ECONOMIC IMPACT ANALYSIS OF THE AREA OF CRITICAL STATE CONCERN DESIGNATION ON THE FLORIDA KEYS

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ABSTRACT

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The state of Florida recognized that the negative effects of development in the Florida Keys were extending beyond the local area and affecting the broader interests of the state itself. In an attempt to regulate growth and its effects, the state, in 1975, designated the archipelago off its southern coast an Area of Critical State Concern. Besides the environmental changes, this designation and its accompanying land use regulations have the potential to create economic impacts. This thesis analyzes the Keys' economy and determines if the critical area designation impacted the local economy.

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CHAPTER I

INTRODUCTION

When adverse effects of development activity within an environmentally sensitive area within the state of Florida extends beyond regional boundaries and affects the state's interests, the state has the legislative power to designate that region an Area of Critical State Concern (ACSC). The Florida Keys, the major land area of Monroe County, is one of three areas that the state has so designated. As a result of the designation development in the Keys has come under state scrutiny since 1975.

The construction and building that was taking place in the Keys, particularly the dredge and fill activity that accompanies development there, was creating negative impacts upon the ecological system. The state imposed the designation in the belief that the pattern of development in the Keys potentially created significant costs to the broader society which exceeded the benefits. The main thrust of the legislation was to regulate growth in a reasonable and planned fashion.

A majority of the citizens living within the Keys

favored the designation but many public officials and some business leaders resisted what they perceived as state interference. The opposition stemmed from fears that the designation would not result in efficient land management but would prohibit and restrict development to the point that land values and profit potential would decrease. They feared that restrictive regulations would impose costs in the form of foregone benefits, and result in a suppression of vital economic activity.

The restrictions upon land usages imposed by the designation result in the fundamental conflict between the right of individual ownership of private property and the right of protection of our common property, the environment. The American concept of private property has developed through social order and is well established through common law. Property, as thus defined by common law, includes the physical characteristics as well as an intangible aspect which results from expectations of future use and the anticipation of profits. Property values thus include both use and exchange values, but the latter exists on the assumption that the property can be bought and sold. If the perception of the buyers in the marketplace is that development of the land is highly restricted and that profit potential is decreased or eliminated, the exchange value decreases. The permissibility of development in the Florida Keys affects both the use and exchange values of private property (Commons, 1935).

Property owners have an exclusive right to control their economic goods, yet do not have unlimited charter to exploit their property to the extent that negative effects are created on other properties, private or common. Ownership is not an absolute right but involves social as well as individual responsibilities. The scope, incidents, and content of ownership are therefore subject to restrictions made in the general interest of society.

Governmental regulation that seeks to protect all properties in general through the regulation of land development runs counter to the rational behavior of the individual private property owner who wishes to exploit his or her property to the maximum. The problem of development activities infringing upon the neighboring property owners, both private and common interests, become acute with an increase of population densities.

Before the 1940s the construction activities within the Florida Keys, primarily the accompanying dredge and fill activities, were not as detrimental to the environment because only a small percentage of land was being impacted. With the increasing magnitude of private property development, the common property, the environment, was suffering negative effects.

The threat resulted from the accumulation of individual development activities. The analogy of the right to fire a weapon can be used to illustrate. Such an act is of little consequence in an isolated area but

compaction and urbanization create an aggregation of individual actions. With increased densities the potential risks to others override the individual's freedom, whether it be to fire a weapon or exploit one's property.

Laws exists which limit where an individual can fire a weapon, but such laws do not prohibit one from doing so in the right place and under the proper circumstances. The ACSC designation does not forbid development but attempts to regulate where and how development can take place. Population and economic growth have exacted a price from the environment. The accumulation over time of dredge and fill activities in the Keys has forced this readjustment of the parameters of the decision making framework.

The optimal amount of restriction and control is a political issue, the responsibility of which rests with policy makers. Environmental protection was the major goal of the participants in the designation process. The pursuit of that goal was tempered by concern for the economic well-being of the Keys.

In many areas environmental regulation has been cited as contributing to increased costs, decreased employment, and decreased income. There is a body of evidence which suggests that restrictions and growth control measures along with delays and uncertainty resulting from increased bureaucratic processing have contributed to an increase in housing prices across the nation.

The attempts to control growth in California have been

shown to add to construction costs by reducing the supply of building sites and imposing high hook-up fees for public services. Developers have revised their plans by building residences of lower density per acre to reduce the pressure on land areas. The result was a higher cost of housing from larger lot sizes. Increased regulatory procedures resulted in a decrease in the supply of housing, an increase in housing costs, a subsequent increase in property valuations, followed by an increase in property tax collections. The furor over increased taxation eventually unleased Proposition 13 which drastically slashed the amount of tax revenues available for public administration and services (Friedan, 1979).

An analysis of the effects of regulation such as the ACSC designation on the Florida Keys includes this issue of externally generated costs and also externally generated benefits. In economic theory the price system of the marketplace is the resource allocation device. For allocative efficiency to exist all costs and benefits must be acknowledged and registered in that marketplace. Only in recent decades have we as a nation seriously focused on the issue of environmental costs and become aware of the inefficiences of our market system in excluding the extra social and private costs of environmental destruction.

If a belching smokestack spews pollutants into the atmosphere, rusts automobiles, causes decay of buildings, or results in respiratory diseases, external costs of

production are being created for which the individual is not being compensated. These external costs of the billowing smoke are not registered in the pricing system. If the offending producer does not somehow pay for the externally created costs the pricing system has failed to fully incorporate all costs of production into the offering of the good in the marketplace. In a modern economy such as ours external effects in production and consumption are a prevalent form of market imperfection. External costs and benefits, or in economic terms, externalities, are defined as follows: production or consumption by one economic unit affecting the productivity or well-being of another economic unit when no compensation is paid for the externally generated benefits or costs. Two conditions necessary for externalities to exist are: (1) inter-dependence between economic units; and (2) non-compensation for the effects of interdependence (Hyman, 1973).

The needs and rising expectations of an increasing population have been met by modern industrialization and development. Intense concentrations of activity have led to a deterioration of our environment because not all costs of the production process are being considered. Theory provides us with methods of internalizating these elusive externalities. Bargaining between economic agents, compensation of the affected agent by the offending agent, taxation, and regulation, are ways to create equitable solutions or at least tolerable compromises (Savage, 1974).

For the pollution example given above complex yet manageable solutions can be attained. The polluter can be identified. Particles in the atmosphere can be measured. Toxic levels can be determined. The effects can be quantified. The offender can install pollution abatement devices or an emissions tax can be imposed. Either will cause costs of operation to increase which will likely be passed onto the consumer in the form of higher prices. The commodity produced would then include all costs. We say that costs have been internalized.

The above senario is greatly simplified but situations such as these have been recognized and a variety of actions and methods have been used to combat such problems. However, in more complex situations where unquantifiable externalities cannot be internalized through correction of the market system or when internalization is impractical, the only recourse is regulation. Such is the case in the Florida Keys. However, controlled land use development to minimize negative externalities has the potential to create additional externalities, either positive or negative.

The important issue of whether the designation has created economic impacts on the Keys has not been determined. The validity of the fears of increased costs or economic suppression have not been verified nor dispelled. An analysis of economic factors such as changes in property values, income levels, construction activities, and employment fluctuations is needed to assess the

economic impacts of the ACSC designation to determine if positive, negative, or no externalities resulted. The purpose of this thesis is to make that assessment.

The economic variables that will be studied are those that register quantitative changes as a result of a shift in economic activity. There are data limitations that prevent the analyst from using the ideal variables, especially in the housing area. The isolated and remote character of the Keys that lends the area charm and distinctiveness is a disadvantage for analytical study. Many statistics simply have not been recorded, particularly for the period prior to the 1970s. Some minor shifts in goals, therefore, were necessary as data collection progressed. Additionally, the extent of implementation of regulations and procedures has to be considered, as well as the psychological impacts of expectations of changes that the designation may have caused.

This thesis takes a macro-perspective by concentrating upon the aggregate quantitative changes in the Keys' economy since the time the designation was made. Two complementary yet different methods of analysis were used: a six-year forecast model of expected growth or decline based upon activity in two comparable areas; and, an econometric covariate model of Monroe County and the two comparative regions which plots the economic trends from 1965 through 1981. Both include time series regression techniques.

There are inherent dangers in an analysis of a regional economy over time. The two compartive study areas were included so that outside contractionary and expansionary forces could be isolated and thus not be confused with effects created by the legislation. The economic activity of the state of Florida was used for comparative purposes, as well as the economic activity of Charlotte County. This comparative county was chosen on the basis of similarities to Monroe County in 12 geographic, demographic, and economic categories. This extensive comparison was considered necessary because the Keys are an unusual region and fluctuations in the economy could otherwise be misinterpreted.

The economic concepts of public goods and externalities are discussed in Chapter II. Because the private sector does not provide a sufficient amount of certain goods, the public sector often attempts to fill the deficiency. Regulation of land uses falls into the category of public goods and in this case is provided because of the existence of externalities. The Keys' residents are concerned with the externally generated costs which directly affect them as well as the external benefits resulting from the preservation of their environment.

Chapter III provides a sketch of the history of land use legislation and explains the ACSC designation process. The impetus for the designation and the implementation procedures are discussed.

A description of the Keys' physical character and an outline of historical development follows in Chapter IV. The support groups involved in the designation process are indentified and the results from two surveys of the Keys' residents taken in 1975 and 1981 are explained.

Chapter V contains a literature review of similar impact studies and explains the methodology used in this analysis, and establishes the criteria used in the selection of the economics variables. A brief explanation of regression analysis is also included.

The economic impact analysis is addressed in Chapter VI. The forecasts based on the growth rates of the comparable study areas are derived, tested, and compared with actual activity in Monroe County. The covariate model is explained, the results are analyzed, and a comparison is made with the results of the forecast model. Interpretation and conclusions complete Chapter VI and the thesis.

CHAPTER II

PUBLIC GOODS AND EXTERNALITIES

The regulation and management of land usages results in the conflict of private versus common property resources. Private property rights have been established through the growth of common law but individuals who do not have such vested interests may suffer damages incurred from losses through abridgement of continued use of common property resources (Krutilla & Fisher, 1975).

Construction activities that proceed without concern of environmental awareness cause irreversible damages and impose external costs upon residents and visitors of a region. The need for land use planning in environmentally sensitive areas has been acknowledged but the attainment of such seldom comes without governmental regulation. This results from a deficiency of the market system which has not adequately provided the necessary restraints on development to protect the public's interest. Government, representing the public sector, can step in to fill the need through the provision of public goods, such as land use control.

Public Goods

A public good is defined as a good which if available to one is available to all others, and therefore, cannot be sold and bought in the marketplace (Bohm & Kneese, 1971). Other examples of such goods are: national defense, flood control, and weather forecasting. The private goods including resources such as land, labor, and capital have prices. Through the price system these scarce resources are efficiently allocated to production of outputs which are of highest value to people (Emerson, 1972). Public goods do not have the market forces of demand and supply to establish a price level for there exists no organized market structure in which buyers and sellers reveal their preferences through prices.

There are inherent characteristics of public goods which create a free rider effect. Benefits are indivisible, consumption is non-rival or joint, and exclusion of others is neither feasible nor efficient. Once a public good is provided everyone else benefits as consumption by one individual does not prohibit consumption by another. When asked to pay, the individual thus has a tendency to understate his true preferences, knowing that if the good is provided by someone else he cannot be excluded from its benefits. Given these conditions there is an incentive to let others pay, that is, become a free rider. A public good thus becomes a complete externality.

Because others cannot be excluded the benefits

spillover and society's gain exceeds the individual's. The potential purchaser does not take the external benefits into account and views costs to be greater than personal benefits. Consequently, private markets tend to under-allocate resources to public goods (Nicholson, 1979).

For example, if one individual is able to buy better air quality, all others in the vicinity benefit. Because on an individual basis each person has the incentive to let the other person pay, each individual's self-interests prevent agreements from being reached between those who cause the deterioration and those who suffer from it. The failure of the market system to establish a pricing system and therefore to deal adequately with public goods is a basic cause of environmental destruction (Maler, 1974).

Besides the free rider effect the determination of the quantity of public goods needed or demanded is difficult to ascertain.

For the moment let us suppose that it is possible through the use of a well-designed and unbiased questionnaire to learn actual demand for public good X and estimate the relevant social demand curve. The researcher vertically sums the individual demand functions to obtain the total market demand. Figure 2.1 represents the vertical summation of the individual demand curves, d_1 and d_2, to obtain the market demand curve, D, in the case of an indivisible public good.

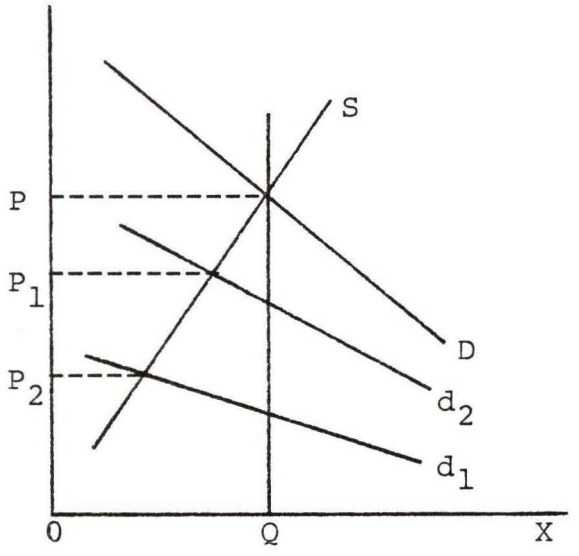

Figure 2.1: Vertical demand summation for a public good.

The exclusion principle is not applicable to the consumption of the benefits because both consumers each individually consume the total quantity of the public good. The joint consumption of the indivisible public good precludes the individual from being able to vary the quantities of the good. All individuals must consume equal amounts regardless of the price they might be willing to pay. In Figure 2.1 consumer 2 will be willing to pay a higher price for his or her quantity of the good than consumer 1 would be willing to pay (Herber, 1979).

As mentioned before, individuals understate their preferences for a variety of reasons including fear of tax increases or hope that others will bear the costs. It is therefore difficult to accurately assess how much of a public good to produce. Even if the quantity demanded could be pinpointed, public goods are not likely to be

produced in socially correct amounts unless a society forces itself, through government, to make payments that otherwise are withheld and thus bring environmental resources into the economic system. Thus the production of public goods become a matter of social rather than individual choice.

Externalities

The need for the provision of a public good is sometimes the result of the presence of externalities. An externality is defined as: the production or consumption of one economic unit affecting the productivity or well-being of another economic unit when no compensation is paid for the externally generated benefits or costs. An external gain is referred to as a positive externality or external economy. It has a beneficial spillover effect that increases the welfare of those not directly involved. An external loss is referred to as a negative externality or external diseconomy. It decreases the welfare of the affected agents.

An important aspect of externalities is that they are incidental by-products of the production process. Externalities are not considered, are not part of the calculations involved in determining the costs or levels of production. It is also very difficult to internalize spillovers into the pricing system. If productivity does not suffer, the producer is not penalized in any way (Mishan, 1976).

