solid waste management regulations as well as maintenance costs of $134 million per year. While it is unclear as to whether or not local governments can effectively cope with this problem, the burden of providing for basic solid waste disposal can be passed directly onto the user. This can be accomplished through an increased reliance on debt financing backed by greater property taxes and/or user fees. The main problem concerning solid waste disposal facing local governments in the state is compliance with regulations severely restricting the location of sanitary landfills in wetland or floodplain areas.

Ports and Waterways

While port facilities are quasi-public enterprises, due to their impact on the economy the state has a vested interest in their operations. In 1977, total capital expenditures for ports equalled $16.8 million. By 1982, capital expenditures for ports increased to $50.5 million, an average annual increase of 49.8 percent. In addition, there are currently outstanding $789.2 million of general obligation and self-supporting debt issued to finance capital improvements for ports. Approximately 85 percent of this debt outstanding is for the development of the Superport. There is also $55.8 million of authorized but unissued general obligation debt for ports still waiting to be issued.

Future investment needs can be classified into two categories: need for new or modified navigation channels to handle an increased volume of traffic with different characteristics, and need for replacement of structurally obsolete facilities.

Data on the need for the replacement of structurally obsolete port facilities within the state are unavailable. No cost estimates have been compiled to determine the investment need in this area. Based on tonnages handled, queuing

theory (lining of ships awaiting a turn), average tow sizes and tonnage capacity, only a few navigation structures have been assessed in terms of time until replacement.

More research is needed to assess the investment needs of ports and waterways in Louisiana. An increased government involvement in ports and waterways can be explained on the basis of protectionist motives. (Governments may be obligated to protect certain industries against income losses or to encourage greater investment because of the impact exogenous changes may have on the cost competitiveness of resources which do not have the opportunities available to mobile factors.) Therefore greater capital investment in ports and waterways may be justified; however, no estimates regarding this support are available. If the state continues its support of port facilities at its current funding level, then required annual investment may equal $33.7 million per year.

Flood Control

The federal government exercises control over the development of most of the major river basins in Louisiana. In this context, the federal government is the prime supplier of irrigation water, navigation improvements, flood control storage or levee and channel improvements, and other water related projects. The distribution of water and the use of water, however, is governed by state laws.

Traditionally, the primary method for reducing flood damage has been through structural measures such as dams, dikes, levees, channel improvements and seawalls. These have been constructed by the U.S. Army Corps of Engineers, at least for the major rivers. During the past quarter century federal expenditures for flood protection have nearly doubled. These increases are attributable to expanding urban development and increased land utilization of floodplain areas. Part of the protection against flood losses also comes from the National Flood

Insurance Program. This insurance program provides subsidized flood insurance policies to property owners in designated flood hazard areas and requires communities to adopt and enforce floodplain management regulations. Since approximately one-fourth of the flood damage in the United States occurs in Louisiana, flood control represents an important concern.

Flood control programs in Louisiana provide for the construction of structures which protect against headwater and backwater flooding. Under the direction of the Secretary of the Corps of Engineers and the supervision of the Chief of Engineers, the Mississippi River Commission, created in 1879, is responsible for this protection within the Mississippi alluvial valley. Total authorized cost to accomplish this work is $7 billion, of which about $4 billion has been spent. Maintenance costs alone equal $46 million per year. Smaller projects (less of a national priority) are the responsibility of the state.

There is no comprehensive study that reflects total investmen needs for the state in terms of flood control. However, a statewide flood control program has recently been enacted (Louisiana Statewide Flood Control Program). The purpose of this program is to design "long-term solutions to specific flood problems by protecting existing towns, facilities and fields in high hazard areas while not encouraging expansion into flood prone areas."[1] The program was initiated because of reduced availability of federal funds for flood control and delays in implementing federal projects, and will fund smaller projects not handled by federal programs. While the funding system requires a 70:30 state-to-local match, maintenance of the structure will be the responsibility of the local government. No estimates have been made for the total investment needs of the state for flood control projects.

1.3 Policy Options

It is difficult to generalize about the options available to finance infrastructure expenditures because much depends on current financial conditions in the tax-exempt bond market and the income flexibility of state and local revenues. The significance of the infrastructure financing problem stems from an increased demand for public goods and services resulting from a desire to remedy long standing deficiencies. At the same time there is a decline in the financial capacity of many governments to finance these expenditures from traditional generated revenue sources or to incur and service debt. As the demands for basic public infrastructure needs increase, emphasis must be placed on alternative financing techniques and capital budgeting.

Traditional financial markets do not represent a cure for all the ills and difficulties besetting state and local governments. A prolonged period of losses on tax-exempt securities through unanticipated increases in the rate of inflation has reduced the ease of converting assets into cash without loss and has also reduced the marketability of long-term tax-exempts. Federal budget cutbacks have added to state and local government's financial vulnerability. Dealers and institutional investors are far less willing to expose themselves to this risk and have therefore set higher interest rates due to such uncertainty. Cutbacks in new services and postponement of capital investment due to higher interest rates have been forced on many states and municipalities as a result. Postponing capital improvement projects ultimately leads to greater costs for the capital facility and may contribute to outmigration of industry and jobs.

The options available to state and local governments thus include increasing taxes, improving state and local government capital financing prospects, and/or relying more heavily on capital budgeting. Perhaps the most significant options

under capital financing prospects are some major innovations in the tax-exempt financial markets.

Tax Policy

Philosophical changes in tax policy are certain to emerge as a necessity to finance greater expenditures on projects. During the past two decades, Louisiana state and local governments have relied heavily on federal funds and petroleum-related windfalls. Federal grants-in-aid tend to distort the costs of providing public services and may lead to overinvestment in some areas. In the absence of user charges, these investments have conferred distributional benefits to selected groups of individuals. Relying more heavily on user charges or special fees whenever possible would reverse this situation.

Stabilizing the revenue base should lead to a greater ability to finance capital improvement projects and to incur and service more debt. For every percent increase in the overall income elasticity of the tax system, capital investment should increase by 2.89 percent. This assumes no change in other expenditures nor any change in current funding. However, if federal grants-in-aid, for example, are further reduced, then part of this increase will be necessary just to offset the substitution effect federal grants-in-aid have on capital expenditures.

Any tax reform should promote efficient distribution of capital. Since taxes create a differential wedge between pretax and posttax returns across broad classes of capital, the wedges cause a misallocation of capital. These distortions are minimized by the reliance on user charges. In addition, user charges remove the subsidy elements involved in the provision of goods and services thereby further promoting economic efficiency. User fees also relate the effective demand for public goods and services in the private market sector to the supply of services in the public sector. If the government must raise additional tax revenues, then user

fees minimize these distortions for any given amount of revenue to be collected. Alternatively, if government must use one or two specific types of taxes to raise revenues, then the guiding principle should be to improve tax revenue collections while attempting to improve the overall allocation of resources.

Infrastructure Bank

Credit market constraints on public sector borrowing may be alleviated by the formation of regional and/or state infrastructure banks. The concept behind these banks would be to provide a reliable source of funding for infrastructure at below market rates of interest to state and local governments. Sources of funding could be provided from direct state appropriations, deposits of federal grants-in-aid to local governments, private capital investment, proceeds from interest on investment funds, and interest on the loans held in the bank's portfolio.

An infrastructure bank, already proposed in New Jersey is anticipated to provide loans to local governments for capital improvements. While the proposal requires Congressional approval for the deposit of federal grants-in-aid, it has significant ramifications on local government finance and could serve as a prototype for other states. Making additional funds available to local governments at subsidized interest rates should relieve their over reliance on traditional debt financing and serve to improve or preserve the credit rating on state and local bonds. This, in turn, means lower net interest cost to these governments and thus a greater capacity to finance capital improvement projects.

Subsidized Taxable Bond Option

State and local expenditures on capital outlays depend heavily on debt financing and the favorable status given tax-exempt interest rates versus interest rates on taxable securities. While historically the rate ratio between long-term

taxables and tax-exempt bonds of comparable credit quality has been approximately 70 to 75 percent, there is no institutional limit constraining this yield differential. Changes in the amount of the relative supply of tax-exempts issued as well as other factors produce changes in this yield spread. Any increase in the tax-exempt rate relative to the taxable rate erodes the subsidy to state and local borrowing. In general, for every one percent increase in the interest rate state and local governments pay, capital expenditures in Louisiana decrease by 0.80 percent.

The option to issue a subsidized taxable bond under which the federal government would pay 40 percent of the interest could have substantial credit market impacts. The likely effect on state and local government budgets would be to reduce interest payments and allow for greater public infrastructure investment. An advantage of subsidized taxable bond options would be to favor state and local capital construction vis-a-vis other forms of capital information.

Bond Bank

Another approach to lowering the interest cost to state and local governments would be to create a state and local bond bank which would purchase bonds from state and local governments and either "pass through" these securities by pooling issues together and selling them to ultimate investors or issue tax-exempt backed bonds. Such secondary market policies could alter the characteristics of state and local bonds to make them more attractive to investors and hence less costly to the issuer. Any reduction in the cost of debt means substantial savings in net interest costs to state and local governments.

Three basic features of a state and local bond bank which would increase the ability to finance capital improvement projects are: packaging, marketability, and risk. Packaging a pool of state and local bonds eliminates the need for investor expertise in underwriting and servicing individual bonds. Marketability is improved since, in general, the greater the volume of trading in securities of a homogeneous risk class, the smaller the spread between bid and asked prices. Risk to the investor is reduced through diversification. That is, the state and local bond financing vehicles are analogous to a mutual fund in that they reduce default risk to the investor through diversification. In sum, overall credit market efficiency could be enhanced.

Short-Term Debt Financing

The use of short-term debt or other forms of creative bond financing are additional tools that could be used to lower interest costs or better match interest payments to tax receipts in order to finance greater amounts of capital investment. The use of short-term debt as an alternative to long-term debt, though, may be dangerous. While short-term debt gives the borrower the ability to better gauge entry into the long-term bond market, it places serious disadvantages on the issuer if everyone follows this practice. The shortened lives of bond issues may also add to the stress on already tight operating budgets if interest rates do not move as anticipated.

Capital Budgeting

State and local governments need to place an even greater emphasis on long-range capital budgeting. An initiation of better long-range planning and budgeting is important if the capital budget is to prioritize real needs. Better information on the consequences of unfunded routine maintenance expenses and repairs is needed

as a planning data base to set forth the specific impacts of declining public infrastructure investment.

Areas where increased data and planning are needed include: local roads, ports and waterways (especially the need to replace structurally obsolete facilities), water supply and water quality, wastewater treatment, solid waste disposal, and flood control programs. Some of these areas recently have received attention regarding long-range planning but much more is needed.

Local roads derive much of their support from intergovernmental aid from the state. Distributional factors attempt to allocate these revenues to local governments either on an origin basis or on an allocation aid program but many inequities exist. In an attempt to equalize local government costs and opportunities, intergovernmental aid from the state, for the most part, bears only a distant relationship to the theory of optimal federalism. If one believes the conventional theory of grants-in-aid, then intergovernmental aid to local governments should be totally unrelated to distributional equity. Instead, intergovernmental aid to local governments from roads should be based on a "Pavement Management System" where needs and priorities are determined on the basis of functional classification of the road system. Periodic assessment of local roads should provide the means for establishing priorities and acceptable levels of travel service.

On the other hand, if one believes that grants-in-aid are central to the redistribution of income among individuals, then state aid to localities and municipalities for roads should be based solely on an allocation aid program. The grants-in-aid in this case would be used to promote greater redistribution of income. By design, allocational efficiency would be impaired and resources would be misallocated, but income would be better distributed.

Since Louisiana's ports and river resources are vital to the state's economy, more interface between private market enterprises and public sector interests is needed, especially in the area of decaying port facilities. Various alternative recommendations exist for the need for new or modified navigation channels to handle an increased volume of traffic with different characteristics but no program has been developed to prioritize these needs on a statewide basis.

Water supply needs and water quality issues have traditionally been taken for granted since Louisiana has an abundant supply of water and an average rainfall of 50 to 60 inches a year. While surface water covers most of the state and fresh groundwater is found in six major aquifer systems, some areas of the state contain no productive freshwater aquifers. Water quality becomes of extreme importance in these areas. Further long-range planning is needed to develop and prioritize these investment needs.

Wastewater treatment facilities in Louisiana currently range from collection with no treatment to collection with advanced treatment. The estimated backlog of needed construction and the additional cost necessary to meet future needs seriously places doubts on the ability of local governments to cope with the problem. It also raises the issue of whether more federal or state support is needed. Reassessment of standards regarding wastewater treatment (and solid waste disposal) and the opportunity costs of unfunded capital improvement projects need to be examined for possible inconsistencies with current limitations on sources of local tax revenues.

Flood control programs in Louisiana provide for the construction of structures which protect against headwater and backwater flooding. For the major river basins, flood control has traditionally been the responsibility of the federal government. Smaller projects (less of a national priority) are the responsibility of

the state. While there is no comprehensive study that reflects total investment need for the state in terms of flood control, there has been a flood control program recently enacted (Louisiana Statewide Flood Control Program) which addresses long-term solutions to specific flood problems. Arising from the reduced availability of federal funds for flood control and delays in implementing federal projects, the Louisiana Statewide Flood Control Program can serve as a prototype for prioritizing needs in other areas. Developing new and revitalizing old infrastructure facilities is difficult unless further capital budgeting and long-term planning is utilized.

II. LOUISIANA STATE AND LOCAL FINANCE

During the past 30 years, state and local governments have experienced difficulties in meeting the demands for public goods and services. Various partial explanations for this phenomenon exist. The main problem is that the demand for services provided by state and local governments is very resilient, while revenues are not especially suited to keep pace with rapidly increasing expenditures.[2] Although most state and local governments have a varied revenue base, their taxes are not extremely income elastic. That is, state and local revenue sources tend to provide more stable yields and for the most part are not extremely sensitive to changes in income. Thus as income increases and the demand for state and local services increase this insensitivity to changes in income poses serious problems for fiscal stability. As a consequence, public expenditures have changed markedly during recent years.

2.1 Economic and Demographic Trends

Louisiana possesses a great potential for economic development owing to its abundant supply of natural resources, land availability, warm climate and established support facilities. Much of this great production power has manifested itself in a comparative advantage for capital-intensive manufacturing industries. While the wealth of specialization depends upon people's demand for those particular products, specialization seems to increase risks. If individual demands or willingness to work in certain tasks should change, then specialization may result in loss of value. The risk for Louisiana is apparent in the heavy investment in the goods producing industrial sector.

Economic growth in Louisiana has primarily been concentrated in mining, construction and manufacturing industries (see Table 2). Over the past 25 years, total production in this sector has increased by over 743 percent. Mining production of oil and gas extraction has experienced the greatest increase. This industry typically pays high wages and provides an important source of income for the state and local governments. By 1981, mining accounted for 9.4 percent of total personal income in Louisiana (see Table 3).

Growth in the construction industry has been due almost exclusively to the relatively high-level of capital-intensive manufacturing concerns. General and specific trade contractors have been engaged in refinery construction, dredging and dock construction, and specialized activities such as electrical work, carpentry and plumbing. Construction accounted for 10.15 percent of total personal income in Louisiana by 1981.

Expansion of manufacturing in Louisiana depends to a large extent on the growth of consumer markets in the South. In 1958, manufacturing accounted for $738 million or approximately 18.74 percent of total personal income. By 1981, the manufacturing's share of total personal income equalled 17.66 percent, a decrease of approximately one percent.

