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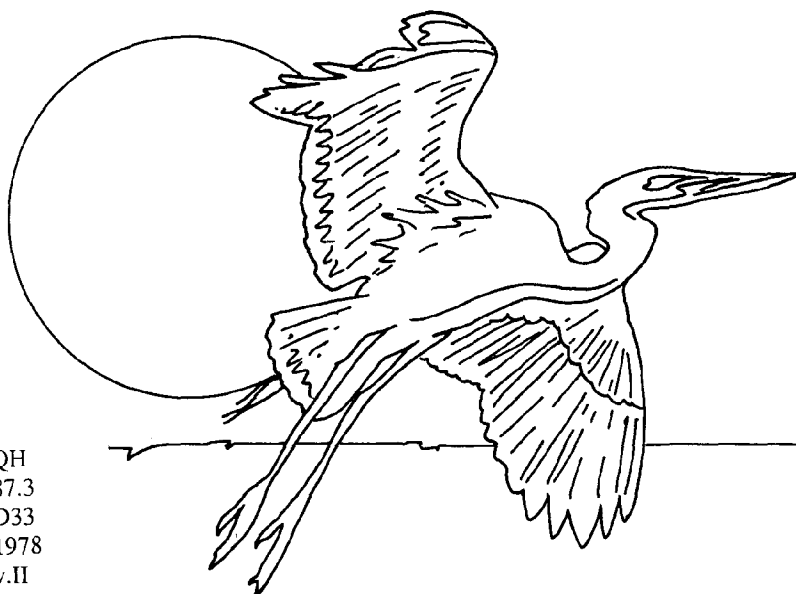
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COASTAL ZONE
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dade county
wetlands demonstration project

Volume II
**ANALYSIS OF MANAGEMENT
TECHNIQUES**



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Dade County Wetlands Demonstration Project

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Volume II
Analysis of Management Techniques

COASTAL ZONE
REGULATION CENTER

Dade County Planning Department

In Conjunction with the Bureau of
Coastal Zone Management, Florida
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PREFACE

This paper was prepared by the firm of Wallace, McHarg, Roberts and Todd, under a contract with Dade County. The purpose of the paper is to explore in some detail the most feasible management option for the East Everglades; Performance Criteria. In addition, several concepts that can be implemented as refinements to performance criteria or to other management approaches are presented.

INTRODUCTION

The East Everglades of Dade County have long been recognized as an area whose rich resources support either directly or indirectly the health and well being of a large proportion of County residents. In addition, since the East Everglades are vital to the maintenance and indeed the continual existence of the environment within the adjacent Everglades National Park, the use or misuse of those same resources assumes National importance.

The County's position regarding this land was officially stated in the Comprehensive Development Master Plan, Ordinance No. 75-22 of March 31, 1975, which designated the East Everglades as an environmentally sensitive area. The larger study of which this paper is a part is a refinement of the Master Plan. It builds upon and extends the conclusions reached in 1975 and in effect endorses the major findings. This study pursues the definition of the factors which contribute to the environmental sensitivity of this area and seeks ways in which the public interests in the area can be secured against future unwarranted depredation.

This section describes some of the methods by which the public sector can manage future change caused by man's activities to prevent modification to the environment which would damage or destroy those resources which are essential to the continued well being of the remainder of Dade County. This aspect of the study is limited in several respects. First it considers primarily those actions which can be undertaken by Dade County now or in the future. Second, many effective management mechanisms which are inherent in the Master Plan are not elaborated upon here.

The foremost example of items in this second category is the provision of public services. It seems clear from the Master Plan that Dade County has no intention of extending public sewer service or water supply into the East Everglades at least for the life of the Plan. In addition there are no proposals to modify the transportation network to increase access to or within the area by an appreciable quantity. In short, as a matter of public policy, Dade County is not taking actions which would increase development pressure upon the area. For this reason, the timing and extent of the provision of services as a means of directing private investment activity is not considered further.

There are several conclusions of this study. The first is that there is substantial variation within the natural environment of the East Everglades. The geographic region is composed of a number of differentiated physiographic zones. From zone to zone the relative importance, fragility, quantity, and adaptability of the different natural factors which in concert compose the present environment will vary. Thus, similar human activities applied uniformly in different physiographic regions will have different consequences. Since it is the consequence which is of concern, it is apparent that a uniform set of controls applied uniformly to the area may, in some cases, be effective, in others have no impact, and in still others be counter productive. To be efficacious, management tools must recognize, and be sensitive to, must prescribe for and must regulate within the diversity found in the existing environment which composes the East Everglades.

Second, it is possible by building upon an increasing understanding of the place and of the importance to Dade County of resources identified, to determine which consequences can be accepted, which can be ameliorated, and which cannot be tolerated. Building upon the basis of existing management frameworks within Dade County and drawing upon an expanding body of experience in other municipalities, it is possible to frame tools which will provide for the rational use of the environment.

The purpose of this section of the study is not to determine whether the public health and welfare is sufficiently endangered by potential development to justify intervention; rather it is to point out ways in which such intervention can take place.

Performance criteria are discussed as a management tool which can be initiated through appropriate ordinances rather quickly and which will insure the maintenance of the resource in a quantity and quality which is necessary for the continued well being of the community. Following this, several devices, such as the transfer of development rights, which could be the subject of more intensive study in preparation for future application are discussed.

PERFORMANCE CRITERIA FOR THE EAST EVERGLADES

Performance criteria describes the natural resources of an area and the level at which the community in which they are found expects those resources to be maintained. These criteria provide the basis for ordinances which can be enacted into law within the established police power of the local government.

When properly written, these criteria have many functions, principally to describe, to educate and to regulate. The resource is described as it works within an environment. Its value and the community's responsibility to it are further explained. Finally, a measurable level at which it can operate is set and at this point the user is expected to fill in the methods which will be used to meet these standards.

In addition to establishing the levels of maintenance of both quantity and quality of existing resources, performance criteria for the East Everglades should do at least the following things:.

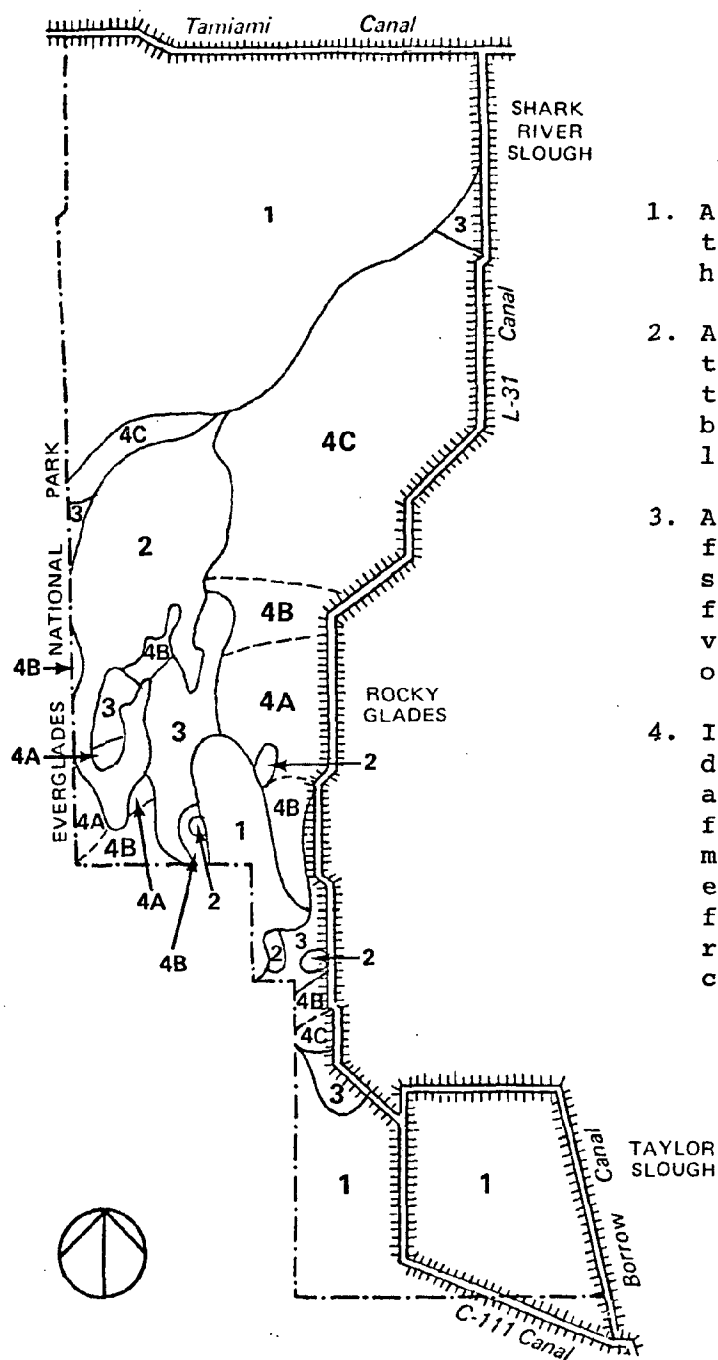
1. Permit additional information to be added to the data base without requiring extensive modification of the legislation.
2. Require legislation within existing Dade County powers and without major administrative reorganization.
3. Discriminate between those items in the environment of vital concern to Dade County and those which are held less valuable.