When the pricing system of the marketplace fails to register all the external costs, those of environmental decline in this case, the social costs exceed private costs of production. Consider the graph:

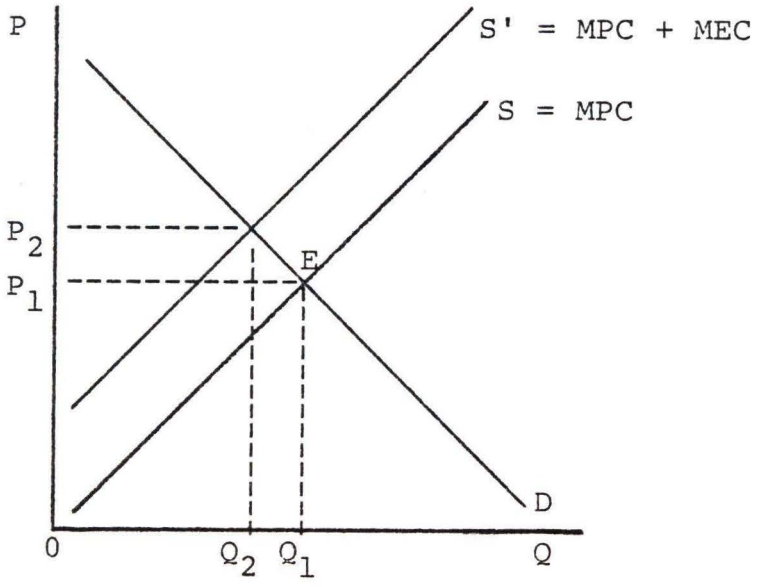

Figure 2.2: External diseconomy in a competitive industry.

S = supply,

D = demand,

MPC = marginal private costs of production,

MEC = marginal external costs of production,

E = initial equilibrium output.

Q_1 represents the amount offered in the market system and the price level rests at P_1. When all costs are incorporated the supply is restricted to S', the quantity offered decreases to Q_2, and price increases to P_2 to reflect all costs of production. When external costs are not included in the costs of production the optimal amount

is not produced and there is not an efficient allocation of resources.

As shown, equilibrium output of an industry which generates an external diseconomy is in excess of the optimal output, Q_2. The difference in market price, the vertical distance between S and S', is equal to the marginal external resource costs, or the social value of the marginal diseconomy. Conversely, if the competitive industry generates an external economy (social benefit), its equilibrium output is below optimal which could be obtained by equating its marginal private resource costs to the market price plus the social value of the marginal external economy (Mishan, 1971).

Solutions and Alternatives

The traditional remedy in such cases is the tax/subsidy solution as espoused by A. C. Pigou in Economics of Welfare (1960). As suggested by Pigou, those who generate external diseconomies should be subject to a unit tax proportional to the damage. Such an excise tax is levied on the producer equal to the value of the marginal external diseconomy. Upon correction, scarce factors of production are properly priced and both production and optimal output levels are met. Conversely, any production of a good generating an external economy (benefit), should be offered a subsidy equal to the value of the marginal external economy at optimal output. This incentive to

production extends output beyond the competitive equilibrium level.

The obstacle to this type of solution is the cost of collecting the necessary information and the cost of supervision. These costs would be particularly heavy for industries in which demand and supply conditions are apt to vary frequently (Mishan, 1971).

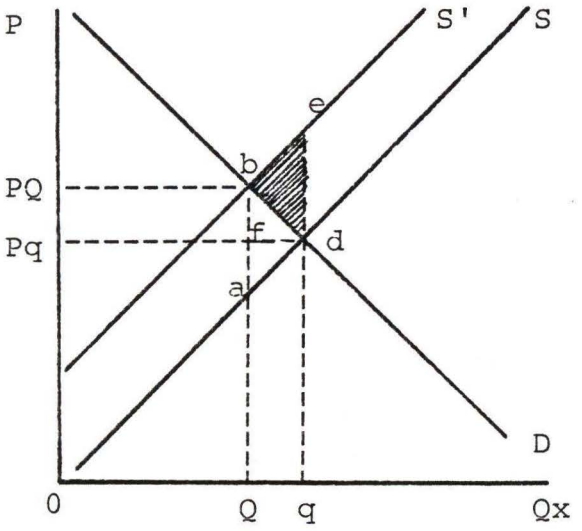

Figure 2.3: Internalization of diseconomy through taxation.

S is equal to the marginal private costs (MPC) of output X. The vertical distance between S and S' is the unit cost of spillovers generated in production. Optimal output level, OQ, can be achieved by an excise tax equal to the vertical distance between S and S'. After the imposition of the tax producers regard S' as the new marginal cost curve and the gains to spillover victims is equal to the area abed. From this gain the losses to two other groups, the consumers and producers, must be

subtracted. The consumers experience a loss equal to fdb; the producers equal to fda. The residual gains are: abed - (fdb + fda) = dbe. The distribution of welfare is more equitable (Mishan, 1971).

There are many who support Pigou's suggestion. William Baumol (1972) believes that settlement through emissions taxes will achieve the optimal allocation of resources. In pollution abatement issues this can be done by setting pollution control standards. Pigou's system designs taxes and effluent charges whose rates are shown by experience to be sufficient to achieve acceptability.

Milton Friedman also believes that the best method is to introduce market discipline by imposing effluent charges. Instead of requiring specific abatement controls, a tax on the amount of effluent discharged will give firms an incentive to use the cheapest methods and also put the costs on the users of the products responsible for the pollution. The products that are expensive, pollution-wise, would increase in price relative to those that are inexpensive. The demand would decrease, output would decrease, and pollution would decrease (Friedman, 1979)

Other solutions besides the Pigovian tax/subsidy programs have been proposed. Outright prohibition is one, which is rather naive and impractical. We could have zero pollution from motor vehicles by banning their use, hardly a desireable solution. Society must weigh the gains and

losses, must make compromises. Additionally, pollution itself is a subjective phenomenon. Rock music is noise pollution to some; while to others it is pleasure (Friedman, 1979). Moreover, optimality does not require that external diseconomies be eliminated but that their amounts be consistent with the optimal amounts of goods that create them. Determining the costs and maintaining an optimal amount of the pollution may itself be prohibitive (Mishan, 1971).

Voluntary agreements through negotiation and bargaining between producers and victims is another alternative. The famous Coase Theorem implies that through bargaining between the agents doing the producing of the commodities and the agents affected by the negative impacts, the ideal solution could be achieved and the externalities internalized. The ability to bargain freely causes the true social costs to be recognized by each (Coase, 1960). For example, if negligible time and effort are required for the non-smoker to bribe the smoker to desist from lighting a cigarette, both can be made better off by the arrangement (Mishan, 1976).

In reference to Figure 2.3, there will be an incentive to move from output Oq to OQ since by so doing there would be a gain equal to the area of the shaded triangle to be shared between the beneficiaries of the good X and spillover victims. The maximum amount the victims will pay to reduce the market output by qQ is given by the

parallelogram area abed, while the loss to producers and consumers from decreased output by qQ is equal to the area of the triangle abd. Additionally, this theory assumes that all parties enjoy equal bargaining positions (Mishan, 1971).

It would appear that those who are harmed could bargain with the creators of the problems and improve allocation of resources. These possibilities may exist when individual firms can be recognized. With environmental destruction, however, the bargaining ability disappears because of high bargaining costs associated with environmental externalities. It is too difficult to organize the many individuals and to calculate monetary losses. The legal systems also are not set up to adjudicate rights of diffuse groups. Information, bargaining, and enforcement, in establishing property rights to environmental externalities are so high that it becomes highly unlikely that efficient solutions can take place through private action (Nicholson, 1979).

Government regulation, the alternative chosen for the Keys, is another possible solution. Governments attempt to internalize the externalities and hopefully achieve the optimality position of covering all costs and attaining efficient market conditions. This solution is used when it is impossible to assign or define private transaction costs resulting from growth.

To illustrate the concept of optimal control as

measured in costs and benefits:

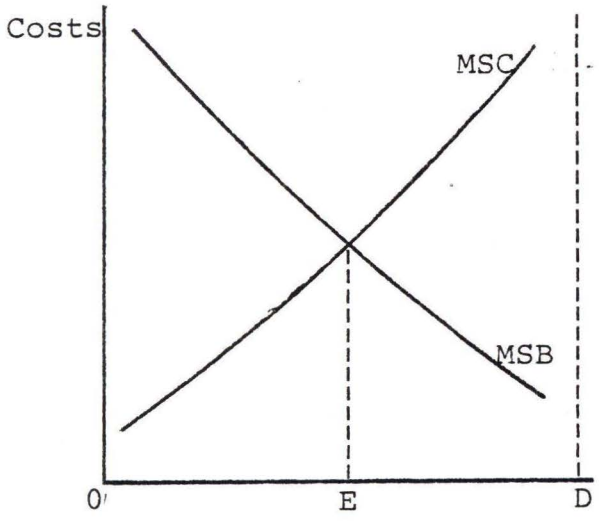

Figure 2.4: Marginal social costs and marginal social benefits equilibrium optimal output.

MSC = marginal social costs,

MSB = marginal social benefits,

E = optimal amount of allowable destruction and environmental control,

D = 100% elimination of environmental destruction.

The government, in an attempt to equalize the costs and benefits of production establishes regulations so that a realistic compromise of control and a tolerable level of environmental destruction can be realized (Savage, 1974).

All costs must be considered, including the costs of establishing and enforcing property rights, the costs of private transactions, the costs of gathering information, the costs of the political process, and also those of foregone output. When costs of establishing and enforcing property rights are high, government action is likely to be the efficient method of internalization. Through

regulation market participants are forced to consider their interdependence by paying appropriate compensation to, or receiving compensation from, the affected parties so as to achieve efficiency. Externalities are then internalized. In well-defined cases the effects can be determined through recognized methods of calculation (Hyman, 1973).

The approach often taken in an attempt to control pollution is to establish a government regulatory agency that has discretionary power to issue specific rules and orders enforced by sanctions imposed by the agency or by the courts. Part of the problem in such attempts is that the factors that produce market failure also make it difficult for government to succeed (Friedman, 1979).

The ACSC designation upon the Florida Keys is a type of government regulation, without the establishment of an agency, designed to internalize the negative externalities of environmental deterioration and provide the public good of land use control. The private market has failed to cope with the externalities related to the environment and has failed to adequately control land uses. Inefficient allocation and non-optimal amount of production has resulted in partial destruction of an ecologically fragile ecosystem. The result has been: environmental destruction from construction activities; pollution through disposal activities; high noise levels; visual pollution from signs and billboards; and in general, an insufficient amount of control of land uses.

The environmental destruction in the Keys is very complex. Measurement of gains and losses from misuse and exploitation of resources is not a straight-forward exercise, particularly when the resources elude quantitifacition and oftentimes complete description (Krutilla & Fisher, 1975). Identification of destructive sources is possible but estimation of external costs and benefits prevents the feasibility of other types of solutions. Environmental standards have been set through the political process with the responsibilities for enforcement at the local level.

However, government measures themselves create externalities. Upon regulation, we are faced with another round of external costs and benefits. This thesis attempts to determine if the external costs imposed on the private sector's economic structure by the designation exceed its benefits.

CHAPTER III

LAND USE LEGISLATIVE HISTORY

Formation of Government Control

The first towns and cities established on American soil were patterned after the European style with municipal governments having considerable authority. These governments could approve or disapprove of physical changes to the city, could own or dispose of vacant city land, as well as hold monopolies on certain aspects of trade. They had the authority to guide and direct the physical form of a community as well as its social and economic policies. Municipalities lost this power after the Revolutionary War with the adoption of the Constitution. They became agents of the states and functioned under city charters or legislative enactments which allowed them very limited power. Cities had no authority to control the development of private property and the states basically ignored such development (American Planning Association, 1979)

External effects of land use development in the urban property market created a need for zoning and restriction of incompatible neighboring land usages. In the first quarter of this century municipalities waged a compaign to

gain control back again and were successful in obtaining from the state legislatures the power to zone. In 1916 New York City set the precedent by adopting the nation's first comprehensive zoning ordinance. Shortly thereafter, in 1922, the U.S. Department of Commerce issued a Standard State Zoning Enabling Act (SSZEA) which became the state model for zoning power (Pelham, 1979).

Up to this point the zoning concept had no strong constitutional foundation. Then, in 1926, the U.S. Supreme Court established the constitutionality of comprehensive zoning in Village of Euclid v.Ambler Realty Company. A majority of the Court reversed a federal trial court by ruling that zoning, in principle, was a valid exercise of delegated police power. This landmark decision became the building block for American city planning and zoning, yet it did not settle the question of whether a particular regulation, as applied to a specific piece of property, was valid. Shortly thereafter, in 1928, the U.S. Supreme Court addressed that issue in Nectow v. City of Cambridge. The Court ruled that a regulation which limited an individual parcel of property to residential use was invalid. Hence, it was established that zoning was constitutional but that police powers may not be exercised in a discriminatory manner to affect particular individuals (American Planning Association, 1979).

All fifty states eventually adopted zoning enabling acts which gave municipalities the exclusive control of

land. The SSZEA allowed the exercise of zoning power for the "health, safety, morals, or general welfare" of its people. The last qualification was too general of a principle and became a basic defect of the model. Each municipality interpreted the concept of general welfare to serve its own parochial interests. Regard for adverse impacts on regional or state levels were ignored. Judicial relief at the Federal level was almost non-existent and the state courts were only slightly better. Legislative action was needed (Pelham, 1979).

The Quiet Revolution

In the late 1960s and 1970s a "quiet revolution" of land use control brought about reform. States such as Hawaii, Massachusetts, California, Oregon, and Florida reasserted their involvement in local land use decisions. When the municipalities initially had claimed land use control there had been little resistance, but the reversal of an established process was not without complications. There exist an entrenched regulatory system and thousands of individual local governments all seeking to maximize their self-interests. Controversy reigned because of the imposition of tighter restriction on the use of private property. There was political and ideological opposition to the centralization of land regulatory power.

Local governments have objectives and operate under constraints and incentives similar to those of persons and

firms. Through the enabling acts they are granted police powers by the states and are assumed in law to represent a public interest, which is in fact a small and particular public. The avoidance of dilution of the tax base, minimization of tax exports, prevention of alien use of local public goods, and avoidance of pure competition among their members are primary motives which do not allow the broader public interests to be served. To correct this situation it has been suggested that the power and duty of the states should be to structure local incentives to constrain local governments to serve all by serving themselves.

In 1963 the American Law Institute (ALI) reexamined the Standard State Zoning Enabling Act and in 1975 proposed a Model Land Development Code. This Model Code placed considerable emphasis on the relationship between state and local governments in the land use control regulatory system. The intent was to aid local governments in development and implementation of land use controls. (American Law Institute, 1975).

Florida took action. In the last decade the state dramatically shifted its position and passed land use legislation that reflected a shift in the state's treatment of land and resource planning. It set state standards for the local decision making process and extended some zoning and planning control back to state level.

Prior to the 1970s one would never have surmised that

this state would become a vanguard of land use legislation and environmental protection. Afterall, in 1949 Florida had been the last of the then 48 states to adopt the SSZEA. The state had been dragging its heels in enacting any environmental legislation and rapid uncontrolled growth was exerting pressure upon Florida's unique ecosystem which includes some of the country's longest coastlines. The recognition was forced by the pressures of a booming population, and, particularly, by a severe water crisis in 1971 (Pelham, 1979).

Back in 1922, when the SSZEA had been issued, Florida had been the 32nd largest state in the union with a population of approximately one million. By 1970 state population had swelled to 6.7 million. Florida was the fastest growing state at that time and had leaped to ninth position in population size. The 1980 census verifies that Florida has continued its rapid growth trend. Today the state has over 10 million people.