While the share of total personal income attributable to service producing industries has increased from 60.80 percent in 1958 to 65.59 percent in 1981 for the U.S., service industries in Louisiana have experienced an opposite trend. In 1958, service producing industries accounted for $2,550 million in Louisiana or about 64.75 percent of total personal income. By 1981, service producing income equalled $19,326 million or 62.42 percent of total personal income. An important component of this sector is the transportation, communication and public utilities industry. Louisiana's geographic location has made the state an important focal

TABLE 2

Total Personal Income in Louisiana by Industry Sector, Selected Years
(Amount in millions)

	Goods Producing				Service Producing						
Year	Total	Mining	Construction	Manufacturing	Total	Transportation	Trade	Finance, Insurance and Real Estate	Service	Government	Agriculture
1958	$ 1,366	$ 298	$ 330	$ 738	$ 2,550	$ 424	$ 767	$ 187	$ 523	$ 649	$ 22
1963	1,576	325	347	904	3,145	495	887	240	686	837	22
1968	2,673	500	779	1,394	4,889	727	1,369	360	1,115	1,318	29
1973	3,526	648	925	1,953	7,357	1,118	2,017	527	1,716	1,979	50
1976	5,664	1,216	1,633	2,815	10,219	1,562	2,853	744	2,452	2,608	69
1977	6,320	1,357	1,764	3,199	11,493	1,765	3,208	865	2,789	2,866	80
1978	7,384	1,628	2,126	3,630	13,176	2,100	3,707	1,005	3,236	3,128	100
1979	8,431	1,818	2,467	4,146	15,017	2,452	4,162	1,109	3,651	3,643	101
1980	9,882	2,317	2,858	4,707	17,061	2,770	4,595	1,213	4,253	4,230	104
1981	11,521	2,910	3,144	5,467	19,326	3,122	5,140	1,369	4,933	4,762	115

Source: Survey of Current Business.

TABLE 3

Total Personal Income in Louisiana by Industry Sector, Selected Years
(Percentage)

	Goods Producing				Service Producing						
Year	Total	Mining	Construction	Manufacturing	Total	Transportation	Trade	Finance, Insurance and Real Estate	Service	Government	Agriculture
1958	35.69%	7.57%	8.38%	18.74%	64.75%	10.77%	19.48%	4.75%	13.28%	16.49%	0.56%
1963	33.23	6.85	7.32	19.06	66.31	10.44	18.70	5.06	14.46	17.65	0.46
1968	35.21	6.59	10.26	18.36	64.41	9.58	18.03	4.74	14.69	17.36	0.38
1973	32.25	5.93	8.46	17.86	67.29	10.23	18.45	4.82	15.70	18.10	0.46
1976	35.51	7.62	10.24	17.65	64.06	9.79	17.88	4.66	15.37	16.35	0.43
1977	35.32	7.58	9.86	17.88	64.23	9.86	17.93	4.83	15.59	16.02	0.45
1978	35.74	7.88	10.29	16.57	63.78	10.16	17.94	4.86	15.66	15.14	0.48
1979	35.80	7.72	10.48	17.61	63.77	10.41	17.67	4.71	15.50	15.47	0.43
1980	36.54	8.57	10.57	17.40	63.08	10.24	16.99	4.48	15.72	15.64	0.39
1981	37.21	9.40	10.15	17.66	62.42	10.08	16.60	4.42	15.93	15.38	0.37

Source: Survey of Current Business.

point for water transportation. Growth in this industry is normally a function of economic conditions and population levels.

Agriculture constitutes a relatively modest share of total personal income in Louisiana. Employment in this sector is expected to decrease due to the increased use of capital equipment. Like the other goods producing industries, a shift is expected to occur away from agriculture to service related industries. Assuming past trends continue, total personal income should increase faster in Louisiana than for all states on average. Overall, total personal income in Louisiana outpaced the national average from 1958 to 1981 (see Table 4). Some of this increase is due primarily to migration patterns which, in turn, affect infrastructure needs. The high mobility and rate of change in population contribute to an even greater stress on state and local finance by adding to required capital expenditures.

Population growth in Louisiana is anticipated to be 1.36 percent during the next two decades. By the year 2000, total population is projected to reach 5.510 million, an annual growth rate of 100 percent higher than that of the entire nation. This can be compared to an average rate of growth of 1.54 percent during the period 1960 to 1980 (see Figure 1).

These population patterns on an area-wide basis contribute largely to the problems of financing local governmental units. The decentralization of the metropolitan areas in Louisiana entails expanding urban services and greater strains on local budgets. Most of the greatest projected population growth rates are to occur near the SMSAs in the state. The average growth rate for the New Orleans area is projected to be 2.4 percent; 2.5 percent for the Baton Rouge area; 1.71 percent for the Lafayette area; 1.50 percent for the Shreveport area; 1.15 percent for the Lake Charles area; 1.01 percent for the Alexandria area; and .84 percent for the Monroe area.

TABLE 4

Growth of Total Personal Income in Louisiana and U.S., Selected Periods

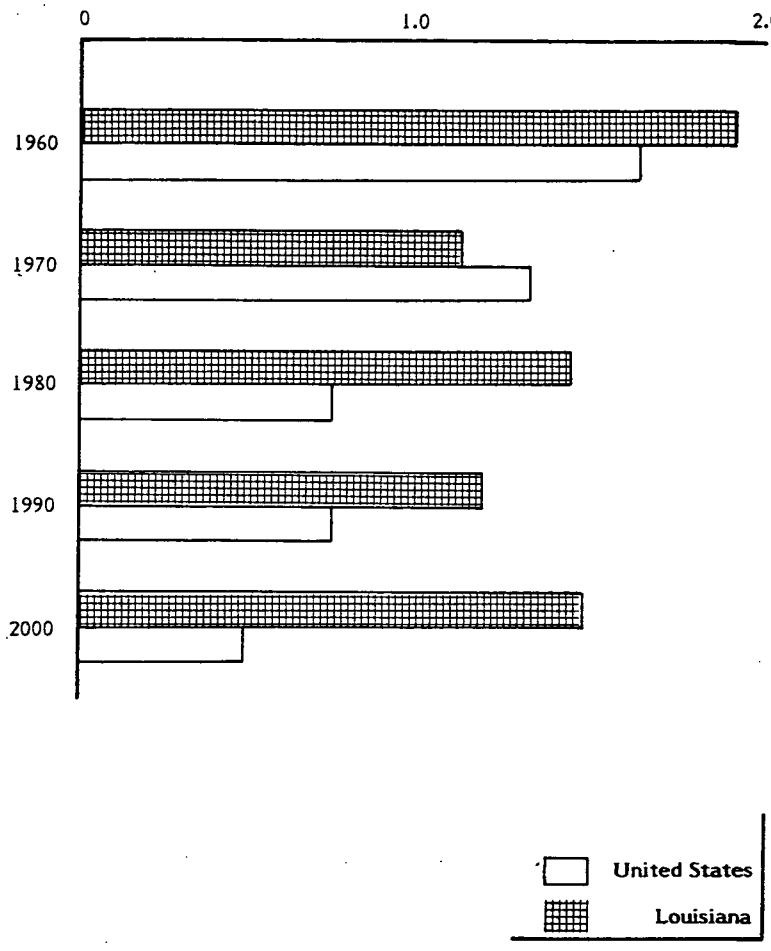
Period	Louisiana	U.S.
1958-1963	20.44%	28.56%
1963-1968	60.06	48.88
1968-1973	44.03	49.33
1973-1976	45.91	28.30
1976-1979	47.62	40.47
1979-1981	31.48	19.03

Source: Survey of Current Business.

FIGURE 1

Population Growth, U.S. and Louisiana

1960-2000



Source: Population Projection Series II Report, The University of New Orleans, Division of Business and Economic Research, and The Louisiana State Planning Office, September 1982.

2.2 State Expenditures in General—A Retrospect View

Expenditures by all states increased from $95,831.6 million in 1975 to $198,347.7 million in 1980, an average annual increase of 15.96 percent in 6 years (see Table 5). During the same period state expenditures by Louisiana increased from $2,089.5 million to $4,281.4 million, an average annual increase of 15.65 percent. Louisiana's sharpest increase occurred in 1977, when expenditures increased by 22.10 percent. A large part of the increase in expenditures in Louisiana resulted from windfall revenues and an increase in prices. Louisiana—as well as other states—has had to make larger expenditures owing to higher prices in general. Corrected for price changes, expenditures in Louisiana increased from $2,089.5 million in 1975 to $2,796.5 million in 1980, an average annual increase of 6.16 percent (see Table 6). This corresponds to an increase of $95,831.6 million to $129,554.3 million in all states, which represents an average annual increase of 6.55 percent. Except for the period 1977 to 1978, expenditures in Louisiana increased faster than expenditures in all states.

Expenditures as a percentage of income were greater in Louisiana than they were for all states (see Table 7). In 1975, state expenditures in Louisiana equalled 11.21 percent of income compared to 7.61 percent for all states. Expenditures as a percentage of income increased in Louisiana and for all states largely because income increased. In Louisiana, the increase was from 11.21 percent to 11.97 percent in 1981 relative to an increase from 7.61 percent to 9.21 percent in 1981 in all states. Thus despite the relatively small increase in expenditures as a percentage of income in Louisiana, expenditures still constitute a much larger share of total personal income in Louisiana than in all states.

Expenditures by local governments in Louisiana are given in Table 8. The percentage increase in spending by local governments in Louisiana is consistently greater than the percentage increase in spending for all governments. From 1975

TABLE 5

State Expenditures in Louisiana and All States, 1975–1980
(Millions of dollars)

Year	Louisiana	All States	Percentage increase over preceding year Louisiana	All States
1975	$2,089.5	$ 95,831.6	—%	—%
1976	2,294.1	103,535.1	9.79	8.04
1977	2,801.2	136,544.9	22.10	31.88
1978	2,934.6	148,690.1	4.76	8.89
1979	3,571.5	173,307.5	21.70	16.56
1980	4,281.4	198,347.7	19.88	14.45
Average	$2,995.4	$142,709.5	15.65%	15.96%

Source: Governmental Finances.

TABLE 6

State Expenditures in Louisiana and All States
in Constant Dollars (1975)
(Millions of dollars)

Year	Louisiana	All States	Percentage increase over preceding year Louisiana	All States
1975	$2,089.5	$ 95,831.6	—%	—%
1976	2,169.0	97,887.0	3.80	2.14
1977	2,488.0	121,276.2	14.70	23.89
1978	2,420.9	122,661.4	-2.70	1.14
1979	2,648.3	128,509.2	9.39	4.77
1980	2,796.5	129,554.3	5.60	0.81
Average	$2,435.4	$115,953.3	6.16%	6.55%

Source: Governmental Finances.
Department of Labor, Bureau of Labor Statistics-Consumer Price Index, all items.

TABLE 7

State Expenditures in Louisiana and All States
as a Proportion of Income
(Percent)

Year	Louisiana	All States
1975	11.21%	7.61%
1976	10.84	7.47
1977	11.80	8.90
1978	10.82	8.61
1979	11.60	8.92
1980	11.97	9.21

TABLE 8

Local Expenditures in Louisiana and All Localities
(Millions of dollars)

Year	Louisiana	All Localities	Percentage increase over preceding year Louisiana	All Localities
1975	$2,187.2	$159,719.7	—%	—%
1976	2,439.4	169,466.7	11.53	6.10
1977	2,831.2	182,995.2	16.06	7.98
1978	3,196.8	201.469.7	12.91	10.10
1979	3,764.9	223,621.4	17.77	11.00
1980	4,281.4	245,101.5	13.72	9.61
Average	$3,116.8	$197,062.4	14.40%	8.96%

Source: Governmental Finances.

to 1980, expenditures by local governments in Louisiana increased from $2,187.2 million to $4,281.4 million, an average annual increase of 14.40 percent. This can be compared to the change in total expenditures of all localities from $159,719.7 million to $245,101.5 million, an average annual increase of 8.96 percent. In real terms, the average annual increase in expenditures in Louisiana is 5.08 percent and 0.07 percent for all localities (see Table 9). Thus local governments in Louisiana have been spending more each year than the national average. This pattern is due mainly to the urbanization of the population and the expansion of the economy.

Sources of expenditure funds for all levels of government were derived either from federal grants-in-aid or other intergovernmental aid, from own revenue sources, and/or from debt financing (for capital expenditures). However, as capital demands for basic public needs increase, the financing capacity necessary to meet these needs has been constrained by institutional limits on federal grants-in-aid and by a beleaguered credit market. Since late 1979, interest rates on state and local debt have increased by over 4 percentage points. Relative to taxable securities, the interest rates on tax-exempts have risen from 70 percent in early 1979 to over 90 percent in 1982. This has made financing public infrastructure investment very costly. If state and local services experience only minor productivity growth over time, then additional financing is necessary just to cover an increasing cost of providing a constant level of public services.[3]

Actual expenditures on capital investment have traditionally been regarded as being susceptible to serious neglect owing to tight budgets, rising costs, and alleged "pork barrel" political practices. Ultimately, the consequence of foregoing capital improvement projects is to incur greater construction costs in the future. While the alternative is to issue debt to finance current capital projects, this may adversely affect the ability to borrow in the future. The problem is that repairing and preventing further deterioration in the state's infrastructure requires large

TABLE 9
Local Expenditures in Louisiana and All Localities
in Constant Dollars (1975)
(Millions of dollars)

Year	Louisiana	All Localities	Percentage increase over preceding year: Louisiana	Percentage increase over preceding year: All Localities
1975	$2,187.2	$159,719.7	—%	—%
1976	2,306.3	160,221.9	5.45	0.31
1977	2,514.6	162,532.3	9.03	1.44
1978	2,637.2	166,201.7	4.88	2.26
1979	2,791.7	165,817.4	5.86	-0.23
1980	2,796.5	160,092.4	0.17	-3.45
Average	$2,538.9	$162,431.4	5.08%	0.07%

Source: Governmental Finances.
Department of Labor, Bureau of Labor Statistics-Consumer Price Index, all items.

amounts of capital. This makes capital expenditures sensitive to cyclical economic fluctuations.

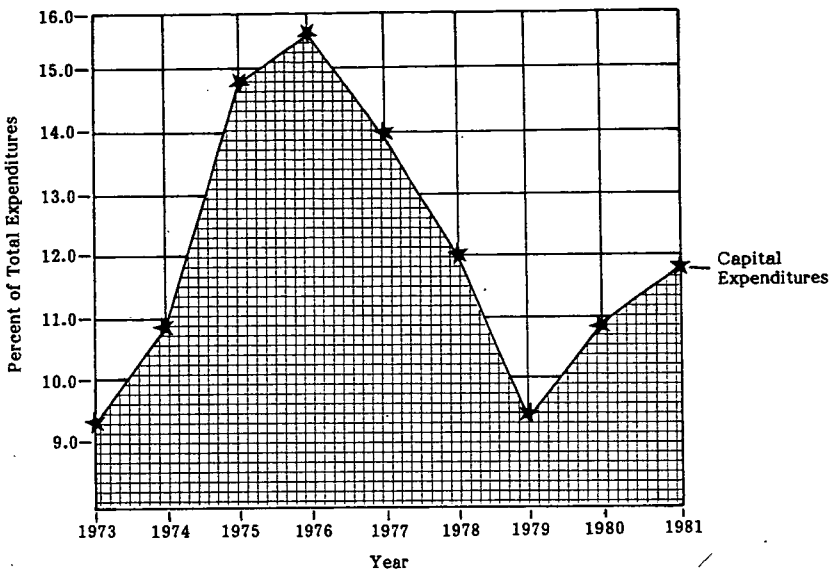
Capital expenditures in Louisiana as a percent of total expenditures during the period 1973 to 1982 are depicted in Figure 2. In 1973 capital expenditures as a percent of total expenditures equalled 11.57 percent. By the period 1975 to 1977, this percentage increased to 14.79 percent. Favorable bond market conditions and an improved economy account for much of this increase. Since 1978, capital expenditures as a percent of total expenditures declined to 10.68 percent. Further exaggerating this decline is the amount of capital projects authorized but not funded.

Partially responsible for this trend in capital expenditures has been the heavy reliance on revenues from oil and gas. In the past, windfall revenues have allowed the state to undertake many public works programs not normally considered a function of the state. Many public works projects of local interest, that to the most highly centralized state would be left to some local authority, have been performed at an increasing rate at the state level as a result of oil and gas windfall revenues. However, this situation has been altered significantly since 1980 primarily due to the world surplus of oil which caused oil prices to plummet and forced severe budget cuts.

Repair and construction of highways and bridges account for most of the state's capital expenditures (see Figure 3). In 1973, the percent of highway expenditures to total capital expenditures equalled 89 percent. While the state's total capital expenditures increased by 180 percent during the period 1973 to 1982, outlays on highways increased by only 120 percent. In 1982 expenditures on highways constituted just 65 percent of total expenditures. Given the recent five-cent federal gasoline tax hike, however, total expenditures on highways should continue to increase as a proportion of total capital outlays in the future.