The performance criteria for the East Everglades are based on the latest best available information. Much of this data describes an extensive ecological system which covers most of South Florida. Geographically, the East Everglades composes only a small portion of this more extensive region. The available information is fine enough to present an understanding of the system and its major components; however, it is not fine enough to permit the mapping of boundaries between different conditions with any confidence. Using this level of information, it is possible to identify and describe which elements of the system need to be protected and the extent of protection required to prevent degradation of the resources. Wherever the condition occurs, then the standard for its maintenance applies. In short, the performance criteria describes the function and not the location.

The accompanying maps indicate the general locale of the function being controlled. In actual use, any request to modify the environment for any purpose should establish which conditions prevail on the site in question. Then it is necessary to demonstrate that for each of these conditions the prescribed criteria are met by the proposed modification.

In the East Everglades, six naturally occurring components of the ecosystem were singled out as being determinants of ecological functioning. Five of these are groundwater, surface water, vegetation, wildlife and soils. These mutual factors interact to produce the total system. Unhealthy modifications to any one of them will cause repercussions to the others.

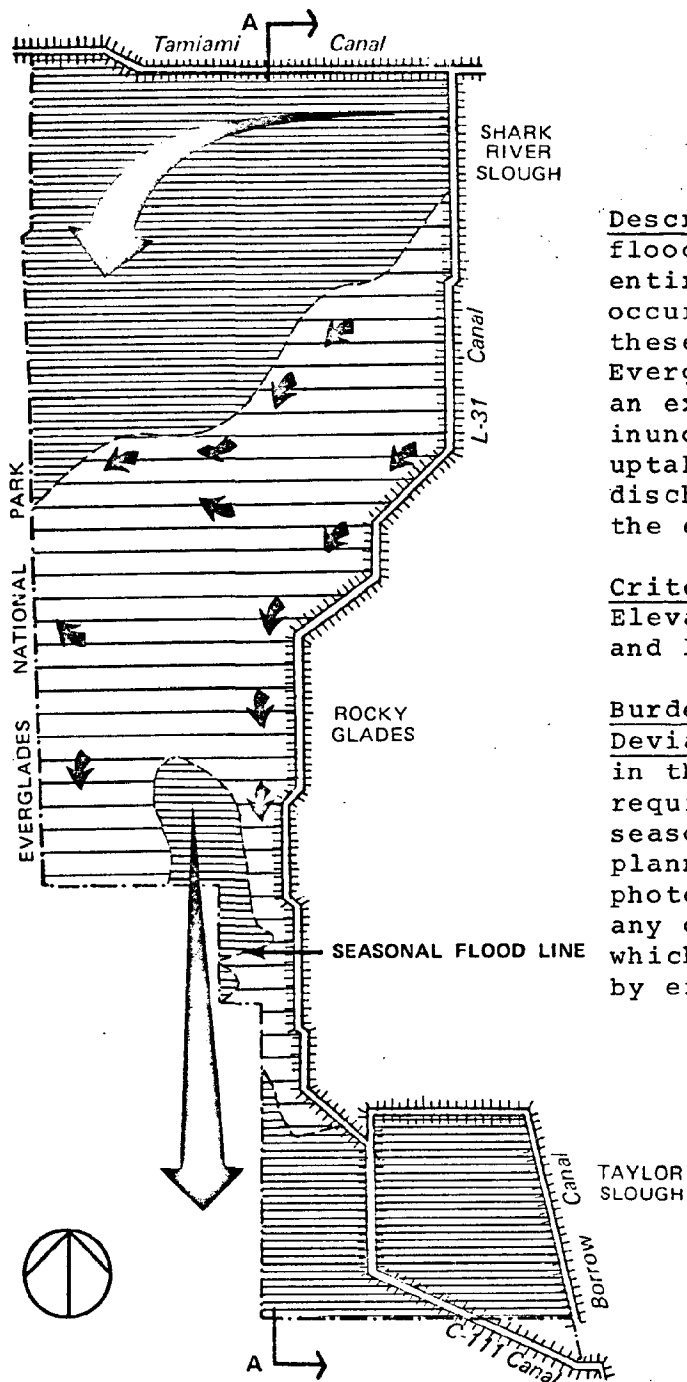
The sixth, flood hazard, is a special description of a characteristic of the water regime. The flooding is, of course, necessary to the maintenance of the ecosystem. It also constitutes a direct threat to the health and safety of people. It is this latter element for which performance criteria have been developed.



A SYNTHESIS MODEL FOR THE AREA

1. All of Zone 1 has serious limitations for development due to the high annual water table.
2. All of Zone 2 has serious limitations for development because of the heads and hammocks, valuable both as vegetation and as wildlife habitat.
3. All of Zone 3 is severely limited for development because of very shallow marls and peats which function to purify water and provide a refuge for estivating organisms.
4. If the decision is made to allow development in the East Everglades, any such development should be focused in Zone 4. All development should allow for appropriate elevations above the 100 year frequency flood level, and should respect the unique environmental conditions of the area.

4A = 1' elevation necessary
 4B = 2' elevation necessary
 4C = 3' elevation necessary



Surface Water

Description: Although surface flooding is extensive over the entire area the dominant flows occur along the two sloughs, these flow in the direction of Everglades National Park. Such an extended period of surface inundation assures nutrient uptake by plants and gradual discharge into park lands and the estuaries beyond.

Criteria for Definition:

Elevations of seasonal high water and length of period of inundation.

Burden of Proof Required to Allow

Deviation: The activity planned in the sloughs can exist without requiring any alteration of the seasonal flood period. The planned activity does not prevent photosynthesis or alteration of any other ecological relationship which inhibits the nutrient uptake by existing vegetation.

SLOUGHSROCKY GLADESFUNCTION

---Unhampered overland flows allows for nutrient absorption by plants and ground water recharge.
 ---Vegetative cover absorbs nutrients and moderates surface water movement.
 ---Natural topography allows for gradual and dispersed patterns of water flow.
 ---Excessive nutrient and sewage concentrations can visually impair and degrade the quality of water in canals, ponds and lakes.

---Amount of surface water and rate of discharge is regulated by the natural contours of the area.

CONSTRAINTS

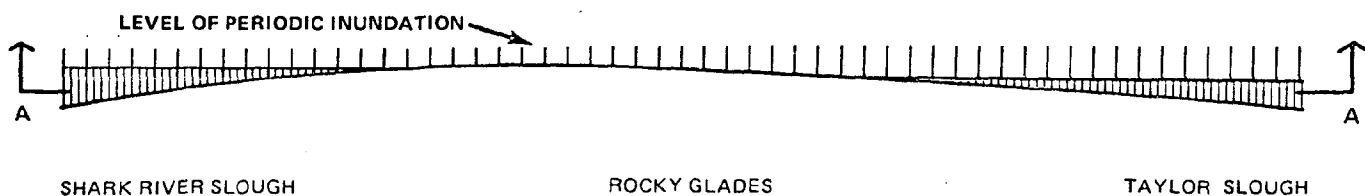
---No positive drainage which waste limited water supplies. Canals hasten water flow-and loss-to the sea and ponded water tends to be lost by evaporation.
 ---Loss of frictional and nutrient uptake surfaces destroys water/plant relationships.
 ---No fill or structures on low laying areas below 100 year flood plain.
 ---Excessive nutrients in runoff can cause unsightly algae growth. Untreated sewage effluent can foster waterborne diseases.