Florida's Environmental Approach

Governor Rubin Askew initiated action by forming a Task Force for Resource Management from which flowed a tide of proposed legislation to control development in an orderly fashion. In 1972, four bills were passed by the Florida Legislature as a result of the Task Force's recommendations:

(1) The Environmental Land and Water Management Act

(2) The Water Resources Act

(3) The Land Conservation Act

(4) The Florida Comprehensive Planning Act (Peckham, 1977).

In a 1972 article for the Florida Naturalist, then Senator-now-Governor Bob Graham outlined three underlying concepts considered in the formulation of the legislation:

> (1) Local governments should continue to have total responsibility for those land use decisions which only affect persons within their jurisdictions, including the decision not to have land use regulations at all.
>
> (2) The state role is to represent the broader public interest in those land use decisions which have a substantial regional statewide impact.
>
> (3) The line between private property rights and governmental regulation through the police power is unchanged. The same constitutional standards which operate when a local government regulates private land will apply to state actions (Graham, 1972, p. 148).

The Environmental Land and Water Management Act of 1972, Florida Statutes, Chapter 380, was the major piece of legislation. It was based on Tentative Draft Number 3 of the American Law Institute's Model Land Development Code (ALI-MLDC). Article 7 of the Code was designed to assist the states in finding a workable method for state and regional involvement in land development regulation. The Land and Water Management Act granted the state

constitutional power to regulate land by assuring state involvement in areas of regional and state impact.

As a result of the combined legislation, particularly the Florida Comprehensive Planning Act, all land use decisions are subject to a mandatory state and local comprehensive planning process, the purpose of which is to establish a coordinated and well-planned state. Local governments must adopt a comprehensive plan that is subject to state and regional review and which is consistent with state planning goals and guidelines.

The Land and Water Management Act contained two important land use tools: Development of Regional Impact (DRI) statements and Area of Critical State Concern (ACSC) designations. A DRI analysis must be made where development affects regional or state interests. Proposals for airports, hospitals, and ports are a few examples of selected activities that require a DRI statement because of the far reaching effects they create beyond a local area.

The designation of a discrete geographical area as an Area of Critical State Concern is designed to protect state and regional interests where any or all development is of more than local concern. An area that possesses unique characteristics of significant interest to the state or region and contains land use interdependencies that require comprehensive, areawide planning and regulation is singled the state for special regulatory treatment (Pelham, 1979).

ACSC designations are an attempt to serve the boarder interests without depriving the local governments of their police powers, to encourage and compel them to recognize the need for local land-use planning. They assign to the state the task of aiding local governments in their management of development activity, consistent with local regulations. This is different from the tack taken by Hawaii and Vermont where the state took over the task of development regulation (Nicholas & Crawford, 1976).

Chapter 380.05 of the Florida Statutes defines an Area of Critical State Concern as one that meets the criteria of at least one of following categories:

> (1) An area containing or having a significant impact upon the environmental, historical, natural or archeological resources of regional or statewide importance.
>
> (2) An area significantly affected by, or having a significant effect upon, an existing or proposed major public facility or other area of major public investment.
>
> (3) A proposed area of major developmental potential, which may include a proposed site of a new community designated in a state land development plan.

Critical area controls are categorized into three general types: selected activities, ad hoc basis, and comprehensive control. Shoreland and coastal citing laws are examples of state regulations of selected activities in certain sensitive areas. Legislation on an ad hoc basis has been implemented by California, Massachusetts, New

Jersey, New York, and North Carolina, in an attempt to regulate entire geographical regions. Comprehensive statewide regulatory mechanisms have been employed by Colorado, Minnesota, Nevada, Oregon, Wyoming, and Florida (Pehlam, 1979).

The Florida ACSC process has three phases: designation, regulation, and adjudication. Originally, the designation was made by an Administrative Commission consisting of the Governor and six popularly elected constitutional officers. The Commission could designate only on recommendation of the Division of State Planning and was restricted by law not to designate more than five percent of Florida's land areas. There exist no statutory standards for ACSC designations but the purpose is to set forth principles for guiding the development of the area when local government cannot or will not adequately protect broader areal interests (Pelham, 1979).

Although the Environmental Land and Water Management Act creates the designations for Areas of Critical State Concern, the Florida critical areas regulatory process is derived from the Florida State Comprehensive Planning Act of 1972 and the Florida Local Government Planning Act of 1975 as well. The requirements of the three acts have not evolved into a well coordinated regulatory system. The administration of critical area regulations is the exclusive responsibility of local government. The effectiveness of any regulatory system depends on

enforcement, a function contingent upon adequate staffing and budgeting at the state level. Whether or not funding has been provided to sufficiently fulfull that need is a matter of debate.

Once an area has been designated, the state planning agency has jurisdiction to review a broad range of local actions, including the granting or denying of building and zoning permits, variances, and plat approvals.

Development orders issued by local governments must be compatible with local development regulations. Local governments must notify the Division of State Planning of any applications for development permit and allow division review. If proposed developments do not appropriately interface with development regulations the division can instigate appropriate judicial decisions to compel proper enforcement (Florida Statutes 380.05(0)).

Most disputes between the state and local governments in the Keys have been resolved on an informal basis. Local governments have willingly modified unacceptable development orders as requested by the Division of State Planning. In re City of Key West Ordinance Nos. 76-8 and 76-112 was an exception. The state planning agency appealed to the Adjudicatory Commission who in turn ruled in favor of Key West. The question involved two local ordinances granting a rezoning and a variance for property located within the Key West Historic Preservation District. It was decided that the ordinances were consistent with the

guiding principles for development (Pelham, 1979).

The ACSC designation under the Florida State Comprehensive Planning Act specifies objectives and policies for 12 land-related resource categories: air, uplands, wetlands, water, soils, agriculture, minerals, amenities, beaches and dunes, natural hazard areas, transportation facilities, and electric power facilities. Under the act all local governments are required to adopt comprehensive plans which must be coordinated with the state plan. All local land development would then be consistent with the state plan. Unfortunately, this act was not as effective as originally hoped because the legislation relegated the state plan to an advisory role rather than a mandatory role (Florida State Comprehensive Plan i-ii, 1978).

The LGCPA, however, was much more substantial. Under its decree local governments must prepare and adopt an acceptable comprehensive plan (Florida Statutes, Chapter 163.3168(2)-(3), 1977). Municipalities had until July 1979 to comply, if not, they were under the jurisdiction of the county comprehensive plan in which the city was located. If a county did not meet the deadline, the Division of State Planning was to recommend a plan to the Administrative Commission (Florida Statute 163.3167(4)-(5), 1977). The local comprehensive plan therefore became the primary instrument for land use planning and coordination of planning among the local, regional, and state levels.

The LGCPA:

(1) Requires local governments to plan and that they must adhere to the plans they formulate.

(2) Requires consistency among various comprehensive plan elements.

(3) Encourages intergovernmental coordination.

(4) Makes environmental matters visible.

(5) Requires public participation in the planning process.

(6) Requires periodic evaluation (Dimmett, 1978).

Intent of the Act was to enable counties and municipalities to "plan for future development and to prepare, adopt, and amend comprehensive plans to guide development" (Florida Statutes 163.168(1)).

The ACSC designation intertwines the requirements of the Local Government Comprehensive Planning Act, the Florida State Comprehensive Planning Act, and the Environmental Land and Water Management Act, with the addition of state supervision. Chapter 380.05(14) of the ACSC mandates: "Any local government which lies wholly or partially within an Area of Critical State Concern and which has adopted a local government comprehensive plan pursuant to Chapter 163 shall conform such plans to the principles for guiding development for the Area of Critical State Concern." The interrelationships of the laws subject the comprehensive plan of the Keys to requirements of Florida Statutes 163 and 380.05. Ideally, ACSC

designations should provide incentive for local governments to adopt land development regulations that achieve the state's purposes and meet local government objectives

Upon designation of a discrete geographical area, standards are specified that must be met by local government's land development regulations. The local government has 180 days to transmit land development regulations to the state planning agency for approval. If they comply with the guiding principles, they must be approved in 60 days, otherwise the planning agency recommends regulations to the Administrative Commission. State imposed land regulations are not effective prior to legislative review of the original rule designating the areas. If approval of the regulations are not made within 12 months of the designation, it is no longer in effect (Finnell, 1980).

When a development is proposed the local government conducts an initial hearing and issues the development order. Permits are granted or denied, and unless appealed to the Florida Land and Water Adjudicatory Commission, the order is final.

CHAPTER IV

THE FLORIDA KEYS

The Environment

The 97 islands of the Keys create an archipelago off the southeastern tip of Florida. "Key" is a derivation of "cayo" a Spanish word meaning small low-lying island. Each island is surrounded by a ring of shallow intertidal waters which provide nutrients, shelter, and habitat for biological productivity. These sensitive environments are ideal for many plants and animals unknown elsewhere in the United States.

Residents and visitors also are dependent on these waters for economic and social benefits. The commerical and sport fishermen share the offshore reefs with divers who plunge below the emerald waters to discover the beauties of life among the coral reefs. The spiny lobster is pursued by the amateur diver out for sport, excitement, and dinner, while the commercial lobstermen depend on the same species as a source of income. Shrimp is another crustacean which provides a livelihood to the professional and an occasional meal to those who have studied their migrational patterns. The endangered Florida manatee, nicknamed the sea cow, also makes its home in the warm

shallow waters.

One finds an unusual variety of animal life in the Keys. There are Key deer, American crocodiles, and the birds that Audobon meticulously recorded: the white ibis, great white heron, mourning dove, least tern, and egrets. Even the uninitiated tourist can spot osprey nests high above the ground on the tops of utility poles.

These are some of the more obvious elements of a subtropical coastal environment but the ecological support system is much more complex. The coastal zones serve a multiple of purposes which create interdependencis among the various systems within the environment. The coast maintains a freshwater head and protects coastal aquifers from saltwater intrusion, filters out sediments, absorbs pollutants, and offers storm protection. Recreation, open space, transportation, commerce, economic development, mineral resources, education, and research are other important features provided by coastal regions (Coastal Coordinating Council, 1974).

The dredging of canals and filling in of marshlands to create a suitable base for construction interferes with and often destroys the habitats of a wide range of marine and land animals and is probably the most destructive activity that occurs in the sensitive and vital coastal zones. When water flow patterns are redirected and sea walls constructed these organisms and their habitats are destroyed.

The introduction of canals into inland areas alters the salinity levels of inland waters. Each species that lives and breeds in these waters has a specific salinity-fresh water requirement level. The nesting areas of many birds, reptiles, and other shoreline inhabitants are destroyed by the alteration of landscape.

Historical Background

The Calusa Indians were the first known residents of the Keys. Other Indian tribes followed, then the Spanish, the pirates, and eventually transplanted white Bahamians whose original roots go back to England. The latter group was nicknamed "Conchs," because of their sympathies with the British during the Revolutionary War and their slogan, "I'd rather eat conch than fight." "Conchs" became a term to identify this particular cultural group and is used today to mean a long term resident of the Keys.

The Conchs were isolated from the rest of the United States due to the remote nature inherent to island life. Their economic and social patterns were more closely aligned with that of Spanish Cuba, 90 miles south of Key West, than that of the mainland. In the early 1900s Henry Flagler built the Florida East Coast Railroad which linked the Keys together and tied them to Florida. When a hurricane destroyed the railroad in 1935, the Overseas Highway was constructed on the remaining bridge structures.

The Keys developed slowly and basically retained an

isolated, independent, and unspoiled character until progress made its mark in the early 1940s. Technological advancement invaded in various ways: automobile transportation improved; the Navy established a base in Key West and installed an aquaduct to bring in fresh water; air conditioning made year-round living much more pleasant and appealing. At this time all of South Florida began to experience rapid growth, and the Keys did not escape the onslaught of the tourist-turned-resident.

The increased population pressures strained the natural resources. The distinctive charm of the Keys began to fade. The development that took place was largely uncoordinated. Zoning codes in Monroe County were not established until 1960; for the next 16 years zoning activities appear to have been on an ad hoc basis due to a lack of a comprehensive or land use plan. Aerial photographs served as county zoning maps and were not available for distribution. Only the Director of the County's Building and Zoning Department functioned as a planner.

As such haphazard development occurred, the natural balance of the sensitive and unique properties of the Keys was disturbed. The environment, economy, and character of the Keys suffered from manipulation and exploitation. Illegal and improperly managed dredge and fill operations as well as inadequately treated or improperly disposed waste materials were primary causes of environmental deterioration. Dredging activities proved detrimental to

fisheries and were the cause of elimination of many inshore nursery areas. Six to seven thousand acres of mangroves, which have signifcant value in the food chain, were removed between 1950 and 1973. Pollutants caused degradation of water quality and hence water-based recreation and tourism were affected. A 1974 study showed that the offshore coral reefs had been severely impacted. The influx of new residents into the city of Key West threatened the historical district with encroachment of incompatible uses and designs. It was widely feared that the military base, a major employer, would close because of construction of high-rises in noise and hazard zones of the Key West Naval Station.

Increased traffic congestion resulted in Monroe County's highway death toll escalating far above the state average (Bureau of Land & Water Management, 1974).

Lack of public facilities for the protection of public health and welfare was a severe problem. The most important was the absence of regionalized waste water treatment and solid waste disposal facilities. Additional problems included the lack of hurricane preparedness and full-time fire departments. Inadequate design and sign regulation, incompatible adjacent land uses, and unregulated land clearing contributed to an overall degradation of scenic and aesthetic resources.

The Designation

The original impetus to consider the Keys as an Area of Critical State Concern came from the Keys' residents who recognized the problems associated with rapid growth. An Upper Keys Citizens Association (UKCA) was formed in the fall of 1971, followed shortly thereafter by a Middle Keys and a Greater Key West Citizens Associations. Together they created a coalition with representatives from 13 environmental, citizen, and civic groups. In 1974 the UKCA made the official ACSC nomination with the support of the coalition. The Division of State Planning (DSP) then notified all local governments and regional planning agencies within the proposed designated area (see Appendix I). Local officials were irritated and resented state interference into their domain. The Key West Jaycees were opposed to the designation, as was the Greater Key West Chamber of Commerce. Opinion among those opposed was that the Keys' residents were more concerned with preservation than anyone else (Peckham, 1977).

To counter resistance the state suggested changes in the Keys Master Plan that were not extensive. Money and expertise were made available to local government. A coordinator in Key West was hired by the South Florida Regional Planning Council to gather citizen input.

The Keys satisfied the critical area criteria for two types of areas: an area containing significant impact from environmental, historical, natural or archeological

resources of regional or statewide importance; and as an area significantly affected by, or having a significant effect upon an existing or proposed major public facility or other area of major public investment. The Division of State Planning went a step further by reporting that the area was also of national concern on the basis that the Keys are an important archipelago accessible to many Americans. The opinion was then presented to the Governor and Cabinet who in April, 1975, declared the Florida Keys an Area of Critical State Concern. They were the third area to be so designated. The first two were virtually uninhabited swamplands, Big Cypress Swamp and Green Swamp (Nicholas & Crawford, 1976).

A petition was filed in the First District Court of Appeal on May 15, 1975, by the city of Key West and 100 Keys' residents. The constitutionality of Chapter 380, the authority of the Administrative Commission, and the adequacy of provisions of public hearings, were being questioned. In Cross Keys Waterways, inc., v. Askew, et al., the court ruled the critical area portion of the Land and Water Management Act unconstitutional, based on an invalid delegation of authority by the Legislature to the Executive Branch and also that it did not provide adequate standards for area selection (Fox, 1978).