FIGURE 2

Capital Expenditures as a Percent of Total Expenditures in Louisiana

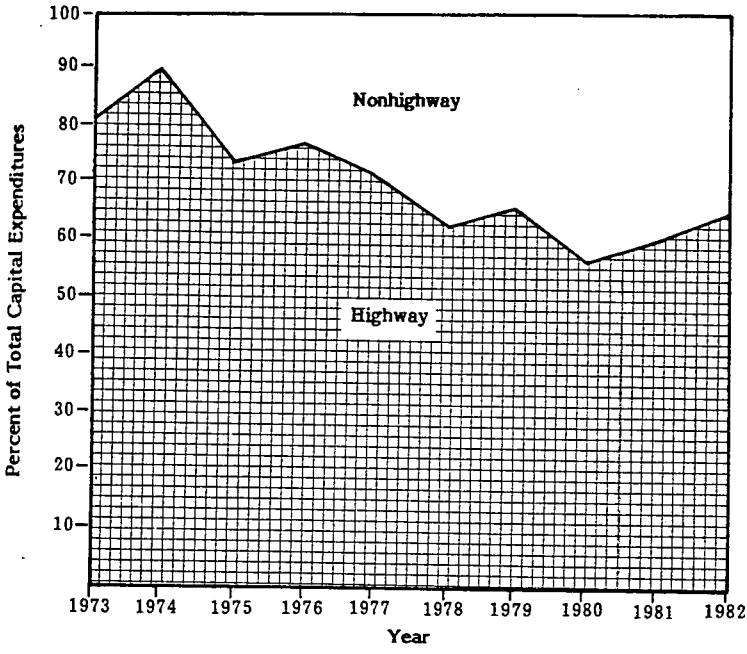


Year	Percent Total Expenditures
1973	11.57
1974	10.88
1975	14.80
1976	15.62
1977	13.96
1978	12.00
1979	9.35
1980	10.92
1981	11.76

Source: Louisiana's Capital Budgeting: Progress or Paper Reforms, Public Affairs Research Council of Louisiana, 1983.

FIGURE 3

Trend in Capital Expenditures in Louisiana



Year	Percent Highway Expenditures	Percent Non-Highway Expenditures
1973	81.16	18.84
1974	89.28	10.72
1975	73.51	26.49
1976	77.02	22.98
1977	71.20	28.80
1978	62.66	37.34
1979	65.09	34.91
1980	57.20	42.80
1981	59.47	40.53
1982	64.26	35.74

Source: Louisiana's Capital Budgeting: Progress or Paper Reforms, Public Affairs Research Council of Louisiana, 1983.

Other capital expenditures have increased by 204.5 percent from 1977 to 1981. Because of the nationwide recession, falling revenues, and high interest rates, other capital expenditures decreased sharply between 1981 and 1982. Anticipating this trend to continue in the short-run would suggest that improvement in most public facilities in Louisiana will lag behind economic recovery.

Figure 4 shows recent trends in state capital expenditures excluding federal aid and debt financing. This trend indicates that state capital outlays have fallen in real absolute terms. On a per capita basis, state expenditures decreased from $24.80 per person in 1974 to $18.13 per person in 1980. This relative decline in real outlays reflects the increasing inability of all governments to hold down the rate of tax growth, while financing an increasing level of public services. Such budgetary practices may keep sources and uses of funds in balance in the short-run, but may impose serious consequences for long-term growth. It also suggests that federal grants-in-aid are primarily responsible for the sustained growth in total capital outlays.

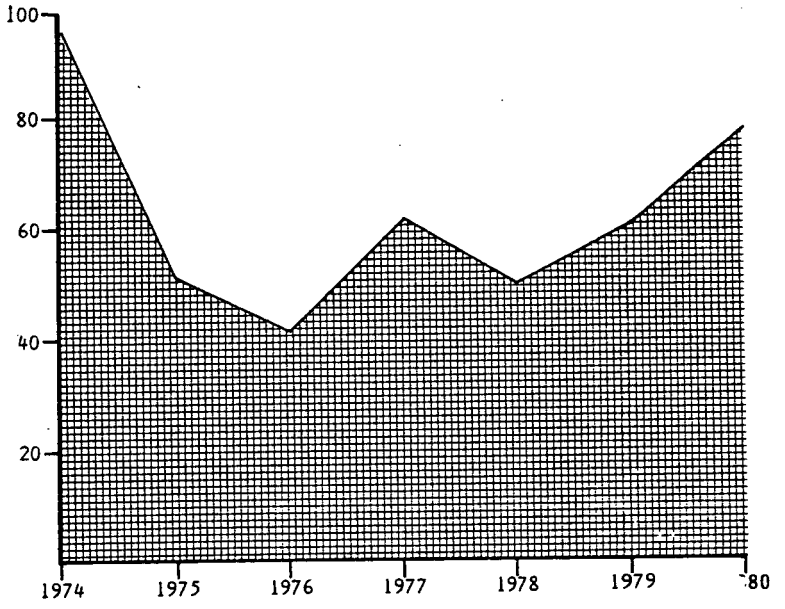
Capital expenditures at the local level correspond to the same trend displayed by state spending. Total spending for highways and public improvements by municipalities on a per capita basis increased by 4.3 percent in current dollars for the period 1974 to 1980. By 1979-1980, capital expenditures accounted for the largest source of total spending for all municipalities. While the strain on municipal budgets was temporarily alleviated by the establishment by the state of a municipal capital outlay revenue sharing fund distributed on a one-time basis in 1980, local governmental finance of capital expenditures has been difficult for those communities which do not have an adequate economic base to support public works improvement projects. Further aggravating the problem is the fact that state aid to local governments contains many distributional inequities.[4] These inherent inequities mask many serious budgetary problems.

FIGURE 4

Trend in State Spending (Excluding Federal Aid)

on Capital Improvements in Real Dollars in Louisiana

(in millions)



Source: Louisiana State-Local Fiscal Study Report, data converted to constant dollars using Consumer Price index, all items.

2.3 Sources of Revenue

Sources of revenue in Louisiana include intergovernmental grants-in-aid, property taxes, general sales taxes, selective sales taxes, income tax, severance tax, other taxes, and charges and miscellaneous services. In 1956, Louisiana had $195 million available for expenditures (see Table 10). The largest amount of revenue was derived from taxes on sales, motor vehicle fuels, alcoholic beverages, motor vehicles and tobacco. Total sales tax revenue represented 35.5 percent of total receipts. By 1979-80, revenue generated from the general sales tax and selective sales taxes equalled 24.8 percent of total receipts. Thus sales taxes have become less important as the state has broadened its revenue base over time.

Intergovernmental payments, or grants from the federal government and local governments, are the second most important source of state funds. Federal grants consist of funds which may be expended directly by the state or distributed to local governments. Revenues received by the state from local governments constitute payment for their financial share of programs administered by the state or for services performed on their behalf.

Intergovernmental payments amounted to 18.5 percent of all revenues received in 1956. By 1979-80, intergovernmental payments increased to over $310 million, which is equivalent to 27.2 percent of all receipts. Relative to intergovernmental payments to all state governments, aid to Louisiana is approximately 28 percent higher than national averages.[5] This heavy reliance on federal aid is not without some serious consequences. The major consequence, of course, is that Louisiana will be severely affected by any reduction in federal funds for state and local governments in the future.

TABLE 10

Trends in Sources of Louisiana State Government Revenues
Selected Years, 1956 - 1979/1980
(Per Capita and Percentage Distribution)

Year	Total Revenue	Intergovernmental Revenue	Property Taxes	General Sales Taxes	Selective Sales Taxes	Income Tax	Severance Taxes	Other Taxes	Charges and Misc.
1956	$ 195	$ 36.1	$3.9	$ 25.9	$ 43.3	$ 9.4	$ 26.7	$10.7	$ 37.8
1961	244	60.8	4.9	26.8	42.0	12.4	44.9	13.2	37.3
1966	338	89.6	5.4	39.9	49.7	18.9	58.8	15.9	57.1
1971	532	140.4	7.4	74.5	75.0	49.5	66.0	25.0	90.4
1974	688	177.5	0	96.3	82.6	49.5	144.5	28.9	103.2
1975	805	212.5	0	109.5	89.4	53.1	145.7	33.0	153.8
1976	818	246.2	0	122.7	94.1	58.1	126.0	36.0	131.7
1977	921	263.4	0	141.8	100.4	94.9	119.7	39.6	159.3
1978	1,011	273.0	0	168.8	107.2	113.2	127.4	40.4	175.9
1979	1,140	310.1	0	175.6	107.2	118.6	125.4	44.5	259.9
				Percentage Distribution					
1956	100.0	18.5	2.0	13.3	22.2	4.8	13.7	5.5	19.4
1961	100.0	24.9	2.0	11.0	17.2	5.1	18.4	5.4	15.3
1966	100.0	26.5	1.6	11.8	14.7	5.6	17.4	4.7	16.9
1971	100.0	26.4	1.4	14.0	14.1	9.3	12.4	4.7	17.0
1974	100.0	25.8	0.0	14.0	12.0	7.2	21.0	4.2	15.0
1975	100.0	26.4	0.0	13.6	11.1	6.6	18.1	4.1	19.1
1976	100.0	30.1	0.0	15.0	11.5	7.1	15.4	4.4	16.1
1977	100.0	28.6	0.0	15.4	10.9	10.3	13.0	4.3	17.3
1978	100.0	27.3	0.0	16.7	10.6	11.2	12.6	4.0	17.4
1979	100.0	27.2	0.0	15.4	9.4	10.4	11.0	3.9	22.8

Source: Louisiana State - Local Fiscal Study Report

Institutional arrangements relating to federal grants-in-aid may have also caused further problems by leading to overexpansion of services in some areas. Federal grants-in-aid may distort factor prices of providing public services and promote certain types of expenditures.[6] Coupled with the political pressure in the past to avoid user charges even when feasible, federal grants-in-aid may have induced state and local governments to undertake negative net present value projects. In the absence of user charges, these investments have conferred distributional benefits to selected classes of individuals.

The demand for new and better services at the state and local level has resulted in state and localities seeking more federal assistance in a variety of areas. This demand for increased federal assistance at the state and local levels also stems from the desire to avoid an indefinitely long commitment of self-generated funds on capital construction projects. Growth in federal grants-in-aid has allowed capital outlay expenditures to increase rapidly during the past quarter century, especially for highways. Highway construction in Louisiana depends heavily on federal grants-in-aid and since the federal government has vastly increased the number and magnitude of grants-in-aid to states, highway construction has greatly benefited. During the period 1957 to 1980, the state's spending on highways outpaced the national average by 4 percent per year. By 1980, expenditures on highways in Louisiana equalled 12.7 percent of total expenditures compared to 9.1 percent for the nation. The overall trend in state and local spending, though, has more of a substitution effect. For every percent increase in federal grants-in-aid, state and local spending increases by .22 percent (see Appendix).

Intergovernmental payments from the state to local governments constitute an important part of local revenues. These payments to local governments are

typically for fiscal aid purposes and either originate from shared taxes or grants-in-aid for specific use. The distribution of revenues is allocated to local governments either on an origin basis or on an allocation aid program. The distribution of revenues according to the actual amount collected in each area is, by design, inequitable. When grants-in-aid are distributed on the basis of need, some consideration is given to an area's ability to support a particular function. These payments represent an attempt to equalize government cost and opportunities. Because the distribution of these funds measures only relative needs and not absolute needs there are many inequities in the allocation formula.

Variations in revenue sharing to individual local governments in Louisiana have contributed to many inequities in financing capital improvement projects. The overall inequitability of distributions per capita has tended to favor wealthier parishes (counties) owing to the royalty fund distributions. Despite this fact, state aid to local governments alone constitutes nearly 36 percent of their revenue. In most cases, municipalities have only limited taxing authority. State law has severely curtailed the extent to which revenues are derived from the use of property taxes. Combined, this has made municipal and local financing very precarious. Because of federal budget cutbacks, municipalities and localities are anticipated to receive less federal aid in the future. Yet service charges and other taxes, such as licenses and fees, are potential sources of raising additional revenues to cope with this problem. Both of these sources possess fewer constitutional and statutory restrictions. Another possibility would be the greater utilization of the ad valorem tax as a source of revenues to fund greater capital expenditures. Louisiana local governments received only 17.4 percent of total revenues from property taxes in 1980 compared to 26.4 percent for all local governments.

Severance taxes in their peak period averaged 18.2 percent of all revenue for Louisiana. By 1979-80, this percentage declined to 11 percent. The problem is

that while Louisiana possesses a great potential for economic development owing to its abundant supply of natural resources, land availability, warm climate, and established support facilities, economic growth has been concentrated in primarily two industries—chemicals and petroleum refining. As a consequence tax revenues have been heavily dependent on these resources. It is estimated that a $1 change in the world price of oil produces a $30 million change in revenues received from severance taxes and royalty collections.

2.4 Bond Financing

State and local capital expenditures have depended heavily on the degree to which these improvements are financed from current revenues as distinguished from the anticipation of future revenues from incurring debt. Recent budgets indicate that bond-funded projects have been growing in importance. As such, many capital appropriations have not been funded due to unfavorable interest rates. Moreover, increased reliance on debt financing is not without certain costs. That is, more state and local construction can be obtained only at the expense of less other capital goods or a temporary decline in consumption. Depending on one's view of the current subsidy tax-exemption gives to state and local borrowing, erosion of the subsidy when tax-exempt interest rates rise relative to taxable securities may not be appropriate.

Historically, the ratio of the rates between long-term taxables and tax-exempt bonds of comparable credit quality has been approximately 70 to 75 percent. Recently, this spread has increased to greater than 80 percent in late 1981 to 1982 period. This has a significant impact on unfunded capital expenditures. Recent studies have shown that a large build-up of unfunded capital projects exists among all states and local governments.[7] The upshot is a large pent-up demand for funds which should keep tax-exempt interest rates high relative to

rates on taxable securities. A similar problem arises from the use of short-term tax anticipation notes which have flooded the market in the last couple of years. Converting these notes into long-term debt may further place upward pressures on long-term costs of debt capital. Thus faced with financing greater levels of capital expenditures, states are severely constrained by the existing tax-exempt market.

For Louisiana, total authorized but unissued general obligation debt currently equals $1.5 billion. Approximately 60 percent of these unfunded capital requirements represent projects slated for highway and bridge construction, 13 percent are for education, and the remainder are for health and hospitals and other purposes. Spending needs for unfunded capital requirements alone would equal $150 million during the next ten years if no new funding were authorized. This raises serious questions as to the state's capacity to pay for these improvements.

Federal budget deficits are likely to have a substantial impact on the future of bond financing. During the next five years, federal outlays are projected to increase from $740 billion in 1982 to $1.1 trillion in 1987.[8] On the other hand, revenues are projected to grow less than outlays, increasing from $631 billion in 1982 to $882 billion in 1987. Thus federal budget deficits are anticipated to increase from $109 billion in 1982, to $188 billion in 1984 and $248 billion in 1987. Budget strategies to reduce the size of these deficits include further reductions in the growth of federal spending, significant tax increases, or further reductions in grants to state and local governments or realignment of federal, state, and local responsibilities. In the absence of these alternatives, net interest costs to the federal government are projected approximately to double. These funding requirements will more than likely keep interest rates high and continue to cause the interest costs to state and local governments to be high. Further reducing grants to state and local governments should aggravate matters by increasing the perceived riskiness of state and local bonds and driving up tax-exempt interest rates relative to taxable securities.

2.5 Capital Budgeting Process

One of the major unresolved issues with respect to state and local government budgeting in Louisiana has been to determine the merits of a long-term capital operating program. According to a recent study, while the criteria used for capital budgeting work extremely well for determining necessary needs for Louisiana's highways, nonhighway capital expenditures have been subject to less successful budgeting techniques.[9] The criteria for determining highway projects requires an objective evaluation of the condition of highways and bridges. Determination of highway needs is made annually for the state maintained system and as required for all other roads. This periodic assessment of highway needs determines the priority of highway projects. The requests, after public hearings have been conducted, are included in the capital budget bill as a lump-sum appropriation. The Legislature is prohibited by law from adding or substituting projects in the highway program and may only delete projects from the amount requested.

Nonhighway capital outlays are adopted by the Legislature in a comprehensive state capital budget plan. The capital budget plan includes projects requested for the current fiscal year plus projects phased-in over a five-year planning horizon. These projects originate from the various state and local agencies. Amounts requested for the projects and recommendations for the first year and years 2-5 are detailed. A lack of emphasis on the scheduling of long-term projects to be considered subsequently in future years causes most of the budget request to be planned for the first year.