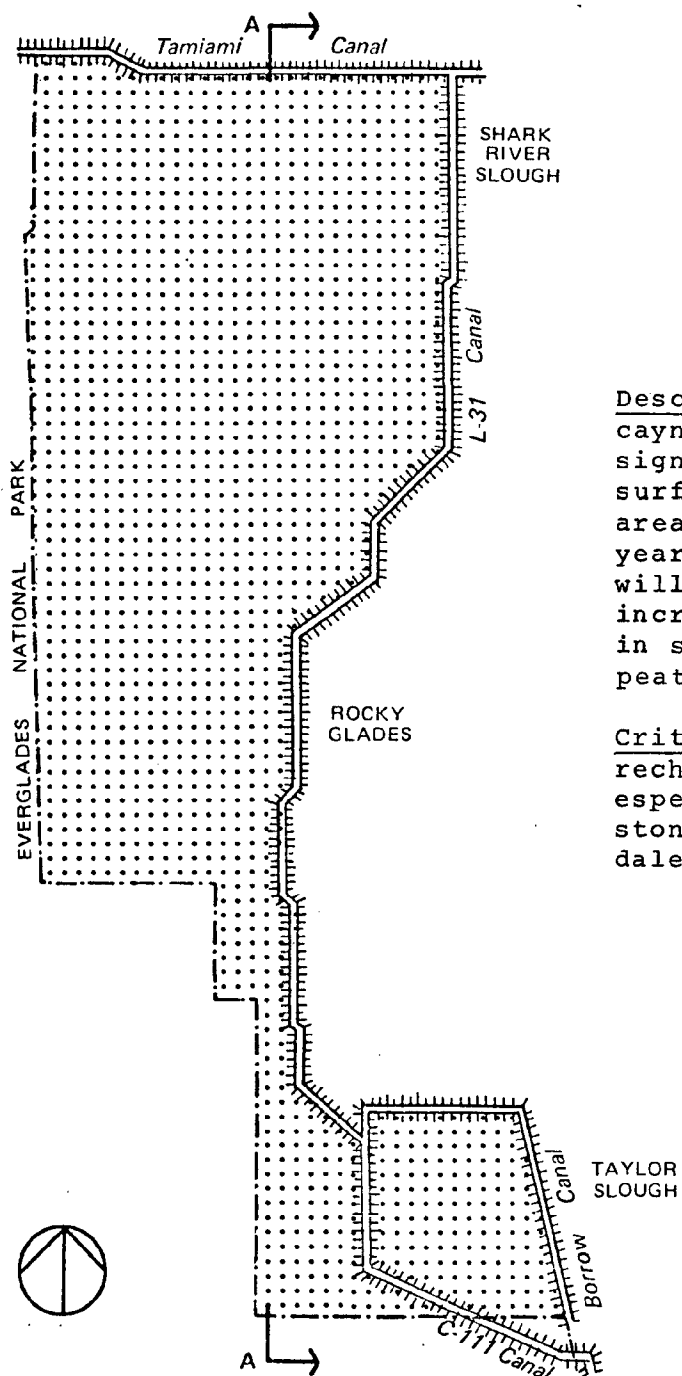
---No alteration of site contours without taking mitigating measures (i.e. detention ponds) to keep current amount and rate of discharge the same along site boundaries.
 ---No positive drainage.
 ---No loss of vegetative capacity to absorb nutrients.
 ---No effluents discharged into surface waters.
 ---No septic tank drainfields within 5' of seasonal high water.
 ---No nutrients applied between May and October.
 ---No pesticide spraying prior to the wet season.

PERFORMANCE CRITERIA

---Ensure occurrence of unimpeded natural seasonal flooding.
 ---Maintain a full native vegetation cover.
 ---Maintain natural patterns of surface water drainage.
 ---Regulate amount and quality of wastes and agricultural drainage. Urge the use of biological treatment in holding devices.

---Maintain a full native vegetation cover.
 ---Maintain natural patterns of surface water drainage.
 ---Regulate amount and quality of wastes and agricultural drainage. Urge the use of biological treatment in holding devices.





Ground Water

Description: The underlying Biscayne aquifer is of regional significance. It is recharged by surface flooding which covers the area for a substantial part of the year. Depletion of this recharge will reduce water availability, increase salt water intrusion and, in sloughs cause oxidation of peat soil

Criteria for Definition: All area recharging Biscayne aquifer especially areas of exposed limestone, very shallow marl or rock-dale soils.

FUNCTION

---High annual rainfall penetrates the rapidly permeable aquifers.

---Vegetation adapted to absorbing flow and channeling it down gradient.

---Ground water highly susceptible to salt water intrusions caused by prolonged droughts and over pumping.

---Ground water supplies potable drinking and irrigation water for Dade County.

CONSTRAINTS

---No pervious surfaces placed on aquifer recharge area.

---No alteration of land surface or vegetation.

---No increase in drainage structure, or pumping.

---No septic tank drainfields on high water table lands.

---No waste disposal sites on highly permeable aquifer.

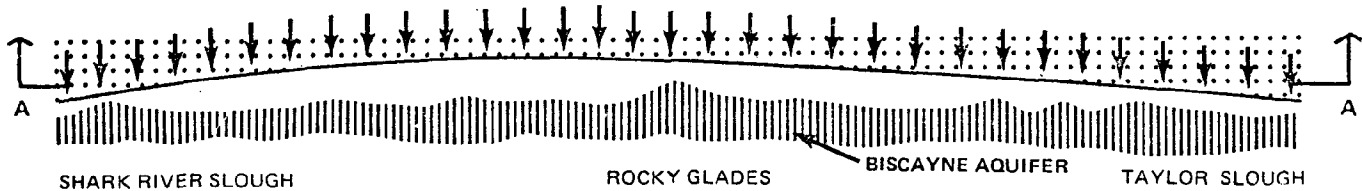
PERFORMANCE CRITERIA

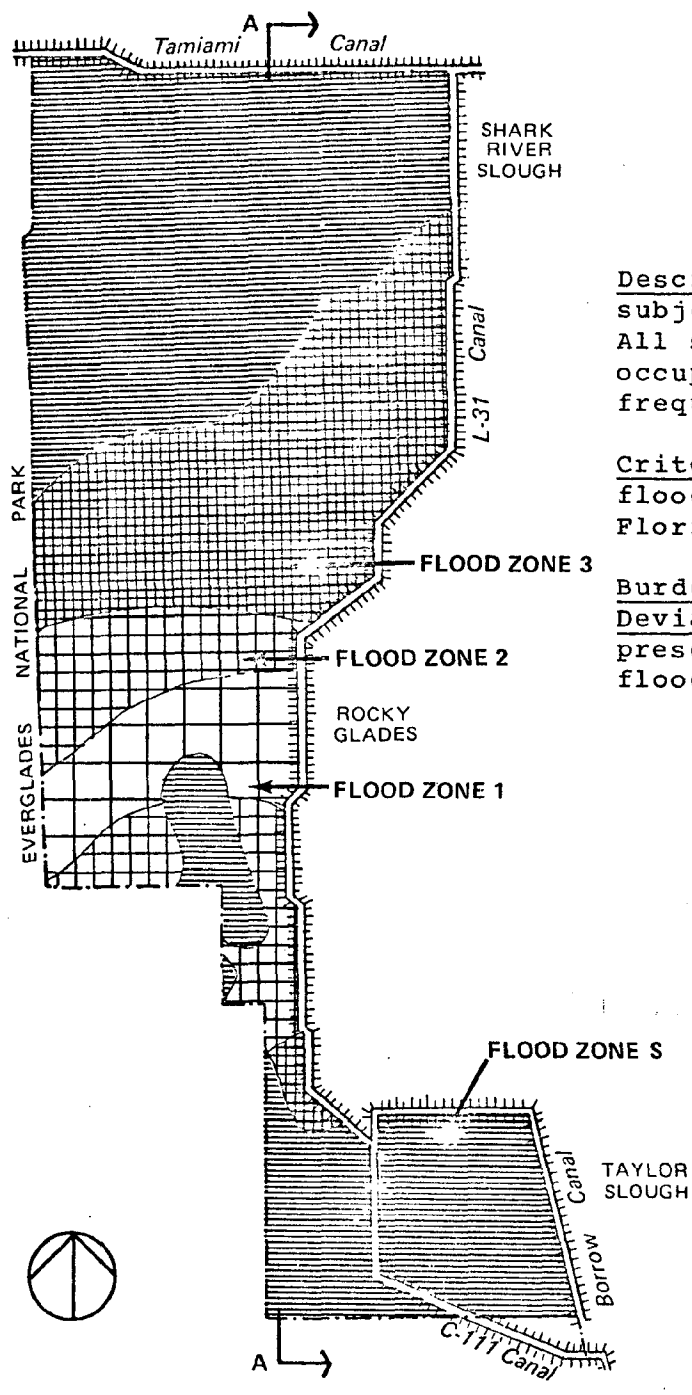
---Maintain current amount of recharge and recharge/discharge relationship.

---Maintain native vegetation cover.

---Maintain high levels of fresh water recharge near coast, and where municipal pumping is heaviest.

---Maintain high ground water quality.





FLOOD HAZARD

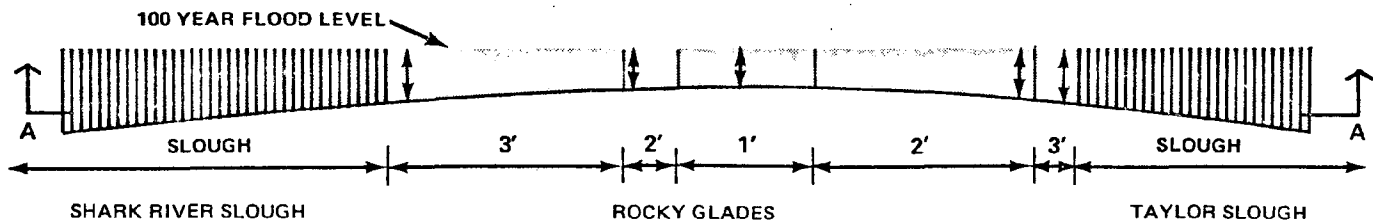
Description: The entire area is subject to periodic inundation. All structures meant for human occupation must be above 100 year frequency flood level.