A year later, in 1978, the Florida Supreme Court upheld that ruling. A special legislative session was convened by Governor Askew the following December when the

Keys were redesignated, this time by the Legislature, as an Area of Critical State Concern. This latest designation had a sunset date of July 1979, at which time reassessment was made and another redesignation set (Stroud, 1979).

Six months after the designation went into effect a survey of 100 Keys' residents was taken by Florida Atlantic University/Florida International University Joint Center for Environmental and Urban Problems. The survey revealed the perceptions that: quality of the Keys' environment was getting worse; the state's action in designating the area was necessary; and the residents'lack of confidence in their elected officials to deal with the growth and associated problems.

A survey of city and county elected officials, however, showed that seven out of ten believed the designation unnecessary, with particular resistance from Key West officials. But, ambiguities existed in their attitudes. They did believe that Chapter 380's ACSC section was important for preserving wilderness and natural resources. They mainly feared a state takeover in their areas of jurisdiction and believed the state had not come through with proper funding and aid.

The Joint Center's conclusions were: the citizens and elected officials had misconceptions about the intent and purpose of the designation; there was inherent resistance by local government to any kind of takeover, real or perceived; and the Act was inadequate in providing an

implementation program (Nicholas & Crawford, 1976).

The implementation was hindered for a variety of reasons, the most important being a lack of adequate funding. The technical assistance from the state agencies was part of their normal activities and no special budgetary provisions to increase that assistance was made. The court challenges sapped some of the initial momentum of the designation impacts, changes in gubernatorial administrations, and the shift of the state planning division from the Department of Administration to the Department of Veterans and Community Affairs all contributed to the interruption of a smooth flow implementation.

Peckham's 1977 study defined a major weakness of the ACSC process: it did not mandate opportunities for citizen involvement. Additionally, many Conchs were pro-growth, did not want outsiders directing their activities, and posited that afterall, they were the first environmentalists (Peckham, 1977).

A 1981 survey conducted by the Joint Center essentially posed the same questions as the earlier survey, with very similar results. The majority perception was that the designation was necessary, that the Keys would become a better place to live as a result, that the environment was still deteriorating, and that elected officials were doing an inadequate job regarding growth regulation and environment protection. A majority opposed

any relaxation of land and water use regulations.

The guiding principles and land development regulations that were adopted for the Keys were more comprehensive than any previously designated area. They addressed natural resources such as water quality and tidal mangroves as well as historical resources and public investments. Each local government was required to adopt a plan and policies for future land use, a community impact assessment ordinance for major developments, and site alteration regulations. The local government was also directed to create a special zoning district for the Key West Naval Air Station. The city of Key West was instructed to adopt an historical preservation plan for the Key West Historical Preservation District (Pelham, 1979).

The designation meant that local governments has six months to submit existing, modified, or new land development regulations to the DSP through a technical assistance program. The four incorporated municipalities, North Key Largo, Key Colony Beach, Layton, and Key West, as well as Monroe County, submitted locally prepared acceptable regulations according to Chapter 380 (Fox, 1978).

Monroe County set up requirements for shoreline protection, land clearing and tree protection, community impact assessment statements, and airport compatible use zones. Federal assistance was brought in through such programs as:

Economic Development Agency Title IX Grant ($2.8 million to upgrade public water facilities);

U.S. Department of Housing and Urban Development 701 grant ($20,000 requested by South Florida Regional Planning Council for use by Monroe County; $15,000 to help fund land use plans);

Coastal Zone Management 305 grant ($21,400 from Department of Natural Resources for hiring a coastal zone planner);

Florida Division of Archives ($55,700 for restoration of old city hall in Key West (Fox, 1978)).

Dispite the limitations of the ACSC process and designation, attention became focused on the need to regulate land use in the Keys. Awareness and knowledge was created where little had existed before.

CHAPTER V

LITERATURE REVIEW AND METHODOLOGY

Literature Review

For ease of analysis and study geographical regions are classified according to population densities, i.e., metropolitan areas have at least one central city and a population of 50,000 or more, nonmetropolitan areas include towns of less than 50,000, and rural areas include centers of less than 2,500, open country and farms (Emerson & Lamphear, 1975).

The Florida Keys evade such classification. Key West, with approximately 24,000 inhabitants, could be categorized nonmetropolitan while most of the remaining area would technically be defined as rural. To make such a classification would be in error for the social and economic connotations associated with a rural definition are not applicable to this chain of small islands which extends into the Atlantic Ocean and Gulf of Mexico.

For statistical analysis one must disassociate the Keys from the usual classifications that apply to metropolitan, nonmetropolitan, and rural areas. This brings the realization that the methodology used in other impact studies for other regions are not directly applicable to

the Keys. A literature search has provided studies that are peripherally related to the Keys' framework. Those that appear to be most relevant are discussed in order to establish the pertinent methodology and variables that should be considered.

The Urban Institute formulated a general methodology for evaluating the fiscal effects on a county of proposed residential and nonresidential development. Their choice of methodology is not applicable to this case but the affected economic variables used in the Institute's study merit attention. The Institute chose to establish a social and economic profile by analyzing population and demography, median family income, and cost of housing, and then comparing an area with other counties of the state. They showed that income and population figures are important factors to consider. Additionally, they established that environmental regulations and land use controls restrict the development of a region because increased costs are imposed on the housing consumer as a result of a decreased supply of available land. The present market value of residential housing, therefore, is a variable that reflects change in economic activity as a result of regulation. A major problem of a local or regional level data base, particularly for non-SMSA counties such as Monroe County, is that housing data for the time period under study has not been collected. A substitute for the housing variable had to be found (Muller

& Thomas, 1972).

The answer was provided in a later Urban Institute publication by Schaenman and Muller (1974). They identified changes that result from development, particularly, the impact upon land values. Therefore, for Monroe County we chose the closest approximation to housing values, the land values variable.

The authors of the Institute's study also suggested an analysis of the changes in the percentage of employment, which is applicable, as well as changes in government fiscal flows, which are not. The latter are important but beyond the scope of this study due to the funding sources for public services in the Keys. A large percentage of funds used for the provision of public services is provided by the federal government rather than from local sources. An analysis of such cannot be adequately addressed by studying local revenue scources, but includes a broader range of government funding.

According to a study by John Hensmann (1977), land values are a positive function of development expectations, population growth, and income, that is, an increase of one or more of them contributes to an increase in land values. The ACSC designation, however, could negatively or positively affect land values as a result in changes in expectations. A negative impact on land values through decreased expectations of development could result if indeed development is restricted or prohibited. The

relationship between values and expectations could, therefore, decrease in magnitude or even become negative. The reverse could also be true in that a restriction to protect the environment could stabilize or improve property values and thus increase expected value. Here again we have the spillover effect, but, as noted by Hensmann, we cannot quantify expectations, We, therefore, cannot hope to prove whether the ACSC designation had a positive or negative impact on expectations or how those expectations affect land values.

The effects of population increases on land values is more clearly defined. Population growth creates an increased demand for land, which in turn makes the land more valuable. This scarcity factor alone may be the cause of any increases seen in land values.

Changes in income also affects this variable. Higher income levels allow individuals to offer higher prices for goods, which in turn bids up prices because a greater number of dollars are chasing a fixed amount of resources.

A variable such as land or property values has other influences acting upon it that could be misinterpreted. Property values include all improvement, do not reflect increases from environmental enhancement alone, nor isolate decreases from deterioration.

In 1976 Fisher and Peterson published a survey of the literature of the environment as related to economics in the Journal of Economic Literature. They noted that

concern for putting natural environments to their best use goes back a long way. The American Conservation movement of 1895-1920 established the preservation of natural beauty in wilderness environments as a primary goal and in 1916 the National Parks Service was formed. However, systematic economic analysis of alternative uses did not appear until approximately 1967.

The concern over pollution can be traced back to 1285 A.D. when the city of London experienced air pollution problems from the burning of soft coal. In 1932 Pigou provided the first economic analysis of pollution as an externality phenomenon. But not until the 1960s, when Kenneth Boulding published his provocative paper which viewed the earth as a closed spaceship which could neither receive nor dispose of materials, did economists realize the need for environmental economic analysis.

Fisher and Peterson acknowledged the paucity of empirical studies of the benefits of preservation reasoning that this deficiency is due to the difficulty of such analysis. Innumerable factors exist, most of which are qualitative not quantitative in nature. For example, a consumer does not necessarily gain explicit welfare from a commodity. One can derive utility from the mere knowledge of the existence of some common goods. They offer in support of this concept the contributions to organizations like Nature Conservancy and World Wildlife Fund. Most of the contributors never see the remote places or exotic

species that their contributions help to preserve.

Fisher and Peterson outlined various methods by different researchers which have been applied in determining whether land value changes indeed measure the benefits of public goods. An assignment model was created by Koopman and Beckman to analyze the wedge that profits and consumer surpluses drive between land values and program benefits. The application of their model is only relevant for a small open city and thus is very limited.

Polinsky and Rubenfield tried to identify underlying utility functions and determine the willingness to pay for environmental amenities within income classes. Their study specifically addressed air quality in Saint Louis and compared results with those obtained in other techniques. Their restrictive assumption of a Cobb-Douglas utility function for consumers was a critical flaw.

Other studies used simple linear regression equations to measure benefits of pollution abatement programs. These techniques have proven to be more precise but still only give an exact measure of benefits for small environmental changes.

In Regional and Urban Economics (1978), Harry Richardson addressed various policy evaluation techniques. He found the most common methods of evaluation of regional policy to be the assessment of effects on an ad hoc basis. Such an assessment includes a study of number, size, and other characteristics of firms benefiting from the policy,

new jobs created in the affected regions, the budgetary costs of the policy, changes in the industrial structure, and variations in unemployment and migration. This method is far from satisfactory because it is so unsystematic and the choice of alternative evaluation criteria rests on the subjective judgment of the analyst.

A more clearly defined approach is the comparison of a region's actual growth with its expected growth in absence of a policy. Historical measurement of past economic performance is compared with the hypothetical situation of expected performance without policy implementation. This method, too, contains major flaws: important non-growth and social effects are neglected; external benefits that result from the policy are not calculated; and most serious, there is no satisfactory methodology for measuring expected performance.

Attempts have been made to improve this projection technique by a closer measurement of expectations, but without much success. To include the cyclical nature of economic activity and thus create a close approximation of expectations, Richardson suggests a comparative study area be analyzed. In this manner economic fluctuations resulting from the policy can be isolated.

The actual-minus-expected-growth approach considers the aggregate effects, or is a macro-perspective of a regional economy. From a micro-viewpoint, a benefit-cost evaluation policy could be made to show whether or not

there is a significant benefit. This method carries with it the traditional objections to cost-benefit analysis; the most difficult obstacle is the inability to accurately convert into monetary terms the consequences of policy.

Another approach, seemingly attractive and logical, is the evaluation in terms of fulfillment of policy goals. If goals are met, then the policy is deemed ineffective. There are hazards in a goal fulfillment approach for policies create unanticipated effects that may be overlooked. Also, the original goals may be scaled down or lowered through the political process so that success becomes likely, if not guaranteed. If, on the other hand, goals are very flexible, vagueness may preclude accurate measurement. Also, if there are multiple goals some may be achieved while others fail. If one goal is not given primacy over others, this approach becomes intractable because of a lack of multiple objective methodology.

Richardson goes on to evaluate a fourth method, that of international comparison. Again, the same difficulties arise. Transferance of policy instruments from one environment to another does not allow for the cultural influences of a specific region. There exists a variety of institutional, political, and social environments that prohibit such broad cross-regional applications.

Methodology

After review of the various techniques described, the

approach adjudged most fitting in conducting an economic impact study in the Keys is one that considers the aggregate effect upon the area's economy. Such a macro-perspective approach was taken by comparing the actual economic activity in Monroe County (i.e., economic activity under the ACSC legislation) with the expected economic activity in Monroe County (i.e., economic activity that one would expect to occur in the absence of the ACSC legislation). The expected economic activity was based on economic activities in comparable areas that were not influenced or affected by ACSC legislation.

The comparative study areas are needed to isolate activity under the effects of the designation and separate outside contractionary and expansionary forces. At approximately the same time the ACSC designation went into effect the nation as a whole was suffering from a recession. In order not to misinterpret the impact of the recession as well as other unknown business fluctuations that the economy as a whole experienced, two other study areas were also analyzed for the comparative purposes: Charlotte County and the state of Florida.

In selecting the first comparable area, it was noted that several Florida counties were somewhat similar to Monroe County. The following Florida counties were considered as comparable areas: Charlotte, Indian River, Lee, Manatee, Martin, Saint Lucie, and Sarasota. To narrow this list, 11 categories were selected and each county was

compared to Monroe County across these 11 categories. Through this process it was determined which county was most similar to Monroe County

Categories that served as criteria for selection are: percentage employed in three major industries of the county; population in 1975; increases in population from 1965 to 1975; number of building permits issued from 1970 to 1975; increase in the tax base from 1965 to 1970; per capita property value in 1975; change in employment from 1968 to 1975; increase in unemployment from 1968 to 1975; total square miles of land area (excluding water); per capita income in 1975; and increase in per capita income from 1965 to 1975. For each of these categories, the county whose value most closely matched Monroe County's value was given a weight of one (1), the county with the next closest match was given a weight of two (2), etc. For each county, cumulative weights were tallied, and that county with the lowest weight was determined to be most like Monroe County. We see in Table 5.1 (wherein weights are given in parenthesis), that we assessed Charlotte County as the county most like Monroe County because its tally is the lowest. Thus Charlotte County is the comparable county in our study.

Additionally, it has been much emphasized that Monroe County is a geographically and economically unique area. Because of this uniqueness it was feared a county might not provide an accurate comparison, i.e., a greater assurance

TABLE 5.1

COMPARABLE AREA CRITERIA

	Charlotte	Indian River	Lee	Manatee	Martin	St. Lucie	Sarasota	Monroe
1975 Population (000s)	(3) 42.2	(2) 46.3	(6) 156.5	(5) 123.5	(1) 47.7	(4) 69.1	(7) 163.2	55.7
Population (000s) Increase 1965-75	(2) 20.4	(1) 14.7	(7) 75.8	(5) 39.3	(4) 23.6	(3) 21.3	(6) 66.0	4.3
Number Bldg Perms 1970-75	(2) 8,922	(1) 5,029	(7) 30,657	(5) 19,093	(4) 11,441	(3) 9,310	(6) 27,034	4,855
Tax Base Increase (000s) 1965-75	(1) 642.6	(2) 719.2	(6) 1,872.3	(5) 1,042.7	(4) 947.7	(3) 782.9	(7) 2,391.2	676.4
Per Capita Property Value 1975	(6) 18,083	(5) 17,633	(1) 13,252	(4) 10,627	(7) 22,535	(2) 14,633	(3) 16,483	13,742

TABLE 5.1 Continued

	Charlotte	Indian River	Lee	Manatee	Martin	St. Lucie	Sarasota	Monroe
Employment Change 1968-75	(4) 7,160	(2) 4,960	(7) 20,180	(6) 17,760	(1) 4,820	(3) 6,040	(5) 12,280	2,020
Increase Unemployment 1968-85	(1) 1,520	(3) 1,260	(7) 6,600	(5) 4,320	(4) 1,180	(3) 2,160	(6) 6,340	1,740
Land Area Sq. Miles (- water)	(3) 703	(7) 506	(1) 785	(2) 739	(5) 556	(4) 583	(6) 527	1,034
Income Per Capita 1975	(5) 4,970	(4) 5,936	(3) 5,096	(2) 5,212	(1) 5,705	(6) 4,814	(7) 6,783	5,478
Increase Per Capita Income 1965-75	(1) 3,046	(5) 3,603	(3) 2,830	(2) 3,036	(6) 3,624	(4) 2,809	(7) 3,954	3,053

TABLE 5.1 Continued

	Charlotte	Indian River	Lee	Manatee	Martin	St. Lucie	Sarasota	Monroe
Major Industry Percent Employed	SMM 25.7	WRT 26.4	WRT 27. 6	WRT 30.9	WRT 22.9	WRT 29.7	WRT 29.3	WRT 29.4
2nd Major Industry Percent Employed	WRT 25.3	SMM 18.1	SMM 19.5	GOVT 20.5	SMM 20.6	GOVT 20.5	SMM 24.3	GOVT 27.5
3rd Major Industry Percent Employed	GOVT 17.3	GOVT 16.6	GOVT 18.2	SMM 16.9	GOVT 14.1	SMM 15.6	GOVT 16.2	SMM 29.6
Total Percent Employed in 3 Industries	(2) 68.3	(5) 61.1	(4) 65.3	(2) 68.3	(6) 57.6	(3) 65.8	(1) 69.8	83.8
Column Totals	(30)	(37)	(52)	(43)	(43)	(37)	(61)	

Source: Florida Statistical Abstract (1965-1977)

Note: WRT = Wholesale and Retail Trade
SSM = Services, Mining and Miscellaneous
GOVT = Government

of the separation of nonunique economic fluctuations was necessary. It was decided to also use the entire state of Florida as a comparable study area as well.