2.6 Investment Needs, Revenues and Priorities

Estimating capital investment needs for public infrastructure presupposes certain assumptions. The problem of such a normative analysis of the public sector

necessarily begins with a statement of an appropriate role of public investment. If it is assumed that there are no constraints on state and local government responses, then investment decisions are closely related to competitive market principles and the government should provide those types and quantities of goods and services that a competitive market would have done if the market would have acted.[10] However, if constraints on government policy responses are recognized, then investment decisions tend not to conform with competitive market conditions and are subject to political debate.[11] Under these conditions, government responses to investment needs depend on the perceived adequacy of existing facilities, anticipated changes in demand for goods and services, warranted improvements in the quality of services, and revenue constraints. The importance of setting priorities for public infrastructure investment is that it is frequently complementary to private investment and thus stimulates capital formation.

In older areas of the nation, the absence of maintenance of highways, bridges, and water distribution systems has been credited as creating a significant barrier to urban economic development. The decline of the central cities and the loss of industry and commerce have been accelerated by the decline in the quality of transportation, inter-regional migration, availability of raw materials, availability and cost of energy, urban environmental and sociological problems, and water and waste treatment facilities.[12] Of major importance have been the quality and the cost of maintaining the highway system in terms of attracting new industry. Nearly half of all industrial firms are market-oriented, and approximately 15 percent serve local markets.[13] The increasing importance of light industry, and the growing orientation toward local markets makes the access to highways and contract trucking essential in industrial site location.[14]

For Louisiana, the major infrastructure factors affecting operation as rated by industry groups and ranked according to significant advantages and

disadvantages are listed in Table 11. According to the survey, the road system ranked as the significant disadvantage to locating in Louisiana by most industries.[15] Important in this consideration is the distinction among the various different types of gaps in the highway system and the effect on particular industries. All other factors seem to be less of a negative determinant in the site location selection and more of a positive factor promoting economic development. Water for industrial use and water for transportation ranked the highest among all factors affecting industry operations.

While highways have been given top priority in the governor's budget message in recent years, the direct economic effects of a commitment to upgrade and expand all public infrastructure investments should have substantial multiplier effects on income and employment in Louisiana. But since public capital investment competes with private investment, there may be adverse allocational effects in the long-run. Some economists have argued that public investment is inherently less efficient than private investment.[16] That is, public investment may have been overexpanded at the expense of private investment. If this is the case, then instead of correcting private market failures, expanding public investment further causes a misallocation of resources. Because capital is not malleable, mistakes are not easily corrected and costs are not easily recovered. Public disinvestment in recent years may then be a natural consequence of excess capacity built up over the years because of overexpansion.

On the other hand, greater public capital investment should be encouraged if public investment leads to an equal increase in private investment.[17] Alternatively, if public needs are defined consistent with private sector demands, then economic efficiency is enhanced and further public investment is warranted. Thus public infrastructure investment may or may not have been overexpanded. Abandonment of old public infrastructure may be a less than optimal policy response depending on which view is correct.

TABLE 11

Infrastructure Factors Affecting Operations
Rated by Industry Group

Rank [a]	Factor	Average Rating all Respondents	Food	Apparel	Lumber and Wood	Paper	Chemicals	Stone Clay and Glass	Fabricated Metals	Machinery	Transportation Equipment
Significant Disadvantages:											
7	Road System	.71	.92	.79	.41	.80	.72	.67	.79	.56	.50
No Significant Difference:											
14	Airport Facilities	.91	.91	1.13	.91	.93	.81	1.00	.94	.83	1.13
15	Trucking	.94	1.15	.77	.87	1.22	.93	1.00	.90	.78	1.00
16	Railroad Transportation	.97	1.16	.80	1.13	1.00	1.01	.88	.88	.83	1.00
23	Transportation Costs	1.06	1.08	.73	.94	1.17	1.35	1.13	1.05	1.00	1.25
Significant Advantages:											
42	Water for Industrial Use	1.47	1.28	2.00	1.40	1.29	1.60	1.25	1.37	1.25	1.50
43	Water Transportation	1.62	1.74	1.50	1.08	1.27	1.88	1.38	1.56	1.44	1.78

[a] Ranked in order of overall importance:
LEGEND: .00- .85 Significant disadvantage
.86-1.14 No significant difference
1.15-2.00 Significant advantage

Source: Public Affairs Research Council of Louisiana, Survey of Manufacturers, 1975.

III. TRANSPORTATION

Louisiana transportation needs are predicated on geographic location and topographic features. Rapid growth of traffic movement resulting from population change, increased urbanization and suburbanization, and the growth of rail transportation and port facility development presents a major challenge for the state. Each of these transportation modes is inextricably linked to attracting industry and benefiting individual people. The extent of the involvement of the state in maintaining these critical transportation linkages includes the funding of several major interstate highway projects, the construction of the Greater New Orleans Bridge, and a commitment to support rail rehabilitation, an extensive mass transit system and small public airports located throughout the state. Thus while other areas of the nation have been able to devote a larger percentage of their capital outlays to other infrastructure facilities in recent years, Louisiana represents an example where most of capital outlay expenditures are spent on the development and maintenance of highways and bridges.

3.1 Highways

During much of the 40-year period when the nation's present highway facilities were being built, construction of a statewide highway system in Louisiana was delayed. The problem of highway adequacy and massive changes in highway use patterns occurred somewhat later in Louisiana than many of the more industrialized areas of the country. Traffic bottlenecks and stress caused by population changes did not burgeon until the 1950s. Most of the construction that did take place prior to 1950 involved the improvement of roads of lesser use and importance.[18] As a result, the state maintained highway system is relatively newer than most highway systems and contains many more gaps. A total of 227 miles of interstate are yet to be completed.

In 1981, there were 56,676 miles of public roads, streets, and highways in Louisiana. Of this total, the state maintained highway system consisted of 16,389 miles of roadway (30 percent of total miles of public roadway). Control of the remaining 40,287 miles (70 percent of the entire system) is the responsibility of local governments. All highways, streets, and public roads are grouped into classes according to the character of service they are intended to provide (see Table 12). Rural highways are principal arterials, minor arterials, collector and local roads located outside of small urban (urban places having a population to 5,000 to 49,999 and not within any urbanized area) and urbanized area boundaries. These roads provide direct service for longer trips among larger cities and towns, and serve small towns plus individual farms and other rural areas. Urban highways are principal arterials, minor arterials, collector and local streets located inside of urban boundaries. This system serves the major cities, carries a high volume of travel on a minimum amount of miles, and is integrated with the rural system.

Collectively, the highway system supports 18.9 billion vehicle miles of traffic per year. Total registered vehicles have been growing at over 4 percent per year during the past decade. There are a total of 49 vehicles registered for every mile of roadway, up from 30 vehicles registered per mile in 1970. This can be compared to the U.S. average of 74 vehicles registered per mile. Most of the traffic flow on the state maintained highway system is on rural roads (see Table 13).

Within the state highway system, there are 11,748 miles of public roads which are eligible for the federal participation program in construction or reconstruction (Federal-Aid Highway System). The remaining 4,645 miles of state highway are not included in the Federal-Aid Highway System and are ineligible for federal assistance. Maintenance of the entire system is the responsibility of the state. Trends in the amounts spent on construction and maintenance of the state highway system are given in Table 14.

TABLE 12
Louisiana Total Road and Street Mileage

		Miles
Rural:		
Under State Control		15,192
Under Local Control		
Parish (County) Roads	28,722	
Other Local	2,256	31,978
Under Federal Control		537
Total		46,707
Urban:		
Under State Control		1,197
Under Local Control		
Parish (County) Roads	1,996	
Other Local	6,776	8,772
Under Federal Control		-
Total		9,969
Total Rural and Urban Roads		56,676

Source: Highway Statistics, 1981.

TABLE 13

Vehicle - Miles Per Day on Louisiana Highways

Rural:	Vehicle Miles	Percent
Interstate	7,524,154	14.5%
State		
Primary	15,409,454	29.7
Secondary	6,382,216	12.2
Farm-to-Market	5,523,264	10.6
Sub-Total	34,839,088	67.0%
Urban:		
Interstate	4,918,477	9.5%
State		
Primary	7,484,488	14.5
Secondary	1,910,305	3.7
Farm-to-Market	2,628,858	5.3
Sub-Total	16,942,128	33.0%
Total Rural and Urban Vehicle - Miles Per Day	51,781,216	100%

Source: Louisiana Highway Traffic Report, 1981.

TABLE 14
Expenditures for Construction and Maintenance
for Louisiana State Maintained Highways
(Amount in $1,000)

Year	Total Highway Expenditures	Capital Outlay for Road & Bridges	Percent of Total	Traffic Services & Maintenance	Percent of Total
1974	$ 350,004	$ 303,096	86.6%	$ 46,908	13.4%
1975	379,025	326,052	86.0	52,973	14.0
1976	480,415	427,623	89.0	52,792	11.0
1977	383,881	527,331	85.3	56,550	14.7
1978	414,625	348,630	84.1	65,995	15.9
1979	433,841	361,439	83.3	72,402	16.7
1980	515,259	465,476	90.3	49,783	9.7

Source: Louisiana Highway Traffic Report, 1981.

The capital and operating costs figures in Table 14 reflect the emphasis on construction in recent years. During this period, total capital outlays for roads and bridges averaged 86.4 percent of total highway expenditures. The relatively small fraction devoted to maintenance (13.6 percent) contrasts markedly with other areas of the nation. A large proportion of this bias can be attributed to long-range projects currently in the highway construction program which are necessary to complete the state highway system, and to the fact that the interstate highways were built more recently and to higher standards and require less maintenance.

Investment Needs

Highway needs in Louisiana are based on a functional classification of the highway system consistent with the standard way highways are evaluated in all states.[19] The assessment consists of applying a needs appraisal approach to determine broad categories of deficiencies. These categories include quantifying traffic capacity, alignment, width, and structural and drainage conditions. The basic approach defines minimum tolerable conditions that are somewhat below the standards for new construction. The design standards are established for each functional class of highway and by traffic volume. Study sections are identified and the character and degree of deficiencies are determined. The study section is then appraised to see if it meets the criteria of tolerability. If it does not, then it is classified as a deficiency and estimates of improvements needed to overcome the deficiencies are made. If it does meet certain standards, then it is also appraised for its ability to meet tolerability conditions under future use. Failing to meet these projected tolerability conditions, the study section is categorized as a future deficiency.

According to the definition of highway needs, "example of conditions which place a highway in the critical deficiency class include:

1. Peak hour traffic volumes resulting in operating speeds lower or volume/capacity ratios higher than the minimum tolerable conditions.
2. Lane widths narrower than the minimum tolerable width specified.
3. Curves, grades, and sight distance restrictions not meeting the minimum tolerable conditions which result in unsafe conditions.
4. Pavement conditions below the minimum tolerable specified.
5. Pavement type below the minimum tolerable specified."[20]

The results of the 1983 highway needs assessment indicate that 2,792 miles of the state maintained highway system (17 percent of the total miles of roadway under the state system) are deficient and in need of improvement today.[21] Of this total, there are 1,906 miles of highway in need of resurfacing. The remaining 886 miles identified in the now need category require some type of construction, reconstruction, or related improvement. That is, 68 percent of the miles which are deficient need to be resurfaced while 32 percent of the deficient miles need some type of construction.

In addition to these improvements, there are currently three major large scale projects which have been initiated and require substantial funding. These projects include the completion of the north-south expressway (Interstate 49), the Westbank Expressway (US 90 Business - Jefferson Parish), and the relocation of US 90 (Terrebonne, Assumption and St. Mary Parishes). Also yet to be completed are interstate sections of I-220 in Shreveport, I-310 in St. Charles Parish and I-510 east of New Orleans. Besides these projects, there are five projects which are currently in design or included in a feasibility study to construct central business district by-passes. Furthermore, there are 22 safety projects either under consideration or in

the initial construction process. These projects include the construction of turn lanes, intersection reconstruction and curve realignment.

The estimated cost in current 1983 dollars to implement the needed roadway improvements on the 2,792 miles of highway deficient is given in Table 15. This figure does not include the cost to complete the interstate system nor improvements to deficient structures. It is estimated that in order to complete the gaps in the interstate highway system it will cost $1.54 billion. Improvements to 2,260 structures on the state highway system that are in need of replacement and rehabilitation are expected to cost $600 million.

Future deficiencies have been estimated for the period 1983 to 2000. Based on the recommended year of improvement, the remaining miles of roadway not classified in the now need category are slated for repair, reconstruction or resurfacing by 2000. That is, the remaining 83 percent of the state maintained highway system will be in need of improvement by 2000. Approximately 21 percent of total miles of roadway will become deficient by 1986, 18 percent by 1991, 12 percent by 1996, and 32 percent by 2001. This is consistent with an average design life of 20 years. Total cost in 1983 dollars necessary to correct these deficiencies is estimated to equal $3.35 billion assuming no change in current highway construction. Included in this estimate is the cost of improving pavement condition plus all other deficiencies.

Changes in interim financing of highway construction could significantly alter these circumstances. Cutbacks in annual maintenance and operating expenses eventually could lead to greater deterioration of road surfaces and to an increase in future rehabilitation and reconstruction needs. On average, normal maintenance and operating expenses should equal

$$(1/8) \times 16{,}389 \text{ mi} \times \$130{,}000 = \$266 \text{ million}$$

where the average surface life is assumed to be approximately 8 years; 16,389

TABLE 15

State Highway Investment Needs, 1983–2000
(Amount in million 1983 dollars)

Item	Investment Need
Interstate Construction	$ 1,540
Overlay, Construction and Rehabilitation of Current Deficiencies (2,792 miles)	1,630
Structure Improvements	600
Future Investment Needs:	
Anticipated Deficiencies	3,349
Overlay, construction and rehabilitation required as normal maintenance	4,520
Total Highway Investment Needs	$11,639
Annual Need	$ 685

Source: Louisiana Department of Transportation and Development.

represents the total mileage on the state-maintained highway system; and $130,000 is the average cost in 1983 dollars of overlay per mile.[22]

Maintaining this level of spending means that normal maintenance and operating repairs should equal $4.52 billion over the next two decades. Thus total highway investment needs equal $11.64 billion for the period 1983 to 2000. This is equivalent to an annual investment need of $685 million. Uncertainties regarding the dynamics of highway obsolescence and changing traffic patterns may severely underestimate this figure.

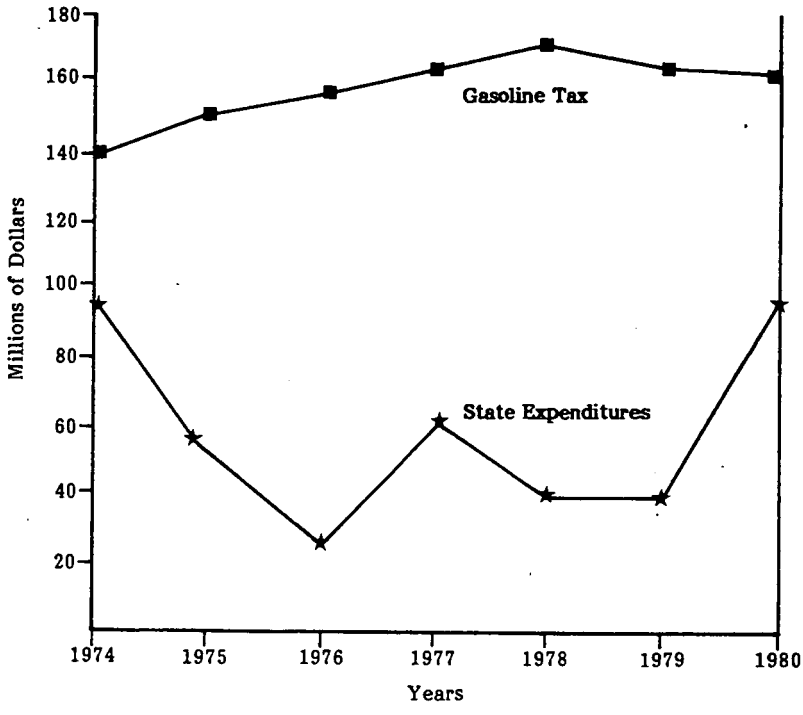
Revenues

Revenues for the reconstruction, resurfacing, restoration and rehabilitation, and the completion and preservation of the interstate system come from a variety of sources. The major sources of funds include federal aid, State General Fund reserves, and capital outlay bonds. No dedication or earmarking of revenues exists. The General Fund is the source of funding for all management, maintenance and highway construction. While critics claim that earmarking of tax revenues severely imposes constraints on the budgetary process, it does link the tax (cost) and the expenditure (benefit) sides of the budget.[23] Dedication or earmarking—however imperfect—relates the budget determination in the public sector to price formation in the market place for private goods and services.