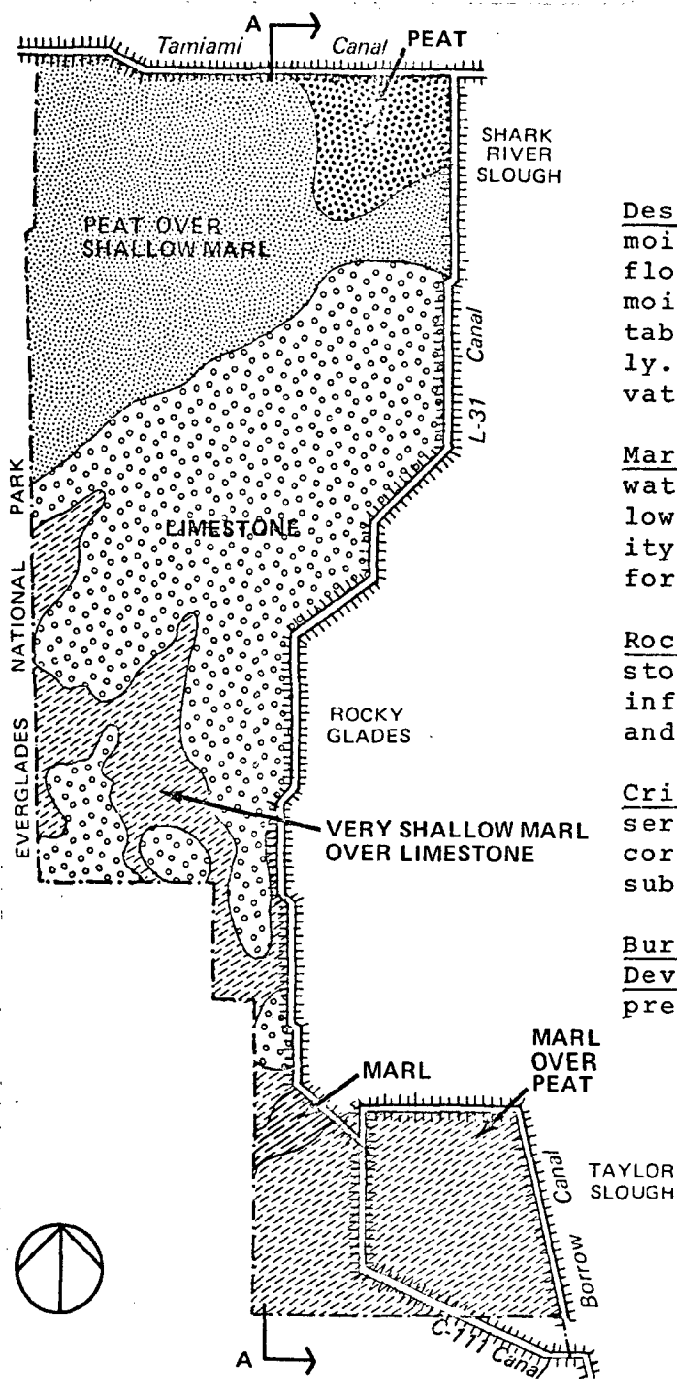
Criteria for Definition: 100 year flood criteria as required by South Florida Building Code.

Burden of Proof Required to Allow Deviation: Site conditions are presently above 100 year frequency flood level.

PERFORMANCE CRITERIA

Flood Zone 1	Flood Zone 2	Flood Zone 3	Flood Zone S
Ensure all structures are above 100 year frequency flood level. = Up to 1' elevation.	Ensure all structures are above 100 year frequency flood level. = Up to 2' elevation.	Ensure all structures are above 100 year frequency flood level. = Up to 3' elevation.	Ensure all structures are above 100 year frequency flood level and do not disrupt free flow =Pile structures raised more than 3'.





SOILS

Description: Peats moderate annual moisture variation which occur with flood and drought. They retain moisture during periods of water table recession and release it slowly. They provide habitat for estivating organisms.

Marls influence ground/surface water relationships as they have low permeability and high capillarity. They provide a area of refuge for estivating organisms.

Rocklands are valuable recharge and storage areas whose uneven surface influence overland flow patterns and rates.

Criteria for Definition: Soil Conservation Series 1947 - No. 4 USDA core borings from site as may be submitted.

Burden of Proof Required to Allow Deviation: Present site conditions preclude natural function.

PEATSMARLSROCKLANDSFUNCTION

---Temper seasonal moisture extremes by absorbing and releasing water gradually.
 ---Surface material results from only partial decomposition of marsh vegetation under excessively wet conditions.
 ---Organic soil and high water table supports a non-woody vegetation of maidencane, spike rush and beakrush.
 ---Moisture in soil retained during dry periods provide habitats for estivating organisms.

---Low permeability high capillarity work to improve water quality.
 ---Surface material formed by CaCo₂ precipitate from periphyton.
 ---Moderate to high nutrients and slow permeability support a non-woody marsh vegetation.
 ---Moisture in soil retained during dry periods provide temporary refuge for estivating organisms.

---Alternating areas of highly porous surficial material influence overland flow patterns and rates.
 ---Only a few inches of surface material is formed over these areas of hard and soft limestone.
 ---Moderate/high nutrient soil supports a vegetation of grasses and sedges dotted with tree islands.

CONSTRAINTS

---Positive drainage would dry out peats causing them to become prone to oxidation, fire and wind erosion.
 ---The development of peat would be halted by removal of marsh plant species.
 ---Destruction of peat would reduce valuable wildlife habitat for estivating organisms.

---Removal of surface material would destroy valuable water quality improvement function.

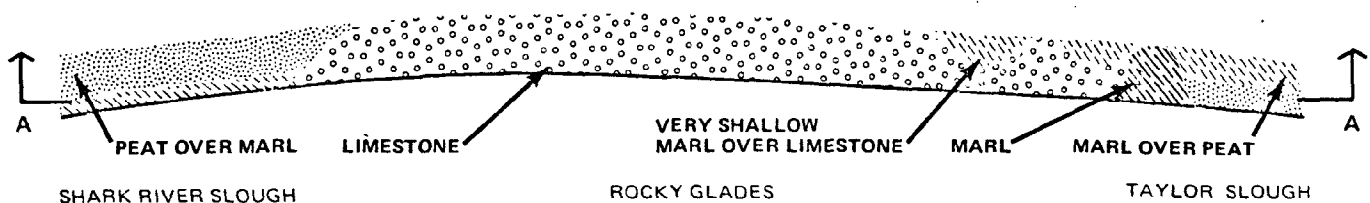
---No crushing or sealing of surface material as it would affect surface flow and percolation.

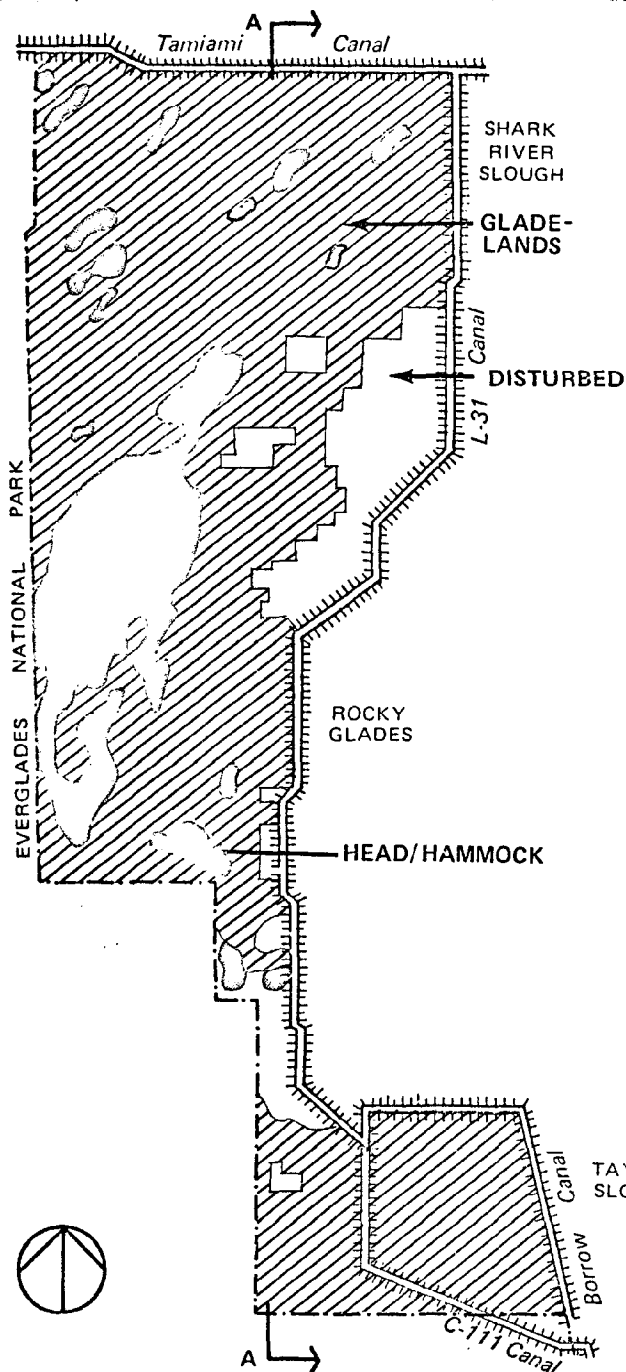
PERFORMANCE CRITERIA

---Maintain seasonal high water table as indispensable to peat development and function.
 ---Maintain continuous cover of marsh vegetation to replenish peat substrate.
 ---Maintain surficial material as a possible refuge for estivating organisms.