Two different approaches were used to determine the economic impacts of the designation upon the Keys. The first includes forecasted trends calculated from the growth rates of economic activities in the comparable areas for the time period since the ACSC designation went into effect. The second includes an expanded data set (1965-1981) of both the comparable areas and Monroe County and is based on an econometric model which includes dummy variables. Both employ regression analysis, an explanation of which is included later in this chapter.

Variable Selection

The variables chosen for analysis were those that most accurately reflect changes in economic activity. Thus, for this impact analysis of policy implementation the following aggregate measurements were selected: employment and unemployment rates, real property values, per capita income, and building permits. These variables are similar to those used in previous economic studies, are suggested by economic theory, and are feasible considering the confines of data availability.

The employment and unemployment variables are expected to reflect business activity. Fortunately, data collected on a yearly basis was sufficient. Thus it was not

necessary to address the short-term vagarities of employment in the tourist trade. Additionally, in interpreting the employment variable one must remain aware that the method of collection changed in 1970 from place of employment to place of residency, thus resulting in an overly optimistic employment outlook.

The per capita income variable is highly useful as it reflects changes in personal income on an individual basis. With respect to the property value variable, it was recognized that property values by nature register inflationary pressures. An adjustment was made for the effects of inflation by dividing property values by the implicit price deflator and attaining a new variable, real property values.

Building permit applications is a variable that is sensitive to psychological and economic factors, as building permits are a function of expectations, interest rates, income, productivity, and population densities. In addition, building permits do not reflect actual development but instead reflect intended development.

Regression Analysis

Regresssion analysis is the most useful statistical technique available to the economist. It allows the researcher to describe and measure the functional relationship between a dependent variable and one or more independent or predictor variables. The statistical

relationship does not itself prove causality although a causal relationship may be inferred from the underlying theory of an economic model (Gujarati, 1978).

The regression equation takes the following form:

$$Y_i = B_o + B_1X_{1i} + B_2X_{2i} + \ldots + B_kX_{ki} + U_i$$

Y_i = the ith value of the dependent variable

B_o = the intercept of the true regression line

B_1 = the regression coefficient of X , the first predictor variable. (B_1 measures the rate of change in Y per unit change in X, holding the other independent variables constant.)

B_2 = the regression coefficient of X_{2i}, the independent variable

B_k = the regression coefficient of the X_kth independent variable

U_i = the disturbances of the Y values from the mean within the population.

Because it is impossible to consider the entire population of variables under consideration the statistician uses sample data to estimate the population parameters. The sample regression line becomes:

$$\hat{Y}_i = \hat{B}_o + \hat{B}_1X_{1i} + \hat{B}_2X_{2i} + \ldots \hat{B}_kX_{ki} + e_i, \text{ where,}$$

e_i = the sample residual term, conceptually analogous to U_i.

The most common method of estimating a trend is by using the ordinary least squares (OLS) technique which reduces to the minimum the sum of the squared deviations of the predicted values of the dependent variable ($\hat{Y}$) from the

observed value (Y). This method is used in constructing the regression function because OLS estimators are linear, are unbiased, and are the best estimators of the actual values.

The residuals or error terms e_i, represent the amount of variation in the observed data not explained by the regression equation. It is the difference between actual Y and its predicted value, $\hat{Y}$. The random unpredictable factors average out, therefore, the expected value or the error terms equal zero.

To prevent the cancellation of positive and negative distances of the actual versus the predicted line, the sum of the error differences is squared which becomes the least sum of squares.

The regression coefficient of the independent or explanatory variables, X_i, measures the magnitude that each X has in explaining variations in Y, the dependent variable, when the other Xs are held constant. The sign, either + or -, that the coefficient carries, explains if the relationship between the X and Y is positive or negative. A positive relationship would indicate that they move in the same direction, i.e., if X increases Y also increases. A negative relationship would indicate that they move in opposite directions, i.e., as X increases, Y decreases.

Assuming the e_i are normally distributed, the standard error of the regression coefficient can be used to measure

the level of confidence that is associated with each $\hat{B}$. The $\hat{B} \pm$ its standard error indicates the confidence range around the coefficient. If the standard error is smaller than the estimated coefficient then the sign associated with it can be explained with confidence. If the error is as large as the $\hat{B}$ then one must proceed with caution about the interpretation of the actual relationship.

The null hypothesis usually tested in regression analysis is $H_0 : B^* = 0$, which states that the X variable has no effect on the dependent Y variable. If the null hypothesis is rejected the usual alternative hypothesis that the B coefficient is not equal to zero is accepted.

The t-ratio measures the significance of the contribution of the independent variable to the explanation of the variation in Y. T-tabulated (critical t) taken from pre-computed t-tables, is determined by the level of significance, usually 95% confidence level, and the degrees of freedom associated with the regression equation. A comparison of the estimate t-ratio with the critical t provides a test of statistical significance. If the estimated t is greater than the critical t, the test is said to be statistically significant and the null hypothesis is rejected.

The unadjusted coefficient of determination, R^2, is the percentage of variation of actual Y values captured by the estimated Y values. It equals the ratio of variation in Y (explained by the combined linear influence of the

independent variables) to the total variation in Y. This R^2 is a measure of "goodness of fit" of the least squares technique of multiple regression to the true regression equation. Its value varies between zero and one; the closer to one, the closer the independent variables have come to explaining the variation in the dependent variables.

Because in this particular study time series regression analysis is used it is judicious at this point to elaborate on the difficulties of interpreting R^2 due to serial correlation of the error term. This is a common problem involving time series data. That is, the error, e_t at any time t is correlated with one or more of its previous values (e_{t-1}, e_{t-2}, etc.) which means the successive values of e are not independent (Wonnacott & Wonnacott, 1970).

The consequences of autocorrelation, used here interchangeable with the term, serial correlation, is that the R^2 is inflated in value and the confidence intervals of the estimators are unnecessarily wide as the ordinary formulas underestimate the standard deviations of the regression coefficient and intercept. Whether or not autocorrelation is a problem is indicated by the Durbin-Watson statistic which is a test of the randomness of the residuals.

Sometimes in regression analysis the dependent variable is affected not only by quantitative variables,

but also by variables which are qualitative in nature and which can be identified in the regression equations. The effect of the ACSC designation on economic activity in the Keys is an example. The geographical categorization of Monroe County, Charlotte County, or the state data is another. Such qualitative variables usually indicate the presence or absence of a condition. One method of quantifying such information is done by constructing dummy variables which take on the values of one or zero. A zero indicates the absence of an attribute and a one indicates its presence (Gujarati, 1978).

CHAPTER VI

ECONOMIC IMPACT ANALYSIS

Forecasts Based on Growth Rates

The forecasts of Monroe County were based upon economic activity for the years after the designation went into effect. It was assumed that Monroe County and the two study areas were influenced by the same business and economic impacts, and therefore any significant differences between forecasted and actual economic activity very likely resulted from impacts that affected only Monroe County, e.g., the ACSC designation.

The forecast equation for Monroe County variables, which was based on Charlotte County and the state of Florida growth rates, takes the following form:

(6.1) $MV_t = (1 + g)\ MV_o$, where

$g = \sqrt[n]{CV_t / CV_o} - 1$,

MV_t = the Monroe variable at time t,

MV_o = the Monroe County variable in 1975,

g = growth rate of the comparative area,

n = the nth year,

t = time (1976 through 1981),

CV_t = comparative area variable at time t,

CV_o = comparative area variable in 1975.

The ACSC designation was made in 1975, and it follows that 1975 be used as the base year and be a unity value growth rate. The 1976-1981 growth rates of the comparative areas were then calculated; these comparative growth rates were used to calculate Monroe forecasted values for years 1976-1981. Three regression analyses were then performed: one on Monroe County actual values, a second on Monroe County values forecasted from Charlotte County growth rates, and the last on Monroe County values forecasted from Florida growth rates. The regression analyses allowed us to make a comparison of actual and forecasted trends.

To make this comparison the t-statistic associated with each slope coefficient within the three groups was analyzed to determine if the slopes had changed significantly over time. Thus it could be determined if actual economic activity in Monroe County, the activity forecasted from Florida growth rates, and the activity forecasted from Charlotte growth rates, had significantly changed over time. If they had, then a second t-test was used to make a comparison of slopes across the three groups, i.e., to find out if the slopes in the three groups were significantly different from one another.

This second t-test takes the form:

(6.2) $t = B_f - B_a / SE_{B_f}$ where,

B_f = the slope coefficient based upon forecasted values,

SE_{B_f} = the coefficient's standard error,

B_a = the slope coefficient based upon actual values.

The null hypothesis associated with this test is H_o: $B_f = B_a$, which says that there is no difference between forecasted and actual slope coefficients, or put another way, the null hypothesis says the particular economic activity under examination has not been significantly affected by ACSC legislation. If the null hypothesis is rejected as a result of a significant t-statistic the alternative hypothesis is then accepted. This alternative, H_a: $B_f \neq B_a$, says that there is an inequality between forecasted and actual slope coefficients, and, therefore, it is possible that the particular economic activity under examination has been significantly affected by legislation.

The first procedure in the analysis was to compute Monroe County forecasts for each of the variables. This was done by recording the county's data for years 1975-1981, with adjustments for factors such as inflation or population. Florida and Charlotte County variables for the years 1975-1981 were also recorded, the same adjustments were made and the growth rates based upon these values were computed. Once established the forecast equation (see Equation 6.1) was used to arrive at Monroe County forecasts for each variable for years 1976-1981.

The second procedure was to perform a regression analysis on actual Monroe County values, a regression analysis on Florida-based forecasted values, and regression analysis on Charlotte-based forecasted values. After these were completed, the calculated t-statistics were compared with their tabulated counterparts to determine their significance.

Real Property Values Variable.

Tables 6.1 and 6.2 list the data for the real property values variable. In Table 6.1 it is seen that state-based forecasts exceed actual values in Monroe County in 1976, 1977, and 1980. This finding is somewhat consistent with Charlotte County-based forecasts, for Table 6.2 reports that Charlotte County-based forecasts surpass the actual values in Monroe County in 1976, 1977, 1980, and 1981.

To determine if these differences were significant, the regression equations were computed. The following equations and t-statistics were obtained where MPV_t is Monroe County real property values at time t, the first constant is the intercept of the estimated regression line, the coefficient associated with the t is both the slope of the line and the regression coefficient of independent variable t, and t is the independent variable time. The regression based t-statistics appear in parenthesis under the corresponding coefficients.

TABLE 6.1

REAL PROPERTY VALUES (MONROE COUNTY AND FLORIDA)

(Thousands of Dollars)[a]

Year	Monroe Actual	Florida Actual	Florida Growth Rate	Florida Forecast	Actual-Forecast
1975	587,553	73,147,040			
1976	579,454	74,010,604	1.0118	594,486	-15,032
1977	568,548	77,075,692	1.0537	619,105	-50,557
1978	730,989	78,410,019	1.0721	629,857	101,132
1979	710,208	78,367,131	1.0714	629,504	80,704
1980	859,889	113,327,281	1.5493	910,296	-50,407
1981	1,066,017	103,814,600	1.4190	833,738	232,259

[a]Source: Florida Statistical Abstracts (1973-1981)

TABLE 6.2

REAL PROPERTY VALUES (MONROE & CHARLOTTE COUNTIES)

(Thousands of Dollars)[a]

Year	Monroe Actual	Charlotte Actual	Charlotte Growth Rate	Charlotte Forecast	Actual-Forecast
1975	587,553	569,854			
1976	579,454	577,809	1.0140	595,779	-16,325
1977	568,548	591,597	1.0381	609,939	-41,391
1978	730,989	589,688	1.0349	608,059	122,930
1979	710,208	636,350	1.1177	656,708	53,500
1980	859,889	940,887	1.6512	970,168	-110,279
1981	1,066,017	1,041,038	1.8268	1,073,342	-7,325

[a]Source: See Table 6.1

(6.3) Monroe County actual real property values:

$$MPV_t = 517.8 + 93.9t$$
$$(9.7) \quad (5.3)$$

(6.4) Florida-based forecast:

$$MPV_t = 555.0 + 59.1t$$
$$(9.1) \quad (2.9)$$

(6.5) Charlotte-based forecast:

$$MPV_t = 501.1 + 100.5t$$
$$(6.3) \quad (3.8)$$

The t-statistics were significant within a 95% confidence level, which means that the slopes of the trend lines changed significantly over time.

Because the initial t-statistics passed the significance screening, the regression coefficients of the actual and forecast-based trends were tested. This required the second t-test structured to determine if there existed significant differences between the slopes of the actual trends as compared with the slopes of the forecast-based trends (see Equation 6.2). Inserting values into this formula, the tests are:

(6.6) $t = 59.1 - 93.9/20.2 = -1.72$

(Florida-based forecast)

(6.7) $t = 100.5 - 93.9/26.3 = .25$

(Charlotte-County based forecast)

A comparison of these t-statistics with the t-critical values reveals that they fall within the critical regions

TABLE 6.3

REAL PER CAPITA PROPERTY VALUES (MONROE COUNTY AND FLORIDA) [a]

Year	Monroe Actual	Florida Actual	Florida Growth Rate	Florida Forecast	Actual-Forecast
1975	9,109.3	8,624.5			
1976	9,154.1	8,654.4	1.0040	9,145.7	8.4
1977	8,996.0	8,841.7	1.0256	9,342.5	-346.5
1978	11,640.0	8,744.9	1.0145	9,241.4	2,398.6
1979	11,096.9	8,479.2	.9836	8,959.9	2,137.0
1980	13,627.9	12,133.5	1.4075	12,821.3	806.1
1981	16,604.6	10,272.6	1.1916	10,854.6	5,750.0

[a] Source: See Table 6.1

TABLE 6.4

REAL PER CAPITA PROPERTY VALUES (MONROE & CHARLOTTE COUNTIES) [a]

Year	Monroe Actual	Charlotte Actual	Charlotte Growth Rate	Charlotte Forecast	Actual-Forecast
1975	9,109.3	12,746.0			
1976	9,154.1	12,926.4	1.0148	9,244.1	-90.0
1977	8,996.0	12,560.4	.9854	8,976.3	19.7
1978	11,640.0	11,608.0	.9107	8,295.8	3,344.2
1979	11,096.9	11,600.2	.9101	8,290.4	2,806.5
1980	13,627.4	15,920.3	1.2490	11,377.5	2,250.0
1981	16,604.6	16,900.0	1.3260	12,078.9	4,525.7

[a] Source: See Table 6.1

of statistical significance. The null hypotheses that the slopes are not statistically different from zero was accepted. These data and analyses would suggest that the actual expansion of Monroe County in the years following the designation is not substantially different from the forecasts based on Charlotte County and Florida values for the same time period. It can be stated with confidence that the 1976-1981 Monroe County real property values were not affected by the ACSC designation.