Examination of revenues collected from the gasoline tax which are deposited into the General Fund and then appropriated to meet the demand for all public goods and services expected by the citizenry reveals that funds have probably been allocated efficiently between the development of highways and other needs despite the fact that taxes are not earmarked. Figure 5 plots gasoline tax collections during the period 1974 to 1980 versus state expenditures on highways excluding federal aid and bond financing. Although a cursory analysis of the gap in Figure 5

FIGURE 5

Sources of Revenues Versus Expenditures on Highways in Louisiana



Source: Louisiana State-Local Fiscal Study Report, and Capital Budgets.

indicates the possibility that funds may have been diverted to other needs at the expense of the development of the highway system, adjusting this difference for state aid to localities for the improvement of roads (Parish Road Fund) and the payment of principal and interest on highway debt outstanding yields a negligible distortion. Thus if deficiencies exist in the method highways are financed, then it is because highway expenditures and revenues have different income elasticities.

Estimates of anticipated revenues in 1983 dollars available to meet the demands for highway construction are given in Table 16. The revenue projections are taken from forecasts developed from an extension of the forecasting model used by the Louisiana Fiscal Office and extrapolated for 1987-88.[24] Sources of federal funding are based on anticipated funding levels projected by the Louisiana Department of Transportation and Development. According to these estimates, Louisiana is anticipated to receive approximately $308 million in federal grants-in-aid for proposed interstate construction (including 4R) and other federal programs (Federal Apportionment Primary, Federal Apportionment Secondary, etc.). Owing to recent federal policy/program changes, this represents an increase of approximately 25 percent in federal funds. Furthermore, federal grants-in-aid are expected to increase by 3.69 percent during the next 3 years and are assumed to continue to increase at this same rate till 1987-88.

State matching money was determined according to the category of Federal Highway Program applicable (Interstate-Federal 90%:State 10%; Primary and Secondary-Federal 75%:State 25%; etc.). Cash apportioned to highways from the General Fund is assumed to remain constant in proportion to total tax revenues. Capital outlay bond funding includes only those priority bonds anticipated to be issued in the current fiscal year. Future capital outlay bond funding is assumed to increase with the increase in estimated tax revenues.

Table 16 indicates that during the period 1983 to 1988 revenues available for highway improvements should average $658.1 million per year assuming current

TABLE 16

Sources of Funding for State Highways
Revenue Projections with Low Inflation
(Amount in millions of 1983 dollars)

	1983-84	1984-85	1985-86	1986-87	1987-88	Average
Total Revenue	$ 4,244.5	$ 4,515.2	$ 4,774.2	$ 5,062.4	$ 5,366.1	$ 4,792.5
Growth Rate	-	6.4	5.7	6.0	6.0	6.0
Sources of Funds:						
Federal Aid	$ 307.9	$ 319.3	$ 330.5	$ 342.7	$ 355.3	$ 331.1
State Funds	46.7	49.7	52.5	55.7	59.0	52.7
State Match	65.0	67.4	69.8	72.3	75.0	69.9
Capital Bonds	181.0	192.5	203.6	215.9	228.8	204.4
Total	$ 600.6	$ 628.9	$ 656.4	$ 686.6	$ 718.1	$ 658.1

Source: William G. Black, "Louisiana Revenues and Expenditures: The Next Five Years," Louisiana Business Review, Winter 1982, and Louisiana Department of Transportation and Development.

funding patterns. If additional funds should become available, then this figure could conceivably be even higher. On the other hand, in the absence of windfall profits from severance tax collections these resources are more likely to be further cut.

Needs versus Revenues

State highway needs and revenues are summarized in Table 17. Revenues fall short of highway spending by $26.5 million per year. Thus to bring the Louisiana highway system up to standards determined by the Louisiana Department of Transportation and Development it would require an additional $451.3 million dollars over the next two decades. This means that in order to keep up with the deterioration of the highway system, spending from the General Fund (non-match state funds) should average approximately $80 to $100 million per year. Contrasted to the current funding level of $46.7 million proposed for fiscal year 1983-84, this means that either additional revenue or greater financing capacity is needed.

3.2 Bridges

Bridge maintenance and rehabilitation constitute an integral part of the state highway system. This need has expanded immensely in recent years. Changing traffic patterns over the last quarter century have contributed greatly to the deterioration of bridges in Louisiana. The continual stress from increased truck traffic, increases in maximum legal weights and greater speeds have caused many bridges to become functionally obsolete. Permitting even heavier loads in the future poses even more serious safety problems.

A survey by the Department of Transportation and Development estimates the total number of bridges in Louisiana to be 15,339.[25] Of this total, there are

TABLE 17

Capital Investment Needs and Revenues
for State Highway System, 1983-2000
(Amount in millions of 1983 dollars)

	Needs	Revenues	Shortfall	Annual Additional Investment
Highways	$11,639.0	$11,187.7	$451.3	$26.5

approximately 8,039 bridges on the state maintained highway system for which the state has responsibility. Approximately 30 percent of these bridges do not qualify for federal aid participation in rehabilitation and replacement. The remaining 7,300 bridges are classified as off system bridges and are the responsibility of local governments.

Investment Needs

Since 1970, bridge replacement has been more pronounced and has significantly improved the condition of bridges on the state maintained system. Replacement and rehabilitation of these bridges are based on a sufficiency rating. Bridges are categorized as either structurally deficient or functionally obsolete depending on their sufficiency rating. Evaluation procedures are established by the Federal Highway Administration.

Bridges that are classified as structurally deficient and have a sufficiency rating less than 50 qualify for Federal Bridge Replacement Funds. Structurally deficient bridges with a sufficiency rating between 50 and 80 may qualify for rehabilitation funds. Functionally obsolete bridges with a sufficiency rating less than 50 can also qualify for Federal Bridge Replacement Funds.

Based on these proceedings, it is estimated that there are approximately 5,000 deficient bridges in Louisiana. That is, approximately 32 percent of all bridges are deficient. Of the total number of deficient bridges, 1,060 are on-system bridges. This is equivalent to 13 percent of the total number of bridges on the state system. The remaining 3,940 bridges which are deficient are off-system bridges. This is approximately 54 percent of the total number of off-system bridges. Thus there appears to be a substantial discrepancy between the quality of bridges on and off the state system. Part of the reason for this deals with the recentness with which off-system bridges have been evaluated and were able to qualify for federal funds.

The estimated cost in 1983 dollars to replace deficient bridges in Louisiana is given in Table 18. On-system deficient bridges are estimated to require $340 million, while replacement of off-system deficient bridges will require $215 million. Combined, the total cost to replace all bridges in Louisiana with a sufficiency rating of less than 50 with structures which meet current standards is estimated to be $555 million. Assuming a ten year programming phase, annual investment needs are $55 million.

Revenues

Revenues for the rehabilitation and replacement of bridges in Louisiana depend heavily on the Federal Bridge Replacement Fund. Under the federal-aid system, 65 percent of the total funds received are eligible for maintenance and replacement of on-system bridges, 15 percent must be allocated to off-system bridges and the remaining 20 percent is discretionary. These funds are prorated to states, based on the number and location of all deficient bridges in the United States. Thus as more bridges are repaired in Louisiana, the share of federal funds should decrease in relative terms.

The Louisiana Department of Transportation and Development has estimated that about $40.7 million in 1983 dollars will be available annually from the Federal Bridge Replacement Fund over the next couple of years. State and local match required is $10.2 million per year. While estimates of revenues at the local government level to replace bridges not on the federal-aid system are not available, the state appropriated $20 million in 1981-82 for this purpose to be used by local governments. Given the delay in planning and engineering, these funds have not yet been spent. Thus total revenues available for bridge replacement equal $529 million for the next ten years.

TABLE 18

Bridge Replacement Investment Needs
(Amounts in millions of 1983 dollars)

	On-System	Off-System	Total	Annual Need
Bridge Investment Needs	$340	$215	$555	$ 55

Source: Louisiana Department of Transportation and Development.

Needs versus Revenues

A summary of investment needs and revenues for bridge replacement is given in Table 19. Over the next ten years, annual investment needs exceed anticipated revenues by $2.6 million per year. That is, the total shortfall is $26 million. Extending this to the period 1993 to 2000, the total shortfall in revenues is $44 million. The nature of this should be viewed with uncertainty since estimates of local revenues available for bridge replacement are unavailable.[26]

3.3 Parish (County) and Local Roads

Maintenance and rehabilitation of parish and local roads in Louisiana is solely the responsibility of local government. Recent trends in the expenditures of these governmental units can be seen in Table 20. Changes in the relative degree of funding for each expenditure item is reflected in the percentage data. For parish and local roads, expenditures in 1975 accounted for 13.6 percent of total expenditures. By 1980, highway expenditures fell to 12.2 percent of total expenditures.

The composition of local highway expenditures is given in Table 21. In contrast to state expenditures, local capital construction constitutes a much smaller portion of total highway expenditures. Essentially, local governments have resorted primarily to rehabilitation programs rather than taking on costly new construction projects in order to check highway obsolescence. These programs have been necessitated by increasing population mobility in recent years.

State aid to localities for highways is depicted in Table 22. The data suggest that aid to parishes and municipalities for highways has more than kept pace with inflation over the last several years. These figures when deflated by the Bureau of Economic Affairs price index for state and local structures show a real growth in state aid for highways of 7.2 percent. The formula for distributing these

Table 19

Capital Investment Needs and Revenues
for Bridge Replacement, 1983-1993
(Amount in millions of 1983 dollars)

	Needs	Revenues	Shortfall	Annual Additional Investment
Bridges	$555	$529	$26	$2.6

TABLE 20

Trends in Expenditures of Louisiana Local Governments
(Amounts in Millions and Percentage Distribution)

Year	Total Expenditures	General and Administrative	Police	Fire	Health and Sanitation	Highways	Recreation	Other
1975	$1167.9	$200.3	$120.6	$53.0	$ 39.5	$158.8	$53.9	$341.8
1976	1372.2	217.6	146.2	53.3	370.2	172.0	65.3	347.7
1977	1391.4	252.6	154.0	58.2	330.9	175.4	116.9	313.5
1978	1600.2	313.6	163.8	60.7	398.9	189.5	122.6	351.1
1979	1876.3	360.0	188.6	70.5	492.4	228.4	128.1	408.3
1980	2175.1	407.8	227.9	81.9	596.1	265.6	143.0	452.8
			Percentage Distribution					
1975	100.0%	17.15%	10.33%	4.54%	21.51%	13.59%	4.62%	29.25%
1976	100.0	15.86	10.65	3.88	26.98	12.53	4.76	25.37
1977	100.0	18.15	11.07	4.18	23.78	12.61	8.40	21.81
1978	100.0	19.6	10.24	3.79	24.93	11.84	7.66	21.94
1979	100.0	19.19	10.05	3.76	26.24	12.17	6.83	21.76
1980	100.0	18.75	10.48	3.77	27.41	12.21	6.57	21.81

Source: Governmental Finances

TABLE 21

Expenditures for Capital Outlays and Maintenance on Local Roads
by Louisiana Local Governments
(Amount in Millions of Dollars)

Year	Total Highway Expenditures	Capital	Percent of Total	Operating and Maintenance	Percent of Total
1975	$158.8	$65.7	41.4%	$ 93.1	58.6%
1976	172.0	64.8	37.7	107.2	62.3
1977	175.4	65.6	37.4	109.8	62.6
1978	189.5	64.4	34.0	125.1	66.0
1979	228.4	94.0	41.2	134.4	58.8
1980	265.6	110.0	41.4	155.6	58.6

Source: Governmental Finances.

TABLE 22

State Aid Distribution to Parishes (Counties)
and Municipalities for Highways
(Amount in Millions of Dollars)

Year	Total State Aid for Local Highways	State Aid to Parishes	Percent of Total	State Aid to Municipalities	Percent of Total
1974	$ 58.5	$39.8	68.0%	$ 18.7	32.0%
1975	70.1	47.6	67.9	22.5	32.1
1976	55.4	32.4	58.5	23.0	41.5
1977	58.6	31.3	53.4	27.3	46.6
1978	85.5	56.2	65.7	29.3	34.3
1979	91.8	54.5	59.4	37.3	40.6
1980	85.9	53.4	62.2	32.5	37.8

Source: Louisiana State-Local Fiscal Study Report.

funds, though, is biased in favor of smaller parishes.[27] Smaller parishes are given more on a per capita basis than larger parishes owing to a certain percent distributed independent of population considerations.

Investment Needs

No data exist on the construction and maintenance of the portion of the highway system under the responsibility of local political jurisdictions. However, it is felt that maintenance and rehabilitation of parish and local roads is a major recurring problem.[28] High motorist fatalities, rising traffic volumes, and terrain and soil conditions have placed increasing demands upon the road system.

As an approximation, resurfacing and reconstruction costs can be estimated by making some heroic assumptions. If it is assumed how often highways must be resurfaced or reconstructed and the cost per mile, then depending on the standards used, investment needs can be determined. While these standards and costs may vary by type of road and by region, the approximation is intended to serve as an unconstrained (by political or fiscal considerations) quantitative assessment of local needs.

Minimum tolerable conditions for urban and rural roads imply an average design life of 8 to 10 years for most bituminous surface treated roads in Louisiana.[29] This figure may vary depending on operating speed, vehicle capacity, lane width, number of lanes, and combined surface and base thickness. The useful life may also vary by terrain and different soil types in various regions of the state.

Cost of the needed resurfacing depends on the functional class of road to be improved, type of improvement, design standard, and location of project by cost area. It is estimated that the cost of asphalt hot-mix 1½ to 2 inches thick used to overlay streets is $79,200 per mile.[30] Thus total investment need in 1983

dollars for resurfacing and reconstruction of local streets per year is

(1/8) x 40,287 mi x $79,200 = $399 million.

If this uniform annual investment of $399 million is assumed constant, then total investment needs for resurfacing local streets will be $6.78 billion for the period 1983 to 2000.

Revenues

Estimates of total revenues in 1983 dollars available for local governments during the next five years are given in Table 23. These projections are based on the assumption that local govenment revenues are expected to experience similar increases as state revenues. This is likely to overstate available revenues as local governments are constrained primarily to ad valorem taxes. Requirements for local match, the potential for increasing revenues and the offset needed to compensate for anticipated cutbacks in intergovernmental grants-in-aid add further uncertainties to these estimates.

Assuming funds available for local streets and roads remain constant relative to total revenues, then revenues available for local streets and roads should average $337.6 million annually for the period 1983 to 1988. This is equivalent to $5.74 billion over the period 1983 to 2000.

Needs versus Revenues

Table 24 summarizes local street and road needs and revenues. Total revenues fall short of total investment needs by $1,040 million for the period 1983 to 2000 or by $61.4 million per year. Limits on taxing authority and differences in income elasticities of road expenditures and revenues is the perennial problem which explains this shortfall. Service charges and other taxes such as licenses and fees are potential remedies. An increased reliance on property taxes could also be a source of funding.

TABLE 23

Sources of Funding for Local Roads
(Amounts in millions of 1983 dollars)

	1983–84	1984–85	1985–86	1986–87	1987–88	5–Year Average
Total Revenues	$2,392.6	$2,545.7	$2,690.8	$2,852.3	$3,023.4	$2,701.0
Growth Rate(%)	—	6.4	5.7	6.0	6.0	6.0
Local Street and Road Funding	$299.1	$318.2	$336.4	$356.5	$377.9	$337.6

Source: William G. Black, "Louisiana Revenues and Expenditures: The Next Five Years," Louisiana Business Review, Winter 1982.