---Maintain this substrate which allows gradual percolation and helps to purify water.
 ---Maintain surficial material as a possible refuge for estivating organisms.

---Maintain marl and porous limestone which create natural but uneven patterns of percolation and surface flow.





Vegetation

Description: Three distinctions can be made between the communities in the study area:

Heads and Hammocks: raised islands vegetated by bays or willows (heads) or by a number of tropical and occasionally temperate trees (hammocks).

Gladelands: seasonally inundated flat areas which are covered by sedges, rushes and herbs that vary in dominance with water depth and period of inundation. Dominant vegetation changes from spike rush to sawgrass to muhly grass as elevation above water table increases.

Disturbed: areas which have been drained, dredged and filled or lumbered. These activities have either reduced or destroyed native vegetated and exotic, weedy species have invaded.

Criteria for Definition: Land use/land cover maps for Miami, Florida U.S.G.S. 1972-73.

Burden of Proof Required to Allow Deviation: Detailed site mapping which reclassifies the site or site components.

HEADS AND HAMMOCKSGLADELANDSDISTURBED

FUNCTION

---Elevated position and flooding in surrounding areas, which serve as protection against wildfire, accounts for development of diversified hardwood vegetation.

---These are excellent habitats for many species of wildlife, providing a food source, shelter and nesting site.

---Both communities depend on seasonal flooding for necessary moisture and nutrients.

---Woody vegetation, in the process of normal succession, will invade the gladelands.

---These provide a rich food source for many wildlife species.

---These have a limited capacity for absorbing and utilizing moderate/high nutrient loads.

---Exotic plants have adapted to a continuum of moisture conditions and have replaced native species.

CONSTRAINTS

---When drained seasonally flooded areas surrounding these islands are prone to fire.

---Exotic plant species spread rapidly at the expense of native vegetation if allowed a foothold.

---No positive drainage.

---Gladelands vegetation prone to wildfire during dry seasons.

---Invasion of woody plants can change the nature of this community.

---Drainage of these areas would heighten disturbance.

PERFORMANCE CRITERIA

---Allow normal flooding in areas surrounding head/hammocks.

---Maintain historic fire influence to remove unwanted vegetation and strengthen native species.

---Maintain intact, undisturbed stratified West Indian community which provides a rich habitat for wildlife.

---Maintain optimum moisture conditions.

---Maintain historic fire influence to eradicate woody vegetation.

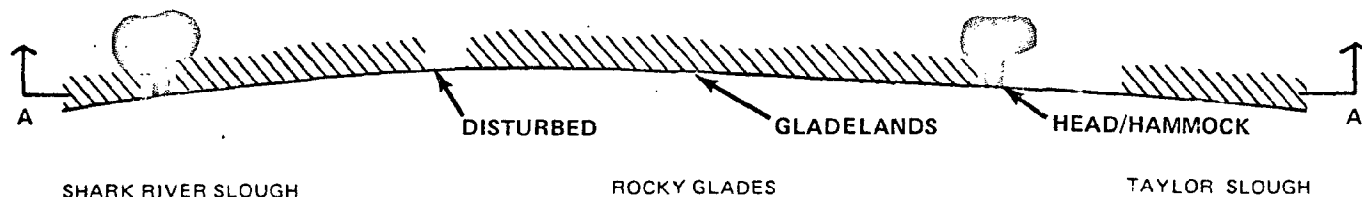
---Maintain these areas as habitat.

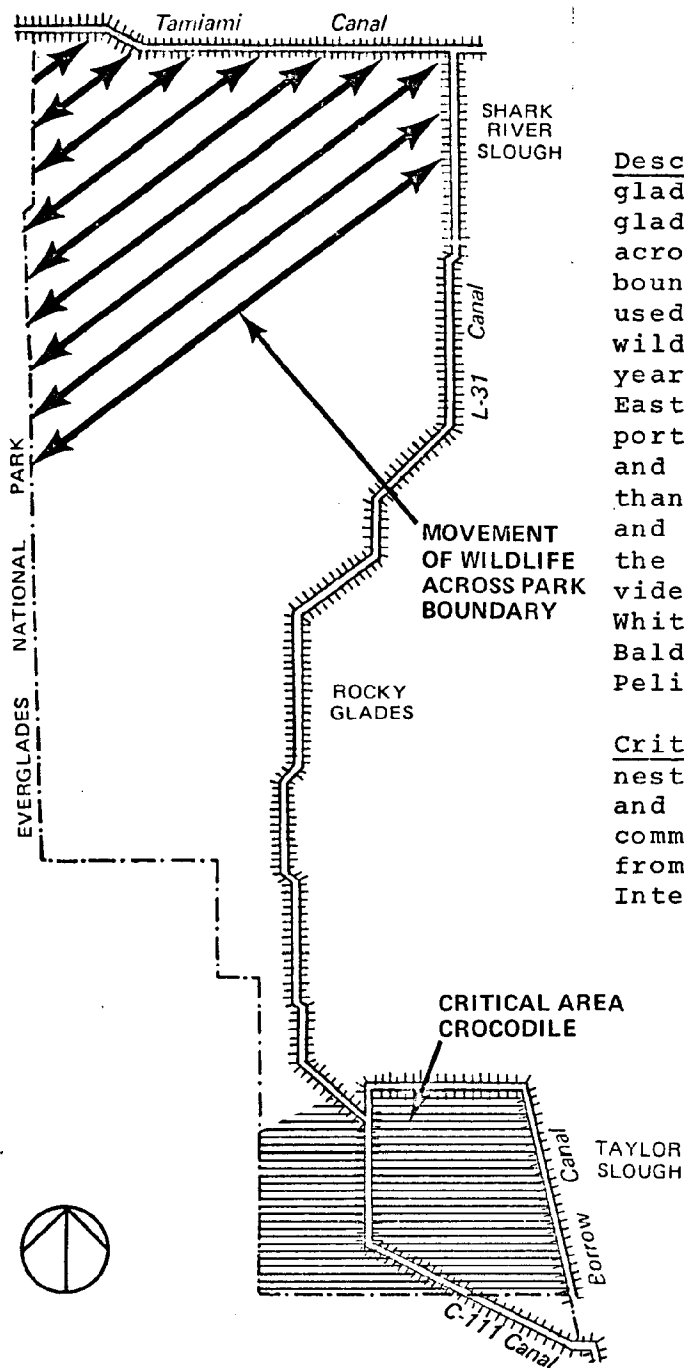
---Maintain a stable and moderate nutrient level.

---Maintain normal water levels.

---Use burning and stump removal to get rid of unwanted exotics.

---Remove exotic species, which make poor habitats.





Wildlife

Description: Wildlife of the Everglades and specifically of Everglades National Park migrate freely across political and jurisdictional boundaries; the East Everglades are used, to a significant degree, by wildlife at various times of the year for nesting and feeding. The East Everglades areas help to support 90% of the American Crocodile and the Cape Sable Sparrow; more than 50% of the Roseate Spoonbills and Reddish Egrets, about 50% of the Wood Storks. As well they provide important nesting areas for White Pelicans, Great White Herons, Bald Eagles, Ospreys and Brown Pelicans.

Criteria for Definition: Use of nesting and feeding areas for rare and endangered, as well as for common species of the Everglades from maps of the U.S. Department of Interior.

FUNCTION		
---Wildlife has adapted to and is dependent on the fluctuations in surface water.	---The variety of habitats in the Everglads allows for species diversity.	---The most sensitive time in the life cycle of most Everglades wildlife occurs during their nesting periods.
CONSTRAINTS		
---No drainage or earthwork which would alter the sensitive water system.	---No removal of native vegetation. No introduction of exotic plants species.	---No interruption of known nesting sites.
PERFORMANCE CRITERIA		
---Ensure the occurrence of normal seasonal fluctuations in the water table.	---Ensure maintenance of existing vegetation.	---Restrict human use in the vicinity of known nesting sites and in those areas where breeding colonies are known to occur.