An additional analysis of real property values was conducted by allowing for population changes within the study areas and arriving at per capita real property values. The forecasts for this refined variable were carried out in the same manner, the results of which can be found in Tables 6.3 and 6.4. It is interesting to compare Tables 6.3 and 6.4 with the previous two tables. Note that the per capita adjustment results in the actual values exceeding the forecasted values for five out of six years. To test the significance of this the regression equations for per capita values were computed:

(6.8) Monroe County actual per capita real property values:

$$MPV' = 8{,}236.6 + 1{,}445.8t$$
$$(9.9) \quad (5.3)$$

(6.9) Florida-based forecast:

$$MPV' = 8{,}725.2 = 534.3t$$
$$(9.5) \quad (1.8)$$

(6.10) Charlotte County-based forecast:

$$MPV'_t = 8{,}183.9 + 610.6t$$

(8.8) (1.98)

The t-statistics for both of the forecasted trends failed the critical region tests for significance. A test of significant differences between the actual and forecasted trends cannot be computed because the trends themselves have not changed significantly over time.

Per Capita Income Variable

The per capita income projections based upon Florida and Charlotte County per capita income trends were derived in the same manner as the real property values variable. Because of limited data availability only per capita income in years 1975-1980 were considered.

The actual and projected Monroe County per capita incomes are summarized in Tables 6.5 and 6.6. It is seen that actual per capita income was greater than the Florida-based forecast of per capita income from 1976 through 1979. However, in 1980 this pattern changed when actual fell below forecasted. A similar trend is observed in comparing Charlotte County-based per capita income forecasts with actual per capita income. In 1976, 1977, and 1978, actual values were greater than Charlotte-based forecasted values, and in 1979 and 1980, Charlotte-based forecasts proved greater than actual values.

TABLE 6.5

PER CAPITA INCOME (MONROE COUNTY AND FLORIDA)[a]

Year	Monroe Actual	Florida Actual	Florida Growth Rate	Florida Forecast	Actual-Forecast
1975	5,304	5,634			
1976	6,276	6,094	1.082	5,737.1	538.9
1977	7,257	6,728	1.194	6,333.9	923.1
1978	8,009	7,581	1.346	7,137.0	872.0
1979	8,362	8,521	1.512	8,021.9	340.1
1980	7,812	8,993	1.596	8,466.3	-654.3

[a]Source: See Table 6.1

TABLE 6.6

PER CAPITA INCOME (MONROE & CHARLOTTE COUNTIES)[a]

Year	Monroe Actual	Charlotte Actual	Charlotte Growth Rate	Charlotte Forecast	Actual-Forecast
1975	5,304	4,937			
1976	6,276	5,640	1.142	6,059.3	216.7
1977	7,257	6,310	1.278	6,779.1	477.9
1978	8,009	7,099	1.438	7,626.7	382.3
1979	8,362	7,805	1.581	8,385.1	-23.2
1980	7,812	8,452	1.712	9,080.3	-1,268.3

[a]Source: See Table 6.1

The regression analysis of the per capita income varible was conducted, the equations and statistics follow:

(6.11) Monroe County actual per capita income:

$$MPCI_t = 6{,}070.8 + 417.7t$$
$$(5.7) \quad (2.6)$$

(6.12) Florida-based forecast:

$$MPCI_t = 5{,}709.9 + 714.6t$$
$$(58.5) \quad (17.9)$$

(6.13) Charlotte County-based forecast:

$$MPCI_t = 6{,}056.5 + 764.8t$$
$$(176.9) \quad (54.7)$$

The degrees of freedom associated with the smaller data set pushes the tabulated t to a higher level. The t-statistic for Equation 6.11 is close, but not acceptable at the 95% confidence level. However, at the 90% level of confidence the t-statistic registers significance. Using the lower range and applying the formula in Equation 6.2:

(6.14) $t = 714.6 - 417.7/39.98 = 7.4$

(Florida-based forecast)

(6.15) $t = 764.8 - 417.7/13.98 = 24.8$

(Charlotte County-based forecast)

Both t-tests are significant at the usual 95% confidence level, which translates into rejection of the null hypotheses and acceptance of the alternative hypotheses that the actual and forecasted trends differed significantly.

For a possible explanation, a reference back to Tables

6.5 and 6.6 reveal that the differences between the actual and forecasted trends were positive or nearly equal until 1980. Interestingly, at this time economic activity of the entire country suffered from recessionary pressures. It follows that a possible explanation for the actual minus forecast differences is that Monroe County's level of income reacted more severely to the recession than either Charlotte County's or the state's.

Unemployment Rates Variable

Tables 6.7 and 6.8 reveal that the actual unemployment rates in Monroe County exceeded the Florida and Charlotte-based forecasts. The forecasted unemployment rates based upon Charlotte activity are lower than actual unemployment rates for all six years considered. There exists a range of 3.71% difference in 1978 to 1.95% in 1981. Florida-based unemployment forecasts are closer to the actual unemployment rates, yet the actual rates remain higher for all years except 1981.

To determine if these differences are indeed significant the regression analyses were made with the following results:

(6.16) Monroe County actual unemployment rates:

$$MU_t = 9.3 - .8t$$

$$(28.9)\ (-7.5)$$

TABLE 6.7

UNEMPLOYMENT RATES (MONROE COUNTY AND FLORIDA)

(In Percentages)[a]

Year	Monroe Actual	Florida Actual	Florida Growth Rate	Florida Forecast	Actual-Forecast
1975	10.2	10.7			
1976	9.4	9.0	.84	8.58	.82
1977	8.9	8.2	.77	7.82	1.08
1978	7.6	6.6	.62	6.29	1.31
1979	6.3	6.0	.56	5.72	.58
1980	6.0	6.0	.56	5.72	.28
1981	5.8	6.8	.63	6.48	-.68

[a]Source: See Table 6.1

TABLE 6.8

UNEMPLOYMENT RATES (MONROE AND CHARLOTTE COUNTIES)

(In Percentages)[a]

Year	Monroe Actual	Charlotte Actual	Charlotte Growth Rate	Charlotte Forecast	Actual-Forecast
1975	10.2	12.6			
1976	9.4	9.2	.73	7.45	1.95
1977	8.9	6.5	.52	5.26	3.64
1978	7.6	4.8	.38	3.89	3.71
1979	6.3	4.3	.34	3.48	2.82
1980	6.0	4.6	.37	3.72	2.28
1981	5.8	5.2	.41	4.21	1.59

[a]Source: See Table 6.1

(6.17) Florida-based forecast:

$$MU = 8.0 - .5t$$
$$(13.8) \quad (-2.5)$$

(6.18) Charlotte-County based forecast:

$$MU = 6.2 - .6t$$
$$(7.8) \quad (-2.3)$$

Significance of the t-statistics was established. The second t-tests yielded the following results:

(6.19) $t = .5 - .8/.19 = -1.58$

(Florida-based forecase)

(6.20) $t = .6 - .8/.26 = -.73$

(Charlotte-based forecast)

These t-statistics, falling within the range of $\pm$ 2.015, are not significant. The null hypotheses are thereby accepted as the tests show that the slopes of the actual and forecasted trends are not significantly different from one another. In spite of the fact that there exist differences in the unemployment rates, these differences have been shown to be insignificant over time.

To expand on the employment/unemployment picture, it was decided that a `total number employed' variable should be added at this point. Tables 6.9 and 6.10 illustrate the actual and forecasted employment values in years 1975-1981. It is seen that, based upon Florida data, actual-minus-forecasted differences are inconsistent and

TABLE 6.9

TOTAL NUMBER EMPLOYED (MONROE COUNTY AND FLORIDA)[a]

Year	Monroe Actual	Florida Actual	Florida Growth Rate	Florida Forecast	Actual-Forecast
1975	16,343	3,053,000			
1976	17,194	3,131,000	1.03	16,760	433.5
1977	17,584	3,232,000	1.06	17,301	282.8
1978	18,264	3,404,000	1.13	18,543	-279.1
1979	19,166	3,605,000	1.18	19,298	-131.9
1980	19,813	3,691,000	1.21	19,758	54.7
1981	22,294	4,206,000	1.38	22,515	-221.1

[a]Source: See Table 6.1

TABLE 6.10

TOTAL NUMBER EMPLOYED (MONROE & CHARLOTTE COUNTIES)[a]

Year	Monroe Actual	Charlotte Actual	Charlotte Growth Rate	Charlotte Forecast	Actual-Forecast
1975	16,343	10,670			
1976	17,194	10,834	1.015	16,594	599.8
1977	17,584	12,340	1.156	18,900	-1,316.9
1978	18,264	13,890	1.302	21,276	-3,012.5
1979	19,166	15,153	1.420	23,209	-4,043.5
1980	19,813	16,164	1.515	24,758	-4,945.0
1981	22,294	19,834	1.859	30,379	-8,085.5

[a]Source: See Table 6.1

sporadic. Yet, a comparison based upon Charlotte data reveals that Monroe County actual employment is substantially less than projected employment in years 1977 to 1981.

The regression analysis of the employment variable yielded the following equations:

(6.21) Monroe County actual total number employed:

$$ME = 16{,}689 + 945.4t$$
$$(35.5) \quad (6.1)$$

(6.22) Florida-based forecast:

$$ME = 16{,}393.9 + 1{,}054.2t$$
$$(35.0) \quad (6.8)$$

(6.23) Charlotte-County based forecast:

$$ME = 16{,}202.8 + 2{,}526.6t$$
$$(19.5) \quad (9.2)$$

The t-tests were found to be significant and thus the trend comparisons were made with the following results:

(6.24) $t = 1{,}054.2 - 945.4/154.7 = .7$

(Florida-based forecast)

(6.25) $t = 2{,}526.6 - 945.4/275.1 = 5.8$

(Charlotte County-based forecast)

The tests of significance for the second t-statistics yield mixed results. The Florida-based forecast of employment is not significantly different from what actually occurred in Monroe County. Thus the null hypothesis that the slopes are equal is accepted. The

Charlotte-based forecast of employment is significantly different. A glance back to Tables 6.9 and 6.10 verifies that although Monroe County's employment numbers increased over this time span, the county did not enjoy the same measure of growth that occurred in Charlotte County. When using Charlotte County as a comparative area, it cannot be stated that Monroe County employment levels were not affected by the ACSC designation. It can be stated with confidence that Monroe County employment levels were not affected by the ACSC designation when Florida is used as a comparative area.

Building Permits Variable

There were numerous ways to analyze building permit activity, as records are kept of the number of single-family and multi-family permits issued, as well as the total value of building permits which includes residential, non-residential and improvements. Building permit activity was evaluated in three different ways: an analysis of per capita total value; an analysis of per capita number of permits (single-family plus multi-family); and an analysis of single plus multi-family permits without the population adjustment. The latter variable was included because the per capita variable was low in magnitude and small but important changes were not adequately reflected.

Tables 6.11 through 6.17 contain the information on building permit activity for the three categories. With

TABLE 6.11

PER CAPITA VALUE OF BUILDING PERMITS

(MONROE COUNTY AND FLORIDA)[a]

Year	Monroe Actual	Florida Actual	Florida Growth Rate	Florida Forecast	Actual-Forecast
1975	.138	.331			
1976	.247	.411	1.242	.171	.076
1977	.893	.605	1.828	.052	.641
1978	.455	.771	2.329	.321	.134
1979	.573	.980	2.961	.409	.164
1980	1.193	1.152	3.480	.480	.713
1981	1.801	1.079	3.261	.450	.630

[a]Source: See Table 6.1

TABLE 6.12

PER CAPITA VALUE OF BUILDING PERMITS

(MONROE AND CHARLOTTE COUNTIES)[a]

Year	Monroe Actual	Charlotte Actual	Charlotte Growth Rate	Charlotte Forecast	Actual-Forecast
1975	.138	.534			
1976	.247	.914	1.712	.237	.010
1977	.893	1.204	2.255	.311	.582
1978	.455	1.644	3.079	.425	.030
1979	.573	2.517	4.713	.650	-.077
1980	1.193	2.276	4.262	.588	.605
1981	1.801	1.369	2.56[illegible]	.354	1.447

[a]Source: See Table 6.1

respect to Tables 6.11 and 6.12 the per capita value of building permits reveal that with a minor exception in 1979, the Charlotte-based projections are less than the actual per capita values. A similar but stronger trend is seen when comparing Florida-based projections and actual values, for actual values exceed the Florida-based forecasts of per capita building permit values in all years studied.

The regression analysis results are:

(6.26) Monroe County actual per capita value of building permits:

$$\text{Value } BP_t = .23 + .25t$$
$$(.9) \quad (2.9)$$

(6.27) Florida-based forecast:

$$\text{Value } BP_t = .12 = .08t$$
$$(1.7) \quad (3.5)$$

(6.28) Charlotte-based forecast:

$$\text{Value } BP_t = .31 + .047t$$
$$(2.8) \quad (1.3)$$

The t-statistics for the actual and Florida-based forecasts passed the t-critical test, meaning that the slopes are significantly different over time. The regression equation of the Charlotte-based forecast did not yield a significant t-statistic, which means the Charlotte-based values cannot be compared with actual activity in Monroe County. The second t-test compared the

slopes of the actual and Florida-based forecasts to determine if there existed a significant difference.

(6.29) $t = .08 - .25/.022 = -7.8$

(Florida-based forecast)

As this t-statistic qualified as statistically significant, the null hypothesis was rejected and the alternative that there existed a significant difference between the actual and Florida-based projection of per capita value of building permits, accepted. In reference to Table 6.11 and the earlier discussion, it was recognized that the actual values exceeded the Florida-forecasted values. Therefore, the significant difference is not a possible indication of a negative ACSC economic impact, but possibly the reverse.

The per capita number of building permits, the forecasts and actual, are listed on Tables 6.13 and 6.14. The Florida-based numbers were greater than actual numbers in 1976, 1977, and 1979. The Charlotte-based forecast of numbers of permits exceed actual numbers from 1976 through 1980.