TABLE 24

Investment Needs and Revenues for
Local Streets and Roads, 1983–2000
(Amount in million of 1983 dollars)

	Needs	Revenues	Shortfall	Annual Additional Investment
Local Streets and Roads	$6,780	$5,740	$1,040	$61.4

3.4 Railroads

Louisiana's rail network is uniquely associated with waterborne commerce in the state. Table 25 identifies the eight Class I railroads and the six Class III railroads operating in Louisiana and the type of commodity handled. The rail system consists of 3435 miles of rail line, 92.9 percent of which is comprised of Class I railroads which carry approximately 95 percent of all rail traffic. Rail in Louisiana serves as a major terminus and transshipment point for waterborne traffic.

The principle bulk commodities handled include paper, wood, chemicals and petroleum products. Other bulk commodities which are likely to have a major impact on the state's rail system in the future are grain and coal exports. According to United States Department of Agriculture figures, 50 percent of all grain is transported nationwide by rail from the farm to an export facility with the remainder primarily transported by barge and some shipped by truck.[30] Barge traffic is the cheapest form of transportation for long hauls and has been increasing its share of total grain shipped. Because of the Mississippi River barge traffic accounts for over 75 percent of grain moving to Louisiana, and rail for less than 25 percent. However, use of unit trains with 100 ton capacity hopper cars with bottom discharge dumping has continued to make rail transportation relatively cost competitive.

Coal exports, which surged in 1980, are primarily transported nationwide to export facilities by rail, with 65 percent of annual production hauled by rail.[32] In contrast, almost all coal arriving or passing through the Lower Mississippi region is transported by barge. Barge traffic accounts for approximately 80 to 90 percent of all coal transported to the Lower Mississippi. Yet, recent developments to allow rail companies to enter into long-term contracts and the ability to improve new facilities (and abandon old facilities) has helped rail companies to compete more effectively for a share of total coal export.

TABLE 25

Railroad Lines Operated in Louisiana

Operating Railroads	Miles in Louisiana	Percent of Total	Type of Commodity Handled
Class I Railroad:			
Atchison, Topeka and Sante Fe	64	1.9	Paper & wood products
Illinois Central Gulf	574	16.7	Paper, wood, food, & chemicals
Kansas City Southern	790	20.1	Chemicals
Louisville and Nashville	36	1.1	Food & chemicals
Missouri Pacific	1,195	34.8	Chemicals, food, wood, & petroleum products
Southern Pacific	520	15.1	Chemicals, food, farm, and petroleum products
St. Louis Southwestern	38	1.1	Wood, petroleum, and non-metallic minerals
Southern	73	2.1	Opens up the port of New Orleans
Total	3,190	92.9	
Class III Railroads:			
Arkansas and Louisiana Missouri	39	1.1	Food
Louisiana and Midland	68	2.0	Wood products
North Louisiana and Gulf	40	1.1	Wood products
New Orleans and Lower Coast	35	1.0	Petroleum, coal, & chemicals
New Orleans Public Belt	26	0.8	Connects many rail yards
Louisiana & North West	37	1.1	Paper & concrete
Total	245	7.1	
Total All Railroads	3,435	100.0	

Source: Louisiana State Rail Update Plan, 1981.

There are only three passenger rail routes in Louisiana: (1) the Cresent providing service between New York and New Orleans, (2) the City of New Orleans providing service between Chicago and New Orleans, and (3) the Sunset Limited providing services between Los Angeles and New Orleans. Each of these routes are operated by the National Rail Passenger Corporation (AMTRAK) through agreements with separate rail carriers for use of existing trackage.

Although Louisiana has no direct jurisdiction over the railroad facilities or companies operating in the state, the state provides assistance in the development of rail planning and ensures the safety of its citizens by monitoring the movement of commodities within the state.

The state recommends financial assistance for selected branchline segments designated as either post-abandonment projects or pre-abandonment projects. The program from 1979 to 1982 has generated over $3.6 million in federal funds and private assistance for these lines, approximately $18,000 of which constituted funds required by the state to match these contributions. Federal funds require an 80:20 match by the railroad for rehabilitation and a similar match by the state for program operations.

Investment Needs

An assessment of Louisiana rail facility needs by the Office of Aviation and Public Transportation has identified certain branchline segments slated for rehabilitation. This report projects a total of $626,558 in needed revenues for three pre-abandonment projects recommended for federal funding in 1981 but not yet funded. No firm projections for additional future requests are available.

However, an update to this rail plan indicates that anticipated commodity traffic patterns for the state preclude 20 rail line segments determined to be of comparatively minor significance. These lines for the most part serve local markets, have relatively low density, and are generally classified as functional class A and B branchlines. Combined, these lines account for 1,152 miles of track within Louisiana. Assuming that these lines run the risk of becoming abandoned and eventually will be considered for assistance, then an approximation for future investment needs can be derived.

The average cost of rehabilitating these lines is assumed to be $20,211 per mi.[33] Thus total investment need in 1983 dollars for rail assistance for the period 1983 to 2000 may be as much as

1,152 mi x $20,211 - $23.3 million.

This is equivalent to an annual investment need for railroads of $1.3 million over the next two decades.

Since federal budget cutbacks have virtually eliminated federal grants for the rehabilitation of railroad branchlines, the shortfall of $23 million would have to be made up by the state. Currently there is no mechanism whereby state funds available can be allocated among different rail projects.

3.5 Airports

A comprehensive airport planning process serves as the foundation for the development of a statewide air transportation system in Louisiana. This plan encompasses over 286 landing facilities in the state, of which 65 are publicly owned airports. Of these, seven are classified as air carrier airports which offer scheduled passenger service. All of these air carrier airports serve the larger population centers. The more rural areas of the state are serviced by an extensive

use of commuter or third level carriers. Approximately all but four parishes (counties) have access to a publicly owned airport. Fifty-six of these facilities are non-tower airports. Government involvement includes not only the allocation of funds to build airports but also financing the purchase of land for airports, clear zones, and development of adequate maintenance procedures.

Investment Needs

Capital investment needs for upgrading and maintaining the state's system of public airports are determined according to a demand/capacity analysis.[34] That is, forecasted demands upon the future aviation system are assessed in terms of whether existing facilities can adequately meet these needs. Requirements for apron space, automobile parking, terminal building and runway capacity are projected based on anticipated aircraft operations. Also included is an assessment of the primary navigational aid system.

Based on this system, most of the smaller airports have been assessed as deficient in the areas of runway length, width, and pavement strength. Electronic navigational aids are also seriously deficient. Total public expenditures for airport rehabilitation and construction in the past have been distributed for clear zone problems, hangar and runway construction, lighting and navigational aids, and land acquisition. Maintenance expenditures have traditionally been left to the local parishes (counties) which own the facilities. User charges in the form of tie-down, hangar, leases, and fuel flowage fees finance these expenditures.

Preliminary investment needs in 1983 dollars for the period 1983 to 2000 are listed in Table 26. These data represent cursory capital investment needs summarized from a preliminary draft of the Louisiana Department of Transportation and Development, Office of Aviation, airport improvement plan. Costs of improvements include the construction and upgrading of the airport system in

general, new navigational equipment, and the upgrading of the length, width, and pavement strength of runways. A total of $68 million is estimated for the improvement of these facilities over the next two decades. Thus to improve and expand general aviation airports it is estimated that $4 million per year should be expended in the interim through the year 2000.

Revenues

Federal revenues available for airport investment needs provided through the Airport Development Assistance Program (ADAP) are distributed on a 90:10 federal-to-local matching basis. Estimates of anticipated federal grants for next year indicate a funding level of $20.4 million.[35] State and local funds are estimated to equal $4.4 million. Approximately 18 percent of total state and local revenue for airports is assumed to be local funds. Thus total revenue available for airports is expected to equal $24.8 million for next year. No further estimates were available for future years.

Needs versus Revenues

Airport needs and revenues are summarized in Table 27 assuming current anticipated funding levels for fiscal year 1983-84 are realized. Total revenues available from federal, state and local sources fall short of total investment needs by $2.5 million per year. Sources of funding for this shortfall could be made up on an on-going basis by an increased reliance on user fees charged at each airport facility or through normal appropriations at the federal, state, or local level. Given the fact that large federal deficits appear to be ominous, the possibility exists that revenues from federal sources for airports may be affected and possible program changes enacted.

TABLE 26

Cost of Airport Facility Needs by Period
(Amount in million 1983 dollars)

	1983-85	1986-1990	1991-2000	Total
Airport	$55.8	$5.0	$7.2	$68.0

Source: Louisiana Airport Plan Update, preliminary, 1983.

Table 27

Capital Investment Needs and Revenues
for Airports, 1983-2000
(Amount in millions of 1983 dollars)

	Needs	Revenues	Shortfall	Annual Additional Investment
Airports	$68.0	$24.8	$43.2	$2.5

3.6 Public Transportation

Public transit programs in Louisiana include an urban transit assistance program, a state transit subsidy, a rural transit assistance program, a special transportation fund for the elderly and handicapped, a ridesharing program, and a technical assistance program for the benefit of the Mississippi River Bridge Authority and for the Regional Transit Authority-New Orleans.[36] These services provide assistance to cities, towns and parishes (counties) for the development of efficient and effective rural and urban public transportation systems. Special studies are done and technical expertise is provided to all interested persons. Federal, state and local funds are appropriated to finance public transit operations.

There are seven major urbanized areas in Louisiana which provide public transit services. Transit operators and the form of ownership are given in Table 28. In general, all of the systems offer fixed route services with traffic patterns oriented toward the central city and limited crosstown services. In addition, the St. Bernard (BUCAT) system is operated in conjunction with a demand-responsive taxi service which provides transporation for passengers to and from a bus stop. The New Orleans Public Service, Inc. system provides the most extensive services.

Table 29 shows the total annual patronage on these systems for 1979 and 1981. Operating results are shown in Table 30. In fiscal year 1977, total operating deficits equalled $19.2 million. By fiscal year 1982, total operating deficits increased to $32.4 million, an increase of 68.6 percent. Thus greater financial support from federal, state, or local level has been necessary to ensure an adequate level of service and to provide for an increase in patronage of 7.12 percent from 1979 to 1981.

TABLE 28

Public Transit System in Louisiana
(Urban Areas)

System	Ownership
Alexandria Municipal Bus Line	Public
City of Lafayette Transit System	Public
City of Lake Charles Bus System	Public
Sportran (Shreveport)	Public
Capitol Transportation Corporation (Baton Rouge)	Non-profit Corporation
New Orleans Public Service, Inc.	Private Utility Company
Kenner Loop	Private
Westside Transit	Private
Harvey Transit	Private
St. Bernard Bus (BUCAT)	Private

Source: Louisiana Mass Transit Study, 1979.

TABLE 29

Total Annual Patronage for Louisiana Urban Transit Systems

	1979	1981
Alexandria	804,000	1,000,000
Lafayette	2,075,000	977,000
Lake Charles	359,000	485,000
Monroe	1,099,000	1,317,000
Shreveport	4,242,000	5,681,000
Baton Rouge	3,044,000	5,479,000
New Orleans	86,430,000	88,330,000
Louisiana Transit	3,402,000	4,180,000
Westside Transit	3,167,000	3,121,000
Harvey Transit	235,000	91,000
St. Bernard	81,000	NA
Total	103,309,000	110,661,000

Source: Louisiana Mass Transit Study, preliminary 1983.

TABLE 30

Income and Operating Expenses for
Louisiana Urban Transit Systems
(Thousands of dollars)

	1979			1981		
	Expenses	Revenue	Deficit	Expenses	Revenue	Deficit
Alexandria	$ 517	$ 182	$ 335	$ 833	$ 247	$ 586
Lafayette	471	161	310	1,002	210	792
Lake Charles	303	94	209	702	126	576
Monroe	680	246	434	976	311	665
Shreveport	2,186	1,303	883	3,850	1,730	2,120
Baton Rouge	1,772	996	776	3,040	1,406	1,634
New Orleans	32,373	16,916	15,457	47,355	23,492	23,863
Louisiana Transit	1,533	1,473	60	2,489	1,724	765
Westside and Harvey Transit	1,399	679	720	2,135	897	1,238
St. Bernard	96	53	43	208	18	190
Total	$41,330	$22,103	$19,227	$62,590	$30,161	$32,429

Source: Louisiana Mass Transit Study, preliminary 1983.

Investment Needs

Preliminary estimates of public transit capital investment needs and required operating expenses in 1983 dollars anticipated for the period 1983 to 1990 are given in Table 31.[37] These projections are based upon assumptions regarding vehicle replacement schedules, fleet sizes, trends in operating expenses for each system, user revenues, and an average expected inflation rate of 7 percent during this period. Capital investment requirements include new storage, maintenance and service facilities, terminal and administrative buildings, and new buses. Maintenance expenses, and wages and salaries are reflected in the required operating expenses per year.

Total operating and capital investment needs for mass transit are expected to equal $67 million in 1983. By 1990, this total increases to $86 million, an increase of 27.4 percent over 8 years. For the period 1983 to 1990, total net project costs equal $597 million. This is equivalent to an average annual investment need of $75 million. Extending this to the period 1991 to 2000, total net project costs equal $1.27 billion.

Revenues

Estimated revenues in 1983 dollars available for the financing of mass transit investment needs are given in Table 32. These estimates are taken from a preliminary study of mass transit needs in Louisiana conducted by the Department of Transportation and Development, Office of Aviation and Public Transportation. Total federal assistance is projected to equal $166 million over the period 1983 to 1990. This is equivalent to an annual average funding level of $21 million. The difference between the anticipated federal funding level and total expenditures for mass transit that must be financed (net nonfederal project cost) is estimated to equal $431 million over the period 1983 to 1990, or $54 million per year.

TABLE 31

Mass Transit Investment Needs for Louisiana, 1983-1990
(Amount in thousands 1983 dollars)

Year	Net Project Cost		
	Operating	Capital	Total
1983	$ 49,020	$ 18,329	$ 67,349
1984	52,354	5,804	58,158
1985	56,019	8,092	64,111
1986	60,220	13,447	73,667
1987	64,556	6,615	71,171
1988	69,075	16,309	85,384
1989	73,772	17,339	91,111
1990	78,862	6,958	85,820
Total	$ 503,878	$ 92,893	$ 596,771
Annual Need	$ 62,985	$ 11,612	$ 74,596

Source: Louisiana Mass Transit Study, preliminary 1983.

TABLE 32

Revenues for Mass Transit System in Louisiana, 1983–1990
(Amount in thousands 1983 dollars)

Year	Source of Revenue: Federal Assistance	Source of Revenue: Net Nonfederal Project Cost
1983	$ 19,338	$ 48,013
1984	17,773	40,385
1985	18,174	45,937
1986	22,812	50,854
1987	17,713	53,457
1988	25,815	59,569
1989	26,304	64,807
1990	18,292	67,528
Total	$116,221	$430,550
Annual Average	$ 20,778	$ 53,819

Source: Louisiana Mass Transit Study, preliminary 1983.

TABLE 33

Mass Transit Investment Needs Versus Revenues, 1983–1990
(Amount in millions of 1983 dollars)

	Need	Revenues	Shortfall	Annual Additional Investment
Mass Transit	$597	$266	$331	$41.4

Needs versus Revenues

Total mass transit investment needs and available revenues are presented in Table 33. If it is assumed that state assistance remains constant at its anticipated current funding level of $12.5 million per year, then total investment needs exceed revenues by $331 million over the period 1983 to 1990. Extending this to the period 1990 to 2000, total shortfall equals $703.8 million. This shortfall constitutes the total local requirement needed over the period 1983 to 2000 to provide for mass transit needs.

3.7 Ports and Waterways

Louisiana's ports and river resources are vital to the state's economy. Each year water related activities account for billions of dollars in commerce. Probably no other industry has a greater impact on employment and income. It is estimated that the total economic impact of water related activities amounts to more than 17 percent of the state's total gross product.[38]

There are over 5,000 miles of navigable rivers in Louisiana— one-fifth of the nation's total navigable miles of waterway. Because of the Mississippi River, ports in Louisiana have become the major import-export point for nearly 21 states in the mid-America heartland. The Intracoastal Canal, which runs west to east from the Mexican border to Florida, plus other smaller rivers provide for shallow-draft inland ports and attractive opportunities for industrial development.

There are three major deep water ports in Louisiana: New Orleans, Baton Rouge, and Lake Charles. The Port of New Orleans handles more than 160 million tons of cargo per year and ranks as the second largest port in the nation behind New York. Most of the tonnage handled is grain exports.