THE APPLICATION OF PERFORMANCE CRITERIA

The previous section demonstrated the form which performance criteria could take for the East Everglades. It remains to determine the method of application for these criteria. Since performance criteria have been used in many forms to accomplish many objectives by a large number of jurisdictions, the experience with legislation and management structures is rich. While there have been many different applications of performance criteria, they all have several elements in common. These are:

- 1) When used by a community to regulate and manage the affairs of its citizens, performance criteria are clearly an exercise of the police powers. As such they require legislative action. Forms of legislation which are most applicable to the East Everglades are inclusion in subdivision regulations, overlays to standard zoning ordinances, special zoning categories such as impact zoning, and special district legislation.
- 2) Administrative procedures established to carry out the legislation also have common elements.
 - a. A permitting process of some sort is established to require notification of the intent of the action.
 - b. Generally a reviewing body is established to pass judgement on the application.
 - c. The party responsible for establishing proof of conformance is designated.
 - d. Methods for securing and considering expert opinion are determined.
 - e. The degree of public participation in the decision is established. This element varies more widely from the rest, ranging from near total exclusion except for the general election process to very broad direct involvement in both the reviewing and decision making process.
 - f. A fee schedule for application is established.
 - g. Finally the means by which recommendations are considered and the decision made is defined.
- 3) Enforcement procedures are often not clearly defined in the specific legislations. Rather communities rely upon procedures established elsewhere in their codes. Where such provisions are included they are generally quite standard dealing with assuring compliance through inspection and indentifying illegal actions (non-permitted modifications).

- 4) Means of maintaining current information are rarely addressed in this form of legislation beyond designating the responsible executive agency or department.

For the East Everglades it is essential that the necessity for maintaining current information be recognized, that the responsible agency be designated, and that sufficient funds be appropriated to permit an adequate effort.

Each of the elements outlined above can be discussed in more detail.

Legislative Form. The concern here is where the performance criteria are placed in the codes. This discussion is limited to those criteria which deal with the maintenance of the natural environment, similar to the ones outlined above for the East Everglades.

One of the most common methods is to include such criteria as an extension of already existing subdivision regulations. Medford Township, New Jersey, has been managing its natural resources through performance criteria since 1974. Ordinances related to specific functions have been incorporated into the subdivision regulations as the criteria have been developed. These specific provisions were preceded by adopting as official documents the text, maps, and provisions of an ecological planning study (Subdivision Ordinance 1974-11 Medford Township, New Jersey).

In Vermont, under the provisions of State Act 250, performance criteria administered by special regional commission are applied selectively. Wherever a local jurisdiction lacks zoning or other regulatory measures, whose provisions equal or exceed the criteria of the act, the provisions of the act apply. Otherwise the local regulations preempt the action of the commissions. In this case, wherever appropriate, the performance criteria overrides the zoning and subdivision ordinances.

The criteria for the East Everglades cannot be as universally applied to the Dade County jurisdiction as are the examples in Medford and Vermont. For this reason, it is suggested that existing zoning and subdivision regulations now pertaining to the area be retained and that the performance criteria be conceived as an overlay to existing zoning, to operate in the geographic area of the East Everglades only.

Reviewing Authority. The premise of performance criteria is that the effects of modification can be determined and can be compared with a desired end result. It is necessary for a finding to be reached concerning the degree to which the proposed action meets the criteria, and a public agency, board or individual be charged with stating this conclusion. (Here the finding is distinguished from a decision. A decision considering the finding can be made to accept risks or actual

loss of resources based upon other anticipated gains.) In Dade County, a form for reaching this finding already exists in the Development Impact Committee. In keeping with the standard that performance criteria for the East Everglades be applied without major administrative overhaul, it is recommended that the Executive Committee of the Development Impact Committee be used as the reviewing authority.

Proof of Conformance. The general practice in determining the effect of a proposed action upon the environment is to place the burden of proof upon the applicant. This allows the user to choose the methods which are most practical for the specific situation, to investigate innovative techniques, if so desired, and to confirm the site specific information concerning the conditions pertaining to the land. In Medford, the developer is largely relieved of the burden of determining site conditions by the use of the official maps which are open to inspection. From these he can quickly establish what standards his proposed development must meet. This is of particular advantage to the small applicant of limited resources.

For Dade County it is recommended that the applicant submit proof of the effects of his proposal in sufficient detail to allow a comparison with the desired standard.

Use of Expert Opinion. If the burden of proof of conformance is placed upon the applicant, it will be necessary for the reviewing board to verify the accuracy of the applicant's claim. Since in many cases the data involved will be highly technical in nature, impartial expert testimony is necessary for the County to act with reasonable confidence. Medford obtains such skills by retaining a unit of the University of Pennsylvania to review all proposals. In Vermont the technical reviews are largely done by in-house staff. The demand for highly specialized experts is quite intermittent in this review process, yet when necessary it is vital. Dade County has an abundance of highly skilled personnel in both the private and public sectors. Therefore, it would seem most productive to use a combination of the two methods. A small in-house technical staff supporting the reviewing agency should be adequate to handle most applications. A group of specialists should be identified as support to be drawn upon by the in-house staff as needed to complete more complex analysis.

Public Participation. This question is one of the most elusive in the whole process. An interesting model of public participation exists in Vermont. There all meetings of the Regional Commission are, in effect, public forums. Applicants present their proposals, direct public response is elicited and a three way discussion between applicant, commission members, and the general public ensues. But Vermont is a fairly homogeneous population which has a long tradition of direct public management of governmental affairs. What works in rural New England may not work in cosmopolitan Dade County.

The diverse population where attention and interests seem to focus elsewhere than the East Everglades is unlikely to be well represented at meetings such as those described above. A more effective way would be to have all review meetings open to the public for information purposes, to have all applications open to public scrutiny, and to set aside regular times to elicit public comment upon pending applications and to incorporate such comments into the record regarding the application.

Fee Schedule. A filing fee for each application can be used as a device to defray the costs of review to the municipality. Medford charges between \$300 and \$500 per application based upon the number of hours required to complete the review. This amount does not cover all municipal costs, but it helps substantially. A uniform fee, if set high enough to defray public costs, falls harshly on the small developer and individual lot owner.

A more equitable solution is a sliding scale increasing with the size of the project. Such a scale can be predicated upon the number of acres involved in the site, or the square footage of improvements.

Another method is to create a scale based upon a percentage of the estimated cost of all improvements on and to the site for which application is made. In this case, the fee would start from a base figure and then proceed as a percentage of total investment. By choosing the base figure and the percentage scale the County can determine who will pay the heaviest burden of the costs. For example, a high base figure and a scale which declines sharply for increasing amounts of investment may fall disproportionately on small investors.

At any rate, the County will need to establish some careful estimates of the costs of review before the amounts and techniques of establishing fees are finally set.

The Decision. Who makes a final decision on applications and what are the statutory limitations on the decisions that are legal and political matters more than technical ones? In Medford, the decision is made by the legislative body acting as a whole. In Vermont, both the finding and the decision are made by the regional commissions. The final arrangement is very much a matter of local precedent and practice.

Wherever the decision ultimately rests, the decision makers should be required to consider the findings and the public record regarding each application. Where the decision conflicts with the finding, it might be advisable to require the decision makers to explain their choice. It is quite possible to place more stringent restrictions upon the latitude within which final decisions can be made. The extent to which this is done is, once again, a matter of local preference.

Enforcement. The question of enforcement has not been a major subject of this study. It is assumed that existing procedures in Dade County are adequate for the task of insuring compliance with approvals. If the rate of change in the East Everglades increases, then it may be necessary to budget more money for additional staff.

The question of illegal action is another matter. Dade County does not presently have the resources to maintain the constant survey necessary to prohibit non-permitted activities from developing. In this regard, the County should make arrangements to get assistance from those agencies to the Federal and State government which have established programs of surveillance as part of their operations. Both the National Park Service and Florida Division of Forestry, use airplanes to observe and police their area of responsibility which is adjacent to or includes the study area. Suspected violations observed by these agencies should be reported to the appropriate authorities for investigation and prosecution.

Maintaining an Information Base. The continued refinement of existing information, the filling in of data gaps, and the building of a sound useful data base are critical issues for the successful maintenance of the resources of the East Everglades. The City of Sanibel, Florida, recently devised performance criteria as a part of preparation of their master plan. For six ecological zones, Gulf Beach, Gulf Back Beach, Gulf Beach Ridge, Interior Ridges and Swales, Mid Island Ridge, Mangrove and Bay Beach, standards regulating water movement, water quality and storage, wildlife, vegetation, soil and elevation were established, using a process very similar to that proposed for the East Everglades. Sanibel continues to update the data base even as the ordinances are being passed. The additional information is used to substantiate or refine existing data, the whole process allowing more precise and accurate decisions to be made.