The regression results for the three categories are:

(6.30) Monroe County actual per capita single plus multi-family building permits:

$$AdBP_t = .0039 + .0035t$$

(3.9) (10.6)

TABLE 6.13

PER CAPITA SINGLE PLUS MULTI-FAMILY BUILDING PERMITS

(MONROE COUNTY AND FLORIDA)[a]

Year	Monroe Actual	Florida Actual	Florida Growth Rate	Florida Forecast	Actual-Forecast
1975	.0044	.0062			
1976	.0035	.0085	1.371	.0060	-.0025
1977	.0072	.0133	2.145	.0094	-.0022
1978	.0128	.0171	2.758	.0121	.0007
1979	.0126	.0188	3.032	.0133	-.0007
1980	.0187	.0184	2.968	.0131	.0056
1981	.0212	.0144	2.328	.0102	.0120

[a]Source: See Table 6.1

TABLE 6.14

PER CAPITA SINGLE PLUS MULTI-FAMILY BUILDING PERMITS

(MONROE AND CHARLOTTE COUNTIES)[a]

Year	Monroe Actual	Charlotte Actual	Charlotte Growth Rate	Charlotte Forecast	Actual-Forecast
1975	.0044	.0102			
1976	.0035	.0179	1.755	.0080	-.0040
1977	.0072	.0316	3.098	.0136	-.0064
1978	.0128	.0414	4.059	.0179	-.0050
1979	.0126	.0358	3.510	.0154	-.0028
1980	.0187	.0600	5.882	.0259	-.0072
1981	.0212	.0313	3.067	.0135	.0077

[a]Source: See Table 6.1

(6.31) Florida-based forecast:

$$AdBP_t = .0083 + .00095t$$

(4.8) (1.7)

(6.32) Charlotte County-based forecast:

$$AdBP_t = .0113 + .0018t$$

(2.8) (1.34)

Although the t-statistic for Equation 6.30 is significant, the forecast trends do not exhibit significant changes over time. Thus the second t-test cannot be made.

The final building permit variable that was studied was the number of single and multi-family permits issued without the adjustment for population. Tables 6.15 and 6.16 summarize actual and forecasted values showing that Florida-based trends are greater than actual trends from 1976 through 1979 and that Charlotte-based forecast numbers exceed the actual in all years except 1981. It appears that 1981 was a big growth year for Monroe County as the actual numbers of permits issued are greater than either of the comparable areas' forecasts, without a consideration for population differences.

The regression equations for this final building permit variable were:

(6.33) Monroe County actual single plus multi-family building permits:

$$BP_t = 131.1 + 238.0t$$

(1.1) (6.2)

(6.34) Florida-based forecast:

$$BP_t = 540.5 + 85.4t$$
$$(4.9) \quad (2.4)$$

(6.35) Charlotte-based forecast:

$$BP_t = 710.2 + 208.1$$
$$(2.1) \quad (1.9)$$

Once again, it was found that the Charlotte-based forecast equation did not yield a significant t-statistic. Therefore, only the secondary t-test on the actual versus Florida-based trend lines could be performed. The result:

(6.36) $t = 85.4 - 238/35.9 = -4.3$

(Florida-based forecast)

The significance of this second t-test required acceptance of the alternative hypothesis that the Florida-based forecast is significantly different from actual activity in Monroe County.

Summary of Forecast-Based Analysis

The task at hand was to determine whether the Area of Critical State Concern designation had an economic impact upon Monroe County and was undertaken by comparing actual trends with expected trends. The expected activity was derived by calculating the growth rates of two comparative areas, Charlotte County and the state of Florida, and applying those rates to Monroe County, thus creating forecasted or projected trends of the economic variables under study. A comparison of trends over time was then made to determine whether the differences between actual and expected values were significant. The following

TABLE 6.15

SINGLE PLUS MULTI-FAMILY BUILDING PERMITS

(MONROE COUNTY AND FLORIDA)[a]

Year	Monroe Actual	Florida Actual	Florida Growth Rate	Florida Forecast	Actual-Forecast
1975	284	52,359			
1976	221	73,113	1.3963	396.5	-175.5
1977	458	116,212	2.2195	630.3	-172.3
1978	335	153,446	2.9307	832.3	-497.3
1979	804	173,631	3.3162	941.8	-137.8
1980	1,177	171,926	3.2836	932.5	244.5
1981	1,362	145,893	2.7864	791.3	570.7

[a]Source: See Table 6.1

TABLE 6.16

SINGLE PLUS MULTI-FAMILY BUILDING PERMITS

(MONROE AND CHARLOTTE COUNTIES)[a]

Year	Monroe Actual	Charlotte Actual	Charlotte Growth Rate	Charlotte Forecast	Actual-Forecast
1975	284	455			
1976	221	801	1.760	499.8	-278.8
1977	458	1,487	3.268	928.1	-470.1
1978	335	2,108	4.621	1,312.6	-977.6
1979	804	1,963	4.314	1,225.3	-421.3
1980	1,177	3,547	7.796	2,214.0	-1,037.0
1981	1,362	1,926	4.233	1,202.2	159.8

[a]Source: See Table 6.1

contains a brief summary of each economic variable and the areas where differences were insignificant and significant.

Real Property Values

Because the t-statistics for the per capita values of real property were insignificant for the forecasted trends no further tests to determine significant differences could be made on that particular variable. The Monroe County actual trend, however, did change significantly over time in an increasing direction. Except for 1976 and 1977 the Charlotte County and Florida-based forecasts, respectively, were not as great as the actual values. Although it cannot ascertained whether this increase was significantly greater than what could have been expected, it can safely be stated that it is highly doubtful that the ACSC designation created a negative impact on the per capita value of property in Monroe County.

Real property values without the adjustment for population differences yielded a result of significant change within each of the three categories, yet when the second t-test was made the null hypothesis of no significant differences between the action and forecasted trends had to be accepted. Assuming that Charlotte County and state level activities are comparable to those in Monroe County we can say that real property values in Monroe County were not affected by imposition of legislation.

Per Capita Income

The regression analysis of per capita income resulted in significant differences over time for the three categories as well as significant differences between actual per capita income in Monroe County and both the Florida and Charlotte-based projections. This result means that it is possible that the ACSC designation had an effect on per capita income. A reference to Tables 6.5 and 6.6 shows that 1980 actual values were remarkedly less than previous years and forecasted values.

The supposition was made that impacts of the recession may possibly have been more severe in per capita income in Monroe County than elsewhere. In support of this theory the major industries section of Table 5.1 is referenced. The wholesale and retail trade sector and the services, mining, and miscellaneous sector employ approximately 56% of the labor force. This figure holds for 1980 as well, as verified in the Florida Statistical Abstract (1980). The trade and services industries in Monroe County are dependent upon tourism which is sensitive to recessionary pressures directly experienced at the local level. The Florida Division of Tourism (1980) reports a decline in tourism of 8.35% in 1980 from the previous year. The Florida Department of Commerce (1981) reports that Monroe County has approximately three times as many hotels and restaurants as Charlotte County. This means that Monroe County is more highly dependent on tourism services than

Charlotte County and that tourism suffered at this time. It is possible that income levels declined for this reason.

Unemployment and Employment Rates

It was found that unemployment rates changed significantly over time in each of the three categories but that there was no significant difference between the actual and forecast-based trends as predicted by both comparative areas. With the assumption that Charlotte County and the state of Florida are comparable areas, it can be stated with confidence that the ACSC designation had no impact on Monroe County's unemployment rates.

The employment variable was next introduced into the analysis with the resultant evidence that employment numbers changed significantly over time for actual and forcast-based trends. This result allowed a test as to whether there were differences of significance between the actual and forecast equations with the result that employment differences between actual Monroe County levels and those based on Florida are insignificant. The reverse was true when comparisons with Charlotte County-based forecasts were made. Assuming that Charlotte County and the state are compatible regions upon which to base Monroe County projections, divergent results are obtained regarding the employment variable . According to Charlotte County employment trends the ACSC designation created a negative impact upon Monroe County. According to Florida

trends, it did not. Tables 6.9 and 6.10 reveal that although the employment numbers for Monroe County and the state both increased steadily for the years 1975-1981, Charlotte's employment numbers leaped ahead of its own previous levels for those same years. An increase of 22.7% from 1980 to 1981 is a huge increase experienced by Charlotte County. Such an unusually high level of growth by Charlotte County lends a possible distortion to the comparative analysis.

Building Permits

In an attempt to satisfactorily define possible impacts upon the building permit variable three different definitions of building permits were used: per capita value of permits issued, per capita number of single-family plus multi-family permits, and single-family plus multi-family permits without the adjustment for population differences.

The per capita number of single and multi-family permits did not change significantly from 1975 to 1981 for any of the three categories. In making an assessment within this limited framework there is no proof of a negative impact created by the designation. Actual Monroe County values moved primarily in the positive direction and the actual-minus-forecasted differences were not consistent and were strongly favoring actual values in the last year of the study.

The analysis of per capita value of building permits yielded insignificant changes for the Charlotte-based forecasts. A statement about this variable when comparing it with Charlotte County activity cannot be made other than to say that actual values exceeded the forecasted values for five out of six years. The comparison of Florida-based forecasts with actual Monroe County per capita values of building permits could be made and resulted in an acceptance of the alternative hypothesis that there are significant differences. Table 6.11 indicates that those differences are positive for actual values exceed the forecasted values. It cannot be said that the increase in per capita values of building permits in Monroe County was caused by the designation but it can be stated with confidence that when using Florida as a comparative area the ACSC designation had no negative impact.

The last economic variable to be considered is the single-family plus multi-family number of building permits. Once again it was found that the Charlotte County-based trend did not change significantly over time which prevented a further comparison. The actual minus forecasted differences were negative though, except for the last year, as seen in Table 6.16.

The Florida-based forecasts were significant over time and a comparison of the slopes of the actual and forecast equations resulted in an acceptance of the hypothesis that the changes were significant. The actual-minus-forecasted

differences noted in Table 6.15 were negative for the first four years of the study. But before conclusions can be drawn about the variable it must be noted that in 1979 Monroe County more than doubled its building approvals above the previous year's level and continued to show a steady growth for 1980 and 1981 which surpassed the Florida-based forecasts for those years. These trends indicate that the ACSC designation may have had an initial negative impact upon the number of single-family and multi-family building permits issued, that these initial negative effects carry a greater weight than the still recent recovery, and that recovery and reversal has occurred within the last few years.

In conclusion, the forecast-based evaluative technique allowed the following assessments of eight variables based on Charlotte County and the state of Florida's growth rates: in five of the 16 cases any negative impacts were entirely ruled out; in one case a positive impact was found; in six cases no conclusive decision could be drawn; and in four cases impact was confirmed, possibly negative in nature. Whether the designation played a role in this impact was questioned and the trends and their most recent direction were studied.

An earlier discussion referenced evidence which suggested that land use controls often contribute to an increase of housing costs and by association, an increase of property values. No proof of such was found in Monroe

County. The changes in property values in Monroe County were not unlike the changes seen in Charlotte County and the state.

The per capita values of building permits did show a clearly significant and positive difference between the Florida-based forecasts and actual values in Monroe County. If property values had shown the same patterns, it could be evidence of second-round externalities. But this particular effect is isolated. Property values did not register significant changes, the other building permit variables showed inconclusive results, and Charlotte County building permit values did not show significance and could not be compared. It is not known whether the increased value of building permits are a reflection of increased housing costs, increased expectations, or a healthier construction industry.

Based upon the results of the forecast model, Monroe County did not experience a consistent negative economic impact in the years following the Area of Critical State Concern designation and no firm evidence of externalities, neither positive nor negative, was found.

The Covariate Model

Often times the researcher desires to expand the analysis by looking at the problem from another direction and thus add an additional dimension to the study. To extend the scope of this analysis the data set was enlarged

to include the years 1965 to 1981 and a covariate model with differential intercept and slope coefficients was created. These differentials are introduced by three dummy variables, the first which represents the structural change that occurred when the designation went into effect, and the second and third which separate the data into the three regions. This allows a construction of artificial variables that capture the qualitative significance associated with differences in time periods and regional effects.

Dummy variables, as formulated for this model, can take on only two possible values, zero or one. A zero indicates the absence of an attribute and a one indicates its presence. For example, if the dummy variable that represents the years after 1975 is significant it means the intercept value of the trend line is significantly different from the initial intercept in 1965. If the same dummy variable, multiplied by the time variable, is significant, it means the slope of the trend line significantly changed after 1975.

The regression model takes the form:

$$(6.36)\quad Y_t = \alpha_0 + \alpha_1 D_a + \beta_1 D_1 + \beta_2 D_2 + \delta_1 D_a D_1 + \delta_2 D_a D_2 + \theta_1 t + \theta_2 t + \theta_3 D_1 t + \theta_4 D_2 t + \gamma_1 D_a D_1 t + \gamma_2 D_a D_2 t + U_i, \text{ where}$$

α_0 = the intercept for Monroe County,

D_a = the intercept dummy variable for the years after the designation,

D_1 = the intercept dummy variable for Charlotte County,

D_2 = the intercept dummy variable for Florida,

D_aD_2 = the intercept dummy variable for the years after 1975 for Charlotte County,

t = time, the coefficient of which represents Monroe County's time trend,

D_1t = dummy slope variable for Charlotte County,

D_2t = dummy slope variable for Florida,

D_aD_1t = dummy slope variable for Charlotte County after 1975,

D_aD_2t = dummy slope variable for Florida after 1975,

U_i = the error term.

As each dummy variable takes on a value associated with the years after the designation or with its relevant regions, the equation that represents each of the three areas becomes:

Monroe County:

$$Y_t = (\alpha_0 + \alpha_1) + (\Theta_1 + \Theta_2)t + U_i$$

Charlotte County:

$$Y_t = (\alpha_0 + \beta_1 + \delta_1) + (\Theta_1 + \Theta_3 + \gamma_1)t + U_i$$

Florida:

$$Y_t = (\alpha_0 + \beta_2 + \delta_2) + (\Theta_1 + \Theta_4 + \gamma_2)t + U_i$$

The analysis of the covariate model was begun by running the full unconstrained equation (see Equation 6.36). If the F-statistic, which tests that the slopes are equal, was significant, the t-ratios of the partial regression coefficients were checked to determine the source of the significance. If the F-test proved to be significant while the t-tests failed, it meant that

Charlotte County and Florida were different from each other.

In a model of this type one can anticipate a variety of results. The intercepts can be the same while the slopes vary, or vice versa. We we may find the same slopes and same intercepts, or different slopes and different intercepts.

After the full equation was run the null hypotheses were formulated to determine if the mean values and rates of change were the same in the three areas. Their resultant restrictions were then introduced into the full equation. The restrictions thus created constrained equations, which in essence are the full equation with selected variables removed. A list of the null hypotheses, their meanings, and the 10 restricted equations which resulted with the formulation of each null hypothesis can be found in Table 6.17.