Baton Rouge ranks behind the Port of New Orleans as being the second largest port in the state and the fourth largest in the nation in terms of tonnage

handled. It is estimated that approximately 90 percent of the cargo handled at the Port of Baton Rouge is dry bulk commodities. The Port of Baton Rouge is the first downstream port on the Mississippi where cargo can be transferred from barge to ship.

The Port of Lake Charles handles in excess of 30 million tons per year. This makes it one of the nation's top twenty-five ports. The major commodities handled include rice and crude petroleum. In fact, the Port of Lake Charles is the leading rice export facility in the nation.

In 1982, the nation's first offshore oil port designed to handle giant oil supertankers, called the Superport, started operations on a full-time basis. The Superport initially has the capacity to handle 1.4 million barrels of crude oil a day. The facility ensures necessary support for the petroleum and petro-chemical industries. Located approximately 18 miles offshore from Louisiana, the port facilities include a marine terminal which can accomodate tankers with 90-foot drafts, underground storage facilities, and a large pipeline for transporting oil.

Besides these major ports, there are many more smaller ports operating in Louisiana. The more than 4,500 miles of waterfront acreage for industrial development provide ample opportunity for smaller ports to operate.

Investment Needs

While port facilities are quasi-public enterprises, due to the impact on the economy the state has a natural vested interest in their operations. Support for the development of port facilities during the past few years is given in Table 34. In 1977, total capital expenditures for ports equalled $16.8 million. By 1982, capital expenditures for ports increased to $50.5 million, an average annual increase of 49.8 percent. In addition, there are currently outstanding $789.2 million of general obligation and self-supporting debt issued to finance capital improvements for

TABLE 34

Authorized Expenditures on Ports in Louisiana
(Amount in Millions of Dollars)

Year	Facilities	Percentage Change from Preceding Year
1977	$16.8	-%
1978	10.4	-38.1
1979	36.6	251.9
1980	39.1	6.8
1981	48.8	24.8
1982	50.5	3.5
Average	$33.7	49.8%

Source: Capital Outlay Acts.

ports. Approximately 85 percent of this debt outstanding is for the development of the Superport. There is also $55.8 million of authorized but unissued general obligation debt for ports still waiting to be issued.

Future investment needs can be functionally classified into two categories: need for new or modified navigation channels to handle an increased volume of traffic with different characteristics, and need for replacement of structurally obsolete facilities. According to a recent rail/port facility needs assessment, the major geographical areas which emerge as most likely to be affected by the need for new or modified navigation channels to handle an increased volume of traffic and to facilitate an interfacing with rail transportation include:

> (1) the Red River Waterway and surrounding lignite development area between Shreveport and the confluence of the Red, Old, and Mississippi Rivers, (2) the south Louisiana coastal region between Lake Charles and New Orleans, (3) the Mississippi River region from Baton Rouge to the Gulf of Mexico, (4) the left ascending bank of the Mississippi River from Baton Rouge to the Louisiana/Arkansas state line, and (5) the Ouachita-Black River Region of Northeast Louisiana. The first three regions represent areas which may well feel the impact of developments in a relatively short time, while the remaining two promise development possibilities and consequential impacts in relation to a longer time frame.[39]

Much attention has been focused on the Red River Waterway project (currently under construction). The estimated cost of the project is $1.7 billion. Funding for this project is from the current Energy and Water Development Act. Opponents to the project argue that the project will be wasted owing to the fact that the river constantly shifts course. Proponents support the project because of its estimated impact on rail service development.[40]

The south Louisiana coastal region between Lake Charles and New Orleans benefits from the offshore oil industry, and chemical and petroleum industrial development. Within this region, the Intracoastal Canal has been the subject of a study to determine the economic justification and environmental impact of enlarging that section between Mississippi and Atchafalaya Rivers.[41] Other projects have been considered within this region but all depend heavily upon public financing.

The Mississippi River region from Baton Rouge to the Gulf of Mexico serving the public ports of New Orleans and Baton Rouge has been the subject of much study because the channel depth is limited to 40 feet. This channel depth allows access only to oceangoing vessels less than 60,000 D.W.T. Estimates indicate that approximately 40 percent of the world fleet is in excess of this maximum size. Initial estimates to provide access to much larger ships by deepening the channel to 55 feet are at $500 million with an annual maintenance expense of $175 million.[42]

The ascending left bank of the Mississippi River between Baton Rouge and the Louisiana/Arkansas State Line consists of many small river ports. Further economic development of these small rural parish river ports is considered plausible only in the event the Mississippi River could be enlarged to accommodate larger barge tows and perhaps small oceangoing vessels. The likelihood of this happening is remote.

The Ouachita and Black River region has several U.S. Army Corps of Engineer projects currently under construction. The purposes of these projects are to improve locks, channel maintenance, and bank stabilization. No short-run projects are feasible to change the characteristics of existing traffic.

Data on the need for the replacement of structurally obsolete facilities within the state are unavailable. No cost estimates have been compiled to determine the investment need in this area. Based on tonnages handled, queuing theory, average tow sizes and tonnage capacity, only a few navigation structures have been assessed in terms of time till replacement.

More planning is needed to assess the investment needs of ports and waterways in Louisiana. An increased government involvement in ports and waterways can be explained on the basis of protectionist motives. That is, governments may be obligated to protect certain industries against income losses or to encourage greater investment because of the impact exogenous changes may have on the cost competitiveness of resources which do not have the opportunities available to mobile factors. Thus greater capital investment in ports and waterways may be justified on the basis of some form of social justice. However, no estimates regarding this support are available. At best, if the state continues its support of port facilities at its current funding level, then annual investment needs may equal $33.7 million per year.

IV. WATER SUPPLY, TREATMENT AND DISTRIBUTION

4.1 Water Supply

Water supply in Louisiana appears less foreboding than in other parts of the nation owing to an abundant supply of water and an average rainfall of 50 to 60 inches a year. Surface water covers 3,097 square miles, or about six percent of the state. Sources of surface water include the Mississippi River and its tributaries and a large number of lakes, channels, streams, reservoirs, bayous, and swamps. Fresh groundwater is found in six major aquifer systems. Some areas of the state, however, contain no productive freshwater aquifers due to variable hydrogeologic features and the presence of saline water.[43] Quality becomes of extreme importance in these areas where supplies are becoming relatively scarce.

Water for residential use has traditionally come from groundwater. Water obtained from underground sources is generally more costly than water obtained from surface sources but is of better quality. Surface water is regarded as having a low quality and usually requires more treatment before it is distributed for consumption. According to a survey of Louisiana water utilities, groundwater is the predominant source of supply.[44]

Public control of water utilities in Louisiana takes the form of either direct ownership or regulation of rate setting policies. Legal jurisdiction over pricing policy is exercised by the Louisiana Public Service Commission which regulates private water utilities, the Farmers Home Administration which controls rural nonprofit corporate water utilities, and the respective local governmental units which regulate their own municipally owned utilities. It is estimated that approximately 35 percent of water utilities are under the regulatory powers of the Louisiana Public Service Commission, 42 percent are controlled by municipal governments, and the remainder are under the auspices of the Farmers Home

Administration.[45] The form of ownership of these water utilities has a direct bearing on the costs of water supplies, the structure of water rates, the financial solvency of water utilities, and the level of future supplies.

The greatest volume of water for residential use is controlled by publicly owned municipal water utilities. This market is local in nature and is influenced to a large extent by changes in population and the level of economic activity within certain areas. Approximately 45 percent of these water utilities serve a population of 500 or less while 68 percent serve a population of 1,000 or less.[46]

Investment Needs

Providing water supply for public consumption is a complex function because water utilities are expected to have a supply capacity not only sufficient to meet average daily needs but also variations in seasonal and peak demands. Present municipal water use is considered to be well within an acceptable level of supply in most regions. In terms of projected water requirements, the Gulf South Research Institute predicted that total water requirements of Louisiana will reach 35,817.1 million gallons per day in 2000, an increase of 120 percent from its estimated level in 1980 (see Table 35).[46] The dependence on groundwater means water utilities are going to have to drill wells to greater depths with the likelihood of encountering lower quality of water. This may mean surface water will become a growing source of supply as has been the case already in some regions.

The cost of providing for future water needs depends on the population served, the topography of the area, and the pumping capacity of the utility. While no comprehensive overview of these capital needs exists, it has been estimated that investment per capita on the part of water utilities is $143.3 (in 1971 dollars).[48] Total investment includes investment in wells, storage facilities,

TABLE 35

Water Requirements for Louisiana, 1970–2000
(Million Gallons Per Day)

Use Category	1970	1980	2000
Municipal	416.0	549.0	801.9
Agricultural	1,637.5	2,896.8	3,245.9
Industrial	4,969.4	7,968.3	19,643.2
Thermoelectric	2,890.2	4,865.6	12,126.1
Total	9,913.1	16,279.7	35,817.1

Source: Gulf South Research Institute, Present and Projected Water Requirements for Louisiana, 1970 - 2020, 1971.

pumps, treatment plants, buildings and distribution lines. The composition of this investment varies according to the three types of water utilities and area (see Table 36).

Using this data, representative investment needs required by water utilities can be determined. Assuming per capita investment remains constant, then total investment needs in 1983 dollars can be determined by multiplying the estimated investment cost per capita times the change in population over this period. That is,

$$\$143.30 \times 926{,}006 \times 2.33 = \$308{,}799{,}780$$

where the multiplier 2.33 converts the dollar figure to current 1983 dollars. Thus total investment needs to facilitate an increased demand for water may be as much as $309 million. This figure likely overstates investment needs since water utilities typically experience increasing economies of scale. Increasing economies of scale or decreasing total cost per capita is a trait of water utilities that explains why they exist as a natural monopoly and consequently the need for government involvement.

Sources of revenues to meet these needs depend on the user fees charged by water utilities. These user charges are generated by either a system of flat rates, metered rates, or a combination of flat and metered rates. Special charges imposed by water utilities include outside area-limits charges, tapping fees, meter installation charges, reconnection fees, surcharges or demand charges, and fire protection charges. Faced with regulated rates on these charges, continued ability to meet water demands is determined largely by regulation and financial strength. Ignoring distributional and equity issues, an efficient allocation of water among the different users and user groups depends solely on marginal cost pricing (i.e. user fees). In the absence of user fees, the ability of local governments to issue debt to finance municipally owned water utilities will greately affect water supply in the future.

TABLE 36

Relative Distribution of Investment Per Capita for Water Utilities
(Amount in 1971 dollars)

Category	Type of Water Utility		
	Municipal	Private	Cooperatives
Distribution Lines	$ 67.21	$21.30	$ 91.34
Buildings	6.25	12.58	26.64
Pumps	14.07	6.78	11.42
Treatment Plants	26.57	15.49	15.22
Storage	25.01	17.42	26.64
Wells	17.19	23.23	19.03
Total	$156.30	$96.80	$190.29

Source: Roopchand Ramgolan, "The Pricing of Water in Louisiana," unpublished PH.D. Thesis, Louisiana State University, 1974.

4.2 Wastewater Treatment

The need for adequate wastewater treatment of organic and inorganic discharge materials stems from the fact that if not properly treated, these pollutants could endanger streams of fish and wildlife, transmit disease, or cause public health hazards. In fact, the Clean Water Act of 1977 calls for "fishable and swimmable" water by 1983 and zero discharge of pollutants by 1985. Coping with this mandate presents serious problems.

Existing municipal wastewater treatment facilities in Louisiana provide various levels of services. These services range from collection with no treatment to collection with advanced treatment. Most common treatment includes lagoons, activated sludge, and trickling filters. For the New Orleans-Baton Rouge metropolitan area, 86 percent of the municipal wastewater treatment facilities use the activated sludge and trickling filter processes and oxidation ponds.[49] By 2000, total municipal wastewater flow is projected to equal 418 million gallons per day for this area. This is equivalent to a 42 percent increase in current capacity. In general, the large municipal wastewater treatment facilities are located in the metropolitan areas within the state and account for most of the total average daily municipal wastewater flow.

In the past, municipal wastewater treatment has depended primarily on the population served and the commitment by communities to upgrade existing facilities. Any actual action, though, has depended heavily on federal grants. Without the use of federal grants, most planned improvements have been postponed owing to the fact that construction of wastewater treatment facilities requires such a major undertaking.

Investment Needs

Table 37 presents the estimated backlog of sewage wastewater construction and stormwater runoff spending in Louisiana as determined by the Environmental Protection Agency (EPA). These needs represent construction spending necessary to meet current EPA goals based on 1980 population. The survey estimates include the cost of secondary treatment, advanced treatment, infiltration and inflow correction, major sewer rehabilitation, new collectors, new interceptors, overflow correction and control of stormwaters. Also included in the survey are estimates of the costs of meeting the needs of the population for the year 2000. The incremental cost thus represents the additional cost necessary to meet future needs.

Total backlog of needed construction is estimated at $1,895 million. Over 66 percent of this need is attributable to control of stormwater runoff. This can be compared to year 2000 assessment of total needed construction of $2,411 million. Based on this, the additional future sewage and stormwater control runoff needs are $516 million.

Revenues

Trends in spending on construction of publicly-owned wastewater treatment facilities and sanitation has on average accounted for aproximately 25 percent of total expenditures by local governments during the period 1975 to 1980. According to the Louisiana Municipal Association, this by far constitutes the major ticket item for municipal governments.[50] Likely funding of the entire EPA assessment of needs represents an impossible challenge.

Estimates of total revenues available over the period 1983 to 2000 are given in Table 38. These estimates are derived from EPA estimates of total annual expenditures projected for this period for the nation on the whole and adjusted to

TABLE 37

EPA Assessments for Construction of Publicly-Owned Wastewater Treatment Facilities
(Millions of dollars)

Category	Backlog of Needed Construction	Year 2000 EPA Assessment
Secondary Treatment	$ 173	$ 431
Advanced Treatment	2	7
Correction of Infiltration/Inflow	52	52
Major Rehabilitation of Sewers	11	11
New Collectors	272	314
New Interceptors	120	331
Overflow Correction	0	0
Control of Stormwaters	1,265	1,265
Total	$ 1,895	$ 2,411

Source: Needs Survey: Cost Estimates for Construction of Publicly-Owned Wastewater Treatment Facilities, EPA.

TABLE 38

Estimated Expenditures for Wastewater Treatment Facilities
(Amount in Millions)

Capital Outlay:	1983 - 2000
Federal Grants	$ 587
Local	29
Other	247
Sub-Total	863
Total Annual Expenditures:	
Operations and Maintenance	362
Other	358
Sub-Total	720
Total Outlays	$1,583

Source: Needs Survey: Cost Estimates for Construction of Publicly-Owned Wastewater Treatment Facilities, EPA.

Louisiana. Total expenditures for the construction of public facilities, private facilities, residential systems, and annual operations and maintenance costs are reflected in the estimates. The projections assume no changes in funding strategies of federal and state agencies.

Based on these projections, total annual expenditures equal $1,583 million. This is equivalent to $93 million per year.

Needs versus Revenues

Comparison of investment needs versus revenues suggests an annual shortfall of $49 million (see Table 39). Total additional investment required over the period 1983 to 2000 equals $828 million. The magnitude of this investment need reflects the relative inability of local governments to cope with the problem of water pollution. It also raises the question as to whether or not local governments are best suited to meet the goals of the Clean Water Act.

4.3 Flood Control

Generally, the federal government exercises control over the development of the major river basins in Louisiana. In this context, the federal government can be singled out as the prime supplier of irrigation water, navigation improvements, flood control storage or levee and channel improvements, and other water related projects. Yet, the distribution of water and the use of water is governed by state laws.

Traditionally, the primary method for reducing flood damage has been through structural measures such as dams, dikes, levees, channel improvements and seawalls. These have been constructed by the U.S. Army Corps of Engineers, at least for the major rivers. In fact, during the past quarter century federal expenditures for flood protection have nearly doubled. These increases are

TABLE 39

Investment Needs Versus Revenues
for Wastewater Treatment Facilities
(Amount in millions)

	Investment Needs	Revenues	Shortfall	Annual Additional Expenditures
Wastewater Treatment Facilities	$2,411	$1,583	$828	$49

attributable to expanding urban development and increased land utilization of floodplain areas.[51] Part of the protection against flood losses also comes from the National Flood Insurance Program. This insurance program provides subsidized flood insurance policies to property owners in designated flood hazard areas and requires communities to adopt and enforce floodplain management regulations. Since approximately one fourth of the flood damage in the United States occurs in Louisiana, flood control represents an important concern.