For the East Everglades, this process must also continue. Data needs can be grouped into two categories. The first is to aid in understanding the environmental condition and the dynamics of change. This should include the following:

- A detailed topographic map should be prepared in sufficient detail to permit the minor changes in elevation which are so significant in the East Everglades to be discerned.
- A detailed study, including mapping, of the vegetation of the region would have direct application to the performance criteria and would also expand the general understanding of the place.
- When, where, and for how long flooding occurs in the area should be determined.

- The agricultural practices in Dade County need to be more thoroughly understood. There are two parts to this. First, from an understanding of microclimate, flooding, and costs of adaption, the suitability of the East Everglades for agricultural uses can be established. Second, it is necessary to determine the future of agricultural activities in Dade County generally. Caught between the millstones of advancing urban uses and remaining lands which are marginally or totally unsuitable, agricultural activities may experience a sharp decline or may be forced to put very marginal areas into production. While this study of agriculture is not integral to the operation of the performance criteria, it will assist Dade County officials in making decisions on relative priorities in the study area and elsewhere.

The second category concerns an understanding of the effects of modifications on the environment and the use of advanced technologies to mitigate the impact of change. Included here are the following:

- What are the effects of rock plowing upon the water regime?
- Can lands which have once been rock plowed be returned to anything like their normal state and function? In this regard Dade County should closely watch the experience of the National Park Service in managing the hole-in-the-donut lands.
- What are the effects upon ground water quality of the use of organic and chemical nutrients and pesticides on the surface? To what extent could this constitute a threat to public water sources?

Undoubtedly the need for other studies will occur. But, as should be obvious from the above list, undertaking such a body of work would strain the resources of Dade County (or any other county) beyond the breaking point. Dade County must look to others for substantial help here. In particular, the Federal government through the National Park Service, the United States Geological Survey, the Army Corps of Engineers and other agencies should move aggressively to secure this information for Dade County. The fact that the County can act responsibly to sustain the natural functions of the Everglades secures the National Park from hazards from this direction. In return, the Park Service and the Department of the Interior should mobilize Federal resources to help Dade County by getting the information which the County needs but cannot afford to generate itself. To be sure that the information generated by such studies is useful to them the County should request to review preliminary and final work programs to be included in progress meeting and to receive all interim reports for any environmental or planning study which affects the East Everglades.

Another source of information is the applications themselves. Once these have been verified through the review process, pertinent information should be abstracted from them and recorded.

In general, the role of Dade County is to establish and maintain a file of significant data to be of use in managing the performance criteria. Most of this data should be generated from other sources; however, of the studies outlined above, the one dealing with agriculture might well be undertaken by the County itself.

NEW DIRECTIONS FOR DADE COUNTY

While performance criteria can be developed and applied relatively quickly in the East Everglades, other mechanisms which have been tried elsewhere have some interest. Final decisions on the efficacy of these for Dade County cannot be made without a great deal of further study. They are discussed here primarily as a shopping list of future directions.

Regulating the use of property through ordinances which permit only activities compatible with fragile resources, i.e., the strong restrictive use of the police powers, often results in economic damage to the property owner, whether or not there is a legal taking. In cases where the threat to public health, safety, and welfare is not sufficient to support such a restrictive use, the community is faced with the choice of losing a resource which it considers valuable or of paying for the lost economic value of the property. Since few communities can support the necessarily heavy outlays required by resource protection, they settle for less than satisfactory mechanisms for management.

Recently communities and individuals have sought ways out of this dilemma. This has resulted in such devices as the transfer of development rights (TDR), the aggregation of development rights (ADR), and negotiated development.

The use of performance criteria or standards potentially has a broader application for Dade County than the East Everglades. One such extension is the development of impact zoning for the County. The other, and more obvious one, is to extend the method demonstrated in the study to other areas of unique resources, such as the Biscayne Bay shoreline. While the particulars would change, the techniques would be directly applicable and the management framework could stay the same.

Transfer of Development Rights. The actions of government have a tremendous effect upon the value of land. In a growing community, the extension of public utilities and improvements in access patterns can substantially increase the value of properties which get the services. Through no particular enterprise or investment on their part, certain

owners achieve a "wind fall" of potential profit. In the same way, highly restrictive uses of the police powers to achieve community land use objectives or resource protection often sharply reduce the development potential of certain lands. These owners suffer a sharply diminished value on their holdings which can be considered a "wipe out."

Legal restrictions on creating a wipe out through use of the police power are far more restrictive than they are on creating a windfall through public expenditure. Therefore, it may become impossible for a community to achieve its full range of land use objectives without paying heavy costs for compensation.

The transfer of development rights, a development control technique which is still quite new, may offer a solution to this problem. The concept of TDR is quite simple. Development rights are severed from one piece of land (a wipe-out property) and transferred to another (a windfall property). The windfall owner pays the wipe-out owner for these rights; then using both his existing and newly acquired package or permits, he builds to the market potential of his property.

TDR thus accomplishes two things. First, it retains value on lands which have been heavily regulated. Second, it spreads out the peaks and valleys between the windfall and wipe-out parcels, by using the increased development potential to subsidize the development restrictions.

The transfer of development rights concept has five distinct components.

1. Some form of "rights" to be transferred.
2. A place for the rights to be transferred from the restricted area.
3. A mechanism to accomplish the transfer.
4. A place to transfer the rights to an area which can accommodate growth.
5. A market for the rights.

Existing examples of TDR's have dealt with these five elements with varying degrees of success. EDR's now adopted or are in advanced stages of planning have been generated by the desire of the community to protect either historic places or environmentally sensitive lands. The New York City ordinance, one of the first, had as its primary objective the preservation of historic landmarks by the retention of some of the development value of the designated site. The intent of the ordinance ran afoul of a long term depressed real estate market in Manhattan, and of other cheaper incentive bonuses in the zoning ordinance. The concept of "adjacency" (that is, that the receiving property must be close to the disbursing property) exacerbated the market situation by sharply limiting potential buyers. From a planning standpoint, adjacency was doubly damaging since there is no reason to give a sudden development boost to a parcel because it happens to be adjacent to an historic structure.

As a matter of practical fact, the New York ordinance was so little used that it cannot claim to have accomplished its objective of supporting historic preservation.

The Chicago Plan, also intended to support landmark building designations, avoids many of the pitfalls of the New York system and provides the classic for future development of this management device. Designed principally by John Costonis, Professor of Law at the University of Illinois, flaws principally in the areas of compensation and planning were overcome. The concept of "adjacency" was abandoned and a large enough receiving area was designated to ensure an adequate market for the transferred rights to exist. Second, a development rights bank was established to smooth out the fluctuation in the real estate market. Since the bank was quasi-public the value of the rights being severed were determined by appraisal, not by negotiation in the market place. The rights were then sold by the bank at a time of high demand. Who the rights were sold to was also determined by the bank. Therefore, rights disbursement could be used as a planning tool to achieve intense development in precisely those locations where an officially adopted plan called for it. Unfortunately, in Chicago as elsewhere, the CBD zoning provisions are extremely permissive and contain a number of bonuses for the enterprising investor to use. After all, the tallest building in the world was built in Chicago in the receiving district without recourse to the purchase of additional development rights; so the question has to be raised, who needs them?

Puerto Rico employed John Costonis and Real Estate Research Corporation to develop a TDR system designed to protect sensitive lands. This legislation is very similar to the landmarks preservation legislation of Chicago. Here, however, whole districts known as Environmental Protection Zones have frozen development rights which can be acquired only in designated Transfer Districts, which may be quite removed from the EPZ's. The major innovation of the Puerto Rican proposal deals with what is being transferred. In dealing with environmental resource protection, the disbursing district and the receiving district are often far apart and rarely will development rights be in the same category (i.e. residential units) or have the same value per unit of right. In the Puerto Rican Plan this difficulty is overcome by transferring the economic value of the right rather than the right itself. While these values can be readily obtained through standard appraisal techniques, the transfer is difficult and oftentimes consuming. In short, the role of the development rights bank as the transfer agent increased substantially.

Finally TDR has been extended beyond the narrow concept of establishing value in restricted areas to a major tool to accomplishing land planning objectives. The Georgetown Waterfront Plan, prepared by the Georgetown Planning Group headed by Wallace, McHarg, Roberts, and Todd, established the concept that a ceiling can be set for total development within an area. The total permitted development can be ascribed as development rights and assigned to the land. To build, both appropriate zoning and sufficient development rights are needed: they may be purchased through negotiations with an owner of excess rights. Thus, the inherent inequities of unequal zoning necessary to achieve desired land use and development patterns are evened out.

The use of TDR is quite new. In those few communities, such as Buckingham Township in Pennsylvania, which have enacted ordinances to protect the environment, the examples of actual use of the provisions of the law are so rare that any evaluation must be highly speculative. Still, the promise is high enough to warrant continued interest.