The next step was calculation of a second F-test to determine if the restricted equations were significant when compared with the unconstrained model. The F-test takes the form:

$$F^{R}_{n-k-1} = \frac{\text{C Res SS - UnC Res SS/\# restrictions}}{\text{UnC Res MS}}$$

C Res SS = residual sum of squares of the constrained model,

UnC Res SS = residual sum of squares of the unconstrained, or full, model,

TABLE 6.17

CONSTRAINED EQUATIONS OF COVARIATE MODEL

H_0: $\alpha_1 = \delta_1 = \delta_2 = 0$ (no change in intercepts after 1975)

(6.37) $Y_t = f(D_1, D_2, t, D_a t, D_1 t, D_2 t, D_a D_1 t, D_a D_2 t)$

H_0: $\theta_2 = \gamma_1 = \gamma_2 = 0$ (no change in slopes after 1975)

(6.38) $Y_t = f(D_a, D_1, D_2, D_a D_1, D_a D_2, t, D_1 t, D_2 t)$

H_0: $\beta_1 = \delta_1 = 0$ (Charlotte County's intercepts are not different from Monroe County's)

(6.39) $Y_t = f(D_a, D_2, D_a D_2, t, D_a t, D_1 t, D_2 t, D_a D_1 t, D_a D_2 t)$

H_0: $\beta_2 = \delta_2 = 0$ (Florida's intercepts are not different from Monroe County's)

(6.40) $Y_t = f(D_a, D_1, D_a D_1, t, D_a t, D_1 t, D_2 t, D_a D_1 t, D_a D_2 t)$

H_0: $\theta_3 = \gamma_1 = 0$ (Charlotte County's slope is not different from Monroe County's)

(6.41) $Y_t = f(D_a, D_1, D_2, D_a D_1, D_a D_2, t, D_a t, D_2 t, D_a D_2 t)$

H_0: $\theta_4 = \gamma_2 = 0$ (Florida's slope is not different from Monroe County's)

(6.42) $Y_t = f(D_a, D_1, D_2, D_a D_1, D_a D_2, t, D_a t, D_1 t, D_a D_1 t)$

H_0: $\delta_1 = 0$ (Charlotte County's intercept is not different after 1975)

(6.43) $Y_t = f(D_a, D_1, D_2, D_a D_2, t, D_a t, D_1 t, D_2 t, D_a D_1 t, D_a D_2 t)$

H_0: $\delta_2 = 0$ (Florida's intercept is not different from Monroe County's)

(6.44) $Y_t = f(D_a, D_1, D_2, D_a D_1, t, D_a t, D_1 t, D_2 t, D_a D_1 t, D_a D_2 t)$

H_0: $\gamma_1 = 0$ (Charlotte County's slope is not different after 1975)

(6.45) $Y_t = f(D_a, D_1, D_2, D_a D_1, D_a D_2, t, D_a t, D_1 t, D_2 t, D_a D_2 t,)$

Ho: $\gamma_2 = 0$ (Florida's slope is not different after 1975)

(6.46) $Y_t = f(D_a, D_1, D_2, D_a D_1, D_a D_2, t, D_a t, D_1 t, D_2 t, D_a D_1 t)$

restrictions = number of restrictions created by the constraints,

UnC Res MS = residual mean squares of the unconstrained model.

If the F-statistic proved to change significantly with the introduction of the null hypotheses, the t-statistic for each coefficient was analyzed to determine the source of the change.

The economic factors that we studied were the same as before: unemployment rates, building permit activity, per capita income levels, and real property values. The 1965 to 1981 data for Monroe County were pooled with the data of the two comparative areas, Charlotte County and the state of Florida, for the same years. This increase of the data base created an increase in the degrees of freedom and thus permitted a wide range of analysis.

Results of the Covariate Model

Per Capita Property Values

The results of the unconstrained and constrained equations for the per capita value of property for the years 1965 through 1980 are shown on Table 6.18. The average property values for Monroe County and the state of Florida were not significantly different from one another in the initial years, but Charlotte County's per capita value of property was greater than Monroe County's in 1965. A positive slope of the trend line was shown for the study

TABLE 6.18

REGRESSION RESULTS OF PER CAPITA PROPERTY VALUES

(Significant t-statistics)

	Independent Variables											
Eq.#	K	Da	D1	D2	DaD1	DaD2	t	Dat	D1t	D2t	DaD1t	DaD2t
6.36	4.0	-2.6	4.6				4.1	2.6				
6.37	3.3		4.4				4.2					
6.38	3.1		4.8				5.0					
6.39	8.3	-2.5						3.0	5.0	-3.4		
6.40	6.2		4.7				4.4					
6.41	6.0	-2.6	7.5		-2.7		4.5	2.9				
6.42	5.7		4.3			-2.4	4.4					
6.43	4.0	-3.0	4.8				4.8	3.0				
6.44	3.7		4.6				4.2					
6.45	4.0	-2.9	5.1				4.4	3.0				
6.46	3.6		4.8				4.6					

period for all areas with an increase in the steepness of the slopes after 1975. The trends for the three areas under study were not significantly unlike one another for the time period. The results have shown that after 1975 the per capita property values for the state of Florida and Charlotte County did not behave in a significantly different manner than the per capita property values in Monroe County.

The results of the forecast model regarding the value of property revealed no significant differences between the forecasted and actual trends in real property values. but no test could be made on this variable with the adjustment for population. The covariate expansion allowed a comparison on a per capita basis, but revealed the same characteristics that there were no significant differences in property values after 1975 when the ACSC designation went into effect.

Per Capita Income

The intercepts for per capita income levels of Monroe County in 1965 proved to be significantly higher than those for both Charlotte County and Florida. All three regions experienced steady increasing growth for the 1965 to 1975 time period and also for the 1976 to 1980 time period. Florida and Monroe County's time trends are not significantly different from one another and increased at comparable rates, including the post-1975 years.

TABLE 6.19

REGRESSION RESULTS OF PER CAPITA INCOME

(Significant t-statistics)

	Independent Variables											
Eq.#	K	Da	D1	D2	DaD1	DaD2	t	Dat	D1t	D2t	DaD1t	DaD2t
6.36	9.1		-4.9	-2.0			5.3		2.8			
6.37	8.5		-4.7	-2.1			5.0	3.7	2.8			
6.38	7.8	3.4	-4.6	-2.1			5.4		2.8			
6.39	6.2						8.4		-2.4			
6.40	10.2		-4.2				7.9	2.7	2.1			
6.41	8.5		-4.6				9.4	2.2				
6.42	9.6		-4.3				8.9	2.7	2.1			
6.43	9.2		-5.1	-2.1			5.3	2.6	3.0			
6.44	9.1		-4.9	-2.2			5.1	3.0	2.9			
6.45	9.4		-5.2	-2.1			5.4	2.4	3.2	2.2		
6.46	9.4		-5.0	-2.4			5.2	2.9	3.0			

In our previous forecast-based analysis we had found that Monroe County and Charlotte County registered significantly different trends, that Charlotte County's per capita income levels were above those of Monroe County. We see those same results again. Monroe County obviously did not keep pace with the healthy increases in income enjoyed by Charlotte County, but then, neither did the state.

In the previous tests of the forecast model we had found that Florida-based forecasts were greater than actual income levels in Monroe County. With the addition of 10 years of data for each region and the pooling of data, the covariate model suggested there are not significant differences between per capita levels in Monroe County and Florida. Table 6.5 showed that the differences between actual and forecasted levels were positive until 1980, but we could only suggest that the significance lay in a positive direction. The additional evidence of the covariate model reveals that there exist no negative differences and thus we have more confidence about our previous statement.

Unemployment Rates

The average rates of unemployment in Charlotte County and the state did not prove to be significantly different from those in Monroe County in 1965 or 1975. By 1975 the unemployment rates had increased to higher levels for all three regions but the trend reversed itself for the

TABLE 6.20

REGRESSION RESULTS OF UNEMPLOYMENT RATES

(Significant t-statistics)

	Independent Variables											
Eq.#	K	Da	D1	D2	DaD1	DaD2	t	Dat	D1t	D2t	DaD1t	DaD2t
6.36		4.2						-3.3				
6.37	2.0											
6.38	2.6	2.4			-2.3	-2.1						
6.39		5.3					2.7	-4.1			-2.2	
6.40	2.3	5.0					2.4	-3.9		2.2		-2.1
6.41		5.5			-2.1		4.2	-4.7				
6.42		5.1					4.3	-4.6				
6.43		5.2						-3.9			-2.0	
6.44		4.9						-3.6				
6.45		5.6			-2.0		2.2	-4.7				
6.46		5.3					2.0	-4.4				

following years. Tables 6.7 and 6.8 show this to be true. The double digit unemployment rates in 1975 for all three areas declined in the years following 1975, and the unemployment picture of Monroe County was not significantly different from that of Charlotte County or the state.

This result is also compatible with the finding of the forecast-based analysis.

Total Number Employed

The employment numbers do not lend themselves to cross-regional comparisons in the covariate model due to size differentiations. They were included only for consistency and yielded the expected results that Florida's average and time trend were greater than Monroe County's.

The greater time span, however, did negate Charlotte County's recent growth spurt and showed a mean value not unlike Monroe County's.

Per Capita Value of Building Permits

The time trends for the values of building permits adjusted for the differences in population for each study area show that Monroe County, Charlotte County, and the state of Florida are in accordance with one another. The trends are are insignificant for all areas until the post-1975 period when the trend increased to a significant level. The only negative signs in the regression results are associated with the intercepts of the dummy variables

TABLE 6.21

REGRESSION RESULTS OF TOTAL NUMBER EMPLOYED

(Significant t-statistics)

	Independent Variables											
Eq.#	K	Da	Dl	D2	DaDl	DaD2	t	Dat	Dlt	D2t	DaDlt	DaD2t
6.36				72.0		-3.7				23.6		3.4
6.37				56.6						19.0		
6.38				59.6						20.8		
6.39				85.5		-4.4				26.7		4.0
6.40	6.2		-3.6						-3.1	15.9		-4.4
6.41				82.6		-4.3				27.9		4.0
6.42	-4.7		2.6	46.3		7.3	5.5		-3.1			
6.43				33.2		4.3				23.9		3.9
6.44		-3.2		62.5				3.2		20.9		
6.45				73.6		-4.3				24.2		4.0
6.46		-2.9		64.9				3.1		22.7		

TABLE 6.22

REGRESSION RESULTS OF PER CAPITA VALUE OF BUILDING PERMITS

(Significant t-statistics)

	Independent Variables											
Eq.#	K	Da	D1	D2	DaD1	DaD2	t	Dat	D1t	D2t	DaD1t	DaD2t
6.36		-2.3						2.4				
6.37												
6.38												
6.39		-2.3						2.6	4.2			
6.40		-2.3						2.5				
6.41		-2.3	3.8				2.9	2.2				
6.42		-2.3						2.5				
6.43		-2.3						2.4				
6.44		-2.8						2.9				
6.45		-2.1						2.3				
6.46		-2.7						2.8				

representing the years after 1975. This occurs because the yearly building permit data for the state of Florida for the years 1965 through 1972 were unavailable. Additionally, Florida's per capita values of building permits decreased from 1973 through 1975. Fortunately, this deficiency does not create a problem because the trends for all three regions show a similar and significant positive slope for the years after 1975.

In the earlier study this variable showed a significant positive difference between the Florida-based forecasts and the actual level of per capita building permits in Monroe County. Because the results are dissimilar it cannot be said that the designation had a positive stimulus on the values of building permits on a per capita basis. It can be said that no negative impact is evident.

Single Family Plus Multi-Family Numbers of Building Permits

Adjustments of the numbers of residential building permits for population differences resulted in low reliability of the parameters of the estimated trends due to the minimal variance within the adjusted data. The same problems occurred earlier when the t-tests for the forecasted trends proved insignificant. Therefore, the unadjusted figures were used.

The average values for Florida numbers of permits compared with that of the counties was substantially

TABLE 6.23

REGRESSION RESULTS OF SINGLE PLUS MULTI-FAMILY

NUMBER OF BUILDING PERMITS

(Significant t-statistics)

	Independent Variables											
Eq.#	K	Da	D1	D2	DaD1	DaD2	t	Dat	D1t	D2t	DaD1t	DaD2t
6.36				14.5		-12.7				-12.9		13.2
6.37												
6.38												
6.39				15.0		-13.7				-13.3		13.9
6.40										5.5		
6.41				15.0		-13.7				-13.4		13.9
6.42				6.5								
6.43				14.8		-13.5				-13.0		13.7
6.44		-2.4		2.9				2.3				
6.45				14.8		-13.5				-13.1		13.7
6.46				6.5								

larger, as is expected due to differences in population size. Keeping in mind the limited data set for the state we saw the trend for Florida was less than the counties, but that in the post-1975 years it was significantly greater. The intercept and slope of the trend lines of building permits issued by Charlotte County is not significantly different from Monroe County's for both before and after the designation. Again, these results substantiate the finding of the forecast model.

Conclusion

The reader has been taken through a regiment of detail of an economic impact analysis of Monroe County, the purpose of which was to determine whether the ACSC designation had affected the local economy. The problem was tackled from two complementary angles, the first included a forecast model of expected economic activity in Monroe County for the years 1976 through 1981 based on the economic activity of two comparable study areas. The second method employed an econometric covariate model which included dummy variables to represent qualitative distinctions. For this second method the data for the three study areas data were pooled and expanded to include the years 1965 through 1981.

The results of each analysis were analyzed and compared. For most of the variables under study there appeared no substantial impacts. Unemployment rates and

property values were not significantly different before or after 1975. Where positive differences were identified, it could not be concluded that the designation had created the increase. For the economic variables in the forecast model that did show differences between actual and expected levels there was little consistency in the patterns for both Charlotte County and the state. Per capita income levels for Monroe County was significantly different than those of the comparable areas. Although the difference in actual and projected income levels were positive for more years than they were negative, by 1980 a negative effect strongly emerged. It was suggested that this may have been caused by Monroe County's dependency on tourism and that industry's sensitivity to the recessionary pressures occurring at that time.

The covariate model lent support to the argument that the differences were primarily positive. Our final statement on per capita income levels was that there appeared no significant negative trends.

Charlotte County also enjoyed a healthy increase in its employment numbers and out-distanced both Monroe County and the state in that area of activity. The interpretation of negative impacts of the ACSC designation on employment in Monroe County cannot be clearly stated as the state levels showed trends consistent with those in Monroe County.

In summary, we conclude that there does not exist

significant differences in the economic activity levels in Monroe County since 1975, the time when the Area of Critical State Concern designation was made.

We have not investigated if the implementation of the ACSC designation procedures have been carried out. Various programs have been put into force and funding has been directed to the Keys in support of the costs of land regulation. The question of adequacy or sufficiency of these programs and funds have not been included in this study. It is possible that the designation was not properly implemented or that only partial implementation occurred and thus there were no impacts to be found. Under the assumption that the designation process has changed the direction of land and water management towards a constructive and organized plan of development, we have shown that economic growth need not be sacrificed for a better environment. Some short term reductions in economic activity are to be expected, yet we have seen that growth has not been suppressed.

The problems of the limitations of natural resources and population growth is not new, but were addressed by Thomas Malthus in the early 1800s. Malthus propounded a very pessimistic outlook, the solutions to which were quite gloomy: dire predictions of starvation and misery. Technological advances have since pushed agricultural production far beyond what was thought possible and food resources have increased to meet population demands.

Because his theory was based on the concept of limited land, there exists an analogy to the situation in the Keys where the land cannot support intensive usages. There are limits to unmanaged growth. Yet, we see that the Malthusian solutions of more resources or less people, is still not an inevitability. A high quality environment is important for the economic health of the Florida Keys. The Area of Critical State Concern designation on the Florida Keys is a method of allowing growth while maintaining a reasonable amount of environmental awareness without significant negative economic impacts.

APPENDIX I

RULES OF THE DEPARTMENT OF ADMINISTRATION, ADMINISTRATION COMMISSION, CHAPTER 22F-8, LAND PLANNING, PART 8, BOUNDARY AND PRINCIPLES FOR GUIDING DEVELOPMENT FOR THE FLORIDA KEYS AREA OF CRITICAL STATE CONCERN:

22-8.02 Boundary. The following area is hereby designated as the Florida Keys Area of Critical State Concern:

All lands in Monroe County, except:

(1) that portion of Monroe County included within the designated exterior boundaries of the Everglades National Park and areas north of said Part;

(2) all lands seaward of mean high water than are owned by local, state, or federal governments; and

(3) excluding any federal properties.

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