Flood control programs in Louisiana provide for the construction of structures which protect against headwater and backwater flooding. Under the direction of the Secretary of the Corps of Engineers and the supervision of the Chief of Engineers, the Mississippi River Commission, created in 1879, is responsible for this protection within the Mississippi alluvial valley. Total authorized cost to accomplish this work is $7 billion, of which about $4 billion has been spent. Maintenance costs alone equal $46 million per year. Smaller projects (less of a national priority) are the responsibility of the state.

There is no comprehensive study that reflects total investment needs for the state in terms of flood control. However, a statewide flood control program has been recently enacted (Louisiana Statewide Flood Control Program). The purpose of this program is to design "long-term solutions to specific flood problems by protecting existing towns, facilities and fields in high hazard areas while not encouraging expansion into flood prone areas."[52] The program was initiated because of reduced availability of federal funds for flood control and delays in implementing federal projects, and will fund smaller projects not handled by federal programs. While the funding system requires a 70:30 state-to-local match, maintenance of the structure once constructed will be the responsibility of the local government. No estimates are included in the total investment needs of the state for this category.

V. SOLID WASTE DISPOSAL

Solid waste systems involve the assimilation and movement of solid waste from points of origin to a disposal site, and the destruction and final disposition of the solid waste collected. Inputs used in the collections activity include collection trucks, bins and labor. Disposal methods available consist of landfills, dumps and incinerators. Each of these disposal methods observed in parishwide and municipal systems in Louisiana require the use of a different set of inputs.

While new patterns of solid waste generation have caused problems for municipalities and local governments throughout the nation, the main problem in Louisiana relates to regulations limiting siting of solid waste facilities in wetlands or floodplains. The Resource Recovery and Conservation Act (RCRA) and Louisiana state law require that all solid waste either be utilized for resource recovery, deposited in a sanitary landfill, or otherwise disposed in an environmentally safe manner. These regulations severely restrict the location of sanitary landfills in wetlands or floodplains. Since approximately half the state, housing more than two-thirds of the population, can be classified as a wetland or floodplain area, solid waste disposal siting presents some serious problems.

The Louisiana solution to the problem calls for the utilization of waste for a useful purpose rather than depositing in a sanitary landfill. This goal solves the problem of the siting of solid waste facilities in wetland and floodplain areas plus provides for an economic solution to the disposal of waste products. Under the Louisiana Resource and Development Authority, the responsibility of developing an economically safe solid waste disposal system in order to recover salable materials and energy resides with the Authority.

Still the most commonly used method of disposal of solid waste in Louisiana involves sanitary landfills which are regulated by the Louisiana Solid Waste Management Program. This program exercises control over all existing open dump sites (all new open dump sites have been banned from operating since 1981). The program also sets forth the requirements to close or upgrade all existing facilities. Control over these sites consists of issuing permits, inspection, monitoring, and enforcement procedures.

Investment Needs

Current estimates indicate that solid waste generation in Louisiana will increase over 31 percent for the period 1983 to 1995, an average annual rate of increase of 2.6 percent per year.[53] Currently, approximately 397 existing disposal sites handle 62,900 tons of solid waste per week statewide. By 1995, the amount of solid waste generated is estimated to increase to 82,576 tons per week.

To meet these increased demands on solid waste disposal in Louisiana, it is estimated that $89 million (in 1983 dollars) in capital costs will be needed to develop an effective parishwide collection and disposal system. Operating and maintenance costs are projected to equal $134 million per year. These proposed waste management improvements include the formation of sanitation districts to lower per capita costs, upgrading the type of collection system for unincorporated or unserved areas, and the continued operation of separate systems in larger communities. In sum, an additional 41 landfill sites are necessary, 22 landfill sites must be upgraded, 4 landfills will be franchised operations, and 5 landfills will continue to operate in the present mode.

Compared to the alternative of a resource recovery system, regional landfills comprise a capital cost savings of $540 million and lower operating and maintenance costs of approximately $3.5 million per year. These estimates depend heavily on the demand for the steam generated from the resource recovery sites. Given a great enough demand, these sites may become cost effective and make resource recovery more feasible.

Revenues

The methods of financing municipal and parishwide solid waste management systems in Louisiana range from revenue sharing, to user fees, and to sales, property, sewage, ad valorem and special maintenance taxes or any combination thereof. In the future, the proposed capital investment and maintenance costs will probably have to be met by a greater reliance on debt financing backed by higher property taxes and/or user fees. Given the precarious nature of state and local revenues, it is uncertain as to whether or not local governments can adequately cope with the problem.

Needs versus Revenues

While the per capita costs of providing for solid waste disposal services is relatively less expensive than other utilities, local government budgets already appear to be overextended. Thus to ensure an adequate level of service and not to confer any distribution benefits to selected classes of individuals it is likely that higher user fees will be charged in the future to support solid waste disposal. Efficient marginal pricing techniques should be able to overcome any shortfall in revenues assuming individuals are willing to bear the burden.

APPENDIX

An important application of econometric models is the quantitative assessment of the impact of changes in economic policy. That is, it is important to understand the impact of a change in economic policy on target variables of primary concern to policymakers. Policy instruments such as state and local expenditures, tax rates, and the favorable tax treatment of tax-exempt interest rates vis-a-vis taxable securities can have differential effects on public policy. The simpliest technique of analyzing these impacts using an econometric model is known as multiplier analysis.

The purpose of this appendix is to derive policy multipliers to assess the comparative impact of different types of policies aimed at public infrastructure investment. The main advantage of multiplier analysis for quantifying these impacts is that once computed these multipliers can be used directly to approximate policy changes. However, the procedure also has certain limitations. Only if the policy changes are not very complex and assuming that several variables do not change at once is this relevant for computing approximations of dynamic real world responses.

Static Model

The model considers three behavioral equations and one identity:

(1) $X = cY$

(2) $T = aY + Fed$

(3) $STL = b_0 I - b_1 Rex I$

(4) $X + I = STL + T$

where X = government expenditures on goods and services excluding capital outlays, Y = real gross personal income, T = taxes, Fed = federal grants-in-aid, STL = supply of tax-exempt securities, Rex = tax-exempt interest rate, and I = government expenditures on capital outlays. Equation (1) is a consumption function of the demand for public goods and services provided by the government; equation (2) is a simplified behavioral relationship relating tax receipts to gross personal income plus federal grants-in-aid; equation (3) assumes that issues of tax-exempt securities should be strongly related to capital outlays and negatively related to tax-exempt yields; equation (4) is an identity which relates the sources and uses of funds.

In order to focus on the impact of policy variables on public infrastructure variables, Y, Fed, and Rex are considered exogenous (taken as pre-determined) while X, I, T, and STL are assumed to be determined within the system. The lower case letters a, b_0, b_1, and c denote behavioral coefficients. The coefficient c is the marginal propensity to consume; the coefficient a represents the fraction that tax revenues increase given an increase in gross personal income; the coefficient b_0 represents the relationship between issues of tax-exempt securities and capital construction outlays and b_1 reflects the impact of rising tax-exempt yields on issues of new securities.

Multipliers

The multipliers can be derived by solving this system of equations for the endogenous variables X, I, T, and STL. From these reduced form equations, the multipliers for public infrastructure investment with respect to a change in tax policy, a change in tax-exempt interest rates, a change in federal grants-in-aid and a change in real income are:

$$(5)\quad \Delta I = \frac{Y}{1-(b_0-b_1 Rex)}\Delta a$$

$$(6)\quad \Delta I = \frac{-b_1 I}{1-(b_0-b_1 Rex)}\Delta Rex$$

$$(7)\quad \Delta I = \frac{1}{1-(b_0-b_1 Rex)}\Delta Fed$$

$$(8)\quad \Delta I = \frac{(a-c)}{1-(b_0-b_1 Rex)}\Delta Y$$

where Δ refers to the change in the variable.

Let $a = 0.112$, $b_0 = 0.56$ and $b_1 = 20$.[54] Assuming that the income elasticity of the demand for government goods and services is 0.70, then the multipliers are[55]

$$(5')\quad \frac{\%\Delta I}{\%\Delta a} = 2.848$$

$$(6')\quad \frac{\%\Delta I}{\%\Delta Rex} = -.8035$$

$$(7')\quad \frac{\%\Delta I}{\%\Delta Fed} = .2289$$

$$(8')\quad \frac{\%\Delta I}{\%\Delta Y} = 1.065$$

From equations (5)-(8), it is obvious that these multipliers depend on the tax-exempt interest rate. Given a change in this rate, the multipliers also will change. Equations (5')-(8') can be interpreted as the percentage change in government investment given a percent change in the policy variable.

FOOTNOTES

[1] An Introduction to the Louisiana Statewide Flood Control Program, created by Act 351 of the 1982 Regular Session of the Louisiana Legislature, November 1982.

[2] See Richard W. Tresch, Public Finance: A Normative Theory, Business Publications, Inc. Plano, Texas, 1981, pp. 614-616.

[3] William J. Baumol and Wallace E. Oates, The Theory of Environmental Policy: Externalities, Public Outlays, and the Quality of Life, Prentice Hall, Inc., Englewood Cliffs, N.J., 1975, pp. 243-44, 248, 258-64, 265-66.

[4] A recent Louisiana Legislative Fiscal Office study indicates that state aid to local governments contain many distributional inequities on a per capita basis. Small parishes are favored over larger parishes whereas wealthier parishes are favored over less wealthier parishes. For more details see Louisiana Legislative Fiscal Office, Louisiana State and Local Fiscal Study, 1982.

[5] Data on intergovernmental aid are from Louisiana Legislative Fiscal Office, Louisiana State and Local Fiscal Study, 1982.

[6] See George M. VonFurstenberg and Burton C. Malkiel, "The Government and Capital Formation: A Survey of Recent Issues," Journal of Economic Literature, vol. XV (3), September 1977, pp. 835-878.

[7] J. Chester Johnson, "Current Financial Conditions and Capital Financing Options for State and Local Governments," Governmental Finance, vol. II, September 1982, pp. 51-55.

[8] Congressional Budget Office, Baseline Budget Projections for Fiscal Years 1983-1987, February 1982.

[9] Public Affairs Research Council of Louisiana, "Louisiana's Capital Budgeting: Progress or Paper Reforms," 1983.

[10] Tresch, Public Finance, pp. 44-59.

[11] R. Lipsey and K. Lancaster, "The General Theory of Second-Best," Review of Economic Studies, vol. 24, 1956-57.

[12] Peter Greenston and Carl Snead, A Selected Review of Urban Economic Development, Report prepared by the Urban Institute for the Economic Development Administration, May 1976.

[13] Benjamin Chinitz and Raymond Vernon, "Changing Forces in Industrial Location," Harvard Business Review, January/February 1960, pp. 126-136.

[14] Economic Development Administration, Survey of Industrial Location Determinants, 1971.

[15] Public Affairs Research Council of Louisiana, "Survey of Louisiana Manufacturers," 1975.

[16]Gary Fromm, "Civil Aviation Expenditures," in Measuring Benefits of Government Investment, edited by Robert Borfman, Washington, D.C., Brookings Institution, 1965, pp. 172-230.

[17]William J. Baumol, "On the Social Rate of Discount," American Economic Review, September 1968, 58 (4), pp. 788-802.

[18]R. S. Friedman, State and Local Relations in Highway Finance in Louisiana, Louisiana State University, 1962.

[19]Louisiana Department of Transportation and Development, Highway Needs and Priorities, 1981.

[20]La DOTD, Highway Needs, 1981.

[21]Investment needs for highways were obtained from the Louisiana Department of Transportation and Development, Office of Highways.

[22]Estimated based on average lane widths, thickness, road surface and terrain, Louisiana Department of Transportation and Development, Office of Highways.

[23]Richard A. Musgrave, The Theory of Public Finance, New York: McGraw-Hill, 1959.

[24]William G. Black, "Louisiana Revenues and Expenditures: The Next Five Years," Louisiana Business Review, Winter 1982.

[25]The information in this section is based on an interview with the officials of Louisiana Department of Transportation and Development, Office of Highways. All estimates regarding investment needs and revenues for bridge replacement and rehabilitation were obtained from information relating to that interview.

[26]According to the Louisiana Department of Transportation and Development, Office of Highways, local governments depend heavily on federal and state intergovernmental grants and probably do not have a sufficient source of own revenues available for bridge replacement.

[27]Louisiana Legislative Fiscal Office, Louisiana State and Local Fiscal Study, 1982.

[28]Louisiana Municipal Association.

[29]Source of information is from the Department of Civil Engineering, Louisiana State University.

[30]Average cost of resurfacing local roads is based on estimates obtained from Baton Rouge City Parish Government, Department of Public Works, Engineering Division.

[31]See Louisiana Department of Transportation and Development, Office of Aviation and Public Transportation, Louisiana State Rail Plan Update, 1981.

[32]See Louisiana Department of Transportation and Development, Louisiana State Rail Plan, 1981.

[33]The cost of rail rehabilitation per mile is taken to equal the total cost of rehabilitating past branchlines divided by the total miles of rail improved.

[34]This section is based on an interview with officials of the Louisiana Department of Transportation and Development, Office of Aviation and Public Transportation.

[35]Estimates of revenues for airports are based on data from the Louisiana Department of Transportation and Development, Office of Aviation and Public Transportation for the fiscal year 1983-84.

[36]For a complete description of public transit programs in Louisiana see Louisiana Department of Transportation, Office of Aviation and Public Transportation, Louisiana Mass Transit Study, 1979.

[37]Estimated investment needs and revenues for public transportation are from Louisiana Department of Transportation and Development, Office of Aviation and Public Transportation, Louisiana Mass Transit Study, preliminary 1983.

[38]Jim Bradshaw, "Ports: Pivot of Louisiana's Prosperity," Acadiana Profile, 1980, pp. 38-58.

[39]Louisiana Department of Transportation and Development, Office of Aviation and Public Transportation, Louisiana Rail Port Assessment Needs, 1982.

[40]See William L. Chaze, Robert Barr and Robert S. Dudney, "The $75 Billion Pork-Barrel Ripoff," U.S. News and World Report, vol. 97 (17), May 2, 1983, pp. 18-21.

[41]U.S. Army Corps of Engineers, New Orleans-Baton Rouge Metropolitan Area Water Resources Study, February 1981, pp. 205-212.

[42]Louisiana Department of Transportation and Development, Office of Aviation and Public Transportation, Louisiana Rail/Port Needs Assessment, 1982.

[43]Gulf South Research Institute, Present Municipal Water Use in Louisiana, October 1969.

[44]Roopchand Ramgolan, "The Pricing of Water in Louisiana," unpublished Ph.D. Thesis, Louisiana State University, 1974, pp. 91-98.

[45]Ramgolan, "The Pricing of Water in Louisiana," pp. 79-82.

[46]Ramgolan, "The Pricing of Water in Louisiana," pp. 82-90.

[47]These predictions are based on 1969 data. See Gulf South Research Institute, Present Municipal Water Use in Louisiana, October 1969.

[48]Ramgolan, "The Pricing of Water in Louisiana," pp. 98-103.

[49]See U.S. Army Corps of Engineers, New Orleans-Baton Rouge Metropolitan Area Water Resources Study, February 1981, pp. 31-78.

[50]The Louisiana Municipal Association ranked capital expenditures on publicly-owned wastewater treatment facilities and sanitation as a major barrier to urban development in Louisiana.

[51]Virginia R. Van Sickle, "The National Flood Insurance Program: A Regulatory Approach for Reducing Flood Losses," Louisiana Business Review, vol. 44 (12), December 1980, pp. 2-6.

[52]An Introduction to the Louisiana Statewide Flood Control Program, created by Act 351 of the 1982 Regular Session of the Louisiana Legislature, November 1982.

[53]Investment needs data for solid waste disposal are taken from Solid Waste Management State of State Report for Louisiana, Department of Natural Resources, Office of Environmental Affairs, Solid Waste Management Division, March 1983.

[54]These parameters are based on Baumol and Oates, The Theory of Environmental Policy, and Patric H. Hendershott, "Analysis of the Impact of Capital Specific Policies or Legislation: Application to Reforms of the Tax-Exempt Market," working paper, Purdue University.

[55]Tax-exempt rate of interest was assumed to equal 9 percent in the calculation of these multipliers.