The problems with TDR can be pointed out readily enough. First, and probably foremost, development rights must have value or the community has done nothing for the lands they have sharply restricted. This means that a market must exist in an area receiving the rights and that that market must not be achievable by existing zoning. This means that in the receiving district demand must be accurately determined, that zoning must be set below it (even if this means down zoning from current levels), that other bonuses must not be excessive and that gaining of variances through the political process must be extremely difficult. When these conditions are met, then a market can be assured for development rights.

All other issues pale into insignificance compared to this one. They do, nevertheless, exist. For TDR to work in the East Everglades, the development rights would have to be transferred to some other district of Dade County. (There is simply no market for development in the East Everglades now or in the near future and thus no value for any development rights). What is an appropriate form for the rights to be transferred? If its existing zoning, one dwelling unit per five acres isn't worth much to a condominium builder. Is it cubic footage, or value of improvements, or still some other unit?

What is the transferring mechanism? Land sales are most generally achieved through negotiation on the open market. If the right available for transfer were defined clearly enough, this would seem to be a very appropriate method for establishing their value. On the other hand, the development rights bank has much to commend it. While a bank is a rather cumbersome governmental or quasi-governmental agency whose operation is to some extent supported by general revenues, its advantages to the community generally outweigh its costs. It evens out the fluctuations in the marketplace for development rights by holding acquired rights for gradual release at the most appropriate times. It insures a purchaser for the restricted land owner within a reasonable time frame and without the handicap of costly sales efforts.

For the community, the land bank can help remove many of the objections to the very restrictive use of police powers to ensure the realization of public objectives. At the very least, the bank should deter suit against the municipality for the depreciation of land values caused by public action. Properly constituted and managed, the land bank can recapture for the community some of the value created by public expenditure through the judicious sale of development rights. Also, the sales device can be used as a very sensitive land management mechanism.

If the amount and the location of the sales were closely regulated by a precise and thorough plan, then intensity of development would be very powerfully controlled. If the timing of sales were managed, then the upper tip of the development range could be controlled to coincide with the ability of the community to extend services and the need for the community to increase revenues. Also, by controlling the time of sale, the absorption of market demand can be managed. If done properly, the cyclic boom and bust nature of development investment can be dampened. Development rights will effect only a small portion of the total development investment made in a community in any one year. They represent, in effect, the tip of the iceberg. Yet, control of this small portion by a development rights bank, acting at public direction, can have a disproportionate impact upon private investment decisions. A major investor may delay his construction, waiting until he can maximize the intensity of development by the purchase of development rights. Builders could seek out locations where rights would be available, again to increase potential intensity of use. Thus, a much larger portion of investment than that prerepresented by rights themselves can be controlled by the manipulation of the rights. As in Georgetown, the use of TDR can achieve much more for a community than simply avoiding litigation on the taking issue.

While there are many difficulties involved with TDR and precedents are presently unavailable to give clear direction, still the possibilities seem too rich to be ignored. Particularly in Dade County with extensive areas in need of resources management, TDR might be most useful.

The place to start is in planning. The success of TDR is conditioned upon sound and complete planning and the integrity of a responsible administrative agency. TDR is particularly vulnerable to inadequate planning (as the New York case has so clearly demonstrated). The entire mechanism from the designation of the area to disburse and to receive rights, the nature of the rights, the mechanism for transfer and the adequacy of markets is a planning function. In Dade County, starting from near ground zero, the effort should be viewed as a long term one. During this time, the accumulating experience of other municipalities in the nation can be used to increase local knowledge and to refine the eventual product.

Aggregation of Development Rights. Many of the more severe problems of TDR can be avoided by a concept known as the aggregation of development rights. In simple terms an owner of non-contiguous and non-adjacent properties is allowed to combine all the development of contiguous parcels. This is a simple extension of this idea.

In general, the local government defines the areas from which rights may be aggregated, the area which may receive rights, the nature of the rights and assigns the rights to the land. From then on, the transfer is affected by a buyer and seller agreeing on the value of the property. While many of the same questions, such as adequacy of the market, persist. This concept relieves the public sector from major involvement once the overall framework has been established. As rights are removed from parcels, this is recorded against the deed. Determination of value, speed of movement, etc., are all a function of the market place as are any other real estate transactions. While this concept has the virtue of simplicity, the cost of that simplicity to the public sector is the loss of the development rights bank as a land management tool.

Negotiated Development The two management devices illustrated in this study - performance standards and opportunity cost analysis - can be powerful tools in a process known as negotiated development. Negotiations of this type are widely used in every community at the present time. They occur when a developer requests a permit for a proposal whose provisions are not to the liking of the public body; but the public agency does not want to proffer a flat refusal. By negotiating, the developer attempts to retain a desirable investment while the public tries to eliminate or mitigate the more objectionable features. While such processes have a long history, they have most often operated without clear cut procedures to protect both parties and, on the part of the public, at least, without precise definitions of what is desirable and of what costs will be occasioned by the development. Performance criteria describe what is necessary to protect the values of the community while opportunity-cost analysis can identify the costs associated with any proposal. With these two pieces of information, the community is in a far better position to enter negotiations.

To complete the requirements for this technique, the procedures of negotiation must be formalized and public safeguards established by placing limits on the practice. First, no negotiations should begin until the performance of the proposal has been compared with the standards and until the opportunity cost analysis has been completed by a public agency. Once positions have been defined (for the developer by the proposal, for the public by the documents described above), the negotiations can begin.

Second, negotiations should be conducted as much as possible in public forums. The term "as much as possible" is used advisedly. Totally open sessions are probably doomed from the outset since few developers are willing to expose such information as expected cash flow and tax position to broad public scrutiny, since this could place them at a real disadvantage with their competitors. Therefore, some sessions will have to be closed. To counter the obvious problems arising from such closed sessions, any negotiations should be undertaken only by a clearly designated public official whose actions are open to scrutiny, and any agreements reached should be confirmed by elected representatives after public hearings.

While negotiated development may have much to commend it on a county-wide basis, it does have a primary requirement that both sides must be willing to deal. The environment of the East Everglades is so sensitive that it is hard to see what room the County might have to negotiate (except for technological methods to mitigate the impact of change). Starting from such a restricted base, it is not likely that the County could expect to enter into negotiations as a general practice for proposals within the study area.

Impact Zoning. Impact zoning is an extension of the concept of performance criteria. In impact zoning, performance criteria becomes the zoning code, and all development actions must demonstrate that they comply with the prescribed standards. In the purest form, use and density designations are abandoned.* In their place are standards for environmental control, fiscal expenditure for operating and capital budgets, visual controls, noise, air quality, open space, surface water flow, sewer and water supply and so on. In theory, the standards are drawn in such a way that, as long as they are met, no undesirable results can occur. For example, a factory could locate next to a residential development because the visual standards would provide for buffering, the noise standards would protect against unacceptable sounds, the air standards against noisome odors, and so on. Such regulations permit and encourage the private builders to exercise substantial ingenuity in solving development problems, and thus they result in considerable diversity in such things as housing types and physical development patterns.

Whatever the advantages of impact zoning, it is hard to see how it could be applied by Dade County without a complete and massive overhaul of the present zoning ordinances. There does not seem to be compelling enough reason to undertake such a monumental task.

Extension of Performance Criteria. This study has demonstrated a method by which performance criteria can be developed for an environmentally sensitive area such as the East Everglades and has discussed ways in which Dade County can apply such standards as a management tool. The method is overt, explicit, and replicable. It can be applied to any area in Dade County for which adequate information exists or is readily obtainable. The shoreline of Biscayne Bay is one example of an area suitable for this process; perhaps Biscayne Bay itself is another.

*In practice, underlying, rather restrictive zoning classifications are generally applied to the land. This gives a "by rights" usage which can be exercised without recourse to the impact zoning review process. Any deviation from this base zoning either in use, intensity, or pattern requires review.

CONCLUSIONS

The conclusions for this study can be simply stated.

1. Rather than developing a plan for the East Everglades, this study has investigated management tools which can be used to maintain the natural resources of the area.
2. The natural environment of the East Everglades is quite diverse. Uniform controls applied across the area not only fail to recognize this diversity but can actually be damaging to it.
3. The resources of the area can be identified and a reasonable inference can be made of the effects of change upon them.
4. Performance criteria can be drawn which will provide the tools to sustain the quality and quantity of the natural resources of the East Everglades.
5. The management mechanism for applying performance criteria can be derived rather simply from existing Dade County agencies. Specifically, this means using the Executive Committee of the Development Impact Committee as the reviewing board and providing the Committee with adequate staff support.
6. More sophisticated control devices, such as transfer of development rights, are only possible after continuing study on the part of Dade County.
7. Federal and State agencies should assist Dade County by undertaking aerial surveillance for non-permitted uses and by conducting extensive studies of the natural factors which the County is acting to preserve.

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